State of California
AIR RESOURCES BOARD

Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Responses

PUBLIC HEARING TO CONSIDER AMENDMENTS TO ADOPT NOT-TO-EXCEED AND EURO III EUROPEAN STATIONARY CYCLE EMISSION TEST PROCEDURES FOR THE 2005 AND SUBSEQUENT MODEL YEAR HEAVY-DUTY DIESEL ENGINES

Public Hearing Date: December 8, 2000
Agenda Item No.: 00-12-5

I. GENERAL

The Staff Report: Initial Statement of Reasons for Rulemaking ("staff report"), entitled "Public Hearing To Consider Amendments To Adopt Not-To-Exceed And Euro III European Stationary Cycle Emission Test Procedures For The 2005 And Subsequent Model Year Heavy-Duty Diesel Engines," released October 20, 2000, is incorporated by reference herein.

Following a public hearing on December 8, 2000, the Air Resources Board (the Board or ARB) by Resolution 00-53 approved the supplemental test procedures for 2005 and subsequent model year heavy-duty diesel engines (HDDEs). Resolution 00-53 is attached and incorporated by reference herein. The Board approved the regulatory language as proposed with non-substantive corrections. The affected sections are title 13, California Code of Regulations (CCR), section 1956.8 (amended) and the incorporated "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" (amended); and section 2065 (adopted).

Background: In the 1990s, seven large manufacturers of HDDEs violated certification regulations by turning off, or defeating, emission control equipment during in-use highway driving. To address this violation, the Department of Justice, the United States Environmental Protection Agency (U.S. EPA) and the ARB signed consent decrees with the seven engine manufacturers. A consent decree is a judicial decree that recognizes a mutual settlement between the parties — in this case, between the government and the engine manufacturers (herein referred to as the "settling manufacturers").

In the consent decrees, the settling manufacturers are required, among other things, to produce HDDEs that comply with prescribed emission standards that are lower than those required in current state and federal regulations, as measured by the Federal Test Procedure (FTP). Specifically, these engines must meet a 2.5 gram per brake horsepower-hour (g/bhp-hr) standard for non-methane hydrocarbons (NMHC) plus oxides of nitrogen (NOx) emissions no later than October 1, 2002 (about 50 percent cleaner than current engines). In addition, because it was found that the FTP was not adequate to ensure that exhaust emissions were controlled during all in-use driving, it was agreed that compliance with supplemental test procedures would be necessary. Thus, the majority of the settling manufacturers agreed to produce engines by October 1, 2002, that would meet supplemental test procedures including the Not-To-Exceed (NTE) test and the EURO III European Stationary Cycle (ESC) test. The consent decree states that these requirements must be met for a period of two years. Together with the FTP test, the supplemental test procedures will require control of emissions during the majority of real world operating conditions, ensuring that in the future defeat devices will no longer be employed.

Recognizing the effectiveness of the supplemental tests, the U.S. EPA published a Notice of Proposed Rulemaking (Vol. 64, Federal Register, pp. 58472- 58566, October 29, 1999) proposing to adopt similar supplemental test procedures for 2004 and subsequent model year HDDEs. However, because of federal timing constraints, the NTE and ESC test procedures will not be required until the 2007 model year for federally certified HDDEs (65 FR 59896, October 6, 2000). Therefore, once the HDDE consent decree requirements expire in 2004, the settling manufacturers will not be obligated to comply with the supplemental test procedures in 2005 or 2006. Not until the 2007 model year, when the federal rule comes into effect, will HDDE manufacturers be required to comply with similar supplemental test procedures federally.

The amendments close the two-year span, after the termination of the consent decrees, from which time engine manufacturers need only satisfy the FTP test under previous state and federal regulations. The span is closed through adoption of the supplemental test procedures that cover a wider range of engine operating conditions. The result is that potential excess NOx emissions greater than 17 tons per day and 13 tons per day in 2006 and 2010, respectively, are eliminated from California registered heavy-duty vehicles. Additional emission reductions could also be realized when other states adopt these procedures under the authority granted in Section 177 of the Federal Clean Air Act[1] from "clean" out-of-state heavy-duty diesel vehicles travelling in California.

There are no changes to the existing emission standards. The amendments include three supplemental test procedures: the NTE test, the ESC test, and the Maximum Allowable Emission Limits (MAEL) test. Each test is identical to those in the consent decrees and is incorporated by reference in the "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles." The NTE test covers most transient operating conditions unlike the current FTP certification test. The NTE test covers a general portion of the engine's operating map instead of a specific test cycle of speed and load versus time for which an engine must be tested. Further, the lack of any specific operating map enables the ARB to conduct in-use tests of vehicles. Emissions from the NTE test are compared to the existing emission standards with an additional 25% allowance (1.25 times the FTP standard).

The ESC test is a steady state test that runs an engine through 13 specific modes of operation. The first mode is at the engine's idle, and the remaining modes vary between 25% load and 100% load, and 25% engine speed and 75% engine speed. The weighted average emissions are then compared to the existing emission standards. Similar to the ESC test, the MAEL test is also conducted during engine steady-state conditions. The MAEL test uses the emission results from the 12 non-idle test modes of the ESC test. These test points form the outline of the MAEL control area in which actual emissions cannot exceed MAEL emission caps. Any intermediate point is determined through linear interpolation. Consequently, a MAEL curve of emission caps can be developed for the entire NTE control area. Both tests limit an engine's potential to exceed existing emission standards during constant speed driving that is typical in highway operation.

Economic and Fiscal Impacts. The Board has determined that the proposed regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(5) and (6), to any state agency or in federal funding to the state, costs or mandate to any local agency or school district whether or not reimbursable by the state pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or other non-discretionary savings to local agencies.

[1] Section 177 allows the adoption of California standards under specified circumstances.

The Board has also determined that the proposed regulatory action will not have a significant adverse economic impact on businesses, including the ability of California businesses to compete with businesses in other states, except as noted below.

The businesses affected by the proposed supplemental test procedures are the manufacturers of HDDEs sold in California. Based on previous sales data, there are 21 companies that manufacture these types of engines. The proposed test procedures may be expected to result in some engine design modifications, which in turn, may result in increased costs to the engine manufacturers. However, these costs are expected to be passed on to the consumers or purchasers of heavy-duty vehicles with a gross vehicle weight rating of 14,001 pounds and greater. Since the settling manufacturers account for approximately 60 percent of heavy-duty diesel vehicle sales and are required to comply with identical requirements beginning two years prior to 2005, most purchasers are not expected to experience an increase in vehicle cost as a result of the proposed regulations.

If the entire costs are passed on to the consumer, heavy-duty vehicle retail prices would increase by a maximum of approximately $674 per medium heavy-duty vehicle and $824 per heavy heavy-duty vehicle in the 2005 model year. U.S. EPA estimates that average vehicle costs are $52,000 per medium heavy-duty vehicle and $108,000 per heavy heavy-duty vehicle. Based on U.S. EPA's estimated vehicle costs, the estimated price increase would represent a 1-2 percent price increase. A price increase of this size is not expected to dampen the demand of heavy-duty vehicles. Consequently, the impact to dealers of heavy-duty vehicles is not expected to be significant. The expected price increase is also not expected to impact California employment, business expansion, creation and elimination, or the ability of California businesses to compete with businesses from other states.

Due to the additional emission control technologies that may be required, manufacturers of those technologies may experience higher sales volume. The higher sales volume may also increase employment for those businesses that supply parts to related businesses. Compared to overall California employment, this effect is expected to be minor. Additionally, to the extent that manufacturers use contract laboratories located in California for testing or other research and development efforts, there is a potential increase in contract laboratory employment. No other associated businesses are expected to be affected by the proposed supplemental test procedures.

Alternatives. For reasons set forth in the Initial Statement of Reasons, in staff's comments and responses at the hearing, and in this Final Statement of Reasons, the Board has determined that no alternative considered by the agency, or that has otherwise been identified and brought to the attention of the agency, would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective or less burdensome to affected private persons than the action taken by the Board.

II. SUMMARY OF COMMENTS AND AGENCY RESPONSE

At the December 8, 2000 hearing, oral testimony was received from:

Mr. Carl Johnson, New York State Department of Environmental Conservation
Mr. William Becker, State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials
Ms. Stephanie Williams, California Trucking Association*
Mr. Jeff Marsee, Isuzu Motors America* (Isuzu) (Mr. Marsee delivered letter that was signed by Samuel A. Leonard and Akira Nagami)
Ms. Jennifer Taggart, Daimler Chrysler* (DC)

Ms. Lisa Stegink, Engine Manufacturers Association (EMA)* (2 comment letters)

Those names above with asterisks also submitted written comments. Most of these written submissions were comments on the proposed amendments to the regulations and were received during the 45-day comment period. About half of the oral testimony were in support of the proposal. Comments to the proposal are addressed below.

Written comments were received by the hearing date from:

Mr. Jed R. Mandel, Representative for Engine Manufactures Association (EMA)
Ms. Patricia Guerrero, Representative for International Truck and Engine Corporations (International) (2 comment letters; 1 timely and 1 late)
Mr. Gilbert S. Keteltas, Representative for Caterpillar Inc.
Ms. Stephanie Williams, California Trucking Association
Mr. Patrick M. Raher, Representative for Daimler Chrysler AG
Mr. Jeffrey Dowell, Director - Product Assurance, AM General Corporation/Hummer
Mr. Samuel A. Leonard/Mr. Akira Nogami, General Motors Corporation/Isuzu America, Inc. (GM/Isuzu)

A number of the commenters supported adoption of the proposed amendments. Comments in support of the amendments are not summarized below. These commenters included:

Mr. Larry F. Greene, President, California Air Pollution Control Officers Association
Ms. Lauren A. Liss, Commissioner, Massachusetts Department of Environmental Protection
Ms. Jane K. Stahl, Deputy Commissioner, Connecticut Department of Environmental Protection
Mr. Jeffrey Saitas, Executive Director, Texas Natural Resource Conservation Commission
Mr. Allen Biaggi, Administrator, Nevada Division of Environmental Protection
Mr. James M. Salvagio, Director, Pennsylvania Department of Environmental Protection
Mr. Kenneth Colburn, Director - Air Resources Division, New Hampshire Department of Environmental Services
Ms. Martha G. Kirkpatrick, Commissioner, Maine Department of Environmental Protection
Mr. John Elston, Administrator, New Jersey Department of Environmental Protection
Mr. John P. Cahill, New York Department of Environmental Conservation
Ms. Jane Nishida, Ozone Transport Commission
Mr. Ronald Methier, Branch Chief – Air Pollution Branch, Georgia Department of Natural Resources (late submittal)

No comments were submitted by the Office of Small Business Advocate or the Trade and Commerce Agency.

Set forth is a summary of each objection or recommendation made regarding the specific regulatory actions proposed, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or of the reasons for making no change. The comments have been grouped by topic wherever possible. Comments not involving objections or recommendations specifically directed towards the rulemaking or to the procedures followed by ARB in this rulemaking are not summarized below. Additionally, any other referenced documents are not summarized below.

A. REGULATORY REQUIREMENTS

1. **Comment:** ARB's proposed NTE requirement undermines ARB's commitments pursuant to the 1995 Statement Of Principles (SOP). The ARB's proposed

amendments represent a radical departure from the commitments embodied in the SOP. (International)

Agency Response: The SOP relates to the stabilization of emission standards to ensure the lead time needed to satisfy those standards. The Board approved requirements only consist of additional test procedures and thus, no changes to the existing emission standards. Therefore, this does not affect the SOP. It should also be noted that even during the signing of the SOP in 1995, several engine manufacturers knowingly violated emission standards through use of "defeat devices" that turned off emission controls. Consequently, the supplemental test procedures will ensure that future engines will include technology that results in lower emissions that are consistent with the emission reductions anticipated in the SOP.

2. **Comment:** The proposed NTE emission standard and test procedure is inconsistent with the mandates of the Clean Air Act ("CAA") and California law. (International)

   The U.S. EPA's proposal violates the mandatory lead time and stability requirements of the CAA. CAA Section 202(a) requires the ARB to provide the mandated lead time and period of stability for any HDE standard it adopts. If the ARB adopts the proposed NTE emission standard for HDEs, it will violate both the stability and lead time requirements. The stability requirement means that any new HDE emission standard that goes into effect must stay in effect for three years before the ARB may establish another standard. Because new HDE standards will take effect in MY 2004, the ARB may not lawfully impose new emission standards, such as the NTE, until MY 2007 at the earliest. Separate and apart from the stability considerations, the ARB is prohibited from lawfully adopting the proposed NTE standard for MY 2005 due to the independent, mandatory lead time requirement. Lead time is calculated using full model years. The U.S. EPA has defined a model year to include January 2 of the preceding year through December 31 of the model year date. Under that definition, MY 2005 could begin as early as January 2, 2004. It is therefore too late to provide four full years of lead time for implementation of the proposed standards in 2005. (International)

   If adopted by the ARB, the proposed amendments would not meet the mandates of the CAA and California law. The ARB proposal violates the lead time and stability requirements of the CAA. ARB's proposal to adopt supplemental emissions requirements and test procedures (SERT) for the 2005 model year fails to provide four years' lead time. ARB's proposal fails to provide the necessary three-year period of stability. (EMA)

   The proposed 2005 implementation date will violate the four year lead time and/or the three year period of stability requirements set out in the CAA. The U.S. EPA does not have the legal authority to give California a waiver to enact these rules in 2005. (EMA comment on 86.1360-2007(a))

   California's proposal fails to comply with the lead time and stability requirements of the CAA. (DC)

   Agency Response: As stated in the Staff Report, federal timing constraints do not apply to California's rulemaking. The CAA requirements do not apply to this rulemaking since there are no proposed changes to emission standards that ARB adopted in 1999. Further, California has authority to adopt a separate state program, including a certification program, for new motor vehicles and new motor vehicle

engines under CAA § 209(b). California has the authority to adopt test procedures that ensure that new motor vehicles and new motor vehicle engines meet California's state emission control standards.

3. **Comment:** The NTE regulatory requirement has been developed to address other manufacturer's concerns. The Consent Decree requirements, including the Supplemental Testing requirements, and specifically the NTE requirements, were the product of private negotiations between the affected engine manufacturers and the regulatory agencies. Thus, GM and Isuzu did not have any input into the final Consent Decree requirements and those requirements do not reflect concerns that relate to the engine designs that GM and Isuzu manufacture and market. Private settlement negotiations are rarely the best method for developing regulations of general applicability. (GM/Isuzu)

   Agency Response: The NTE and ESC have been developed to address the concern of "off-cycle" emissions, that is, engine operation outside of the Federal Test Procedure (FTP). The excess emissions from HDDE operation not included in the FTP test accounts for a significant amount of the total NOx and particulate matter emissions. Concerns for off-cycle emissions increased during the last decade as electronic controls were developed and manufacturers attempted to optimize fuel economy using the advanced capabilities of these electronic controls. The electronic controls exist on both current consent decree and non-consent decree engines. Therefore, new supplemental test procedures were developed to cover most operation cycles, thereby reducing emissions. These tests ensure that the original benefits assumed for the FTP test are obtained.

   The U.S. EPA, U.S. DOJ, and the ARB continue to have meetings with the consent decree manufacturers regarding the consent decree requirements. The ARB will schedule frequent meetings with the non-consent decree engine manufacturers to inform them of any changes to the consent decree requirements and discuss the need for changes to the proposed requirements.

4. **Comment:** The proposed NTE requirement is an emission standard, not simply a test procedure. The proposed NTE standard will force manufacturers to design their engines to emission control levels significantly lower than the FTP-based standard, thereby effectively creating a new and more stringent de facto standard. In addition, the NTE requirements constitute emission standards because, according to the ARB's own analysis, they are purportedly designed to reduce emissions. The courts have consistently found that such requirements are, by definition, standards. (International)

   The proposed requirements constitute new emission standards, not simply test procedures. The initial mail-out on the proposed amendments was titled, "Consideration of Amendments to Adopt Not-To-Exceed and Euro III European Stationary Cycle *Emission Standards* and Test Procedures for the 2005 and Subsequent Model Year Heavy-Duty Engines and Vehicles." After EMA's meeting with ARB Staff on October 5, 2000, in which EMA representatives pointed out that ARB did not have the authority to adopt new emissions standards for heavy-duty on-highway engines without meeting the lead time and stability requirements imposed by Section 202 of the CAA, the ARB deleted the words "Standards and" from the title of the second mail-out announcing the Board hearing. The ARB's thinly-veiled attempt to recast its proposal does not change the substance: The ARB has proposed new emission standards. The ARB cannot avoid characterization of the SERTs as emissions standards simply by changing their name to call them "test

procedures" or "caps." Indeed, while the Staff attempts to use semantics to avoid such characterization of the SERTs in the proposed regulatory language, the Staff Report belies that approach by acknowledging that the SERTs are emissions standards. [Emphasis in original] (EMA)

The use of different emission control strategies and upgraded engine accessories – changes in engine design – are essential to compliance with emissions standards. Test procedures are designed to provide a consistent means to measure an engine family's ability to meet the standards, not a means to drive engine design. Staff's acknowledgement that the proposed requirements necessitate revised engine designs and Staff's projection of emission inventory benefits from the proposal are convincing arguments that the SERTs, in fact, constitute new emissions standards. (EMA)

Agency Response: The NTE and ESC requirements constitute additional test procedures to the FTP since the requirements only provide extended methods for testing heavy-duty diesel engines and vehicles. Emission results from the tests are compared to the existing emission standard, rather than a new emission standard. ARB adopted the standard in 1999 for the 2004 model year to parallel the U.S. EPA's 2004 model year standards. The NTE testing allowance of an additional increment of 25% of the FTP provides manufacturers flexibility to control emissions during operation not included in the FTP.

Further, the test procedures ensure the original emission benefits assumed for the existing FTP-based emission standards. The benefits previously assumed during the typical range of in-use operation were no greater than certified emissions. Notwithstanding the emission levels tested by the FTP, some engine manufacturers modified their engines to increase fuel economy during non-FTP driving. This resulted in higher than certified emissions. The NTE and ESC test procedures will cover a wider range of operating conditions, thereby ensuring that "non-FTP" emissions are at the same levels as FTP emissions.

5. **Comment:** CTA supports a consistent test procedure from 2002 forward for all bus and truck engines. Historically, bus engines have met the same or more stringent standards than heavy-duty truck engines. It is unclear why urban bus manufacturers would be exempt. A heavy-duty bus engine should be able to meet a tighter standard than a heavy-duty truck engine. (CTA)

   Agency Response: Bus engines will continue to be subject to more stringent emission standards as can be noted in the separate urban bus standards recently adopted in 2000. Consequently, in 2004 urban buses will likely require aftertreatment devices to comply with NOx and PM emission standards that are 75% to 90% lower than HDDE standards. At this time, very little data exist on compliance with the NTE and ESC tests in engines with aftertreatment devices.

6. **Comment:** Promulgating a California-only engine standard and exempting buses will have a negative impact on NOx emissions, demonstrate a false NOx emission value based on attainment criteria and allow natural gas engines to "escape" from a more rigorous test procedure. (CTA)

   Agency Response: The comment focuses on the omission of urban buses and natural gas engines from the requirements. The NTE and ESC requirements do not apply to urban buses due to other recently adopted standards that progressively reduce emissions from urban buses. These urban bus standards were adopted in

2000 and apply to 2004 and subsequent model year urban buses. Further, natural gas engines typically emit less than their diesel fueled counterparts and account for a smaller portion of the emission inventory. Reductions of excess emissions were calculated based on heavy-duty diesel vehicles only and do not include exempt vehicles to avoid false emission values.

It should be noted that the Board adopted requirements only include supplemental test procedures, not emission standards. There is no change to the existing emission standards. The supplemental test procedures only ensure previous emission benefits as calculated and determined in the FTP test. The anticipated emission reductions will not demonstrate a false NOx value since the supplemental tests include a broader range of operating conditions. As demonstrated by engine manufacturers, without the supplemental tests, emission reductions from HDDEs based on the FTP have been illusory since electronically controlled engines are capable of optimizing fuel economy with a corresponding increase in NOx emissions.

Of further benefit are the fourteen additional states that have voiced support for the adopted requirements. These states intend to adopt similar requirements under Section 177 of the CAA. Including California sales, these states account for almost 40% of nationwide sales. Due to manufacturing economics, engine manufacturers will likely build a single line of clean engines throughout the U.S. rather than in selective states only.

7. **Comment:** Not-to-Exceed Test Procedure should set reasonable cutpoints to verify compliance with the standards. The area under the torque curve of an engine where emissions must not exceed a specified amount may not be a reasonable method for either engine users or engine manufacturers. While test cutpoints are necessary (in this case 1.25 times the FTP limit), a more averaged approach may be more beneficial to both the end user and the manufacturer. As was found with the initial "snap-idle test procedure", the method for measuring smoke was too sensitive and did not average the emissions over a period of time. This approach made it difficult to determine if the engine was out of specifications for certification or if the end user was not maintaining the vehicle. It turned out that the cutpoints were so sensitive that a clear line could not be drawn unless the cutpoints were less restrictive. The extreme sensitivity of the testing equipment left the regulator with no clear delineation of compliance verses non-compliance. (CTA)

   Agency Response: The proposed requirements are identical to those in the consent decrees. Engine manufacturers have agreed upon the consent decree requirements since 1998. The consent decree requirements will be effective in October 2002, three years before the test procedures are implemented industry-wide. To change those requirements and/or "cut points" now, will only decrease the time available for any changes that may be needed in engine design.

   While the comment mentions the benefits of an "averaged approach," it also mentions the difficulty in determining if an engine is "out of specification." Another purpose of the NTE test is to enable in-use testing of vehicles. The averaging approach would increase the difficulty in determining compliance of an in-use vehicle. There would be no certainty whether the engine was intended to reduce the overall average emission or had emissions above the average. Manufacturers could potentially claim that all engines tested were the above average emitting engines, while those that were not tested were the below average emitting engines. Therefore, no changes to the requirements have been made.

8. **Comment:** The requirements are also subject to potential changes and indeed we understand that Consent Decree companies are still in discussions with the regulatory agencies concerning potential alterations to the NTE requirements defined in the Consent Decrees. (GM/Isuzu)

   Agency Response: The consent decrees were not the sole basis for the staff's proposal. Details from the U.S. EPA's Final Rule and the technical information provided from manufacturers during numerous meetings also helped to establish the requirements in the proposed supplemental test procedures. If there is any need to modify the consent decree NTE requirements due to the technological difficulties, the deficiency allowance for the NTE test will provide flexibility for manufacturers. If regulatory changes are needed, staff will propose changes to the Board at a later date. In addition, manufacturers will be given opportunities to present comments and findings to the ARB during the technology review process scheduled in 2003. Further, ARB staff will schedule frequent meetings with the non-consent decree engine manufacturers to inform them of any changes to the consent decree requirements and discuss the need for changes, if any, to the proposed test requirements.

B. TECHNOLOGICAL FEASIBILITY

9. **Comment:** Subparagraph 86.1370-2007(f) appears in the U.S. EPA rule and provides a cold temperature operating exclusion from the NTE requirements for engines equipped with EGR. This subparagraph is proposed to be deleted from the ARB rules even though subparagraph 86.007(p)(2) of the ARB proposal suggests that the NTE cold temperature exclusion is allowed. Clearly, the ARB must resolve the inconsistencies in these two sections of the proposed rulemaking. Further, the ARB must determine that the cold temperature exclusion is allowed. The Staff Report's casual reference to manufacturers' ability to use more corrosion resistant materials grossly misrepresents the technical challenge associated with making appropriate material substitutions for components in the intake system and combustion chamber while retaining full functionality and durability of the engine. Also to be considered is the added cost of the substitute materials. These feasibility and cost factors were not considered in the Staff Report. Further to be considered is the fact that the added development and material costs may represent a stranded investment in technology that is no longer required after 15 ppm or lower sulfur fuel becomes available in mid-2006 as anticipated. (EMA)

   Agency Response: Although the Staff Report references the manufacturer's ability to use more corrosion resistant material, the ARB does agree that some technical challenges remain to allow applicability of this technology to all operating conditions. The primary concern for material corrosion has been the use of EGR during cold temperatures. To be consistent with the consent decrees and to allow flexibility, no specific cold temperature exclusion is included in the adopted requirements. Rather, deficiency allowances may be granted with sufficient technical justification. Since this allowance is granted on an engine family and model year basis, engine manufacturers must demonstrate progress to resolve the technical challenges. Added material costs should not be viewed as stranded investments since sulfur will continue to be in the diesel fuel and lubricants. Consequently, corrosion will continue to be a concern. The additional costs due to these developments is included in the

cost analysis and are not expected to be significant since similar materials are currently used in other chemical and refining applications.

10. **Comment:** The NTE emission standard is not technologically feasible. The staff have failed to cite or analyze any relevant data to support a finding that the proposed requirements are technologically feasible. (International)

    ARB has failed to meet its legal mandate to demonstrate that the proposed SERTs are technologically feasible. (EMA)

    The ARB has completely failed to take into consideration the feasibility of its proposed new requirements. (DC)

    Agency Response: It should be noted that the Board adopted requirements only include supplemental test procedures, not emission standards. From February to June of 2000, staff participated in a series of meetings with the engine manufacturers and the U.S. EPA regarding the supplemental tests. The major concerns raised by engine manufacturers were extreme operating conditions, such as high altitude and high torque conditions. These conditions represent a small, though challenging, portion of the control zone. Control strategies compliant under these operating condition are expected in the consent decree engines by October 2002. Thus we expect that feasibility in 2005 will not be a problem. Additionally, if there are concerns, the deficiency provisions may be used to allow additional lead-time for compliance.

11. **Comment:** GM and Isuzu have no experience in meeting an NTE requirement with our engines and therefore are likely to encounter unexpected technical hurdles. For GM and Isuzu, this proposal is not a question of "continued compliance" or an issue of preventing "backsliding." For our companies, this is an entirely new regulation that will take effect in 2005, two years earlier than the similar U.S. EPA requirements. (GM/Isuzu)

    Agency Response: Although the NTE requirements will require non-consent decree engine manufacturers to complete some research and development, consent decree manufacturers will implement the same requirements in October 2002. Since the technologies used for compliance will be available prior to the adopted requirements, non-consent decree engine manufacturers like GM and Isuzu will be able to learn from the experiences of the consent decree engine manufacturers. The ARB also plans to meet with non-consent decree engine manufacturers on a regular basis to discuss technology development issues. It should be noted that the U.S. EPA published a public notice of their intent to adopt the same test procedures into regulation in October 1999 for 2004 implementation. Therefore, this is neither a new regulation nor an unfamiliar requirement.

12. **Comment:** Under the CAA and California law, a test procedure must be designed to measure conformity with the underlying standard. The NTE measures conformity with an altogether new and different requirement -- 1.25 x FTP standard. Specifically, unlike the FTP, it is an absolute cap on emission excursions under conditions that can reasonably be expected to be encountered in normal vehicle operation. (International)

    A manufacturer is potentially subject to unlimited compliance jeopardy under one view of the NTE requirement because the provisions apply under any operating conditions within the NTE zone. (GM/Isuzu)

Agency Response: As stated in the comment, the supplemental test procedures measure conformity with the FTP emission standard with an additional 25% allowance to add compliance flexibility. Therefore, the NTE test does not measure conformance with new and different requirements. The objective of the NTE is to provide a method to address the emissions that are not covered in the current HDDE FTP test and are likely to occur in real world operation. ARB's experience in the past using the FTP test in engine certification, was that many manufacturers optimized their engines to comply with the known test cycle only. Consequently, operation of the engine outside of the test cycle often resulted in higher emissions. Therefore, in order to ensure the reduction of emissions as presented in the certification data, manufacturers are given a range of prescribed test cycles and are required to meet the existing emission limit with a 25-percent allowance within the range of the NTE control zone.

The comment also mentions that unlike the FTP, the NTE test is an absolute cap. However, both the FTP test and the NTE test are only test procedures. There are no proposed changes to the existing emission standards. These existing emission standards "cap" emissions at the standard. Notwithstanding the standard, certain engine manufacturers have taken advantage of the limited range of the FTP to optimize engine performance outside of the FTP test cycle. The NTE and ESC tests cover a wider range of operating conditions, thereby limiting the possibility of exceeding the standards over the range of typical in-use operation. The NTE test also enables in-use compliance verification to ensure continued compliance. Additionally, a 25% allowance is added to the testing protocol to allow flexibility in complying with the entire range of operations.

13. **Comment:** The inefficient and arbitrary numerical limit placed on engine emissions under any operating condition within the NTE zone. (GM/Isuzu)

Agency Response: The NTE emission cap is identical to the requirements in the consent decree and the U.S. EPA's Final Rule. Thus, the NTE emission cap is an established number. Additionally, if manufacturers demonstrate to the ARB that they have difficulty meeting the cap due to technology or lead time issues, deficiency provisions are provided for specific modes of operation. This allows manufacturers additional lead time for technology development and compliance in the range of typical operations.

14. **Comment:** The subjective nature and imprecision will accompany compliance measurements under the NTE requirements. (GM/Isuzu)

Agency Response: Although the NTE test gives a range of prescribed test cycles rather than prescribed testing points, the compliance measurements are identical to the consent decrees. Consequently, a vehicle and its engine may be tested in modes of operation that the vehicle will experience in "real-world" operation rather than under conditions a prescribed test cycle fails to represent. Thus, the results reflect emission levels that are truer to in-use emissions.

C. COSTS AND EMISSION BENEFITS

15. **Comment:** The ARB failed to demonstrate that its proposal is cost-effective. (EMA)

    Agency Response: Included in Section 9 of the Staff Report is a complete economic impact analysis that demonstrates the cost effectiveness of the requirements. To summarize the analysis, the costs are based on U.S. EPA estimates that included compliance with similar supplemental test procedures, as well as reducing the NOx portion of the FTP emission standard from 4 to 2 grams per brakehorsepower-hour (The U.S. EPA adopted the 2 gram standard in 1997 and reaffirmed the standard in 2000; 62 F.R. 54694, October 21, 1997 and 65 F.R. 59896, October 6, 2000). Consequently, the costs used in ARB's analysis are worst case costs since the adopted requirements include only the supplemental test procedures. The average cost of compliance is about $800 per vehicle, per lifetime. With an average reduction of about 2 tons per vehicle, in its lifetime, the cost effectiveness is $0.17 per pound of NOx reduced. This compares favorably to the cost effectiveness of other recently adopted emission reduction measures, which can often cost $5 per pound of pollutant reduced, or more.

16. **Comment:** California fails to take into consideration market impacts of the new standards. California's actions in enacting these new NTE and ESC test procedures and standards will serve to isolate California from the rest of the nation. Specifically, these new requirements will encourage the out-of-state purchase and registration of trucks, especially if significant penalties are associated with failure to comply with the new standards. (DC)

    Agency Response: The staff's Initial Statement of Reasons, included both a cost analysis and emission analysis. The cost analysis includes conservative cost estimates for medium heavy-duty diesel vehicles and heavy heavy-duty diesel vehicles. The emission analysis includes emission inventory calculations, with projected emission reductions calculated separately for California registered and non-California registered vehicles operating in California. The cost effectiveness of NOx reduction was estimated to be at the lower range of those from other regulations promulgated by ARB in the past decade. Furthermore, with other states adopting the California regulations using Section 177 of Clean Air Act, the burden to California businesses will significantly decrease.

17. **Comment:** The ARB failed to accurately quantify the emission inventory benefits of its proposal. The ARB has estimated that its proposal to pull ahead the SERT requirements for model years 2005 and 2006 would result in NOx reductions of 10.8 tons per day in 2005 and 22.1 tons per day in 2006. ARB's inventory estimates are incorrect and must be revised. For example, the estimates are based on faulty assumptions about when vehicles are sold and when they accumulate mileage. ARB's emission reduction analysis wrongly assumes that all 2005 model year vehicles were put into service on January 1, 2005, and all 2006 model year vehicles were put into service on January 1, 2006. A proper analysis should have assumed that no vehicles were put in service by January 1, and nearly all by December 31 of the applicable model year, so that approximately one-half of the vehicles were in service by June 30. (EMA)

Agency Response: The comment is based on incorrect analysis. The daily vehicle miles traveled (VMT) used in estimating the excess NOx emissions are derived from the model year specific, average annual mileage accrual rate and the corresponding model year specific, vehicle population. The average annual accrual rate is the average of all vehicle miles driven throughout the calendar year by vehicles of the same model year. In the case of new model year vehicles, the average annual accrual rate is the average of all vehicle miles driven throughout the calendar year, in other words by vehicles sold from January 1 to December 31. Thus, unlike EMA's comment, the daily VMT used in estimating excess NOx emissions reduced with the proposal accounts for the fact that the new model year vehicles were put into service throughout the year.

D. EXEMPTIONS

18. **Comment:** There is no reason to restrict its application to "natural gas and other non-diesel fueled diesel cycle engines." Engines using diesel fuel should be treated the same as engines using non-diesel fuel with regard to this exclusion. (EMA)

    Agency Response: The adopted requirements are similar to those in the consent decrees and are intended to prevent excess emissions from on-road heavy-duty diesel engines after the consent decrees terminate. Since no compliance problems have been revealed from off-road and non-diesel fueled diesel engines, the adopted requirements will not apply to those engines.

19. **Comment:** Believe that the small volume manufacturer and the ultra-small volume manufacturer designations originated with rulemakings that did not involve HDDEs (but rather vehicles) and, that it may not be appropriate to conclude that the best characterization of an ultra-small HDDE manufacturer is 300 sales or less in California. Rather, in order to provide small, single-line manufacturers the additional flexibility needed to compete in the marketplace, we strongly urge the ARB to amend their proposal. We request that ARB include an additional provision in Section (j) that grants HDDE manufacturers who certify a single engine family and who have California sales less than 1000 units/year an exemption from the supplemental NTE and ESC requirements until the 2007 model year. (AM General Corporation/Hummer)

    Agency Response: The exemption is provided to allow small volume manufacturers additional time to develop control methods for NTE and ESC operation. Since HDDE regulations traditionally do not include exemptions for ultra-small volume manufacturers, the exemption provides more flexibility compared to other requirements. Based on the last three years of sales data provided by manufacturers, the exemption applies to approximately 1-2 percent of heavy-duty engines sold. The commentor's proposed exemption would more than double the exemption to 5-8 percent of heavy-duty engines sold. Additionally, ARB's exemption level is identical to that for motor vehicle fuel evaporative emission standards and test procedures (California Code of Regulations, Title 13, Section 1976). Therefore, the exemption threshold shall remain as adopted.

E. SPECIFIC PORTIONS OF REGULATORY TEXT

20. **Comment:** Preamble discussion of the test procedures (page B-3). This discussion includes existing language stating "Starting with the 1990 model year, these regulations shall be applicable to all heavy-duty diesel natural-gas-fueled and liquefied-petroleum gas-fueled engines." The new supplemental test procedures will therefore become applicable to gaseous-fueled engines even though neither the U.S. EPA nor the ARB has done any evaluation to assess whether it is technically feasible for gaseous fueled engines to meet the new supplemental requirements. (EMA)

    Agency Response: Although the test procedures included general language relating to their applicability to natural-gas-fueled and liquefied-petroleum gas-fueled engines, the adopted test procedures apply specifically only to "heavy-duty diesel engines," and not natural gas engines. Therefore, no modifications to the preamble of the test procedures are necessary.

21. **Comment:** 86.007-21(o). Subparagraph (2) requires submission of "Brake specific emission data for each of the 13 test points…." The brake specific emissions for the idle point are indeterminate. The subparagraph should say "Brake specific emission data for each of the 12 non-idle test points….". If this data is required to be submitted, ARB must supply a form for submission of this information. (EMA)

    Agency Response: This requirement is identical to that in the U.S. EPA's Final Rule. Emission data are required for all test points and not just the non-idle test points. The brake specific emissions at idle will be zero since there is no power output (in the denominator) at idle. A form has not been provided to allow manufacturers the flexibility to provide the information in the most convenient method possible.

22. **Comment:** 86.007-21(o). Subparagraph (3) requires submission of "Concentrations and mass flow rates for all regulated gaseous emissions plus carbon dioxide." It is not clear if this information is to be for each individual steady-state test mode or if this is supposed to be weighted results over the 13 mode test. This information is not required under the consent decrees and submission of this information represents additional burden for manufacturers. Neither the U.S. EPA nor the ARB has provided any rationale for why this information is needed or indicated what it will be used for. If this provision is to be retained, ARB must justify why this information is required and must provide a form to facilitate submission of this information. (EMA)

    Agency Response: This requirement is identical to that in the U.S. EPA's Final Rule. Since weighted average or specific mode information is not specifically identified, the manufacturer should submit data for each specific mode. This information is necessary to validate the weighted average emission results. A form has not been provided to allow manufacturers the flexibility to provide the information in the most convenient method possible.

23. **Comment:** 86.007-21(o). Subparagraph (4) requires submission of the "Values of all emission-related engine control variables at each test point." The term "emission-related engine control variables" is vague. This term could be interpreted broadly enough to include variables that are not typically recorded in engine testing. Submission of this information is not currently required under consent decrees and represents additional burden for manufacturers. Neither the U.S. EPA nor the ARB has provided any rationale for why this information is needed or indicated what it will

be used for. If this provision is to be retained, ARB must specifically identify the parameters to be reported, justify why this information is needed and must provide a form to facilitate submission of this information. (EMA)

Agency Response: This requirement is identical to that in the U.S. EPA's Final Rule. This requirement is meant to be interpreted broadly since there are many engine control variables. This information is necessary to validate all emission results and ensures consistent calibration of engines. This also prevents loopholes that may allow manufacturers to alter unspecified engine control settings. A form has not been provided to allow manufacturers the flexibility to provide the information in the most convenient method possible.

24. **Comment:** 86.007-21(o). Subparagraph (6) needs to be modified to require "A statement that the test results were obtained with the engine emission control system operating normally" instead of the proposed requirement for "A statement that the test results corresponds (sic) to the maximum NOx producing condition…". For an explanation of why this change is needed, see the discussion for 86.1360-2007(e)(4). (EMA)

    Agency Response: This requirement is identical to that in the U.S. EPA's Final Rule. Certification of an engine should reflect worst case conditions since in-use testing will include not only frequently used operating conditions, but extreme operating conditions as well.

25. **Comment:** 86.007-21(o), subparagraph (7), ARB proposed changes to the U.S. EPA's language. The phrase "weighted average emissions standard" was changed to "weighted average emissions cap" and the phrase "Maximum Allowable Emission Limits" was changed to "emission testing caps". ARB has offered no explanation for the wording changes. It is not clear if ARB is attempting to make some subtle distinction with these wording changes. ARB needs to clarify their purpose in making these changes. It is noted that the ARB proposal includes the phrase "Maximum Allowable Emission Limits" in several other places in the proposal so ARB's purpose in substituting the phrase "emission testing caps" in this instance is particularly baffling. (EMA)

    Agency Response: In most instances, the phrases "emission standard" and "emission limit" were replaced with "emission cap." This is due to the fact that the regulatory action only includes adoption of test procedures. In turn, the test procedures include emission caps that are based on the existing emission standards rather than new emission standards. Since "Maximum Allowable Emission Limits" is the name of an existing test procedure, there is no change to this name.

26. **Comment:** 86.007-21(p). Subparagraph (1) requires manufacturers to "provide a statement in the application for certification that the diesel heavy-duty engine for which certification is being requested will comply with the applicable Not-To-Exceed Limits specified in 86.1370-2007(d) when operated *under all conditions* which may reasonably be expected to be encountered in normal vehicle operation and use." This subparagraph would preclude the use of alternate emission control devices (AECD) needed for engine protection if they result in emissions that exceed the NTE limits. This goes beyond consent decree requirements and is probably beyond the limits of technology. This subparagraph needs to be revised to recognize the need for AECDs. (EMA)

Agency Response: Similar to the U.S. EPA, the ARB does allow use of some alternate emission control devices (see U.S. EPA Advisory Circular 24-3, dated January 19, 2001). Additionally, the NTE requirements incorporate the NTE deficiency allowance from the U.S. EPA's Final Rule. The ARB recognizes that due to the additional technical requirements, there are other operating conditions under which manufacturers have difficulty controlling emissions. Although compliance is expected prior to full implementation of the requirements, the deficiency allowance may be granted on a case-by-case basis to allow additional time for compliance.

27. **Comment:** 86.1313-90(b). This regulatory section deals with "Fuel Specifications." The U.S. EPA's recently promulgated rule makes no changes to the fuel specification sections of federal rules. ARB's "Informative Digest of Proposed Action and Plain English Policy Statement Overview" and the Staff Report provide no discussion of any changes being made to the fuel specifications. The proposed regulatory language changes in this section are without any background or explanation of purpose. Further, the proposed changes appear to be totally unrelated to the other issues being addressed in this regulatory package. ARB needs to provide some rationale for the changes being proposed to this section. (EMA)

    Agency Response: Revisions to the fuel specification section update the CFR reference to ensure that test fuel reflects fuel that is commercially available ("in-use" fuel); test fuel specifications are not always similar to in-use fuel. The revisions have been required for federal certification since 1990, before the promulgation of the U.S. EPA's Final Rule. The revisions allow manufacturers to use fuel with various specifications (i.e., lower sulfur content diesel fuel) during certification if they can provide evidence that the fuel is in widespread use. This would ensure that engines are designed for the in-use fuel, rather than the test fuel.

28. **Comment:** 86.1313-90(b). Subparagraph (1) adds a sentence stating that "Fuels specified for emissions testing are intended to be representative of commercially available in-use fuels." This provision is vague. First, it is unclear whether the test fuel is to be representative of fuels used in California or more generally through the United States. If the test fuel must represent California fuel, then manufacturers may have an additional burden to conduct separate certification testing programs using representative California fuel and the U.S. EPA specified certification fuel. Second, the term "representative" is subjective. It does not provide certifying engine manufacturers with guidance regarding the fuel properties that are to be controlled nor any indication of the permissible ranges of these parameters. Third, the phrase "are intended to be" is unclear, as it is not possible to determine whether this provision is a requirement or merely guidance. Finally, there is no indication of when this provision is intended to take effect. The sentence is included in a subparagraph that is already in effect, but the overall proposal is not proposed to take effect until 2005. (EMA)

    Agency Response: First, test fuels should be representative of fuels used in California. However, the in-use fuel is an option to fuels meeting the specifications in either of the tables. Consequently, any additional costs to determining the in-use fuel, and it's specifications, are also optional. Second, the fuel properties that should be verified, should include those listed in Table N98-2. Finally, the requirements of this section are intended to take effect immediately after the approval of the adopted regulation by the Office of Administrative Law.

29. **Comment:** 86.1313-90(b). Subparagraphs (2) and (3) discuss fuel requirements for emission test fuel and for service accumulation fuel. Identical new language is proposed to be added to both subparagraphs. The language should clarify that these provisions are related only to the use of special fuels (emission test fuel and service accumulation fuel). (EMA)

    Agency Response: The fuel requirements are similar to those required federally in the CFR. Therefore, these are not new requirements. Subsection (b) identifies the fuel as "test fuel." However, the requirements may be substituted when predominant in-use fuel has different specifications compared to those in the fuel requirements. This can occur when market conditions drive refiners to produce fuel that is different than the fuel specifications in Table 90-2 and 98-2. Further clarification is not necessary at this time.

30. **Comment:** 86.1360-2007(a). This paragraph states that "This section applies to 2005 and subsequent model year heavy duty diesel engines." Clarification is needed whether the section applies only to diesel-fueled engines or whether gaseous-fueled engines are also included. As a point of clarification, the section should be revised to limit the applicability to on-highway engines since it is not ARB's intent to apply these requirements to non-road or stationary or other classes of heavy-duty diesel engines at this time. (EMA)

    Agency Response: The sentence is self-explanatory in that the section applies to "diesel engines" and not to engines with other fuels. The ESC test procedure is referenced from the CCR subsection pertaining to on-road motor vehicle requirements. Therefore, further clarification is not necessary because of the regulatory context.

31. **Comment:** 86.1360-2007(b). Subparagraph (1) defines the 13 test modes and modal weighting factors for the 13 mode steady-state test. Mode 1 is described as "Idle" with no "percent load" shown. For engines used predominantly with automatic transmissions, the idle portions of the transient FTP are run with a curb idle transmission torque (CITT) applied. ARB should consult with the U.S. EPA and engine manufacturers to reach a common decision on idle mode testing. (EMA)

    Agency Response: Since this is identical to the consent decree requirements and the U.S. EPA's Final Rule, no changes are necessary for this subsection at this time. Should the U.S. EPA decide to modify this subsection to address any concerns regarding automatic transmissions, ARB will review and incorporate the changes.

32. **Comment:** 86.1360-2007(b). Subparagraph (2) states that "ARB may select, and require the manufacturer to conduct the test using, up to 3 additional test points within the control area…." It is not clear whether the ARB intends to select three additional points in addition to the supplemental points selected by the U.S. EPA. ARB needs to develop a procedure whereby supplemental test points can be supplied to manufacturers in a timely manner that will avoid testing delays. A procedure that involves three-way communication between the U.S. EPA, the ARB and the manufacturer may be required. (EMA)

Agency Response: The subparagraph clearly states that "ARB may select" 3 additional test points. In most cases, ARB will concur with the U.S. EPA's 3 additional test points. However, there may be occasions in which ARB selects other test points. The manufacturer should consult with ARB prior to any testing to avoid delays and/or the need for any additional testing. Staff agrees that three-way communication is helpful.

33. **Comment:** 86.1360-2007(c). This paragraph includes a subparagraph number (1), however there are no other subparagraphs. The subparagraph designation is not needed and should be deleted. (EMA)

    Agency Response: ARB prefers, where possible, to maintain parallel numbering to the federal numbering. In this instance ARB is following the federal numbering scheme and the federal numbering scheme is not based on "classic" outline format. No change to notation is necessary at this time. The comment will be noted and modification to the notation will be completed in any subsequent changes to the regulatory section, if necessary.

34. **Comment:** 86.1360-2007(c). The "Maximum Power" is defined as being equal to "the maximum observed power calculated according to the engine mapping procedures defined in 86.1332-90. 86.1332-90 gives engine mapping procedures but does not define or provide a method for calculating the "maximum observed power". An appropriate reference or definition for "maximum power" must be provided. (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Pursuant to standard mechanical engineering reference manuals, power is determined from the torque and speed of the engine. Power at each point on the engine map can be determined since the engine map plots engine torque and engine speed. As a result, maximum power can be determined. Therefore, no further reference or method is necessary provided that appropriate engineering principles are utilized.

35. **Comment:** 86.1360-2007(e). Subparagraph (2) states that "The ARB selected test points identified under paragraph (b)(2) of this section must be performed immediately upon completion of mode 13." This conflicts with a similar U.S. EPA requirement that calls for performing the U.S. EPA's selected test points immediately upon completion of mode 13. Separately specified U.S. EPA and ARB selected test points can not be run simultaneously. Either the U.S. EPA or the ARB must select the same set of three points or there must be an agreement between the U.S. EPA and the ARB regarding the order in which the separately specified points are to be run. (EMA)

    Agency Response: As previously stated, ARB will often concur with the U.S. EPA's 3 additional test points. However, there may be occasions in which ARB selects other test points. The manufacturer should consult with ARB prior to any testing to avoid delays and/or the need for any additional testing. If different, the additional test points selected by the ARB may be performed immediately after the U.S. EPA test points. Therefore, further clarification is not necessary in the regulatory language since the order of the additional test points is not expected to affect the results of the tests.

36. **Comment:** 86.1360-2007(e). Subparagraph (4) states that "The test must be conducted with all emission-related engine control variables in the highest brake-specific NOx emissions state which could be encountered for a 30 second or longer averaging period at the given test point and for the conditions under which the engine is being tested." For any given test point and set of conditions, the engine can be in only one NOx emissions state. It is meaningless and creates confusion, therefore, to require that the engine be operated "with all emission-related control variables in the highest brake-specific NOx emissions state". This subparagraph should be rewritten to state that "The test must be conducted with all engine emission control systems operating normally." (Reference above comments regarding subparagraph 86.007-21 (o)(6).) (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Staff disagrees that at "for any given test point ... the engine can be in only one NOx emission state." This has potential implications with engines that require an aftertreatment device. Therefore, requiring operation at the highest NOx emissions state is not the same as operating "normally." Hence, operating normally may not always produce the highest NOx emissions. Therefore, no change to the regulatory language is made.

37. **Comment:** 86.1360-2007(e). Subparagraph (6) defines the parameter A_p as the "Modal average power". The definition goes on to note that "Any power measured during the idle mode (mode 1) is not included in this calculation." It is assumed that the calculation referred to is the calculation of the weighted cycle power. The added note is redundant because the summation used to calculate the cycle weighted power is taken over modes 2 through 13. Mode 1 is not included in the summation. It is suggested that the redundant language be removed. (See comments on subparagraph (b) (1)) (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. The subsection clearly states that the parameter A_p is the modal average power at each mode except at idle. Any power measured at idle is not included in the power calculations for the idle mode and is not included in the weighted average emission calculations. The equation in this subsection clearly shows, by algebraic expression, the method of calculation. The redundancy is intended to ensure no misunderstanding during calculation.

38. **Comment:** 86.1360-2007(f). Subparagraph (1) states that "Each engine shall have its own Maximum Allowable Emission Limits generated from the 12 non-idle supplemental steady-state test points *from that engine*." The intent of this sentence is good since it precludes the development of limit values on one engine and applying these limit values to another engine. This avoids the concern that limits may be exceeded simply due to the normal engine-to-engine variability of production engines. This provision does not, however, go far enough because it still would allow an engine to be tested at one time to establish the limit values and tested for compliance at another time, perhaps in a different test facility, against these same limits. Under these circumstances, the limits may be exceeded simply due to normal testing variability. This subparagraph needs to be modified to make it clear that the limit values established from the 13 mode steady-state testing only apply to the same engine and during the same testing sequence. The word "supplemental" should be removed from the sentence quoted above to avoid confusion with the ARB selected supplemental test points. (EMA)

Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Testing variability and error are both considered during a compliance demonstration. The testing sequence is defined in the test procedure. However, the engine is expected to comply with the requirements regardless of the sequence of test modes. The word "supplemental," clarifies the "steady-state test". Therefore, no change to the regulatory text is necessary at this time.

39. **Comment:** 86.1360-2007(f). Subparagraph (1) concludes by referring to Figure 1 and noting that the figure "depicts a sample Maximum Allowable Emission Limit *curve"*. It should say that the figure "depicts a sample Maximum allowable Emission Limit *surface*." (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Any change to wording will contradict the descriptions that manufacturers are familiar with in the previously available requirements. Therefore, no change to the regulatory text is necessary at this time.

40. **Comment:** 86.1360-2007(f). Subparagraph (2) states that "*If* the weighted average emissions, calculated according to paragraph (e)(6) of this section for any gaseous pollutant is equal to or lower" than the applicable standard, then each of the test points are multiplied by specified factors. The "if" is unnecessary and should be deleted since, for any compliant engine, the weighted emissions will always be less than or equal to the weighted average emission standard. (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. There may be some occasions where the calculated weighted average emissions exceed the standard due to measurement error or test-to-test variability. Therefore, no change to the regulatory text is necessary at this time.

41. **Comment:** 86.1360-2007(g). Subparagraph (1) states that "For the three points selected by ARB…….the emissions must be measured and calculated as described in paragraph (e)(6)(i) of this section (except that n=1 and WF =1)." The term in the denominator of the equation in paragraph (e)(6)(i) is a summation from i=2 to n. This term cannot be appropriately evaluated for n=1. This subparagraph must to revised to properly describe how the brake-specific emissions for the three ARB-selected test points is to be calculated. (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. The subsection and use of proper engineering judgement fully describe how to calculate brake-specific emissions. The emissions should be calculated individually for each point, rather than averaged, as indicated by the use of n=1 (total points equal one) in the algebraic summation equations. Therefore, no change to the regulatory text is necessary.

42. **Comment:** 86.1360-2007(g). Subparagraph (1) concludes by saying that "The interpolated values are determined from the modes of the test cycle closest to the respective test point…". This should say "the four closest modes of the test cycle that envelop the respective test point." (EMA)

Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Section (f) describes the control area as 25% to 75% engine speed, and 25% to 100% engine load. Common sense dictates that an intermediate test point will have four "closest" test points. Further, the calculation method in subsection (g)(2) and Figure 2 both imply the use of four test modes to interpolate the emission value. Therefore, no change to the regulatory text is necessary.

43. **Comment:** 86.1360-2007(g). The lead-in to Subparagraph (2) should say "Interpolating emission *limit* values" instead of "Interpolating emission values".

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. These emission values are used to determine the emission cap at various modes of operation in the control area. Therefore, no further clarification or change to the regulatory text is necessary.

44. **Comment:** 86.1360-2007(g). The term "control points" is used in the first sentence of this subparagraph, however, this term is not defined anywhere. To avoid confusion, it is suggested that the term "control points" be replaced with "ARB selected supplemental test points". It is further suggested that the sentence be revised to improve clarity as follows: "The gaseous emissions *limit* for each regulated pollutant for each of the *ARB selected supplemental test points* (Z) *within the control zone defined in paragraph (d)* must be interpolated…….". (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. The term "control point" references any point in the "control zone." The term is not intended to reference the ARB selected test point. Therefore, no change to the regulatory text is necessary.

45. **Comment:** 86.1360-2007(g). To improve clarity, the beginning of sub-subparagraph (2)(ii) should be revised to read "The interpolated *limit* value…". The parameter E_Z needs to be defined. As a suggestion, E_Z could be defined as "The brake specific emission limit value for point Z within the control area defined in paragraph (d)." (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. This subsection defines the term "E" as the brake specific gaseous emissions, thereby implying that E_Z is the brake specific emissions value for point Z. Therefore, no change to the regulatory text is necessary.

46. **Comment:** 86.1360-2007(g). The clarity of subparagraph (3) could be improved by modifying the final phrase to read "must be less than or equal to the interpolated *limit* value E_Z." (EMA)

    Agency Response: This is identical to the consent decree requirements and the U.S. EPA's Final Rule. Comparison to the interpolated value, implies that it is the emission cap. Therefore, no further clarification or change to the regulatory text is necessary.

47. **Comment:** 86.1360-2007(j). Subparagraph (2) appears to be redundant with subparagraph (g)(3). One of these provisions can be eliminated. (EMA)

Agency Response: While subsection (g)(3) explains the calculation method for compliance with the Maximum Allowable Emission Limits, subsection (j)(2) describes the applicability of the calculations. Therefore, no change to the regulatory text is necessary.

48. **Comment:** 86.1360-2007(k). Paragraph (k) is titled "In-use compliance". Since it is included in section 86.1360-2007 which describes procedures and requirements associated with Euro 3 and MAEL testing, it is presumed that this paragraph specifically deals with in-use compliance testing and requirements associated with the Euro 3 and MAEL protocols. (EMA)

    Agency Response: The assumption explained in the comment is correct. The in-use compliance section details in-use compliance requirements when testing to the ESC and MAEL test procedures.

49. **Comment:** 86.1360-2007(k). Paragraph (k) states that "No engine may be used to establish the existence of an emission exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance." This exclusion clause should be extended to include engines that are beyond their useful life. (EMA)

    Agency Response: Subsection (k) references the "California Code of Regulations, Title 13, Sections 2111 through 2140." Section 2137 specifies that engines subject to the in-use compliance provisions shall be within their "useful life." Therefore, no further clarification or change to the regulatory text is necessary.

50. **Comment:** 86.1360-2007(k). Sub-subparagraph (1)(i) refers to testing being done "using vehicle test equipment." Euro 3 and MAEL test procedures are only defined for engine dynamometer tests. These tests cannot be executed using a complete vehicle. This entire paragraph must be rewritten to eliminate all references to the use of any test system other than an engine dynamometer for Euro 3 and MAEL testing. (EMA)

    Agency Response: The "vehicle test equipment" refers to various types of equipment not included in sub-subparagraph (1)(ii). Examples of equipment listed in the regulatory text are the "ROVER" and the chassis dynamometer. The comment that the tests "cannot be executed using a complete vehicle" is not correct. Although a chassis dynamometer is not practical since loads can be added to vehicles on a dynamometer to complete the test, this is not infeasible. Additionally, vehicles can be run on a track while using an on-vehicle measurement device. Torque and speed information can be obtained from the engine computer. This is similar to the consent decrees that also require testing using a "ROVER" or chassis dynamometer. Therefore, no change to the regulatory text is necessary.

51. **Comment:** 86.1360-2007(k). Sub-subparagraph (1)(i) makes a passing reference to "ROVER," but provides no definition or description of what ROVER is. (EMA)

    Agency Response: This provision is identical to the consent decree requirements. "ROVER" stands for the remote on-board vehicle emissions recorder. ROVER is being developed by the U.S. EPA, with full knowledge by all heavy-duty engine manufacturers. Further, the consent decree settling manufacturers provided funding to evaluate the ROVER. Therefore, no further clarification or change to the regulatory text is necessary.

52. **Comment:** 86.1360-2007(k). Sub-subparagraphs (1)(i) and (ii) refer to "the applicable maximum NOx emissions limit." Per section 1956.8, there will be a combined NOx + NMHC standard in 2005, but no separate NOx limit. The sub-subparagraphs refer to limits and threshold allowances only for NOx. It is not clear whether NOx is the only regulated pollutant that ARB intends be subject to in-use compliance testing. If it is not, it is not clear why ARB has not provided threshold allowances for the other pollutants. (EMA)

    Agency Response: This provision is identical to the consent decree requirements. The allowance is added to the applicable NOx emissions limit. In 2005, when there is a combined NOx + NMHC standard, the allowances provided in the subsections shall be applied to the total NOx plus NMHC emissions limit. Therefore, if the Euro III ESC NOx plus NMHC limit is 2.5 grams per brake horsepower-hour, the emissions threshold for an in-use engine dynamometer test will be 3.0 grams per brake horsepower-hour (for a vehicle test, the emissions threshold is the emissions limit plus the greater of 0.5 grams per brake horsepower-hour or one standard deviation).

53. **Comment:** 86.1360-2007(k). Sub-subparagraph (1)(i) sets a NOx threshold allowance of "the greater of 0.5 g/hp-hr or one standard deviation of the data set established pursuant to paragraph (k)(2)…" The threshold allowance must be large enough to account for testing errors and variability. ARB has not provided any data or analysis to support the use of a 0.5 g/hp-hr allowance. Indeed, because a viable test system for in-use testing of vehicles has not been developed, any estimate of an appropriate allowance is premature guesswork and not the result of sound science. Similarly, setting the allowance equal to one standard deviation does not ensure that "false failures" are avoided. If the testing equipment has a consistent bias error that causes the emissions to read above the true value, a threshold allowance based on testing variability will not protect against false failures. (EMA)

    86.1360-2007(k). Sub-subparagraph (1)(ii) imposes a NOx threshold allowance of 0.5 g/hp-hr for engine dynamometer testing. While it would be possible to use existing engine test facilities to develop an appropriate threshold allowance, there is no evidence that ARB has performed any such study. The Staff Report contains no discussion of how this value was developed. The proposed 0.5 g/hp-hr allowance appears to have been selected arbitrarily without the use of any data or scientific analysis. (EMA)

    Agency Response: The basis for these requirements is the consent decrees. The threshold allowances are provided to be consistent with those in the consent decree requirements. Comments during the regulatory development process also indicated that engine manufacturers did not want new requirements that they were not familiar with. Thus, the consent decree thresholds were proposed. Therefore, no change to the regulatory language is necessary.

54. **Comment:** 86.1360-2007(k). Subparagraph (2) states that "Where an engine dynamometer or vehicle test shows an apparent exceedance of the emission threshold, the party conducting the original test shall repeat the test under the same conditions at least nine times." If, as specified in sub-subparagraph (1)(i) the threshold is determined by the standard deviation of the tests in subparagraph (2), it may not be possible to determine if there has been "apparent exceedance of the emission threshold" after the completion of a single initial test. Each Euro 3 test requires approximately one-half hour. It may not be possible to complete nine additional tests under the same conditions as the initial test. This is particularly true

for vehicle tests where the ability to monitor and control test conditions is limited. Even in engine dynamometer tests where intake air temperature and humidity can be controlled, barometric pressures changes of significant magnitude can be expected to occur over the period of several hours required to complete nine additional tests. (EMA)

Agency Response: This provision is identical to the consent decree requirements. During re-testing, manufacturers should to the best of their ability, duplicate the conditions encountered during the original testing. If significant changes in barometric pressure are expected to affect engine emission performance, the manufacturer should wait until those conditions subside. Engine manufacturers may want to consult with local weather services to determine the possible meteorological conditions. Therefore, no change to the regulatory language is necessary.

55. **Comment:** 86.1360-2007(k). The following words should be appended to the end of subparagraph (2). "….and for vehicle tests, the standard deviation of the emission results from the ten tests shall be computed and used to determine the emission threshold as described in paragraph (k)(1)(i) of this section." (EMA)

    Agency Response: This provision is identical to the consent decree requirements. The appended statement is incorrect since this subsection references both engine and vehicle testing. As stated in the prior subsection (k)(1)(ii), the cap is determined from "the applicable maximum NOx emission limit plus 0.5 g/hp-hr." A standard deviation is not necessary in the calculations. Therefore, no change to the regulatory language is necessary.

56. **Comment:** 86.1360-2007(k). Subparagraph (3) states that "If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results." The manufacturer then has the option to initiate an "influenced recall" or to perform additional tests or engineering analysis in accordance with paragraphs (k)(4) or (k)(5). The size of the sample of engines used to compute the "average emissions" prior to the Executive Officer's decision to notify the engine manufacturer is not specified. This sample should be specified and must be sufficiently large to be able to project with reasonable statistical confidence that a substantial portion of the production population exceeds the limits. (EMA)

    Agency Response: This provision is identical to the consent decree requirements. The typical California test sample as specified in CCR, Section 2137 is 10 engines. However, no quantity was specified to allow flexibility in determining the sample size. Comments were received during regulatory development and subsequent meetings with the engine manufacturers on the inflexibility of a specific sample size and the resulting differences with the consent decrees. Therefore, the consent decree requirements were maintained in the adopted requirements and no change to the regulatory language is necessary.

57. **Comment:** 86.1360-2007(k). Subparagraph (4) states that "*If* the testing conducted under paragraph (k)(1) ……. was performed using vehicle testing equipment, then the engine manufacturer may elect to conduct additional tests *of that engine* using an engine dynamometer…." As noted in the discussion of subparagraph (1)(i), Euro 3 and MAEL testing procedures are only specified for engine dynamometer tests. These tests are not defined for vehicle testing. Therefore, the testing in (k)(1) can never have been performed "using vehicle test equipment" and the premise of the subparagraph can never be satisfied. The meaning of the phase "*that engine*" in the above quoted sentence is unclear. By the time the manufacturer receives notice

from the Executive Officer that "the average emissions of the test vehicles exceed the emissions threshold," a sample of multiple engines will have been tested under the provisions of subparagraph (k)(1). It is not clear which one of these engines "*that engine"* refers to or whether it refers to each of the engines in the original sample. It must be recognized that the engines in questions are under the control of the owner and the manufacturer has no authority or certain means to gain access to these engines and vehicles for dynamometer testing. (EMA)

Agency Response: This provision is identical to the consent decree requirements. The comment is similar to Comment #50. The comment that the tests "cannot be executed using a complete vehicle" is not correct. Although a chassis dynamometer is not practical since loads can be added to vehicles on a dynamometer to complete the test, this is not infeasible. Additionally, vehicles can be run on a track while using an on-vehicle measurement device. Torque and speed information can be obtained from the engine computer. This is similar to the consent decrees that also require testing using a "ROVER" or chassis dynamometer.

The phase "*that engine*" in the quoted sentence means the engine in the vehicle that was tested. No other engines are mentioned in the sentence, therefore, the sentence is self-explanatory. Engines that may be in question are under the control of the owner. However, a manufacturer may provide the vehicle owner some other form of compensation or a temporary replacement of the vehicle during engine testing. Therefore, no change to the regulatory language is necessary.

58. **Comment:** 86.1360-2007(k). Subparagraph (4) continues and states "If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph (k)(5) of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emission threshold and the emission levels of the exceeding engines." The subparagraph does not discuss how information from the analysis, namely "the percentage of the affected population that exceeds the emission threshold and the emission levels of the exceeding engines" is to be used. Without a stated purpose for this information, there is no reason for a manufacturer to perform any analysis. ARB needs to describe how the information from this analysis is to be used. (EMA)

Agency Response: This provision is identical to the consent decree requirements. The sentence explains that the engineering analysis will "determine the percentage of the affected population [of engines] that exceeds the emission threshold and the emission levels of the exceeding engines." Information from this engineering analysis may be used to determine the extent of any recall and/or the extent of any imposed fines. Therefore, no change to the regulatory language is necessary.

59. **Comment:** 86.1360-2007(k). Subparagraph (5) states that "Within 60 days of receiving notice of an exceedance under paragraph (k)(2) of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option." As already noted, there are no defined procedures for performing Euro 3 and MAEL tests on vehicles. Therefore, the suggested option of performing vehicle tests does not really exist. Further, the cost of procuring and testing a sample of ten or more engines on an engine dynamometer is apt to be prohibitively expensive. As a consequence, there will be little or no usage of this subparagraph unless changes are made to allow smaller sample sizes. (EMA)

Agency Response: This provision is identical to the consent decree requirements. The comment is similar to Comment #50. The comment that the tests "cannot be executed using a complete vehicle" is not correct. Although a chassis dynamometer is not practical since loads can be added to vehicles on a dynamometer to complete the test, this is not infeasible. Additionally, vehicles can be run on a track while using an on-vehicle measurement device. Torque and speed information can be obtained from the engine computer. This is similar to the consent decrees that also require testing using a "ROVER" or chassis dynamometer.

Engines may be under the control of the owner. However, a manufacturer may provide the vehicle owner some other form of compensation or a temporary replacement of the vehicle during engine testing. Additionally, this provides flexibility to engine manufacturers to test their engines and refute any claims of emission exceedances. It should also be noted that the manufacturer's testing of vehicles is strictly optional. Further, the sample sizes are identical to those agreed upon in the consent decrees. Therefore, no change to the regulatory language is necessary.

60. **Comment:** 86.1360-2007(k). Subparagraph (6) refers to the "testing of additional engines under paragraphs (k)(4) and (k)(5) of this section…". The reference to paragraph (k)(4) is improper since (k)(4) concerns retesting of engines originally tested under paragraph (k)(2) and not the testing of additional engines. (EMA)

    Agency Response: This provision is identical to the consent decree requirements. Paragraph (k)(4) allows testing of additional engines when original testing was conducted using vehicle testing equipment. Additional vehicle or engine testing is provided under paragraph (k)(5). Therefore, both paragraphs concern the testing of additional engines as stated and no change to the regulatory language is necessary.

61. **Comment:** 86.1360-2007(k). Subparagraph (6) concludes with the statement that "….the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices." Variability is a random uncertainty. While it may be possible to report the test results with an uncertainty range which is a function of variability, it would not be appropriate to "adjust" the test results to account for variability. Where systematic test systems errors have been documented, adjusting the test results to account for this error is appropriate. This same testing error adjustment clause should be applied to the testing done under subparagraph (k)(2). (EMA)

    Agency Response: This provision is identical to the consent decree requirements. Although variability may be a random occurrence, systematic variation in test results may be demonstrated with a series of test results. Consequently, an engine manufacturer may be able to demonstrate some test-to-test variability. Since accounting the variability is optional, no change to the regulatory language is necessary. This option is not provided in subparagraph (k)(2) since the previous subparagraph is only used as a screening tool. The additional testing is used to validate the previous test results, thus the inclusion of adjustments for errors and variability.

62. **Comment:** 86.1360-2007(l). Subparagraph (1) provides an exemption from the requirements of this section for "ultra-small volume manufacturers." Ultra-small manufacturers are manufacturers "with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years." Since the proposed regulations are applicable only to heavy-duty diesel engines, it is not clear why sales of passenger cars, light-duty trucks, medium-duty vehicles and heavy-duty vehicles should be counted for the purposes of determining if an entity is an "ultra-small volume manufacturer" and is exempt from the proposed new requirements and standards. The sales threshold for defining an "ultra-small volume manufacturer" should be based only on the sales of heavy-duty diesel engines and not other products that are unrelated to the proposed rule. The sales threshold used for purposes of this exemption, should be based on sales in the current year for which the exemption is in effect, not the average of the previous three years. As proposed, an entity with average California sales of under 300 units in 2002, 2003 and 2004 could sell an unlimited number of exempted engines in 2005. This is not consistent with what we assume to be ARB's intent to put a strict limit on the number of engines not meeting the proposed new requirements in 2005 and 2006. (EMA)

    Agency Response: This exemption includes California sales of passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles, in addition to heavy-duty engines since total sales volume is a better indication of an engine companies ability to fund research and development of available technologies to comply with the requirements. Additionally, since medium-duty engines may be certified using the supplemental test procedures, this class of vehicle should be specifically included. There are several engine manufacturers that do not currently produce many heavy-duty engines, but sell thousands of vehicles and have large funding capabilities. Therefore, no change to the regulatory language is necessary.

    Sales figures for the current year, which the exemption is in effect, is not possible, since only estimates are available for the current year. These are only estimates and can vary significantly compared to actual sales. This prevents an engine manufacturer from consistently providing low estimated production data to qualify for the exemption. Additionally, any overproduction in an existing year will affect the three-year average in the following year. Therefore, no change to the regulatory language is necessary.

63. **Comment:** 86.1370-2007(a). This subparagraph states that "The purpose of this test procedure (NTE) is to measure in-use emissions of 2005 and subsequent model year heavy-duty diesel engines while operating within a broad range of speed and load points (the Not-To-Exceed Control Area) and under conditions which can reasonably be expected to be encountered in normal operation and use." This statement of purpose is not consistent with other provisions of the proposed rule. Paragraph 86.007-21(p)(1) states that "manufacturers must provide a statement in the application for certification that the diesel heavy-duty engine for which certification is being requested will comply with the applicable Not-To-Exceed Limits specified in 86.1370-2007(d) when operated under all conditions which may reasonably be encountered in normal vehicle operation and use." While this required statement is a representation that the engine would meet NTE limits, it does not fulfill the stated purpose of the "this test procedure" which is to actually "measure in-use emissions." Further, because in-use engines typically are not available at the time of family certification, it would not be possible to fulfill the stated purpose of measuring in-use emissions at the time of certification. Thus, paragraph 86.007-21(p)(1)

applies the NTE outside its stated purpose as defined in paragraph 86.1370-2007(a). (EMA)

Agency Response: As stated, the purpose of the test procedure is to "measure in-use emissions." Therefore, the test procedure provides the ARB a tool/method to conduct in-use emission tests. In-use emission testing would not be conducted at the time of certification; rather, the test would be conducted during the engine's useful life. However, engine manufacturers are expected to gather in-use emission data during the development of the engine for certification and durability determinations. Consequently, the ARB expects that engine manufacturers will make the statement relying upon the data from their own in-use testing using the NTE test. Therefore, no change to the regulatory language is necessary.

64. **Comment:** 86.1370-2007(d). When carried over from the federal language, the subject of this subparagraph (1) was changed from "Not-to-exceed control area *limits*" to "Not-to-exceed control area *caps.*" ARB has offered no explanation for this wording change. It is not clear if or how this wording change effects the meaning of the paragraph. ARB needs to provide an explanation so that the intended differences, if any, between the federal rule and the ARB proposal can be properly understood. (EMA)

    Agency Response: In most instances, the phrases "standard" and "limit" were replaced with "cap." This is due to the fact that the regulatory action only includes test procedures. In turn, the test procedures include emission caps that are based on the existing emission standards rather than new emission standards. Therefore, the adopted proposal includes "NTE caps" rather than "NTE limits." Therefore, no change to the regulatory language is necessary.

65. **Comment:** 86.1370-2007(d). Subparagraph (1) states that "….brake-specific exhaust emissions in grams/bhp-hr (as determined under paragraphs (b) and (c) of this section), for each pollutant shall not exceed 1.25 times the applicable emission standards…..". The referenced paragraphs (b) and (c) of this section do not define procedures for assessing brake-specific emissions as suggested. ARB must provide an appropriate discussion of how the brake-specific emissions are to be computed for in-use NTE testing. This cannot be addressed simply by referencing a different citation. Nowhere in the federal or ARB rules is a procedure given for determining brake-specific emissions from the in-use testing of vehicles. Several complex technical issues need to be addressed. These include specification of the measurement devices to be used, the appropriate means for compensating for phasing differences between measured values of emission concentrations, exhaust flows and speed and torque measurements, and procedures for acquiring and recording engine torque. (EMA)

    Agency Response: Brake-specific emissions are computed based on exhaust emission rate, engine speed, and torque. The exhaust emission rate is a basic measurement of exhaust from the vehicle. Engine speed and torque are available from the engine's electronic control unit (ECU). While engine speed is a direct broadcast from the ECU, engine torque may be determined from the percent load, measured curb no-load percent load, and manufacturer's lug curve. Further information regarding the determination of brake-specific emissions from the in-use testing of vehicles is in the "Evaluation of Mobile Monitoring Technologies for Heavy-Duty Diesel-Powered Vehicle Emissions," developed by West Virginia University with funding from the consent decree manufacturers. Therefore, engine manufacturers

are knowledgeable about the pertinent technical issues. No change to the regulatory language is necessary.

66. **Comment:** 86.1370-2007(d). The subparagraph (1) specifies limits/caps of "1.25 times the applicable emission standards." These limits would preclude the use of AECDs needed for engine protection if they result in emissions that exceed the NTE limits. This goes beyond the consent decree requirements and is probably beyond the limits of technology. The subparagraph needs to be modified to recognize the need for and allow for the use of engine-protection AECDs under certain operating conditions. (EMA)

    Agency Response: Although the rule did not specifically include provisions for auxiliary emission control devices, the use of AECDs is not precluded. Similar to the U.S. EPA, the ARB does allow use of some alternate emission control devices (see U.S. EPA Advisory Circular 24-3, dated January 19, 2001). Additionally, the NTE requirements incorporate the NTE deficiency allowance (see subsection 86.1370-2007(i)) from the U.S. EPA's Final Rule. The ARB recognizes that due to the additional technical requirements, there are other operating conditions that manufacturers have difficulty controlling emissions. Although compliance is expected prior to full implementation of the requirements, the deficiency allowance may be granted on a case by case basis to allow additional time for compliance. NTE deficiencies may be claimed for a period of one model year. Deficiencies are granted on an engine model and/or horsepower rating basis within an engine family. Further, the manufacturer must demonstrate why the specific portions of the NTE requirements cannot be met. Therefore, no change to the regulatory language is necessary.

67. **Comment:** 86.1370-2007(d). Subparagraph (3) sets smoke limits for operation within the NTE control area. The opacity limits are specified to apply as an average over a 30 second time period for transient operation and over a 10 second average for steady-state operation. Neither the ARB nor the U.S. EPA, however, has provided a definition of steady-state and transient operation making it impossible to determine which averaging period, 10 seconds or 30 seconds, applies. ARB must provide a set of practical definitions that can be applied to determine which averaging period applies. In sub-subparagraph (3)(i), there is no definition of the smoke number (e.g., R. Bosch, AVL) referenced in the phrase "A filter smoke number of 1.0 under steady state operation …."(EMA)

    Agency Response: This provision is identical to the consent decree requirements. Subsection 86.1360-2007 is described as the "Supplemental steady-state test." Thus, steady-state operation occurs when engine speed and engine load remains the same. Any change to engine speed or engine load, results in transient operation. Additionally, procedures for determining smoke emissions are described in Subsection 86.1372-2007. The subsection includes a note that "a filter smoke number is similar to the Bosch smoke number (BSN) scale." Therefore, no change to the regulatory language is necessary.

68. **Comment:** 86.1370-2007(e). Sub-subparagraph (1)(iv) states that "Where test conditions require such correction factors, the *manufacturer* must use *good engineering judgement and generally accepted engineering practice* to determine the appropriate correction factors, subject to *ARB review*." This provision gives the manufacturer the responsibility to determine the appropriate correction factors. It is unclear whether the manufacturer's responsibility applies for ARB-conducted tests or just to tests conducted by the manufacturer. This should be clarified. (EMA)

Agency Response: This provision is identical to the consent decree requirements. The manufacturer is responsible to determine the appropriate correction factor. These correction factors will be used for tests conducted by the manufacturer and the ARB. Therefore, no change to the regulatory language is necessary.

69. **Comment:** 86.1370-2007(e). Sub-subparagraph (1)(iv) states that "Where test conditions require such correction factors, the *manufacturer* must use *good engineering judgement and generally accepted engineering practice* to determine the appropriate correction factors, subject to *ARB review*." The natural phenomena that cause emissions to vary with temperature and humidity result in emission changes that are smooth, continuous functions of temperature and humidity. Sub-subparagraphs (i), (ii) and (iii) require correction protocols which, unlike the natural phenomena, have discontinuities at 50 and 75 grains of humidity and at 55 and 95 degrees of temperature. Use of correction schemes which have unnatural discontinuities is not consistent with "good engineering judgement and generally accepted engineering practice." These sub-subparagraphs set up conflicting requirements and cannot coexist without revision. (EMA)

    Agency Response: This provision for correction factors is identical to the consent decree requirements. The comment begins by stating that "natural phenomena .... result in emission changes that are smooth, continuous functions of temperature and humidity." Since emissions are a "smooth, continuous function" of temperature and humidity, correction factors can be developed to reflect emissions in a smooth and continuous function. The correction factors would not include operation within the NTE temperature, and humidity, operating zone. Use of correction factors is not a new requirement since emission tests are routinely corrected to specific temperatures and humidity. Therefore, no change to the regulatory language is necessary.

70. **Comment:** 86.1370-2007(e). Sub-subparagraph (1)(iv) states that "Where test conditions require such correction factors, the *manufacturer* must use *good engineering judgement and generally accepted engineering practice* to determine the appropriate correction factors, subject to *ARB review*." The appropriate correction factors are subject to ARB review. The parallel federal language makes the correction factors subject to U.S. EPA review. This creates the possibility that different correction protocols may be approved for federal and California purposes. The regulatory language should be modified to avoid this complexity and to assure that common correction protocols will be used nationwide. (EMA)

    Agency Response: Section 209 of the federal Clean Air Act gives California authority to certify vehicles for California. Attendant with the certification authority granted, the ARB has the authority to approve different correction factors compared to those of the U.S. EPA. However, the ARB intends to work closely with the U.S. EPA in reviewing the correction factors. The manufacturer has the responsibility though, to ensure a uniform process by submitting proposed correction factors to both agencies and relaying any concerns over differences in judgment. Therefore, no change to the regulatory language is necessary.

71. **Comment:** 86.1370-2007(f). Subparagraph (f) appears in the U.S. EPA rule and provides a cold temperature operating exclusion from the NTE requirements for engines equipped with EGR. This subparagraph is proposed to be deleted from the ARB rules even though subparagraph 86.007(p)(2) of the ARB proposal suggests that the NTE cold temperature exclusion is allowed. Clearly, ARB must resolve the inconsistencies in these two sections of the proposed rulemaking. Further, ARB must determine that the cold temperature exclusion *is* allowed. The Staff Report's casual reference to manufacturers' ability to use more corrosion resistant materials grossly misrepresents the technical challenge associated with making appropriate material substitutions for components in the intake system and combustion chamber while retaining full functionality and durability of the engine. Also to be considered is the added cost of the substitute materials. These feasibility and cost factors were not considered in the Staff Report. Further to be considered is the fact that the added development and material costs may represent a stranded investment in technology that is no longer required after 15 ppm or lower sulfur fuel becomes available in mid-2006 as anticipated. (EMA)

    Agency Response: The reference to cold temperature operating exclusion in subsection 86.007-21(p)(2) was inadvertently included in the proposal. This subsection was deleted (see non-substantive change #4). Although there is no cold temperature operating exclusion, manufacturers may submit a request for a deficiency allowance. The deficiency allowance will provide manufacturers with additional time to further develop any necessary corrosion resistant materials. Additionally, engine manufacturer's may request an AECD for cold temperature operation pursuant to U.S. EPA Advisory Circular 24-3, dated January 19, 2001. Therefore, no change to the regulatory language is necessary.

72. **Comment:** 86.1370-2007(g). This paragraph states that, "For each engine family, the NTE limits must apply during one of the following two ambient operating regions." The paragraph fails to specify who makes the determination of which of the two options is to be used, when the determination is made, and how the chosen option is to be communicated to others that may have a need to know. (EMA)

    Agency Response: This provision is identical to the U.S. EPA's Final Rule. The manufacturer is allowed to decide which ambient operating region will be used. During certification, the manufacturer is expected to relay this information to the ARB. Therefore, no change to the regulatory language is necessary.

73. **Comment:** 86.1370-2007(g). Subparagraph (1) states that "The NTE limits apply for all *altitudes* less than or equal to 5,500 feet above sea level." Engine emission performance does not respond to altitude. The fundamental parameter involved is barometric pressure. This subparagraph should be rewritten to describe the operating region in terms of barometric pressure, not altitude. (EMA)

    86.1370-2007(g). Subparagraph (2) states that "The not-to-exceed emissions limits apply at all altitudes less than or equal to 5,500 feet above sea level." The subparagraph also includes an equation defining the maximum temperature for which the NTE limits apply. The equation gives the temperature as a function of altitude. Again, the engine emission performance does not respond to altitude, but rather is a function of barometric pressure. This subparagraph should be rewritten to describe the operating region in terms of barometric pressure, not altitude. (EMA)

Agency Response: This provision is identical to the U.S. EPA's Final Rule. The altitude and temperature boundaries only describe the NTE control zone. In accord with the basic fluid dynamics principles, the flow of any compressible fluid (i.e., an engine's combustion air) is related to the ambient temperature and ambient pressure of the fluid. This relationship can only be determined from the absolute pressure and ambient pressure. Both are functions of altitude and not barometric pressure. Barometric pressure is a measure of the atmospheric pressure and does not include the gage pressure; therefore, barometric pressure is not absolute. Therefore, no change to the regulatory language is necessary.

74. **Comment:** 86.1370-2007(h). Paragraph (h) is titled "In-Use Compliance." Since it is included in section 86.1370-2007 which describes procedures and requirements associated with NTE limits, it is presumed that this paragraph specifically applies to in-use testing done to enforce NTE limits. (EMA)

    Agency Response: This comment is similar to Comment #48. The assumption explained in the comment is correct. The in-use compliance section details in-use compliance requirements when testing to enforce the NTE requirements.

75. **Comment:** 86.1370-2007(h). Paragraph (h) states that "No engine may be used to establish the existence of an emission exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance." This exclusion clause should be extended to include engines that are beyond their useful life. (EMA)

    Agency Response: This comment is similar to Comment #49. Subsection (k) references the "California Code of Regulations, Title 13, Sections 2111 through 2140." Section 2137 specifies that engines subject to the in-use compliance provisions shall be within their "useful life." Therefore, no further clarification or change to the regulatory text is necessary.

76. **Comment:** 86.1370-2007(h). Sub-paragraph (1)(i) makes a passing reference to "ROVER," but provides no definition or description of what "ROVER" is. (EMA)

    Agency Response: This comment is similar to Comment #51. This provision is identical to the consent decree requirements. "ROVER" stands for the remote on-board vehicle emissions recorder. ROVER is being developed by the U.S. EPA, with full knowledge of all heavy-duty engine manufacturers. Further, the consent decree settling manufacturers provided funding to evaluate the ROVER. Therefore, no further clarification or change to the regulatory text is necessary.

77. **Comment:** 86.1370-2007(h). Sub-subparagraphs (1) (i) and (ii) refer to "the applicable maximum NOx emissions limit." Per section 1956.8, there is no applicable NOx limit for 2005 and later model years. The standard is given as a combined NOx + NMHC standard. The sub-paragraphs refer to limits and threshold allowances only for NOx. It is not clear whether NOx (or NOx + NMHC) is intended to be the only pollutant regulated under the ARB in-use NTE compliance provisions. If it is not, it is not clear why ARB has not provided threshold allowances for other pollutants. (EMA)

Agency Response: This comment is similar to Comment #52. This provision is identical to the consent decree requirements. The allowance is added to the applicable NOx emissions limit. In 2005, when there is a combined NOx + NMHC standard, the allowances provided in the subsections shall be applied to the total NOx plus NMHC emissions limit. Therefore, if the Euro III ESC NOx plus NMHC limit is 2.5 grams per brake horsepower-hour, the emissions threshold for an in-use engine dynamometer test will be 3.0 grams per brake horsepower-hour (for a vehicle test, the emissions threshold is the emissions limit plus the greater of 0.5 grams per brake horsepower-hour or one standard deviation).

78. **Comment:** 86.1370-2007(h). Sub-paragraph (1)(i) sets a NOx threshold allowance of "…the greater of 0.5 g/hp-hr or one standard deviation of the data set established pursuant to paragraph (h)(2)…" The threshold allowance must be large enough to account for testing errors and variability. ARB has not provided any data or analysis to support the use of a 0.5 g/hp-hr allowance. Indeed, because a viable test system for in-use testing vehicles using the NTE protocol has not been developed, any estimate of an appropriate allowance is premature guesswork and not the result of sound science. Similarly, setting the allowance equal to one standard deviation does not ensure that "false failures" are avoided. If the testing equipment has a consistent bias error that causes the emissions to read above the true value, a threshold allowance based on testing variability will not protect against false failures. (EMA)

    86.1370-2007(h). Subparagraph (1)(ii) imposes a NOx threshold allowance of 0.5 g/bhp-hr for engine dynamometer testing. While it would be possible to use existing engine dynamometer test facilities to develop an appropriate threshold allowance for this type of testing, there is no evidence that ARB has performed any such study. The Staff Report contains no discussion of how this value was developed. The proposed 0.5 g/bhp-hr allowance appears to have been selected arbitrarily without the use of any data or scientific analysis. (EMA)

    Agency Response: This comment is the same as #53. The basis for these requirements is the consent decree since they are identical to the consent decree requirements. The threshold allowances are provided to be consistent with those consent decree requirements. Comments during the regulatory development process also indicated that engine manufacturers did not want new requirements that they are not familiar with. Therefore, no change to the regulatory language is necessary.

79. **Comment:** 86.1370-2007(h). Subparagraph (2) states that "Where an engine dynamometer or vehicle test shows an apparent exceedance of the emissions threshold, the party conducting the original test shall repeat such test under the same conditions at least nine times." If, as specified in sub-subparagraph (1)(i), the threshold is determined by the standard deviation of the tests in paragraph (2), it will not be possible to determine if there has been an exceedance of the threshold after the completion of a single initial test. For vehicle tests, repeating the original NTE test under the same conditions will be problematic both because repeating the engine operation sequence identically and maintaining the same ambient operating conditions will not be possible. (EMA)

    Agency Response: The comment is similar to #54. This provision is identical to the consent decree requirements. Re-testing is provided for manufacturers to confirm the failure using more than one type of test. If re-testing is required, manufacturers should, to the best of their ability, duplicate the conditions during the original testing.

80. **Comment:** 86.1370-2007(h). The following words should be appended at the end of subparagraph (2). "….and for vehicle tests, the standard deviation of the emissions results from the ten tests shall be computed and used to determine the emission threshold as described in paragraph (h)(1)(i) of this section." (EMA)

    Agency Response: The comment is identical to #55. This provision is identical to the consent decree requirements. The appended statement is incorrect since this subsection references both engine and vehicle testing. As stated in the prior subsection (k)(1)(ii), the cap is determined from "the applicable maximum NOx emission limit plus 0.5 g/hp-hr." A standard deviation is not necessary in the calculations. Therefore, no change to the regulatory language is necessary.

81. **Comment:** 86.1370-2007(h). Subparagraph (3) states that "If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results."" The manufacturer then has the option to initiate an "influenced recall" or to perform additional tests or engineering analysis in accordance with paragraphs (h)(4) or (h)(5). It is not clear how the average emissions are to be compared with the emission threshold. In the case where the emission threshold is determined using the standard deviation as described in subparagraph (1)(i), a separate threshold value is determined for each engine. Since each engine has its own threshold value, it is not clear which one of these threshold values is to be used for purposes of comparing with the average emissions of the test vehicles. The size of the sample of engines used to compute the "average emissions" prior to the Executive Officer's decision to notify the engine manufacturer is not specified. This sample should be specified and must be sufficiently large to be able to project with reasonable statistical confidence that a substantial portion of the production population exceeds the limits. (EMA)

    Agency Response: The comment is identical to #56. This provision is identical to the consent decree requirements. The typical California test sample as specified in CCR, Section 2137 is 10 engines. However, no quantity was specified to allow flexibility in determining the sample size. Comments were received during regulatory development and subsequent meetings with the engine manufacturers on the inflexibility of a specific sample size and the resulting differences with the consent decrees. Therefore, the consent decree requirements were maintained in the adopted requirements and no change to the regulatory language is necessary.

82. **Comment:** 86.1370-2007(h). Subparagraph (4) states that "If the testing conducted under paragraph (h)(1)…..was performed using vehicle testing equipment, then the engine manufacturer may elect to conduct additional tests *of that engine* using an engine dynamometer provided that all environmental and engine operating conditions present during vehicle testing under paragraph (h)(1) ….can be reproduced…" The meaning of the phrase "*that engine"* in this sentence is unclear. By the time the manufacturer receives notice from the Executive Officer that "the average emissions of the test vehicles exceed the emissions threshold," a sample of multiple engines will have been tested under the provisions of paragraph (h)(1). The phrase "*that engine"* could refer to any or all of the engines in the original sample. The option provided in this paragraph can only be exercised if "all engine and operating conditions present during the vehicle testing…" can be reproduced. In order to make this possible, "all engine and operating conditions" must be measured and recorded during the initial testing and this information must be provided to the manufacturer. The regulation should specify the particular parameters that must be reproduced, the tolerance for each of these parameters and ensure that each of these parameters is recorded during the initial testing. It must be recognized that the

engines in question are under the control of the owner and the manufacturer has no authority or certain means to gain access to these engines or vehicles for the purposes of dynamometer testing. (EMA)

Agency Response: The comment is similar to #50 and #57. The comment that the tests "cannot be executed using a complete vehicle" is not correct. Although a chassis dynamometer is not practical since loads can be added to vehicles on a dynamometer to complete the test, this is not infeasible. Additionally, vehicles can be run on a track while using an on-vehicle measurement device. Torque and speed information can be obtained from the engine computer. This is similar to the consent decrees that also require testing using a "ROVER" or chassis dynamometer. Therefore, no change to the regulatory text is necessary.

83. **Comment:** 86.1370-2007(h). Subparagraph (4) continues and states "If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph (h)(5) of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emission threshold and the emission levels of the exceeding engines." The subparagraph does not discuss what happens if, based on the additional tests, the engine does *not* exceed the emission threshold. Additionally, the subparagraph does not discuss how the information from the analysis, namely "the percentage of the affected population that exceeds the emission threshold and the emission levels of the exceeding engines" is to be used. Without a stated purpose for this information, there is no clear reason why the manufacturer should perform this analysis. ARB needs to describe how the information from this analysis is to be used. (EMA)

Agency Response: The comment is similar to #58. This provision is identical to the consent decree requirements. The sentence explains that the engineering analysis will "determine the percentage of the affected population [of engines] that exceeds the emission threshold and the emission levels of the exceeding engines." Information from this engineering analysis may be used to determine the extent of any recall and/or the extent of any imposed fines. Therefore, no change to the regulatory language is necessary.

84. **Comment:** 86.1370-2007(h). Subparagraph (5) states that "Within 60 days of receiving notice of an exceedance under paragraph (h)*(2)* of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option." The appropriate reference is (h)(3) not (h)(2). The cost of procuring and testing a sample of ten or more engines on an engine dynamometer is apt to be prohibitively expensive. Further it will, in many cases be impossible to duplicate vehicle tests on an engine dynamometer. As a consequence, there will be little or no usage of this provision – especially if smaller cost-effective sample sizes are not allowed. (EMA)

Agency Response: The comment is similar to #59. This provision is identical to the consent decree requirements. The comment that the tests "cannot be executed using a complete vehicle" is not correct. Although a chassis dynamometer is not practical since loads can be added to vehicles on a dynamometer to complete the test, this is not infeasible. Additionally, vehicles can be run on a track while using an on-vehicle measurement device. Torque and speed information can be obtained from the engine computer. This is similar to the consent decrees that also require testing using a "ROVER" or chassis dynamometer.

Engines may be under the control of the owner. However, a manufacturer may provide the vehicle owner some other form of compensation or a temporary replacement of the vehicle during engine testing. Additionally, this provides flexibility to engine manufacturers to test their engines and refute any claims of emission exceedances. It should also be noted that the manufacturer's testing of vehicles is strictly optional. Further, the sample sizes are identical to those agreed upon in the consent decrees. Therefore, no change to the regulatory language is necessary.

85. **Comment:** 86.1370-2007(h). Subparagraph (6) refers to the "testing of additional engines under paragraphs (h)(4) and (h)(5) of this section….". The reference to paragraph (h)(4) is improper since (h)(4) concerns resting of engines originally tested in (h)(2) and not the testing of additional engines. (EMA)

    Agency Response: The comment is similar to #60. This provision is identical to the consent decree requirements. Paragraph (k)(4) allows testing of additional engines when original testing was conducted using vehicle testing equipment. Additional vehicle or engine testing is provided under paragraph (k)(5). Therefore, both paragraphs concern the testing of additional engines as stated and no change to the regulatory language is necessary.

86. **Comment:** 86.1370-2007(h). Subparagraph (6) concludes with the statement that "….the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices." Variability is random uncertainty. While it may be possible to report the test results with an uncertainty range, which is a function of variability, it would not be appropriate to "adjust the test results to account for variability." Where systematic test system errors have been documented, adjusting the test results to account for this error is appropriate. This same testing error adjustment clause should be applied to the testing done under subparagraph (h)(2). (EMA)

    Agency Response: The comment is similar to #61. This provision is identical to the consent decree requirements. Although variability may be a random occurrence, systematic variation in test results may be demonstrated with a series of test results. Consequently, an engine manufacturer may be able to demonstrate some test-to-test variability. Since accounting the variability is optional, no change to the regulatory language is necessary. This option is not provided in subparagraph (k)(2) since the previous subparagraph is only used as a screening tool. The additional testing is used to validate the previous test results, thus the inclusion of adjustments for errors and variability.

87. **Comment:** 86.1370-2007(i). Subparagraph (1) allows the Executive Officer, upon application from the manufacturer, to allow NTE deficiencies "For the model years 2005 through 2007...." U.S. EPA-comparable provision at 86.007-11(a)(iv) allows deficiencies through 2009. It is not clear if this disharmony is intended or the result of a drafting error. If this disharmony is retained, it could prevent manufacturers from making some products available in California during the 2008 and 2009 model years. (EMA)

Agency Response: The deficiency provision in the proposal is intended to provide a relief to the manufacturers until the similar supplemental test procedures in the U.S. EPA's Final Rule are implemented in 2007. Similar to the U.S. EPA, the ARB provides a total of three years for deficiencies. Three years is expected to be sufficient time to solve lead time technical issues. Therefore, no change to the regulatory language is necessary.

88. **Comment:** 86.1370-2007(j). Subparagraph (1) provides an exemption from the requirements of this section for "ultra-small volume manufacturers." Ultra-small manufacturers are manufacturers "with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the three previous consecutive model years." Since the proposed regulations are applicable only to non-urban bus heavy-duty diesel engines, it is not clear why sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and urban bus engines should be counted for the purposes of determining if an entity is an "ultra- small volume manufacturer." The sales threshold for defining an "ultra-small volume manufacturer" should be based only on the sales of non-urban bus heavy-duty engines and not on other products that are unrelated to the proposed rule. The sales threshold used for purposes of this exemption should be based on sales in the current year for which the exemption is in effect, not the average of the three previous years. As proposed, an entity with average California sales of under 300 units in 2002, 2003 and 2004 could sell an unlimited number of exempted engines in 2005. This is not consistent with what we assume to be ARB's intent to put a strict limit on the number of engines not meeting the proposed new requirements in 2005 and 2006. (EMA)

Agency Response: The comment is similar to #62. This exemption includes California sales of passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles, in addition to heavy-duty engines since total sales volume is a better indication of an engine company's ability to fund research and development of available technologies to comply with the requirements. Additionally, since medium-duty engines may be certified using the supplemental test procedures, this class of vehicle should be specifically included. There are several engine manufacturers that do not currently produce many heavy-duty engines, but sell thousands of vehicles and have large funding capabilities. Therefore, no change to the regulatory language is necessary.

Sales figures for the current year, which the exemption is in effect, is not possible, since only estimates are available for the current year. These are only estimates and can vary significantly compared to actual sales. This prevents an engine manufacturer from consistently providing low estimated production data to qualify for the exemption. Additionally, any overproduction in an existing year will affect the three-year average in the following year. Therefore, no change to the regulatory language is necessary.

89. **Comment:** 86.1372-2007(a). Subparagraph (3) states that "For valid tests, zero and span drift between the pre-test and post-test checks shall be less than two percent of full-scale." The smoke limit value set in 86.1370-2007(d)(2)(i) is 4% opacity. Thus the measurement uncertainty resulting from zero and span drift of the opacimeter alone could be as much as 50% of the proposed standard. Clearly, this is not an acceptable situation. ARB should work with industry experts to determine smoke standards and accuracy specifications for smoke measurement systems that are compatible with good engineering practice. (EMA)

86.1372-2007(c). Subparagraph (3) states that "For valid tests, zero and span drift between the pre-test and post-test checks shall be less than two percent of full-scale." The smoke limit value set in 86.1370-2007(d)(2)(i) is 4% opacity. Thus the measurement uncertainty resulting from zero and span drift of the opacimeter alone could be as much as 50% of the proposed standard. Clearly, this is not an acceptable situation. ARB should work with industry experts to determine smoke standards and accuracy specifications for smoke measurement systems that are compatible with good engineering practice. (EMA)

Agency Response: The provision for "zero and span drift…" is identical to the consent decree requirement. The two percent figure for the drift is between pre-and post-test and is not the same as the drift inherent to the measurement device. Therefore, the two percent figure in relation to the four percent opacimeter measurement limit does not yield a 50 percent deviation. Therefore, no change to the regulatory language is necessary.

90. **Comment:** 86.1372-2007(a). Subparagraph (4) states that "Opacimeter calibration and linearity checks shall be performed using manufacturer's recommendations *or* good engineering practice. The word "or" in this provision should probably be changed to "and". (EMA)

    86.1372-2007(c). Subparagraph (4) states that "Opacimeter calibration and linearity checks shall be performed using manufacturer's recommendations *or* good engineering practice. The word "or" in this provision should probably be changed to "and". (EMA)

    Agency Response: The sentence is intended to be read as written. The checks should be performed according to the manufacturer's recommendations whenever available. Good engineering practice should be exercised when there is no explicit recommendation from the manufacturer. Therefore, no change in regulatory language is necessary.

91. **Comment:** 86.1372-2007(d). This paragraph states that "Replicate smoke tests may be run to improve confidence in a single test *or stabilization*." The meaning of the phrase "or stabilization" is unclear. (EMA)

    Agency Response: This provision is identical to the U.S. EPA's Final Rule. The phrase "or stabilization" refers to the smoke test results. The ARB would like to ensure that the results of the test reflect results during normal operation of the vehicle, rather than a one time occurrence of high smoke emissions. Consequently, this will "improve confidence" in the test(s). Therefore, no change to the regulatory language is necessary.

92. **Comment:** 86.1372-2007(e). This paragraph provides requirements for the frequency and sampling protocols used to obtain average smoke data. As written, the paragraph appears to apply only to transient smoke tests. A similar paragraph is needed to apply to opacimeter smoke measurements made during steady-state tests. (EMA)

    Agency Response: The frequency and time interval between sampling are stated in this provision to accommodate a shock loading from the transient element of the testing. A similar paragraph is not needed for steady state testing because replicate testing and stabilization are provided.

F. NON-SUBSTANTIVE CORRECTIONS

The text shows the amendments to originally proposed adoption of the federal regulatory language in underline for additions and ~~strikeout~~ for deletions. The ARB's non-substantive corrections are shown in **bold double-underline** to indicate additions to the noticed proposal and **~~bold double strikeout~~** to indicate deletions to the noticed proposal. The ellipsis symbol ("….") means that the remainder of the text for a specific section, which is not shown, has not been changed. An explanation of the reasons for the non-substantive corrections is provided after the corrections.

1. **Comment:** 86.007-21(o), subparagraph (1) requires submission of "Weighted brake specific emissions data (i.e. in units of g/bhp-hr), calculated according to *86.1360-2007(e)(5)*…" Referenced paragraph 86.1360-2007(e)(5) does not describe procedures for calculating weighted brake specific emissions. The correct reference is 86.1360-2007(e)(6). (EMA)

   Agency Response: Correct Section 86.007-21(o)(1) to read as follows:

   (1) Weighted brake-specific emissions data (i.e., in units of g/bhp-hr), calculated according to § 86.1360-2007(e)**~~(5)(6)~~** **(5) and (6)**, for all pollutants for which an emission standard is established in § 86.004-11(a);

   The modification reflects correction to the cross-reference. ARB believes that both subparagraphs (5) and (6) are appropriate cross-references. Subparagraph (5) is appropriate since it cross-references calculations that are also cross-referenced in subparagraph (6).

2. **Comment:** 86.007-21(o), subparagraph (5) requires the submission of "Weighted *break*-specific particulate matter…". This should say "brake-specific". This subparagraph is redundant since submission of brake-specific particulate matter is also required under subparagraph (1). (EMA)

   Agency Response: Correct Section 86.007-21(o)(5) to read as follows:

   (5) Weighted **~~break~~** **brake**-specific particulate matter (i.e., in units of g/bhp-hr);

   The modification reflects a correction to spelling.

3. **Comment:** 86.007-21(o), subparagraph (6) requires submission of "A statement that the test results corresponds to the maximum NOx producing condition specified in 86.1370-2007(e)(4)." The appropriate verb form is "correspond" not "corresponds". (EMA)

   Agency Response: Correct Section 86.007-21(o)(6) to read as follows:

   (6) A statement that the test results correspond**~~s~~** to the maximum NOx producing condition specified in § 86.1360-2007(e)(4). The manufacturer also must maintain ….

   The modification reflects a correction to grammar.

4. **Comment:** 86.007-21(p), subparagraph (2) states that "For engines equipped with exhaust gas recirculation, the manufacturer must provide a detailed description of the control system the engine will use to comply with the requirements of 86.1370-2007(f) for NTE cold temperature operating exclusion, including but not limited to the method the manufacturer will use to access this exclusion during normal vehicle operation." Consistent with EPA regulations, this subparagraph suggests the availability of a cold temperature NTE exclusion for engines using EGR. However, the referenced paragraph 86.1370-2007(f), which is included in the EPA regulations, has been deleted from the proposed ARB regulations. Further, the Staff Report (p 24) states that the "…exclusion is not included in the proposal since manufacturers may use more corrosion resistant materials. (EMA)

   Agency Response: Delete Paragraph (2) and renumber Paragraph (3) of Section 86.007-21(p) to read as follows:

   ~~**(2) For engines equipped with exhaust gas recirculation, the manufacturer must provide a detailed description of the control system the engine will use to comply with the requirements of** § 86.007-11(a)(4) (iii) and **§ 86.1370-2007(f) for NTE cold temperature operating exclusion, including but not limited to the method the manufacturer will use to access this exclusion during normal vehicle operation.**~~

   ~~**(3)**~~ **(2)** For each engine model and/or horsepower rating within an engine family for which a manufacturer is applying for ….

   The modifications reflect that the noticed proposal for the NTE test procedure included neither of the provisions cross-referenced in subparagraph (2); therefore, subparagraph (2) of § 86.007-21(p) is not needed. Because subparagraph (2) is deleted, subparagraph (3) is renumbered to (2).

5. **Comment:** 86.1360-2007(c). The paragraph discusses "engine speeds A, B, C, D and E and states that these speeds are referenced in paragraph (b)(1). Only speeds A, B and C are referenced in paragraph (b)(1). Not only are speeds D and E not referenced in paragraph (b)(1), but the equations given for these speeds are not needed and should be deleted. (EMA)

   Agency Response: Correct Section 86.1360-2007 to read as follows:

   (c) Determining engine speeds. (1) The engine speeds A, B, ~~and~~ and C, ~~D, and E,~~ referenced in the table in paragraph (b)(1) of this section ~~, and speeds D and E, referenced in § 86.1380,~~ **and speeds D and E referenced in § 86.1370-2007,** must be determined as follows: . . .

   The modifications reflect corrections to cross-references.

6. **Comment:** 86.1360-2007(j). Subparagraph (1) refers to "The weighted average exhaust emissions, as determined under paragraph (e)(5)…." The appropriate cite for determining the weighted average exhaust emissions is paragraph (e)(6). [Note – the corresponding federal provision is at 86.007-11(a)(3)(i).] (EMA)

Agency Response: Correct Section 86.1360-2007(j)(1) to read as follows:

(1) Weighted average exhaust emissions as determined under paragraph (e)~~**(5)(6)**~~ **(5) and (6)** of this section pertaining to the supplemental steady-state test cycle ....

The modification reflects a correction to the cross-references. ARB believes that both subparagraphs (5) and (6) are appropriate cross-references. Subparagraph (5) is appropriate since it cross-references calculations that are also cross-referenced in subparagraph (6).

7. **Comment:** 86.1360-2007(k). The word "satisfaction" in the last sentence of subparagraph (4) is misspelled. (EMA)

   Agency Response: Correct Section 86.1360-2007 to read as follows:

   (k)(4) If the testing conducted…. However, manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's sati**s**faction that such analysis alone is sufficient under the circumstances.

   The modification reflects a correction to spelling.

8. **Comment:** 86.1360-2007(k). Subparagraph (5) states that "Within 60 days of receiving notice of an exceedance under paragraph (k)(2) of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option." The appropriate reference is (k)(3), not (k)(2). (EMA)

   Agency Response: Correct Section 86.1360-2007 to read as follows:

   (k)(5) Within 60 days of receiving notice of an exceedance under paragraph (k)**(3)**~~**(2)**~~ of this section, the manufacturer may commence testing....

   The modification reflects a correction to the cross-reference.

9. **Comment:** 86.1370-2007(b). Subparagraph (6) states that "For natural gas and other non-diesel fueled diesel cycle engines, the manufacturer may petition the Executive Officer at certification to exclude operating points from the Not-To-Exceed Control Area….if the manufacturer can demonstrate that the engine is not expected to operate in such points in normal vehicle operation and use." Since the NTE requirement only applies "under conditions which can reasonably be expected to be encountered in normal vehicle operation and use" (see 86.1370-2007(a)) a provision allowing the exclusion of operating points not expected to be experienced in normal operation and use is unnecessary. (EMA)

   Agency Response: Delete Section 86.1370-2007(b)(6).

   The modification reflects that the noticed proposal for the NTE test procedure includes no provisions for natural gas and other non-diesel fueled diesel cycle engines; therefore, subparagraph (6) is deleted.

10. **Comment:** 86.1370-2007(e), subparagraph (1) references paragraph (g)(1)(i). The referenced paragraph does not exist. The appropriate reference is paragraph (g)(1). (EMA)

    Agency Response: Correct Section 86.1370-2007(e)(1) to read as follows:

    (1) For engines operating within the ambient conditions specified in paragraph (g)(1)~~**(i)**~~ of this section ….

    The modification reflects a correction to the cross-reference.

11. **Comment:** 86.1370-2007(e), subparagraph (2) references paragraph (g)(1)(ii). The referenced paragraph does not exist. The appropriate reference is paragraph (g)(2). (EMA)

    Agency Response: Correct Section 86.1370-2007(e)(2) to read as follows:

    (2) For engines operating within the ambient conditions specified in paragraph (g) ~~**(1)(ii)**~~**(2)** of this section ….

    The modification reflects a correction to the cross-reference.

12. **Comment:** 86.1370-2007(h). The word "satisfaction" in the last sentence of subparagraph (4) is misspelled. (EMA)

    Agency Response: Correct Section 86.1370-2007(h)(4) to read as follows:

    (4) If the testing conducted…. However, manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's sati**s**faction that such analysis alone is sufficient under the circumstances.

    The modification reflects a correction of spelling.

13. **Comment:** 86.1370-2007(i). NTE requirements are referenced as "standards" rather than "requirements." (Isuzu, General Motors)

    Agency Response: Correct Section 86.1370-2007(i) to read as follows:

    (i) Deficiencies for NTE **requirements** ~~**emission standards**~~. (1) For model years 2005 through 2007, upon application by the manufacturer, the Executive Officer may accept a HDDE as compliant with the NTE **requirements** ~~**standards**~~ even though specific requirements are not fully met. Such compliances ....

    The suggested modifications reflect corrections to the nomenclature, reflecting the fact that the test procedures represent NTE requirements.

14. **Comment:** 86.1372-2007(d). The paragraph includes the phrase "…additional tests which *confirm* to this section…". It is presumed that the word "confirm" is meant to be "conform". (EMA)

Agency Response: Correct Section 86.1372-2007(d) to read as follows:

(d) Replicate smoke tests may be run to improve confidence in a single test or stabilization. If replicate tests are run, three additional tests which conform to this section shall be run, and the final reported test results must be the average of all the valid tests.

The modification reflects a correction of spelling.