State of California
AIR RESOURCES BOARD

Final Statement of Reasons for Rulemaking
Including Summary of Comments and Agency Response

PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE EMISSION CONTROL REGULATIONS FOR 1995 AND LATER MODEL UTILITY AND LAWN AND GARDEN EQUIPMENT ENGINES

Public Hearing Date: July 28, 1994
Agenda Item No.: 94-7-1

1. GENERAL

The Staff Report: Initial Statement of Reasons for Proposed Rulemaking (Staff Report), released June 10, 1994 is incorporated by reference herein.

Following a public hearing on July 28, 1994, the Air Resources Board (ARB or Board), by Resolution 94-50, approved amendments to the regulations regarding exhaust emission standards and test procedures applicable to 1995 and later utility and lawn and garden equipment engines (utility engines). In taking the above action, the Board approved the amendments as proposed in the Staff Report, with modifications, which were noticed and made available at the Board hearing. These modifications were, in part, made in response to comments received during the 45-day comment period prior to the Board hearing. The amendments affect Sections 2400 - 2407, Title 13, California Code of Regulations (CCR), and the incorporated "California Exhaust Emission Standards and Test Procedures for 1995 and Later Utility and Lawn and Garden Equipment Engines" (Test Procedures).

On September 14, 1994, the ARB issued for public comment a "Notice of Public Availability of Modified Text" (15-Day Notice, Mail-out #94-35), setting forth the modifications initially noticed at the Board hearing. The 15-Day Notice is incorporated by reference herein, and the modifications noticed therein are summarized below:

(1) Applicability of the Regulations. Section 2400(a)(1) was modified to clarify the applicability of the regulations to only engines produced on or after January 1, 1995, and to utility equipment that use engines produced on or after January 1, 1995.

(2) Label Requirements and Penalties. Section 2404(f) was modified to delete entirely the fuel label requirements. Section 2404(j) was modified to make specific the requirement that engine manufacturers submit samples of their own engine or supplemental engine labels (as applicable), and samples of engine or supplemental labels (as applicable) used by original equipment manufacturers (OEMs). Section 2404(l)(1) was modified to clarify

that the ARB may seek to limit the scope of an injunction against an engine manufacturer to California sales of subgroups of an engine family when that subgroup, rather than the entire engine family, fails to comply with the labeling requirements.

(3) Compliance Requirements and Penalties. Section 2407(a)(12)(A) was modified to clarify that that the ARB may seek to limit the scope of an injunction against an engine manufacturer to California sales of subgroups of an engine family when that subgroup, rather than the entire engine family, fails to comply with the requirements of Section 2407(a). Section 2407(b)(4)(A) was modified to clarify that an engine manufacturer is required to select one percent of the California sales volume of each engine family for quality-audit (QA) testing. The regulations implied previously that one percent of the engines (i.e., total nationwide engine sales) was to be selected for QA testing.

(4) Test Procedure Clarifications. Part I, Sections (1)(a) and (b) were modified to be consistent with the modifications to the applicability provisions of Title 13 (i.e., the regulations apply to only engines produced on or after January 1, 1995, and to utility equipment that use engines produced on or after January 1, 1995). Part II, Section (2)(c)(3) was modified to specify that the fuel flow rate measurement instrumentation must have a combined accuracy of +/- 2 percent of the reading. Part II, Sections (2)(d)(2)(vii) and (viii) were modified to clarify the location of the sample probe in the exhaust system with Figure 2-1 Engine Test Setup modified accordingly. Part II, Section (5)(a), and Part III, Section (8)(a) were modified to clarify that the dynamometer be performance verified only as necessary. Part II, Section (11)(a)(2)(i)(C), and Part III, Section (4)(a)(2)(i)(C) were modified to add the provision that the Reid Vapor Pressure of service accumulation gasoline shall be characteristic of an engine fuel appropriately suited to the ambient conditions of the indoor test cell in which the service accumulation takes place. Part II, Section (12)(b)(2)(ii), and Part III, Section (18)(a)(1) were modified to indicate that it is recommended that spark-ignition engines be preconditioned by operating the engine at a power greater than or equal to 50 percent maximum power at rated or intermediate speed (as applicable) for 20 minutes. Part II, Section (12)(d)(2), and Part III, Section (21)(g) were modified to indicate that the engine load values are to be maintained, for all applicable loads, to within the larger range provided by +/- 0.27 Nm (+/- 0.2 lb-ft), or +/- 10 percent of the specified load value for loads of 50 percent and less, or +/- 5 percent of the specified load value for loads above 50 percent. Part II, Section (14)(a) was modified to clarify that Phase 2 reformulated gasoline and other alternatively fueled engines should utilize the molecular weights of the particular test fuel compounds when performing mass emission calculations. In addition to the aforementioned, other technical changes were made to the Test Procedures in order to maintain completeness and consistency.

The Executive Officer of the ARB adopted amendments to test fuel specification provisions of the Test Procedures (Part II, Section

(11)(a)(1)(i), and Part III, Section (4)(a)(1)(i), of the Test Procedures) and submitted the sections to the Office of Administrative Law (OAL) for approval on September 2, 1994. The ARB bifurcated the rulemaking to assure that engine manufacturers would be able to use Phase 2 reformulated gasoline test fuel for 1995 certification of utility engines. The OAL approved the adopted sections on October 18, 1994 with an early effective date.

Pursuant to Government Code Section 11346.9, the ARB has determined that this regulatory action does not result in costs or mandates to any local agency or school district.

The Test Procedures incorporate by reference International Standards Organization (ISO) document 8178-1. Existing administrative practice of the ARB has been to have technical recommended practices, such as the ISO document, incorporated by reference rather than printed in the CCR. The incorporated document is a highly complex and technical document. The document includes "nuts and bolts" engineering protocols and has a very limited audience. Because the ARB has never printed engineering documents or test procedures in the CCR, the affected public is accustomed to the incorporation format utilized in Sections 2400 - 2407 of Title 13. Moreover, printing portions of the documents in the CCR when the bulk of the procedures are incorporated by reference would be unnecessarily confusing to the public.

The ARB has determined that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board. The affected industry did not suggest any regulatory alternatives that could achieve the same purposes as the adopted regulations and be less burdensome. Industry did request some minor technical corrections to the test procedures. Some of these comments were adopted by the ARB. Many of the comments were without technical merit.

At the time of publication of the 45-day notice for this rulemaking, regulations interpreting Government Code Section 11346.5(a)(3)(B) were not yet in effect. Accordingly, the ARB attempted to comply with the plain English requirements of the Government Code section in good faith to the best of its abilities. Since the regulations could not be drafted in plain English because of their technical nature, the ARB provided a plain English statement of the regulation, in the informative digest of the 45-day notice. That statement outlined the broad objectives of the amendments. The ARB further provided a plain English summary of the proposed amendments in the staff report. The summary set forth specific objectives of the amendments. Both the 45-day notice and the staff report were made available to the public prior to the July 28, 1994 Board hearing.

The ARB has complied with the requirements of Government Code Section 11346.2(b)(6) by diligently attempting to avoid unnecessary duplication or conflicts with Federal regulations. At the time the utility and lawn and garden regulations were adopted in March 1992 and these amendments were noticed in June 1994, Federal regulations did not exist. Federal regulations were proposed for the first time in May 1994 and became final on or about May 31, 1995. The ARB has actively consulted with the United States Environmental Protection Agency (U.S. EPA) to minimize duplication and conflict between the state and Federal regulations. California is authorized by Health and Safety Code Sections 43013(b) and 43018 to adopt regulations for off-road equipment and engines. The Federal Clean Air Act Amendments of 1990 (CAA), Section 209(e)(2) specifically provides that California may adopt its own regulations if such regulations are more protective of public health an safety than comparable Federal regulations, if California needs such regulations to meet extraordinary and compelling conditions, and if such regulations are consistent with Section 209 of the CAA.

## 2. SUMMARY OF COMMENTS AND AGENCY RESPONSE

During the public comment period prior to the July 28, 1994 hearing, the ARB received numerous written comments, including a petition, from representatives of industry. The Engine Manufacturers Association (EMA) submitted the petition, which requested that the Board consider substantive regulatory amendments outside the scope of the notice of this rulemaking. In addition to the petition, the EMA and other trade associations and individual engine and equipment manufacturers submitted written comments, some of which were outside the scope of this rulemaking. The commentators are listed in Appendix A.

The EMA petition requested the ARB to consider amendments that would modify the regulations as follows: (1) delay the effective date of the Tier I exhaust emission standards from January 1, 1995 to August 1, 1996; (2) modify the adopted carbon monoxide (CO) standard for non-handheld engines (i.e., engine classes 1, 2 and 3) from 300 to 350 grams per brake horsepower-hour (g/bhp-hr); and (3) modify the regulations to exempt small-volume equipment manufacturers from certain regulatory requirements. The ARB found the substance of the petition to be without merit and denied the petition on September 1, 1994. (A copy of the petition is attached hereto for the purpose of information.) Specifically, the ARB found no basis for delaying the implementation date of the regulations because a significant number of engine models had already been certified. The ARB similarly found no reason for modifying the CO standard, to which many engine families had already been certified. The ARB concluded that a modification at this time could upset the established competitive balance of the industry. Finally, the ARB found the small-volume manufacturer allowances to be unnecessary because the potential impact of the current regulations on these manufacturers was insignificant.

Included in the out-of-scope comments received by the ARB were comments received from the Portable Power Equipment Manufacturers Association (PPEMA) which argued for amendments for handheld equipment engines similar to those petitioned for by the EMA. In addition, the PPEMA requested that the Board consider amendments to delete the particulate matter (PM) emission standards for two-stroke engines and to adopt a broader definition of handheld equipment similar to that proposed by the U.S. EPA. The PPEMA also sought to have the ARB reclassify one-wheeled lawn edgers as handheld equipment. To the extent that the comments are outside the scope of this rulemaking, the comments are not addressed.

Oral testimony was presented at the hearing by the EMA, the PPEMA, and Andreas Stihl (Stihl) (See Appendix B). To the extent that the comments were within the scope of the proposed amendments, the commentators voiced general support for the adoption of the "clean-up" amendments.

Comments were received regarding the 15-day Notice of modified text from the American Honda Motor Co., Inc. (Honda) (See Appendix C).

TOPICS ADDRESSED IN COMMENTS

A. Applicability of the Regulations

B. Definitions

C. Labeling

D. Warranty

E. Compliance Tests

F. Quality-Audit Tests

G. Test Procedures

A. APPLICABILITY OF THE REGULATIONS

1. Comment: The regulations should be revised to provide explicit clarification that the utility engine regulations are applicable to only engines produced on or after January 1, 1995 (Ref.: Section 2400(a)(1)), and that the equipment supplemental labeling requirements are applicable to only equipment that use engines produced on or after January 1, 1995 (Ref.: Section 2404(b)). (EMA, Tecumseh)

2. Comment: The scope of the regulations appears to have been expanded to include equipment. This imposes substantial distribution and inventory constraints. Equipment using engines produced after the effective date of the regulations should be subject to the provisions; engines built prior to the effective date should be exempt (Ref.: Section 2400). (Tecumseh, Onan)

3. Comment: Engines covered by standards and procedures should be included if they are manufactured after the effective date of the regulations (Ref.: 2403(b), and Test Procedures, Part I, Section (9)(b)). (Tecumseh)

Agency Response: It was the ARB's intent to limit applicability of these regulations to engines produced on or after January 1, 1995. Thus, the ARB agrees that it was necessary to modify Section 2400 to reflect this intent. Thus the regulations have been modified in the 15-Day Notice to reflect that the utility regulations are applicable to engines produced on or after January 1, 1995, and to equipment that use engines produced on or after January 1, 1995. Since Sections 2403(a) and 2404(b) already make it clear that the requirements of those sections only apply to engines produced on or after January 1, 1995, the ARB found that it was unnecessary to further amend those sections.

4. Comment: The ARB is without authority to regulate utility engines until the ARB receives Federal approval to do so. (Tecumseh)

Agency Response: Under Section 209(e)(2) of the Federal Clean Air Act Amendments of 1990, the ARB is required to request authorization from the U.S. EPA prior to enforcing off-road engines that are not otherwise preempted under Section 209(e)(1). The ARB has filed a request for authorization and a hearing was held on the matter in December 1994. That request is presently pending before the U.S. EPA. The ARB acknowledges that it will not seek to enforce the regulations prior to receiving the required authorization.

B. DEFINITIONS

Definitions of "Basic Engine" and "Engine Family"

5. Comment: The definition of "Basic Engine" should not include the type of fuel system as one of the main determinants of an engine family. (Ref.: Section 2401(a), and Test Procedures, Part I, Section (2)). (EMA)

6. Comment: The definitions of "Basic Engine" and "Engine Family" are incompatible. They should be revised to eliminate the words "fuel system". The fuel system is used to define an engine family; it is not a characteristic of the basic engine. (Ref.: Section 2401(a), and Test Procedures, Part I, Sections (2) and (17)(c)). (Onan)

Agency Response: The definitions of "Basic Engine" and "Engine Family" that are used in the utility engine regulations are appropriate for utility engines and are consistent with the Federal on-road motor vehicle regulations (Ref.: Code of Federal Regulations [CFR]). Both industry and the ARB recognize that the fuel system is used in the definition of "Engine Family" (Ref.: CFR 86.09-24(3)(i)(F)). Engines that are grouped into a specific engine family are expected to have similar emission characteristics. An engine's particular type of fuel system and calibrations influence the engine's emission characteristics. Hence, the use of the fuel system as an engine family criterion is reasonable. The fuel system is also used in the definition of "Basic Engine" (Ref.: CFR 86.8082-2(b)). However, the degree of differentiation among fuel systems in the basic-engine definition is more general than in the engine-family definition. For example, basic engines may be distinguished by their fuel systems (i.e., whether an engine uses fuel injection or carburetors). Engine families are distinguished further on the basis of more specific details (e.g., component specifications, etc.) of the fuel injection system or of the carburetors in order to have groups of engines with similar emission characteristics. Consequently, a fuel system criteria is appropriate for the definitions of both "Basic Engine" and "Engine Family", and these definitions are compatible.

The Definition of Engine Power

7. Comment: The use of the term "Gross Power" is inappropriate for utility engine emission testing and is inaccurate as listed. The EMA recommends that "Gross Power" be deleted and replaced with the definitions of "Idle Speed", "Net Brake Power", and "Fully Equipped Engine" that are listed in the Society of Automotive Engineers' (SAE's) procedure J1349. Such revisions are necessary to measure net brake power without radiator cooling fans installed for water-cooled engines in order to harmonize with European regulations (i.e., EEC directives and ECE regulation 637). (Ref.: Test Procedures, Part I, Section (2)). (EMA)

8. Comment: The references to "Gross Power Output" should be changed to "Net Power Output". (Ref.: Test Procedures, Part I, Section (2)). (Kohler)

9. Comment: "Gross power" should be revised to "Net Brake Power Output" (without cooling fan for water-cooled engines) in order to harmonize the ARB procedures with the European regulations. (Ref.: Test Procedures, Part I, Section (20)(a)(2)). (Kubota)

Agency Response: The definition of "Gross Power" is adopted from the U.S. EPA's proposed nonroad small engine test procedure (Ref.: CFR 90.418 (d) & (e)) and the International Organization for Standardization (ISO's) 8178 test procedures (Ref.: Clauses 3.9 & 5.3 of 8178-1 Reciprocating Internal Combustion [RIC] engines - Exhaust emissions measurement, Part I: Test bed measurement of gaseous and particulate exhaust emission from RIC engines, Version N124, dated November 11, 1992). This definition states that the value of engine power to be used in the calculation of the emission test results is the amount of power that is available at the engine crankshaft when the engine is operated with only the subsystems that are necessary for engine operation (e.g., an engine-powered water pump used on a water-cooled engine, etc.). Any add-on accessories are excluded. This definition is fundamentally correct for emission test purposes. It is simple in concept, and is appropriate for utility engines because these engines are "simple" in comparison to other types of engines (e.g., motor vehicle engines, etc.). This definition is similar in concept to the SAE's definition of "Net Brake Power" for a "Fully Equipped Engine" (Ref.: J1349; June 1990). However, while the SAE definition is labeled as "Net Brake Power", the ARB definition has been labeled "Gross Power" in order to be consistent with the U.S. EPA and ISO power definitions. The European regulations are not a factor in the definition of utility engine power because the European regulations that were cited pertain only to motor vehicles.

10. Comment: The definition of "Gross Power" is not applicable to certain two-stroke engines when the engine load is a necessary accessory (e.g., the fan for leaf blower produces the both functional and engine cooling air flows). In this situation, an accurate power measurement is not possible because some of the engine power output is used to power the necessary accessory (e.g., the cooling fan). The regulations should be revised to allow the removal of the necessary accessory, and to use an auxiliary accessory as required. (Ref.: Test Procedures) (PPEMA)

Agency Response: The definition of "Gross Power" is appropriate for utility engine emission test purposes (See Response to Comments 7, 8 and 9). However, the regulations already include provisions for the Executive Officer to prescribe an alternative test procedure when an engine cannot be tested satisfactorily in accordance with the required procedures. A forced air-cooled engine that powers a leaf blower may be eligible for such consideration.

C. LABELING

Engine Label Locations

11. Comment: The regulations indicate that the label can be attached to any permanent part of the engine. Specific references to the engine "block" and "crankcase" should be deleted from the Engine Label Content and Location provisions (Ref.: Section 2404(c)(1)). (EMA, Tecumseh)

Agency Response: The existing requirement is that the engine label be attached permanently to the engine. Some engine parts, such as the block or crankcase, are never or rarely removed from the engine. Other engine parts, such as air cleaner covers, are required to be frequently removed, or are easily removed. Hence, engine labels that are attached to the block or crankcase will never, or rarely, be lost due solely to the removal of these parts. Accordingly, the most preferable locations for attaching engine labels are on the block or crankcase. The next most preferable locations for attaching engine labels, when such labels cannot be attached on the block or crankcase, are on engine or equipment components that is not likely to be replaced during the engine's or equipment's useful life.

Carryover of Engine Labels

12. Comment: Engine manufacturers have previously requested that they be given an allowance to carry-over engine labels. In other words, an engine family configuration that is not changed for the duration of the certified calendar year could use the same engine family name (i.e., engine label) for the next (and subsequent) calendar years. This allowance should be clearly stated in the regulations (Ref.: Section 2404(c)(4)(H)). (EMA, Kohler)

Agency Response: The ARB allows engine manufacturers to carry over engine family certification from one year to the next year. "Carry over" implies that an engine's emission control system has not changed (i.e., no running changes) from the previous certification. Accordingly, the engine label may be carried over with the same engine manufacturer information, with the exception of the engine family name. The engine family name remains the same except for the calendar year designation character. In other words, an engine family name that is carried over to the next calendar year is updated to the current calendar year character. Thus, engine manufacturers that carry over certification data and results may use the same engine label information with the exception for updating the engine family name.

Necessity For Fuel Labeling

13. Comment: The requirements for engine manufacturers to provide fuel type notices on the engines should be deleted because it imposes unwarranted costs on the manufacturers. Deleting this labeling requirement does not affect the expected emission reductions because the possibility of damaging emission control systems has been practically eliminated with the elimination of leaded gasoline in California. Also, the requirement to provide a fuel tank label is redundant because the fuel information is already required to be provided either on the engine label or in the owner's manual. If such a label is required, the regulations should provide the option that allows either a worded notice or an internationally accepted symbol to be used (Ref.: Section 2404(f)). (EMA, PPEMA)

Agency Response: The ARB agrees that the fuel labeling requirements are no longer necessary for utility engines. Accordingly, the requirement was deleted in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 2).

Fuel Labeling Responsibilities

14. Comment: The requirement that engine manufacturer that markets an incomplete engine assembly without a fuel tank must permanently attach a plastic or metal fuel type label on the engine assembly in a readily visible location is redundant. An OEM that procures an incomplete engine assembly without a fuel tank is already required to provide the appropriate fuel type label notice in conjunction with the installation of a fuel tank (Ref.: Section 2404(f)(1)(ii)(4) & (5)). Also, a fuel type notice is already required to appear on the engine label supplied by the engine manufacturer (Ref.: Section 2404(c)(4)(C)). (EMA, Kohler)

Agency Response: This comment is not applicable to the amendments because the requirement for fuel labels in deleted. See Response to Comment No. 13.

15. Comment: The regulations should be revised so that diesel-cycle engines using a low-sulfur diesel certification fuel are required to attach a fuel type notice label stating "LOW SULFUR DIESEL FUEL ONLY". This should be required because these engines could be operated on high-sulfur fuel. If so, the engines would not necessarily operate in compliance with the emission standards. (Ref.: Section 2404). (Kubota)

Agency Response: Only low-sulfur diesel fuel is allowed to be sold commercially in California on and after October 1, 1993. Therefore, it is unlikely that any 1995 and later diesel-cycle utility engines will be operated in use on a high-sulfur fuel in California. Nevertheless, all certified engines are expected to be in compliance through their warranty period. However, injunctive penalties for noncompliance will probably not be enacted until the ARB has discussed and reviewed the background and any additional information about noncompliant engines. Additionally, the requirement for engine manufacturers or OEMs to provide fuel type notices was deleted (See Comment No. 13).

Submission of Sample Production Labels

16. Comment: The regulations should be revised to explicitly state the engine manufacturer is required to submit to the Executive Officer samples of only actual production labels which the engine manufacturer has access to or control over. Also, the regulations should state that the OEM has the responsibility to submit samples of any required labels for the equipment (Ref.: Section 2404(j)). (EMA)

17. Comment: An engine manufacturer cannot satisfy the requirement to submit samples of production labels that are used by all potential OEMs because there may not be any contractual agreements between the engine manufacturer and the OEMs. (Tecumseh)

Agency Response: The ARB agrees with this comment. The 15-day Notice clarifies the regulations to indicate that an engine manufacturer is to submit samples of their own engine or supplemental engine labels (as applicable), and samples of engine or supplemental engine labels (as applicable) used by OEMs that are available to the engine manufacturer through direct market contact and contractual agreements between the manufacturers (Ref.: Mail-out #94-35, Item 2).

Re-Use of Labels

18. Comment: The requirement to ensure that labels cannot be re-used should be deleted because it may preclude the use of common adhesives. Also, the requirement is redundant because the regulations already require that labels be affixed in a manner so that they are destroyed in any removal process (Ref.: Section 2404). (PPEMA)

Agency Response: The requirement was included in a "draft" proposal of the amendments (Ref.: Mail-out #94-09, released February 16, 1994). This provision was not contained in the Hearing Notice version of the proposed amendments (Ref.: Mail-out #94-24, released June 10, 1994).

Attachment of Labels Prior to Effective Date

19. Comment: Handheld equipment engine manufacturers should be allowed to certify and label their engines prior to the 1995 calendar year. This advanced labeling is necessary to satisfy seasonal marketing situations. (PPEMA)

Agency Response: The regulations do not prevent engine manufacturers from labeling engines prior to January 1, 1995. Moreover, the ARB agrees that advanced engine labeling is in the best interests of the utility engine industry, and that such labeling would not compromise the anticipated emission reductions from utility engines.

Supplemental Engine Label Content: Deletion of Manufacture Date

20. Comment: The proposal to delete the requirement for date of engine manufacture from the supplemental engine label is desirable. However, the proposal does not go far enough because it proposes to delete the requirement only if the date of manufacture is readily visible on the engine. (Ref.: Section 2404). (Tecumseh)

Agency Response: The date of manufacture of the engine is required to be displayed either on the engine label or on another location on the engine that is readily visible. When a supplemental engine label is required to be attached, a manufacturer may delete the date of manufacturer from the supplemental label only if the date is readily visible elsewhere on the engine or equipment. As set forth in the initial rulemaking, the date of manufacture is necessary to determine what standards are applicable and to properly enforced the regulations.

D. WARRANTY

Warranty Claim Charges

21. Comment: The regulations should be changed to clarify that an engine manufacturer may charge an equipment owner for diagnostic labor that is performed because of an unfounded warranty claim. (Ref.: Section 2405). (PPEMA)

Agency Response: The existing warranty statement provides that the equipment owner shall not be charged for diagnostic labor if a warranted part is defective. An engine manufacturer may charge an equipment owner for diagnostic work when determined that a warranted part is not defective.

E. COMPLIANCE TESTS

Compliance Test Requirements

22. Comment: The requirement that engine manufacturers supply unique specialty hardware and personnel to the ARB, within seven days of an ARB request to do so, should be clarified with respect to the items that are to be requested. Also, the provisions should allow some consideration of the difficulties that can arise due to the hardware requirements between different laboratories (Ref.: Section 2407). (PPEMA)

Agency Response: This requirement is part of the existing regulations. The adopted change clarifies that the requirement can pertain to either the specialty hardware or personnel, or to both the hardware and personnel. The ARB will consider the difficulties a manufacturer will have regarding hardware requirements of different laboratories on a case-by-case basis.

23. Comment: The regulations should be revised to clarify the compliance procedure when engines have not successfully passed the required three emissions standards. Engines should not be required to be re-tested for emissions that the engines have already passed successfully. The compliance tests should be required to continue only for those pollutants for which the engine has not passed (Ref.: 2407(a)). (PPEMA)

Agency Response: Engines are compliance tested in groups of five. The emission data for each pollutant are evaluated after all five engines are tested. The emission tests continue until the sample group of engines has passed the evaluation. Emission data continue to be gathered for all pollutants; however, the data are re-evaluated for only the pollutants that have not received a pass determination. These procedural requirements are already specified in the provisions.

F. QUALITY-AUDIT TESTS

Necessity of Two-Stroke Engine NOx Measurements

24. Comment: The requirement for NOx emission measurements should be deleted for two-stroke engine assembly-line QA testing because prior emission tests indicate that these engines are usually considerably below the NOx emission standard. This testing also indicates a high correlation between NOx and CO emissions. Therefore, engine manufacturers should be allowed to demonstrate NOx emission QA compliance by using a NOx-CO correlation factor. This would save time and money for the engine manufacturers. The QA regulations should be modified to allow this option. (PPEMA)

Agency Response: The necessity for a two-stroke engine NOx emission standard was already determined in the initial rule development in 1990. The regulations provide that a two-stroke engine manufacturer can request that the Executive Officer allow a manufacturer to deviate from the procedures on a case-by-case basis. Such a deviation could include the option that allows for the development and use of a NOx-CO correlation factor for QA NOx compliance test purposes.

Quality-Audit Tests: Test Muffler

25. Comment: The regulations should allow QA testing to be conducted using a standardized probe-equipped test muffler that is inspected, maintained, and replaced on a regular basis. Such a test muffler provides consistency with respect to the sample probe locations; hence, greater test accuracy and repeatability. It also reduces the testing costs. (PPEMA)

Agency Response: See Agency Response to Comment 24 above regarding Executive Officer approval of alternative procedures on a case-by-case basis.

Quantity-Audit Tests: Specific Carburetor Settings

26. Comment: The regulations should be revised to indicate the appropriate power value to be used for handheld equipment engine QA and compliance testing of engines with adjustable carburetors. The regulations allow the rated engine power and speed values determined for certification (or alternative load devices) to be used in QA testing instead of actual measured QA and compliance test values. However, in these situations, the procedures should also clearly indicate the particular setting of an adjustable carburetor for both QA and compliance tests. (PPEMA)

Agency Response: The comment is correct only with respect to QA tests; it is not correct for compliance tests. The ARB provides this allowance for QA tests because those tests require a large quantity of engines to be tested (e.g., one percent of California sales). Consequently, a requirement to determine the actual values of power and speed for each production engine that is QA tested would be burdensome. Compliance tests (which are conducted at the ARB's discretion) require only five engines to be tested initially. The initial group of five is supplemented with subsequent groups of five (as necessary and up to a maximum of 30) until compliance is determined. Thus, a requirement to determine actual values of power and speed for compliance tests (if and when such tests are conducted) is not burdensome because a relatively small quantity of engines are ultimately compliance tested. As it relates to QA tests, the issue was addressed in the Staff Report (Ref.: Mail-out #94-24, released June 10, 1994). The provisions and the approved amendments allow the use of the certification engine power and speed values to be used for QA tests. This reduces the engine manufacturers' testing burden. However, a similar provision for adjustable carburetors was not proposed because the settings may vary over the adjustable range. The settings are not precise or repeatable. By allowing engine manufacturers to use adjustable carburetors, they agree to comply at any setting within the adjustable range.

27. Comment: The regulations allow adjustable carburetor-equipped engines to be QA tested with the carburetor settings at any engine manufacturer-specified positions (i.e., set to values or positions that are available to the ultimate purchaser). The regulations should be revised to indicate that QA and compliance tests should be performed at the engine manufacturer's suggested settings, and that the emission data from such tests are to be reported for only one position of carburetor adjustment (Ref.: Section 2407(b)). (PPEMA)

Agency Response: The suggestions included in this comment are not reasonable. By allowing the use of an adjustable carburetor, such engines can be tested at any available carburetor setting. In the current regulations, the engine manufacturer may choose to QA test at their own preferred settings; however, the ARB may choose to compliance test at any available settings. This ensures compliance at any setting available to consumers. Therefore, each carburetor setting that was tested for QA purposes should be submitted.

Quality-Audit Tests: Engine Speed

28. Comment: The regulations should be revised to indicate that the engine speed (e.g., rated, intermediate, etc.) of a particular engine configuration is the correct speed to be used when such production engines are QA tested. The certification test is conducted at a specific engine speed (i.e., the engine speed of the worst-case engine configuration). However, the worst-case engine configuration speed is not the appropriate engine speed for QA tests because each individual production engine must be tested at its own particular speed, and not necessarily at the certified engine speed (Ref.: Test Procedures, Part I, Section (20)(c)(2)). (EMA, Tecumseh)

Agency Response: The regulations provide manufacturers with flexibility in conducting QA testing at the engine speed that is appropriate for a particular engine.

Quality-Audit Selection of Engines

29. Comment: The regulatory language should be changed to indicate that one percent of the estimated California sales volumes of engines from each engine family shall be selected for QA testing. It is not one percent of the engine manufacturer's total sales volume (Ref.: Section 2407(b)(4)(A)). (EMA, Onan)

Agency Response: The ARB agrees with this comment. Accordingly, the appropriate change is reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 3).

30. Comment: The regulations should be revised to clarify that the QA engine selection requirement is a random selection of one percent of the engines from each engine family. The one percent value applies for any volume of production (Ref.: Section 2407(b)(4)(A)). (Onan)

Agency Response: The regulations already specify that the one percent value applies to a volume that is representative of an engine manufacturer's California sales of each engine family.

Quality-Audit Procedure and Approvals

31. Comment: The requirement regarding the minimum number of engines that must be QA-tested each month should be clarified. The regulations should clarify the different situations when less than ten engines may be tested. (Ref.: Section 2407(b)). (PPEMA)

32. Comment: The regulations should be revised to clarify that engine manufacturers must obtain approval for both their QA engine selection method and QA-testing method. These approvals must be obtained before the start of production. (Ref.: Section 2407(b)(1), and (b)(4)(A)). (PPEMA)

33. Comment: The regulations should be revised to clarify that an engine manufacturer may be allowed to use the alternative QA engine selection method for all quarterly engine production volumes. (Ref.: Section 2407(b)). (Onan)

Agency Response: The issues raised by these comments were addressed in the Staff Report (Ref.: Mail-out #94-24). The amended provisions indicate that the test data from a quarterly sample of less than ten engines is to be combined with the data from successive quarters until the data of ten engines is available. The amended provisions also clarify the current requirement for manufacturers to submit and receive ARB approval for the QA test method. The requirement to submit the QA engine selection method is already included in current regulations. The regulations are not changed to clarify that an engine manufacturer may use the alternate QA engine selection procedure that is outlined in the regulations for any production quantities. The alternative QA engine selection method is already understood to be applicable to all quarterly production volumes.

Batch Production

34. Comment: QA reports require information about the start and stop dates of batch-produced engine family production. The phrase "batch-produced" should be clarified in the regulations (Ref.: Section 2407(b)). (PPEMA)

Agency Response: The phrase "batch-produced" originated with industry. This phrase is not defined in the regulations because the meaning is obvious. A "batch" is a quantity produced as the result of a single operation. "Batch-produced" engine family production means the quantity of engines produced during a particular manufacturing run (e.g., the assembly line is not retooled, etc.). The ARB is interested in total production per quarter.

Quality-Audit Report Submissions: Significant Digits

35. Comment: The regulations require that all emission data submitted for QA test reports be rounded to one significant digit beyond the applicable standard. This provision should be revised to require that the data be rounded to the same number of significant figures as the applicable emission standard. (Ref.: Section 2407(b)(8)(B)(iii)). (PPEMA)

Agency Response: The draft version of the amendments (Ref.: Mail-out #94-09, released February 16, 1994) stated that the emission data be rounded to one significant digit beyond the applicable standard. However, the Staff Report version (Ref.: Mail-out #94-24) of the amendments stated that such data is to be rounded to two significant digits. For example, the hydrocarbon plus NOx standard of 12.0 is to be reported as 12.0XX. The two significant digit requirement is the current practice used for certification. The requirement to provide additional significant figures for the test data that are beyond the applicable emission standard prevents any compromise of the integrity of the standards. It is good engineering practice that facilitates the certification and compliance processes. This requirement is not burdensome.

Quality-Audit Report Submissions

36. Comment: The regulations require engine manufacturers to submit the QA report in written format (hardcopy), and encoded on a computer diskette or as an electronic transmission. This requirement to provide both mediums is burdensome. (Ref.: Section 2407(b)). (PPEMA)

Agency Response: The ARB does not consider this requirement to be burdensome. The engine manufacturer-produced hardcopy of the report can be used to verify the accuracy of the copy that is produced by the ARB from the diskette or electronic transmission. Such verification facilitates the allocation of resources by the ARB.

37. Comment: There is a typographical error in Section 2407(b)(6)(C). The reference should be to Paragraph (D); not to (C). (EMA)

Agency Response: The ARB agreed with this comment. The appropriate revision is reflected as a minor change in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 12).

Noncompliance Penalties

38. Comment: There are inconsistencies in the regulations regarding the noncompliance penalties with respect to entire engine families and subgroups of engine families. The regulations should be revised to eliminate these inconsistencies (Ref.: Section 2407(a)(11), (a)(12), and (b)(7)(C)(i)). (EMA)

Agency Response: The ARB agreed with this comment. Accordingly, the appropriate change is reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 3).

39. Comment: The regulatory proposal states that it is intended to merely clarify the regulations adopted in 1990 (Ref.: Staff Report, released June 10, 1994, Section I). However, the regulatory proposal appears to create a new system for enjoining the offering of entire engine families upon finding noncompliance of some engines within the family group. This change goes beyond clarification. It regulates new categories of businesses not previously covered by the rule by adding "equipment", not just engines. (Tecumseh)

Agency Response: As initially adopted, the injunctive relief penalties were intended to be applicable to both engine and equipment manufacturers. This is because of the special nature of the utility and lawn and garden equipment industry in which vertical, integrated manufacturing of both engines and equipment is not performed by every manufacturer. It is common in this industry for engines and equipment to be built by separate manufacturers. Thus, while the emission standards set forth in the regulations apply to engines, compliance through QA and compliance testing (Section 2407) can be conducted on completed engine and/or equipment assemblies. Therefore, compliance penalties are directed at the manufacturers of both engines and equipment that house the engines. Since the encasing equipment and housed engine are inextricably a part of the integral whole of the tested product, the possibility that an equipment manufacturer could have its product enjoined from further sales in California, if the engine does not meet established emissions standards, has always been implicitly understood. Also implicit in the regulations was the possibility that equipment, along with the noncomplying engines, could be enjoined from further sales or distribution if noncompliance was the result of the equipment manufacturer's action (e.g., tampering, etc.). The amendments clarify the regulations by making the respective responsibilities and liabilities of the manufacturers explicit.

40. Comment: The Staff Report indicates that the regulations are being revised to require the seller of an engine assembly to provide purchasers with the appropriate emission requirements of the engine assembly. However, the amended provisions do not reflect such changes. This should be clarified. (Ref.: Staff Report, released June 10, 1994, Section (IV)(H)(1)). (Honda)

Agency Response: The intent of the regulations is that the integrity of the engine certification must be maintained. This integrity must be maintained in both the situation in which an engine is produced entirely by a single engine manufacturer and in the situation in which an engine is produced by one or more manufacturers. In the latter case, the second manufacturer, usually an OEM, may purchase an engine manufacturer's incomplete engine assembly and add component parts to complete the engine assembly at the time of manufacture of the equipment in which the engine is encased. The second manufacture that completes the final engine assembly must comply with the appropriate emission-related engine specifications (e.g., exhaust backpressure, labeling, etc.) in order to produce compliant

engines. This information is known by the manufacturer who certifies the engine, and that manufacturer has the responsibility of passing the necessary information onto other manufacturers involved in the assembly process to assure production of compliant engines. Because of the many different potential relationships that may be involved in the production of a final engine assembly, the ARB was reluctant to establish by regulation, specific protocols for how this information should and must be conveyed. Rather, the ARB believes that it is most practical to consider the question of responsibility for failure to comply with certification standards on a case-by-case basis. As stated in sections 2407(a)(11) and (12) and (b)(7), prior to seeking injunctive relief against any engine or equipment manufacturer the ARB will consider all necessary information to determine who is responsible for noncompliance. (See Response to Comment No. 39).

## G. TEST PROCEDURES

### Requirement to Report Test Results in SI Units

41. Comment: Engine manufacturers should not be required to calculate brake-specific emissions in grams per kilowatt-hours [g/kW-hr] because the emission standards are specified in grams per horsepower-hour [g/bhp-hr] (Ref.: Test Procedures). (PPEMA)

Agency Response: To be consistent with the proposed U.S. EPA's nonroad small engine emission standards and test procedures, the procedures utilize the International System of Units (SI) even though the emission standards are expressed in English units (e.g., horsepower). The requirement that emission results be expressed in SI units facilitates comparisons between the ARB and U.S. EPA certifications. The requirement is a simple calculation and is thus not burdensome.

### Engine Displacements

42. Comment: The procedure for determining engine families is restrictive with respect to the allowable intervals of engine displacements. Specifically, the ARB technical policy that allows for the inclusion of engines within an engine family if their displacement is within 15 percent of the largest engine displacement is too restrictive. All handheld equipment engines that have the similar emission characteristics should be allowed to be included within the same engine family. For example, the ARB policy would not allow for the inclusion of a 38 cc engine within an engine

family when the largest handheld equipment engine within that family is 45 cc, even though the two engines may have similar emission characteristics. The regulations should be revised in order to eliminate this burden. (Ref.: Test Procedures). (PPEMA)

Agency Response: There are three separate engine classes for handheld equipment engines based on engine displacement. These engine classes were developed when the utility engine regulations were proposed initially. The engine emission and equipment analysis conducted at that time indicated inherent break points for engine displacement groupings on the basis of similar emission characteristics (Ref.: Staff Report, released October 22, 1990, Section (IV)(B); [Mail-out #90-64]). It is clear that engines with different displacements will exhibit different emissions because the combustion parameters (e.g., air, fuel, surface, area, volume, temperature, pressures, etc.) will change. The 15 percent displacement limit is consistent with the policy that has been used for on-road motor vehicle engine family determinations.

Inclusion of SAE J1088 Test Procedure

43. Comment: The ARB implies that the latest version of the SAE J1088 test procedure is to be included in the amended ARB procedures. However, the amendments do not include the entire J1088. (Ref.: Staff Report, released June 10, 1994, Section (IV)(B)(1); [Mail-out #94-24]). (Tecumseh)

Agency Response: The SAE J1088 recommended practice was not intended to be a verbatum adoption into the amended test procedures. The intent of the regulations is to incorporate and integrate the SAE's most recent J1088 with the current Raw Gas Method (RGM) test procedures in order to improve the technical aspects of the procedures. Portions of the U.S. EPA's proposed nonroad small engine procedures were also integrated in order to create as much consistency as possible with the Federal requirements. Some portions of the SAE J1088 have been modified to be consistent with the U.S. EPA procedures already included similar provisions. Also, other portions have been modified to avoid conflict with any current practices or Executive Officer-approved industry-wide allowances.

Tamper-Resistance Requirements

44. Comment: The language regarding the misadjustment of tamper resistance parameters should be revised. This provision should reflect more accurately the case when misadjustments will cause either the breakage of the restriction device and/or the parameter, or result in unsatisfactory engine operation. Both results should not be necessary. (Ref.: Test Procedures, Part I, Section (18)(d)(4)(iii)). (EMA, Onan)

45. Comment: Requiring engine manufacturers to design engine parameters that result in poor engine performance due to tampering is not good engineering practice and may result in an increased risk of personal injury. (Ref.: Test Procedures, Part I, Section (18)(d)(4)(iii)). (Onan)

Agency Response: The intent of the tamper-resistance provisions is to provide sufficient deterrence to the adjustment of any emission control system parameters that are not authorized by the engine manufacturer. By requiring that parameters be set so that exceedance will cause poor performance, the regulation is consistent with the existing motor vehicle regulations and should adequately deter individuals from tampering. Requiring poor performance does not and should not mean that parameters be set at levels which will endanger users if exceeded.

Requirement to Disassemble Engines Using Special Tools

46. Comment: Utility engines are designed to be repaired easily. They can be disassembled in a short period of time using common and simple standard tools. The requirement to allow only disassembly with special tools is not compatible with the basic design intent; therefore, the requirement should be deleted. (Ref.: Test Procedures, Part I, Sections (2), (18)(d)(3)(i)). (Tecumseh)

Agency Response: The requirement to use special tools applies to the disassembly of systems that provide tamper resistance of the emission control system. The requirement does not apply to basic engine maintenance components. The necessity to use special tools or expertise to circumvent any tamper-resistance measures increases the difficulty of such action because either the tools are not readily available or the expertise is not commonly known. Therefore, the requirement is justified.

Confirmatory Testing

47. Comment: The procedures indicate that confirmation testing will occur automatically unless the engine manufacturer obtains a testing waiver. This is an unfair burden on engine manufacturers because their emission data should be presumed to be reliable. Confirmation testing should be required only when the ARB has reasons to question an engine manufacturer's data. Also, the regulations should clarify whether the confirmatory tests are conducted on the original test engine or on another new engine. (Ref.: Test Procedures, Part I, Section (26)). (PPEMA)

Agency Response: Confirmatory testing is not a new requirement. The language was clarified to specify the criteria used to initiate testing, and to indicate that the confirmatory test is conducted on test engine(s) (i.e., the original test engine(s)). Confirmatory testing is necessary to verify

that the emissions data is accurate and test engines produced by the engine manufacturer are in compliance with the emission standards. Confirmatory testing is only performed when the engine manufacturer has not requested a waiver pursuant to Part I, Section 26 of the Test Procedures, or has failed to meet the conditions set forth for granting such waivers. If the criteria for granting a waiver is satisfied, the test waiver is approved and the engine manufacturer is not required to retain the certification engine. The burden on the engine manufacturer is simply to retain the certification engine until the confirmatory testing decision is made by the Executive Officer; this occurs early in the certification process.

48. Comment: The criteria used to evaluate confirmatory test waivers is unfair because one of the factors is "marginal compliance" with the emission standard. The ARB uses a method whereby a test result is considered to be marginal when the initial test result is less than 15 percent below an applicable emission standard. This method arises from concerns of in-use deterioration. The criteria is unfair because the regulations were not intended to address in-use emissions. (Ref.: Test Procedures). (PPEMA)

Agency Response: The criteria used to evaluate test waivers is reasonable and technically valid. This criteria is used to verify the repeatability and compliance of an engine's certification test results. A greater assurance exists that production engines are in compliance when the certification emissions are more than fifteen percent below the applicable standard. The "marginal compliance" criteria is not used in response to concerns about in-use deterioration.

49. Comment: The regulations should be revised to allow representatives of the engine manufacturer to witness confirmatory testing if the Executive Officer determines that such testing is required and the testing is conducted at a location other than the engine manufacturer's facility. (Ref.: Test Procedures, Part I, Section (26)(a)). (Tecumseh)

Agency Response: Realizing the benefits of an open process, existing ARB practice for on-road engines is to permit manufacturer representatives to witness confirmatory testing that is conducted. The ARB intends to continue the practice for off-road confirmatory testing.

Certification Carry-Over: Similar Engines

50. Comment: The regulations should be revised to clarify that a calendar-year certification is obtained based on a previous calender-year certification, or emissions data, submitted for a similar engine. The regulations should clarify the definition of a "similar engine" (Ref.: Test Procedures). (PPEMA)

Agency Response: This comment is beyond the scope of the amendments because it addresses a provision for which a change was not proposed. However, a response is provided in order to clarify the issue. Engines are grouped together on the basis of similar emission characteristics. The expectation is that engines that have certain technical similarities (e.g., displacement, etc.) will also exhibit similar emission characteristics. Therefore, the use of such technical criteria to formulate engine families should result in groups of engines (i.e., the engine families) that exhibit similar emission characteristics. The regulations provide guidance for the determination of engine families through the use of specific technical criteria. Accordingly, an engine from a particular calendar year that satisfies the same technical criteria as did an engine from the previous calendar year qualifies as a similar engine for carry-over purposes. Additionally, the ARB can consider other criteria to qualify the carry over of data between two different calendar-year engines, such as differences (e.g., calibration, etc.) that are expected to result in equivalent or superior emission characteristics based on the ARB's technical judgement.

Idle-Mode Tests

51. Comment: The idle-mode power cannot be measured for clutch-equipped handheld equipment engines because the power produced is not sufficient to allow for clutch engagement. The procedures should be revised to allow for the clutch to remain on such equipment engines during testing, and for the corresponding idle-mode power value to be designated as zero (Ref.: Test Procedures). (PPEMA)

Agency Response: The procedures are general in nature and are correct for the vast majority of engines. The ARB recognized that certain engines may not "fit" into the basic test protocol. Consequently, upon an engine manufacturer's request, the Executive Officer may allow case-by-case deviations for engines that are not susceptible to being tested according to the required procedures.

52. Comment: Some utility engines cannot drive the dynamometer when operating at idle as is required for idle-mode testing. The procedures should reflect this situation and allow such engines to be uncoupled from the dynamometer during idle-mode testing (Ref.: Test Procedures, Part II, Section (12)(b)(2)(xv)). (Honda)

Agency Response: The ARB disagrees. Uncoupling the engine from the dynamometer during the emission tests results in inaccurate emission tests. Idle-mode power measurements are possible if the dynamometer is coupled to the engine and the transmitted idle-mode power is measured.

Certification of Gaseous-Fueled Engines

53. Comment: The regulations should be revised to allow engine manufacturers of gaseous-fueled engines to certify such engines on the basis of the non-methane hydrocarbon (NMHC) emissions. The provisions should explain how this certification is accomplished (Ref.: Test Procedures). (PPEMA)

Agency Response: The regulations and test procedures were revised to clarify that the Executive Officer may allow these engines to certify to either the hydrocarbon plus oxides of nitrogen or hydrocarbon emission standard, as applicable, based on only the NMHC portion of the total hydrocarbon exhaust. In testing, manufacturers of gaseous-fueled engines are not required to include the methane portion of the HC emissions to demonstrate compliance. In terms of testing the engines, the engine manufacturer is provided with the flexibility to propose a NMHC-type procedure to the Executive Officer for review and approval. The NMHC testing is well documented for other mobile source emission testing. (Ref.: Staff Report, released June 10, 1994, Section (IV)(A); [Mail-out #94-24]).

Production Engine Identification System

54. Comment: An explanation of the engine manufacturer's production engine identification system must be submitted at the beginning of each calendar year. An engine manufacturer is not required to identify individual production engines unless requested specifically to do so by the Executive Officer. However, the regulations do not indicate what circumstances would require an engine manufacturer to actually supply such identification information. Such requests should be made under only limited, clearly identified conditions because such efforts are costly and time consuming. (Ref.: Section 2407). (PPEMA)

Agency Response: A method to identify specific production engines is necessary in order to effectively verify, as required, the actual implementation of any emission-related design changes to production engines. Such circumstances require that the appropriate engines be individually located and recorded. The requirement for engine manufacturers to implement an identification system serves to facilitate this process.

55. Comment: Engine manufacturers are required to advise the Executive Officer of an engine numbering system that identifies if an engine is covered by a particular Executive Order. The requirement that an engine must have the engine family identification on the engine label is therefore an unnecessary duplication. The regulations should be revised to eliminate this duplication (Ref.: Test Procedures, Part II, Section (12)). (Tecumseh)

Agency Response: These two requirements apply to different situations. The engine numbering system requirement applies to the identification of individual production engines (See Comment No. 54). The requirement that engine family names appear on the engine label identifies the engine family of each individual engine. The two requirements are not duplicative.

Estimated Production Engine Sales

56. Comment: The requirement for an engine manufacturer to supply the method used to estimate California sales as part of the certification application is unnecessary because this information can be obtained from QA reports (Ref.: Test Procedures). (PPEMA)

Agency Response: Engine manufacturers are required to explain the rational used to determine the estimated sales figures that are submitted at certification in order to verify the reasonableness of the estimated value. The sales values provided in conjunction with certification indicate estimates of future engine sales. The values provided in the QA reports indicate accurate values of actual engine production. These two items of information serve two different functions. For example, estimated sales figures may be used in analysis purposes when actual figures are not available.

Engine Maintenance: Training of Personnel

57. Comment: The regulations should be revised to clarify the need for engine manufacturers to provide descriptions of the training programs and equipment used to perform engine maintenance in emission tests. Specifically, the provisions should clearly indicate whether or not engine manufacturers are required to provide only information about the activities, or to actually demonstrate the programs and equipment. (Ref.: Test Procedures). (PPEMA)

Agency Response: Section (14)(b)(2)(viii), Part I of the Test Procedures was initially adopted in 1992 and is not being amended by this rulemaking. The regulations already explicitly indicate that an engine manufacturer is required to provide a statement about the training program and equipment used by the personnel that will perform engine maintenance. There is no requirement to demonstrate any training or equipment.

Emission Measurements

58. Comment: The language that describes the test equipment setup has errors and redundancies. Specifically, the requirements to measure the exhaust volume and gross power are wrong, and measurements of both fuel consumption and fuel flow are redundant. Measurements of the exhaust volume are unnecessary when using the raw gas method (Ref.: Test Procedures, Part I, Section (20)(a)(2)). (EMA)

Agency Response: This test procedure language is adopted from the SAE J1088 small engine test procedure and the proposed U.S. EPA nonroad small engine test procedures in order to align the ARB procedures as closely as possible with these other procedures. Specifically, the requirement to measure individual exhaust test data is indicated "as applicable" in the amended procedures. The measurement of the exhaust volume is necessary when the Constant Volume Sampling (CVS) test procedures are used because such a measurement is applicable to the CVS procedures. Also, the proposed language does not include a requirement to measure fuel consumption; there is a requirement to measure fuel flow. The necessity to measure gross power is appropriate because the gross power value is used to determine the specific emissions. See the response to Comments 7, 8 and 9 for an explanation about the necessity to measure gross power.

Right of Entry

59. Comment: The regulations should be revised to clarify that the ARB will provide prior notice to both OEMs and engine manufacturers before seeking entry to utility engine equipment retail outlets for compliance purposes (Ref.: Test Procedures). (PPEMA)

Agency Response: The commentator misunderstands the respective obligations of both the regulated industry and the ARB under Section (31)(c)(3) of the Test Procedures. The section does not restrict the ARB from entering an otherwise open public facility, without first giving prior notice to manufacturers. Rather, the section mandates that manufacturers must allow entry to public and private facilities by ARB enforcement officers whenever prior notice is given.

60. Comment: The draft proposal needs to be renumbered because Section 19, Part I, of the Test Procedures was deleted. (EMA)

Agency Response: This comment is not correct. Section 19 (Executive Officer's Engines) was not deleted from the amended regulations.

Emission Test Setup

61. Comment: The procedures should specify the alternative analytical systems that may be used instead of the analytical systems indicated in the procedures. (PPEMA)

62. Comment: Only one measuring system is necessary for the analytical test setups. Therefore, the description of the exhaust analyzer systems procedure should be modified to indicate either a valve to meter flow rate, or gauges to measure pressure. Both of these components should not be required. Also, the criteria about the sample probe positions should be deleted. (Ref.: Test Procedures). (PPEMA)

63. Comment: When a Heated Chemiluminescent Analyzer (HCLA) is used, it should be placed in the heated sample stream with the Flame Ionization Detector (FID). The analyzer should not be located with the cold sample stream as is indicated. Also, the language indicates that analyzer flow meters are located in the analyzer exhaust. These flow meters should be located in the inlet flow to the analyzers to ensure proper flow without impairing the analyzers performance. (Ref.: Test Procedures, Part II, Section (2)(b)(1)(i), and Figure 2-2). (EMA, Tecumseh)

64. Comment: The procedures should be changed to allow for one and two probe sampling systems. The two-probe system allows one sample line for dry exhaust sampling, and the other probe for wet (heated) gas sampling. Exhaust gases should be allowed to be sampled with two probes if the engine manufacturer submits a request to the Executive Officer and the request is approved (Ref.: Test Procedures, Part II, Section (2)(b)(1)). (EMA, Kubota)

Agency Response: The intent of the test procedures is to provide a uniform and reproducible method of measurement, and allow as much flexibility as possible in the physical construction of the experimental apparatus. Accordingly, an engine manufacturer may request approval to deviate from the test methods and setups presented in the test procedures to accommodate a particular test cell or facility (e.g., a request to use a two-probe sampling system, or to utilize an alternative analytical test setup). Such requests should be resolved on a case-by-case basis prior to any emission testing.

65. Comment: In Figure 2-1: Engine Test Setup, the exhaust gas sample probe is located at the muffler/catalyst, and as an option, at the tail pipe (i.e., after the optional mixing chamber). It does not make sense to locate the sample probe in the muffler because the exhaust gases in the muffler are not equivalent to the gases that are actually emitted from the tailpipe. The regulations should be changed so that a sample probe is located in the tailpipe regardless of whether or not a mixing chamber is used (Ref.: Test Procedures, Part II, Section (2)). (Honda)

Agency Response: The ARB partially agrees with this comment. The amended procedures indicate sample probe locations for the various engine exhaust systems that may be emission tested in order to maintain consistency with the proposed U.S. EPA small engine test procedures and to provide alignment with the SAE J1088. The language about the sample probe locations was revised and clarified in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 6) in recognition of Honda's concern that a sample probe should be located in the tailpipe regardless of whether or not a mixing chamber is used. However, more than one sample probe location option is necessary because of the variety of engine and exhaust system configurations (e.g., the sample probe may need to be located in the muffler, etc.). The intent of the provisions is to obtain a well-mixed, homogeneous exhaust sample. (See Response to Comments 61 through 64).

IM240 Dilution System

66. Comment: An IM240 type of dilution system should be allowed by the regulations because this type of dilution system is more desirable than the system in the provisions. (EMA, Tecumseh)

Agency Response: The ARB does not have any experience with this type of dilution system. However, any engine manufacturer that desires to utilize such systems may submit a proposal to the ARB for consideration as an alternative procedure. (See Response to Comments 61 through 64).

Data Reduction: Conversions From Concentration To Mass

67. Comment: The provision regarding the conversion from emission concentration measurements to mass measurements should be clarified. The procedures state that the conversion may be based on either the airflow or fuel flow; however, the procedures state that the fuel flow method is recommended. This recommendation is confusing and needs to be clarified (Ref.: Test Procedures, Part II, Section (2)(c)(1)). (Honda)

Agency Response: The regulations are specific in this conversion requirement. Engine manufacturers have the option to use either the airflow method or the fuel flow method as the basis for the conversion. The fuel flow method is the preferred (i.e., recommended) method because it is believed to be technically superior to the airflow method. However, the airflow method is considered to be accurate for the engines at their current emission values.

Test Accuracy

68. Comment: The ARB requirement for an accuracy of +/- 1 percent of the full scale flow rate measurement is not in agreement with the latest SAE J1088 procedure (Ref.: Test Procedures, Part II, Section (2)(c)(3)). That procedure specifies an accuracy of +/- 2 percent of the reading. The ARB procedures should be changed to indicate the same accuracy requirement as the SAE J1088 procedure. (EMA, Tecumseh)

Agency Response: The ARB agrees with this comment. Accordingly, the appropriate change is reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 5).

Mixing Chamber

69. Comment: If the ARB believes that the surface temperature of the exhaust tract should be maintained to the same value as at the sample probe whenever a mixing chamber is not used, the regulations should be revised accordingly. Also, the regulations should specify only the minimum allowable temperature. (Ref.: Test Procedures, Part II, Section (2)(d)(3)(iv)). (Honda)

Agency Response: The exhaust gas tract must always be maintained above the dew point temperature of the exhaust gas. Otherwise, portions of the exhaust gas sample could condense out of the exhaust stream before the pollutants are measured. Such condensation would invalidate the test results. Temperature maintenance is good engineering practice and should be done routinely. The regulations specify a range of temperatures (i.e., not only the minimum) because the exhaust gas sample should never be allowed to reach its oxidation temperature. The test results would be invalidated when pollutants in the system are oxidized.

70. Comment: The regulations should be revised to clearly indicate that a mixing chamber is not required for measuring emissions from two-stroke engines. One provision states that mixing chambers should not be used for two-stroke engines; another one states that a mixing chamber is optional for RGM (Ref.: Test Procedures). (PPEMA)

Agency Response: The PPEMA has not characterized the amendment correctly. The current regulations state that a mixing chamber is not recommended for two-stroke engine RGM tests, and that it is included as part of the test setup for four-stroke engine tests. The amended procedures state that the use of a mixing chamber is optional for both two- and four-stroke engine RGM tests. Therefore, an engine manufacturer is not required to use a mixing chamber in the test setup for two-stroke engine tests.

71. Comment: The word "tank" should be replaced with the word "chamber" (Ref.: Test Procedures, Part II, Section (2)(d)(3)(ii)). (Honda)

Agency Response: The ARB agrees with this comment. The appropriate change is reflected in the 15-day Notice (Mail-out #94-35, Item No. 12).

Calibration of Test Equipment

72. Comment: The ARB requires zero-grade nitrogen for the RGM calibration of hydrocarbon analyzers. Good engineering practice calls for the use of zero-grade air in non-explosive concentrations as the proper diluent because it more closely represents the measured exhaust gas. Nitrogen should be used when a higher diluent concentration is required (Ref.: Test Procedures, Part II, Section (3)(a)(4)). (PPEMA)

73. Comment: The CVS calibration gas specifications are inconsistent with respect to the dilute (i.e., "C3H8 and purified nitrogen" should be "C3H8 and purified synthetic air"). (Ref.: Test Procedures). (Kubota)

Agency Response: These comments refer to a draft version of the proposed amendments (Ref.: Mail-out #94-09, released February 16, 1994). The Staff Report version of the amendments (Ref.: Mail-out #94-24, released June 10, 1994) reflected changes similar to those indicated by the comments.

74. Comment: The meaning of "performance verified" is not clear in the provisions regarding the calibration of the dynamometer. Also, the calibration interval is not clear. The required interval should be at least once each month, or, alternatively, once each week, if necessary. The procedures should be revised to eliminate this confusion (Ref.: Test Procedures, Part II, Section (5)(a)). (Honda)

Agency Response: The ARB agrees with this comment, and the change was reflected in the 15-day Notice (Mail-out #94-35, Item No. 7).

75. Comment: The accuracy of calibration and span gases should be within +/- 2 percent of the National Institute for Standards and Testing's (NIST's) gas standard. Requiring the accuracy of the calibration gases to be within +/- 1 percent will not provide greater test accuracy, and will increase test costs significantly. The regulations should be revised accordingly (Ref.: Test Procedures). (PPEMA)

Agency Response: One intent of the proposed amendments was to align the ARB procedures as closely as possible the U.S. EPA's proposed nonroad small engine test procedures. The U.S. EPA's on-road and proposed nonroad procedures, and the ARB's on-road procedures, already include a +/- 1 percent accuracy requirement for calibration gases. The ARB is not certain that test costs will increase significantly because manufacturers are required to use these same accuracies to satisfy the U.S. EPA's nonroad small engine requirements. Consequently, the test costs are based on the cost of certification on a nationwide basis.

76. Comment: The procedures should be revised to clarify whether a gas divider can be used for spanning, testing and calibration. Also, the requirement to check the linearity of each analyzer over its entire operating range should be deleted (Ref.: Test Procedures, Part II, Sections (6) through (9)). (PPEMA)

Agency Response: The procedures explicitly allow the use of gas dividers to span and calibrate gases for test purposes, provided that these instruments are maintained in accordance with the device manufacturer's instruction. The analyzer is not required to be calibrated over all possible operating ranges, but only over the full range of those used in the test.

77. Comment: The nomenclature does not adequately distinguish between calibrating test equipment (a complete system process), and zeroing and spanning the test equipment (a less comprehensive process). Also, the analyzer calibration schedules should be clarified (e.g., yearly, monthly, etc.) (Ref.: Test Procedures, Part II, Sections (6) through (9)). (PPEMA)

Agency Response: The procedures clearly distinguish between these actions. The analyzer calibration provisions outline the calibration instructions and schedules. Analyzer zeroing and spanning checks are required to be performed after each test cycle. The hydrocarbon analyzer is to be adjusted for the optimum range on an annual basis, and calibrated on a monthly basis. The carbon monoxide analyzer is to be adjusted for the water vapor response on an annual basis, and calibrated on a monthly basis. The oxides of nitrogen annual analyzer is to be checked for conversion efficiency and calibrated on a monthly basis. The carbon dioxide analyzer is to be calibrated on a monthly basis. Furthermore, the procedures allow the analyzer calibrations to be performed in accordance with the analyzer manufacturer's instruction instead of the regulatory-specified instructions.

78. Comment: The frequency of calibrating test equipment should be that as recommended by the testing equipment manufacturer. (Ref.: Test Procedures). (PPEMA)

Agency Response: The schedule for analyzer calibrations that is provided in the procedures represents the minimum frequency that is allowed in order to obtain technically correct test data. However, an engine manufacturer may propose to deviate from the required methods (See Response through Comments 61 to 64).

Service Accumulation: Appropriate Fuel

79. Comment: Proper engineering judgement dictates that engine manufacturers be allowed to run service accumulation on a fuel that has a Reid Vapor Pressure that is more appropriate for the seasonal conditions of the test site (i.e., indoors or outdoors, as appropriate) (Ref.: Test Procedures). (EMA)

Agency Response: The ARB agrees with this comment, and the appropriate change was reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 8).

Service Accumulation: Length of Time

80. Comment: Engine service accumulation (i.e., break-in) is unnecessarily long. The service accumulation should be reduced as long as engine emissions are stabilized (Ref.: 2407). (PPEMA)

Agency Response: The break-in procedure (e.g., the amount of time, etc.) is not determined by the ARB, but by the engine manufacturer. It is the engine manufacturer that specifies the amount of time required for the engine to become stable before testing.

Effect of Sampling Instrumentation

81. Comment: The requirement to measure the fuel consumption and power output before and after installing the emission sampling equipment should be deleted. These measurements should not be required if the emission test equipment's effect on a given engine family has been determined previously. The engine manufacturer should be allowed to provide data that indicates that the test set-up does not result in values beyond the acceptable limits for these engine parameters. (Ref.: Test Procedures, Part II, Section (12)(a)(2)(ii)). (EMA, Onan, Tecumseh)

Agency Response: The requirement that the test equipment does not significantly affect the fuel flow and power (i.e., before-and-after operational values do not differ beyond +/- 5 percent) is a current requirement. Such verification is reasonable because the possibility always exists that an engine test will not be set up accurately. This requirement ensures that the test data is not affected significantly by the test equipment, and has a smaller amount of variability. Accordingly, this verification should be conducted as part of each emission test.

Leak Check Procedure

82. Comment: The requirement to check the maximum allowable leakage rates for the vacuum and pressure sides of the analyzer systems is burdensome. The specification of pressure side leakage rate should be eliminated. It is burdensome and does not serve any useful purpose since any leakage on the pressure side does not contaminate the sample. (Ref.: Test Procedures, Part II, Section (12)(a)(3)(i)). (EMA, Onan, Tecumseh)

Agency Response: The requirement was incorporated from the U.S. EPA's proposed nonroad small engine test procedures. This requirement is good engineering practice because it ensures that the pollutants in the exhaust gases do not escape in amounts that render the test data invalid. Hence, the emission tests are more accurate and repeatable. However, the Executive Officer may allow an engine manufacturer to deviate from these leakage check procedures when circumstances require and allow for such deviations (See Response to Comments 61 through 64).

Zero and Spanning of Calibration Gases

83. Comment: The requirement to check analyzer zero and span after each test cycle is unnecessarily stringent and burdensome. Engine manufacturers should have the option of demonstrating that zero and span can be checked less frequently without loss of accuracy. (Ref.: Test Procedures, Part II, Sections (12)(a)(3)(iii)). (EMA, PPEMA, Tecumseh)

Agency Response: This requirement was incorporated from the U.S. EPA's proposed nonroad small engine test procedures. The ARB considers this requirement to be good engineering practice and incorporation makes the California practice consistent with federal practice.

84. Comment: The analyzer zero and span drift tolerance requirements of +/- 2 percent of full scale are additional burdens that are unnecessary. If required, the tolerance should be +/- 5 percent. (Ref.: Test Procedures, Part II, Section (12)(e)(4)). (EMA, Tecumseh)

Agency Response: This requirement was incorporated from the U.S. EPA's proposed nonroad small engine test procedures. Again, the ARB considers this requirement to be good engineering practice, and incorporation of the practice makes California's procedure consistent with federal practice. However, the Executive Officer may allow an engine manufacturer to deviate from these leakage check procedures when circumstances require and allow for such deviations. (See Response to Comments 61 through 64).

Service Accumulation: Substitution For Engine Preconditioning

85. Comment: The provision for substituting engine preconditioning for engine service accumulation if such accumulation was conducted for at least 40 minutes should be clarified. The extent to which the amount of time required for break-in (as determined by the engine manufacturer) is reduced is not clear (Ref.: Test Procedures). (PPEMA)

Agency Response: The intent of the regulations is to encourage engine manufacturers to use sound engineering practices to ensure that the emission control system is stabilized before emission samples are measured. The ARB believes that 40 minutes of continuous operation is the minimum amount of time required to stabilize the emission control system. The requirement detailed in the provisions specifies that the engine preconditioning can be deleted (i.e., proceed directly to the thermal stability determination) if the service accumulation (as determined by the engine manufacturer) has occurred without interruption for at least 40 minutes. (Ref.: Mail-out #94-35, Item No. 9).

Engine Preconditioning: Time Constraints

86. Comment: The requirement that the test cycle begin within five minutes of completing the engine preconditioning is too strict because it is difficult to time the completion of the engine service accumulation. The procedures should allow the emission testing to begin after engine temperature has stabilized as is specified in SAE J1088. (Ref.: Test Procedures). (PPEMA)

Agency Response: The time interval stated in the amended procedures was incorporated from the U.S. EPA's proposed nonroad small engine procedures in order to maintain consistency with the federal procedures. However, if the engine temperature stabilization is not accomplished within the time period, an engine manufacturer may request that the Executive Officer allow a manufacturer to deviate from the the time interval requirement on a case-by-case basis.

87. Comment: The preconditioning requirement for spark-ignition engines to be operated for a minimum of 20 minutes prior to the start of the thermal stability check should be deleted (Ref.: Test Procedures, Part II, Section (12)(b)(2)(ii)). (EMA, Tecumseh)

Agency Response: The ARB agrees, in part, with this comment. The provision has been revised to state that it is recommended, as opposed to required, that spark-ignition engines be preconditioned for 20 minutes. The change was reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item 9).

Determination of Engine Thermal Stability

88. Comment: The proposed amendments are not clear as to the location for measuring the cylinder temperature in determining thermal stability of the emission control system. The provisions should be changed to indicate that it is acceptable to measure the engine cylinder head temperature (i.e., at the spark plug seat) because it is not practical to measure the temperature in the engine cylinder. (Ref.: Test Procedures, Part II, Section (12)(b)(2)(viii)). (Honda)

Agency Response: The provisions do not require that a specific method be used to determine emission control system thermal stability. An engine manufacturer should use good engineering practice to accomplish this task. The provisions require that the emission control system thermally stable and that the method used to determine this stability be recorded.

89. Comment: The method for determining thermal stability should not be specified exactly (i.e., +/- 5 deg C over a five minute period). A general requirement provision should be used instead (e.g., goal is to achieve stability of engine parameters using various indicators). (Ref.: Test Procedures, Part II, Section (12)(b)(2)(viii)). (Kubota)

Agency Response: This comment is specific to language that was contained in the draft version of the amendments (Ref.: Mail-out #94-09, released February 16, 1994). The Staff Report version of the amendments addressed this issue (Ref.: Mail-out #94-24) by stating that the objective was to achieve thermal stability of all engine parameters prior to the emission measurements, and that the method used to determine this stability be recorded.

Carburetor Settings

90. Comment: The test procedures should be revised to allow engine manufacturers to test engines in any carburetor-setting sequence (i.e., rich, lean, nominal, etc.) as long as the proper engine speeds and loads are included. For example, adjustable carburetor-equipped engine testing should be conducted using a sequence of: i) at setting "A" measured at rated speed, then at idle; ii) at setting "B" measured at idle, then at rated speed; and, iii) at setting "C" measured at rated speed, then at idle. This sequence method is not as burdensome as the method contained in the regulations (Ref.: Test Procedures). (PPEMA)

Agency Response: Where appropriate, engine manufacturers may request that the Executive Officer approve an alternative to the required procedures (See Response to Comments 61 through 64). This affords manufacturers with flexibility while assuring maximum uniformity and equivalency.

Tolerances For Engine Speeds and Loads

91. Comment: The requirement to maintain engine speed and load to within +/- 5 percent for all power modes that have torques greater than 0.2 [lb-ft] is not realistic. The specification should be changed to be either +/- 5 percent, or +/- 0.1 [lb-ft] (whichever value is greater). (Ref.: Test Procedures, Part II, Section (12)(d)(2)). (EMA, Tecumseh)

92. Comment: The CVS procedure requires that the engine speed and load be maintained to the smallest tolerance possible within the capabilities of the test equipment and through the use of good engineering practice. This tolerance requirement should also apply to all torques (not just those less than 0.2 N-m) for the RGM test procedure. Tolerances should not exceed those specified by the engine manufacturer. (Ref.: Test Procedures, Part II). (PPEMA)

Agency Response: These tolerance values were changed on the basis of further discussions with industry. These changes are reflected in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 10). These tolerance values apply to both the RGM and CVS test procedures, and tolerance values are specified for all possible ranges of torques.

93. Comment: The provisions regarding the measurement methods for determining tolerances of specified engine speeds and loads need to be clarified (i.e., determine and record maximum, minimum, average values) (Ref.: Test Procedures, Part III, Section (15)(b)). (Kubota)

Agency Response: This comment refers to language that was included in the draft version of the amendments (Ref.: Mail-out #94-09, released February 16, 1994). The Staff Report version of the amendments (Ref.: Mail-out #94-24, released June 10, 1994) contained provisions that were more specific, and therefore, addressed the concerns stated in the comment.

Requirement For Hang-up Checks

94. Comment: The requirement to perform a hydrocarbon hang-up check within one minute of the completion of the last test mode should be optional (Ref.: Test Procedures, Part II, Section (12)(e)(1)). (EMA, Tecumseh)

Agency Response: A hydrocarbon hang-up check should be conducted as soon as possible as after the completion of the last mode of testing because this is good engineering practice. The one-minute requirement will ensure that the check is done as soon as possible. If circumstances require an allowance for a longer period of time beyond one minute, the Executive Officer may allow case-by-case deviations. (Ref.: Test Procedures, Part I, Section (20)(d)).

95. Comment: The procedures do not specify how a hydrocarbon hang-up check is accomplished. The regulations should be revised to clarify this requirement. (Ref.: Test Procedures, Part II). (PPEMA)

Agency Response: The purpose of the check is to improve the consistency of the test data in order to generate valid test results. To provide manufacturers with maximum flexibility, the test procedures have been drafted to allow manufacturers to develop their own particular check method. The method to accomplish this check should be based upon sound engineering practice.

Test Record

96. Comment: The provisions should be revised to clarify the format the ARB will require for test information when a data acquisition device other than a strip chart recorder is used (Ref.: Test Procedures, Part II, Section (13)(i)(1), (2) & (3)). (Kohler)

Agency Response: The format for non-strip chart recorder information is not specified in the regulations in order to provide individual engine manufacturers with sufficient flexibility to develop the applicable formats in accordance with their own particular requirements.

97. Comment: The requirement to continuously record the engine torque and speed for each mode should be eliminated because it is burdensome. Recording the average torque for each mode should be allowed because the average is used to determine the modal weighted results. (Ref.: Test Procedures, Part II, Section (13)(f)(4)). (Onan)

Agency Response: This requirement was adopted from the U.S. EPA's proposed nonroad small engine test procedures. The ARB has incorporated the procedure to be consistent with federal practice, but manufacturers may request to use alternative procedures that will assure equivalent results. (Ref.: Responses to Comments 60 to 63).

98. Comment: The requirement to record continuously the dynamometer test run of all modal emission data and analyzer output of exhaust gases implies that incremental recording is not allowed. Incremental recording should be permitted. (Ref.: Test Procedures). (PPEMA)

99. Comment: The preferred and/or pre-determined format for reporting the required information should be clarified. Single-point digitally averaged numerical values should be identified as an alternative method to satisfy the requirement for continuous records or strip chart records for engine torque and speeds, and for zero, span, sample, and hydrocarbon hang-up checks. (Ref.: Test Procedures, Part II, Section (13)). (EMA, Tecumseh)

Agency Response: The preferred format for reporting the required information is not intended to be specified in the regulations (See Comment No. 96). The regulations allow for variation in the test hardware; hence, the regulations must also allow for possible variations in the recording methods and in the manner that data are continuously recorded. (See Response through Comments 61 through 64). The Executive Officer may consider single-point digitally averaged numerical values (i.e., incremental recording) to be equivalent to continuous recording. Therefore, such incremental recording will be allowed upon approval of the Executive Officer. (Ref.: Test Procedures, Part I, Section (20)).

100. Comment: The test record procedures require engine manufacturers to continuously measure and record engine speed and torque. However, the test procedures indicate that the engine speed and torque are to be measured and recorded at only three intervals: 1) before the emission equipment is connected; 2) after the test equipment is connected before testing; and, 3) after all testing is completed. This contradiction should be clarified. (Ref.: Test Procedures, Part II, Section (13)). (PPEMA)

Agency Response: There is not a contradiction between these requirements. Engine manufacturers are required to measure and record continuously the engine torque and speed for emission sampling (See Response to Comment 97). Engine measurements related to the verification of sampling equipment effects (See Response to Comment 81) are not required to be recorded and submitted to the Executive Officer in conjunction with engine certification.

Humidity Correction Factor

101. Comment: The requirement to measure and record the ambient air humidity when testing two-stroke engines should be deleted (Ref.: Test Procedures, Part II, Section (13)(f)(11)). (PPEMA)

Agency Response: The humidity correction factor is used in the conversion of oxides of nitrogen concentration measurements into mass emission rates. The ARB provides two options to determine humidity values for two-stroke engine testing. The first option is to set the humidity correction factor to unity for data reduction of two-stroke engine emission measurements. Thus, an actual measurement is not required. The second option allows a manufacturer to determine the correction factor based on actual humidity measurements. However, this second option requires that the ambient humidity be measured and recorded. An engine manufacturer must consistently use the same option for all two-stroke engine families that are certified by the manufacturer. In other words, if the first option is chosen for one two-stroke engine family, then it must be used for all of the other two-stroke engine families. Or, when the second option is chosen for one engine family, then the humidity correction factor used for all of the other engine families must be based on actual ambient measurements, and the ambient measurements must be recorded. Accordingly, the requirement to measure and record the ambient humidity is not deleted. However, it is optional for certification tests of two-stroke engines.

102. Comment: The humidity correction factor (i.e., KH) is specified only for gasoline-fueled engines. The correction factor for diesel-cycle engines should be included (Ref.: Test Procedures, Part III, Section (26)(c)(5)(vii)(B)). (EMA, Kubota)

Agency Response: The ARB agrees with this comment and modified the proposal to reflect the change in the 15-day Notice (Mail-out #94-35, Item No. 12).

Data Reduction: Calculation of HC, CO, and NO2

103. Comment: The equations given for calculating HC, CO, and NO2 emissions do not agree with the equations contained in the SAE J1088 procedure. Specifically, the SAE formulas include a term for the correct molecular weight of the fuel. The accurate molecular weight of the certification fuel is required to obtain accurate results. Therefore, the SAE J1088 formula should be included in the regulations. (Ref.: Test Procedures, Part II, Section (14)(b)(4)). (EMA, Tecumseh)

Agency Response: The ARB agrees with this comment and modified the proposal to reflect the change in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 11).

Data Reduction: Formulas

104. Comment: The formula for determining H2 has an error (Ref.: Test Procedures, Part II, Appendix A). (EMA, Onan, Tecumseh)

Agency Response: The ARB agrees with this comment and modified the proposal to reflect the change in the 15-day Notice (Ref.: Mail-out #94-35, Item No. 12).

Dilution Air Sample

105. Comment: The wording "dilution exhaust sample" should be "dilution air sample" (Ref.: Test Procedures, Part III, Section (26)(c)(1)(iv)(B)). (EMA, Kubota)

Agency Response: The ARB agrees with this comment and modified the proposal to reflect the change in the 15-day Notice (Mail-out #94-35, Item No. 12).

International Organization for Standardization's (ISO's) 8178 Test Procedures

106. Comment: The particulate matter (PM) test procedures contained in the ISO's document 8178, Part I, Version N208, released October 4, 1993, should be incorporated by reference instead of Version N124 (Ref.: Test Procedures, Part IV). The N124 version is outdated and should be replaced by the N208 version in order to reduce test variability. Also, the procedures should be revised to include an allowance for engine manufacturers to utilize changes to these PM procedures without the burden of getting formal ARB approval. (EMA, Yanmar)

Agency Response: The ISO 8178-1 N124 version test procedures, released November 11, 1992, were added to the ARB procedures because the current procedures lacked methods for PM measurements of diesel-cycle engine exhaust. The N124 version was the version which was available when the regulatory amendments were developed. The N124 version is technically correct and reasonable, and its incorporation into the Test Procedures eliminates the current deficiencies. Therefore, the N124 version is satisfactory for the amendment purposes, and it remains the designated PM procedure in the regulations. However, an engine manufacturer can request approval from the Executive Officer to deviate (i.e., use the N208) from the required procedures. Any requests to deviate from the regulatory test procedures should be discussed with the ARB before an engine manufacturer proceeds with a plan of action. Otherwise, the final results may not be accepted as technically valid. (See Response to Comments 61 through 64).

Availability of ISO 8178 Test Procedure

107. Comment: The PPEMA could not evaluate the proposed incorporation of ISO 8178 procedures because the ARB did not provide a copy of these procedures in the draft version of the amendments (Ref.: Mail-out #94-09, released February 16, 1994). (PPEMA)

Agency Response: This comment refers to the draft version of the proposed amendments which was mailed out prior to the issuance of the Notice of the proposed rulemaking. Two copies of the ISO 8178 procedures were sent by the ARB to the PPEMA on April 18, 1994. The documents were available to the public during the 45-day comment period prior to the Board hearing.

COMMENTS RECEIVED IN THE 15-DAY COMMENT PERIOD

Test Setup

108. Comment: Utility engines are not typically equipped with long tail pipes as described in the procedures (Ref.: Test Procedures, Part II, Section (2), and Figure 2-1: Engine Test Setup). The regulations should allow the used an additional tail pipe (e.g., an extension, etc.) because this setup eliminates the need to sample the emissions at the muffler. This setup provides results that are more representative of actual emissions, and reduce the test difficulty due to equipment circumstances (e.g., inability to mount a sample probe into a small muffler, etc.). (Honda)

Agency Response: As set forth above, when appropriate and necessary, manufacturers may request that the Executive Officer approve alternative procedures on a case-by-case basis. (See Response to Comments 61 through 64).

Idle-Mode Torque Measurements

109. Comment: The amended procedures allow engine manufacturers to substitute a minimum torque capability for the required 10-percent torque value when the required value is not attainable (Ref.: Test Procedures, Part II, Section (12)(b)(2)(vii)). Some small utility engines cannot drive the dynamometer when the engines are operated at idle; therefore, these engine do not have a measurable minimum torque capability. The procedures should recognize this situation and allow the engine to be uncoupled from the dynamometer whenever the minimum torque cannot be measured in the idle-mode tests. (Honda)

Agency Response: This comment is duplicative of one received during the 45-day comment period. See the agency response to Comment 52.