

# FINAL STATEMENT OF REASONS

## ADOPTION OF THE VERIFICATION PROCEDURE, WARRANTY AND IN-USE COMPLIANCE REQUIREMENTS FOR IN-USE STRATEGIES TO CONTROL EMISSIONS FROM DIESEL ENGINES

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State of California  
AIR RESOURCES BOARD

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

PUBLIC HEARING TO CONSIDER THE ADOPTION OF THE VERIFICATION  
PROCEDURE, WARRANTY AND IN-USE COMPLIANCE REQUIREMENTS FOR  
IN-USE STRATEGIES TO CONTROL EMISSIONS FROM DIESEL ENGINES

Public Hearing Date: May 16, 2002  
Agenda Item No.: 02-4-3

**I. INTRODUCTION AND BACKGROUND**

In 1998, the Air Resources Board (ARB or the "Board") identified diesel particulate matter (PM) as a toxic air contaminant following a ten-year review process. A toxic air contaminant is an air pollutant which may cause or contribute to an increase in mortality or serious illness, or which may pose a present or potential hazard to human health. Many toxic air contaminants are volatile and are found primarily in the atmosphere as gases, but some are atmospheric particles or liquid droplets. Diesel PM is of particular concern, because it is prevalent and can be distributed over large regions, thus leading to widespread public exposure.

The amount of diesel PM emitted into California's air and its significant potential cancer risk, makes it a top toxic air contaminant. To address this significant health concern, the ARB adopted the Diesel Risk Reduction Plan in 2000, which outlines control measures to reduce diesel PM. A main component of the Diesel Risk Reduction Plan involves the use of diesel emission control strategies with existing diesel vehicles and equipment in on-road, off-road, and stationary applications. Before any of the proposed diesel emission control regulations may be implemented, ARB must be determined whether these control strategies will be effective in reducing emissions.

For years, the ARB has had a program to control sales of aftermarket engine parts. While that program ensures that aftermarket modifications do not increase emissions from certified engines, it was not designed to determine whether strategies reduce emissions or to quantify those reductions. The Verification Procedure, Warranty, and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines ("Procedure") was developed by ARB staff to identify strategies that provide real and durable reductions in diesel PM emissions, as well as reductions in emissions of oxides of nitrogen (NOx) which are ozone precursors. The primary function of the Procedure is to support the Diesel Risk Reduction Plan, but in light of California's persistent ozone problem, it may also be used to evaluate technologies for reducing NOx emissions. Currently, using the procedure is voluntary.

The proposed Procedure encompasses on-road, off-road, and stationary applications and includes provisions for evaluating strategies such as diesel

particulate filters, diesel oxidation catalysts, alternative diesel fuels and fuel additives. The durability and warranty requirements help to ensure that verified strategies will perform as required during a specified time period. In-use compliance testing will allow ARB staff to confirm that production units are consistent with verified designs, therefore giving equivalent reductions. These considerations were incorporated into the proposed Procedure.

This rulemaking was initiated by the publication on March 29, 2002 of a notice of public hearing to consider the adoption of the Procedure. The Staff Report: Initial Statement of Reasons for Rulemaking ("Staff Report"), entitled "Proposed Regulation for the Verification Procedure for In-use Strategies to Control Emissions from Diesel Engines," was also released on March 29, 2002, and made available to the public upon request as required by Government Code § 11346.2.

At the public hearing held on May 16, 2002, the Board considered the Procedure and received written and oral comments on the regulatory proposal. Staff also proposed several modifications at the Hearing, most notably to allow waiving the low-speed test cycle requirement, to allow flexibility in NO<sub>2</sub> measurement, to include requirements for an installation warranty, to require multimedia assessment for fuel strategies, and to require registration of fuel additives.

At the conclusion of the hearing, the Board approved the regulatory language with the modifications described. Further, in accordance with section 11346.8 of the Government Code, the Board in Resolution 02-23 directed the Executive Office to make the text of the modified amendments available to the public for a supplemental written comment period of 15 days. The Executive Officer was then directed to adopt the Procedure with additional modifications and clarifications as may be appropriate in light of the comments received.

The text of the Board-approved modifications with the modified text clearly indicated, was made available for a supplemental 15-day comment period in a "Notice of Public Availability of Modified Text" issued on January 29, 2003. Several written comments were received during the 15-day comment period.

A complete description of the proposed regulatory action and its rationale are contained in the Staff Report and the information made available in the supplemental Notice of Modified Text. These documents and the March 29, 2002 Notice are incorporated herein by reference. This Final Statement of Reasons updates the Staff Report by identifying and explaining the modifications made to the text of the originally proposed regulatory language. This Final Statement of Reasons also contains a summary of the comments the Board received on the proposed regulatory action during the formal rulemaking process and ARB's responses to those comments.

**Incorporation of Diesel Fuel Specifications and Off-Road Steady-State Test Procedures from the California Code of Regulations; and On-Road Engine and Chassis Test Procedures from the Code of Federal Regulations and the Code of California Regulations.** The proposed Procedure will appear in Title 13, California Code of Regulations (CCR), Sections 2700 to 2710. The proposed Procedure, in turn, incorporates (1) diesel fuel specifications adopted by the ARB

and contained in the CCR, Title 13, sections 2280 through 2283; (2) on-road engine and chassis test procedures adopted by the U.S. Environmental Protection Agency, contained in Title 40 Code of Federal Regulations (CFR) Part 86; and (3) off-road steady-state test procedures adopted by ARB, contained in CCR, Title 13, section 2423. The fuel specifications, on-road engine and chassis test procedures, and off-road steady-state test procedures are incorporated by reference because it would be impractical and costly to print them in the CCR. Current ARB administrative practice has been to have the test procedures and/or fuel specifications incorporated by reference rather than to print them in the CCR because these procedures are highly technical, lengthy, and complex. They include the "nuts and bolts" engineering protocols required for the verification of a diesel emission control strategy and have a very limited audience. Because the ARB has never printed complete test procedures in the CCR, the affected public is accustomed to the incorporation format utilized therein.

**Economic and Fiscal Impacts.** In developing the Procedure, the ARB staff evaluated the potential economic impacts on private persons and businesses. 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.

The Board's Executive Officer has also determined that pursuant to Government Code section 11346.5(a)(3)(B) the regulations will not affect small business. Therefore, in accord with Government Code section 11346.9(a)(5) no alternatives that would lessen the adverse economic impact on small businesses were considered.

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 proposed Procedure is not mandatory and simply establishes a protocol for evaluation of in-use diesel emission control technologies. Participation in the Procedure is voluntary. Presumably, a business would use the Procedure only if the business believes it will be financially advantageous for it to do so. Thus, there are no mandated costs to equipment manufacturers. Costs are incurred only if parties choose to participate in the Procedure. Those costs include research and development costs, marketing costs, and costs associated with the testing necessary to comply with the requirements of the Procedure.

It must be noted that the program does not impose any requirements on end-users. If and when other regulations require the use of control strategies, costs to the end-users would include purchase price of the control strategies and maintenance costs. Those costs will vary by market segment and will be addressed in detail as ARB staff prepares the individual control measures.

The proposed Procedure would have no significant impact on the ability of California's businesses to compete with businesses in other states. Participation in the Procedure is voluntary and the Procedure applies to all businesses that manufacture or market diesel emission control technologies and voluntarily elect to participate, regardless of their location.

Finally, the Board has determined that this regulatory action will not create costs or savings, as defined in Government Code section 11346.5 (a)(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. The regulations apply only to diesel emission control manufacturers who elect to participate in the program. Therefore, no state agency, local agency, or school districts will incur costs in reasonable compliance with this regulation.

**Consideration of 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 May 16, 2002 hearing, oral testimony was received from:

Mr. Bruce Bertelsen, Manufacturers of Emission Control Association\*  
Mrs. Dawn Friest, Engine Manufacturers Association\*  
Ms. Stephanie Williams, California Trucking Association\*  
Mr. Paul J. Beck, Clean Air Partners, Inc.  
Mr. Oreste M. Bevilacqua, Clean Air Vehicle Technology Center  
Mr. Donel Olson, Olson Engineering, Inc.\*  
Mr. Brad Edgar, Cleaire Advanced Emission Controls  
Mr. Chris Weaver, Engine, Fuel, and Emissions Engineering, Inc.

Those names listed 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 was neutral or supported the proposal. Both the Manufacturers of Emission Controls Association and the Engine Manufacturers Association were in favor of the proposal while the California Trucking Association opposed the proposal. Comments to the proposal are addressed below.

Additional written comments were received by the hearing date from:

Mr. Jim Boeger, citizen  
Mr. Kris Steinke, citizen  
Mr. Albert C. Starr, citizen

Mr. Kevin Brown, Lubrizol Company  
Mr. Marc Runmminger, Cleaire Advanced Emission Controls  
Mr. John Stekar, Catalytic Exhaust Products Limited  
Mr. Mike Jones, Hartridge Test Products  
Dr. Collin Hill, Biofriendly

Set forth below 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. Applicability**

1. **Comment:** It is inconceivable that dual fuel retrofits have not been included from the beginning in the CARB verification procedure. (Olson Engineering)

**Agency Response:** Dual fuel retrofits are not excluded from consideration in the Procedure. The Procedure will be used to verify any emission control strategies capable of reducing emissions of diesel PM by at least 25 percent. Dual fuel retrofits will be treated just like any other diesel emission control strategies and will be verified if they meet the criteria of the Procedure.

2. **Comment:** Verification of dual fuel systems for off-road and stationary diesel engines should be included in the Verification Strategy because this is the most cost-effective approach now available to reduce both PM and NOx. (Olson Engineering)

**Agency Response:** See the response to Comment 1 which is incorporated by reference here.

3. **Comment:** Dual fuel retrofit for heavy-duty engines is by far the most cost-effective solution to reduce both particulate and oxides of nitrogen that is available. It is a commercially available technology. There are thousands of dual fuel systems on heavy-duty diesel engines in operation across the United States that have been certified at the OEM level. But there is not a verifiable retrofit procedure available. And it should be included as a protocol, and isn't included as a protocol in this verification procedure. (Olson Engineering)

**Agency Response:** See the response to Comment 1 which is incorporated by reference here.

4. **Comment:** We believe the proposed regulations present a balanced, fair, and flexible approach and will serve a critical role in advancing ARB's Diesel Risk Reduction Plan (DRRP) and will help ensure the objectives of that program are achieved. (MECA)

**Agency Response:** The staff agrees with this comment.

## **B. Application Process**

5. **Comment:** We strongly support the proposal to create multiple verification classifications for both PM and NOx reduction strategies. This innovative approach will help to stimulate efforts to develop, optimize, and verify the most effective strategies feasible for the full range of on-road, off-road, and stationary diesel vehicles and equipment. (MECA)

**Agency Response:** The staff agrees with this comment.

6. **Comment:** We find that Section 2702 "Application Process" appears to be rather lengthy which will impact on the limited financial resources that we have available. Can Section 2702 be simplified for companies that only seek "off-highway" verifications? (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. Section 2702 explains the overall application process and suggests a report framework for applicants to follow. Regardless of whether the diesel emission control strategy is used in on-road, off-road, or stationary applications, the need for information applies equally. As the Procedure covers a multitude of requirements, the application format helps the applicants to lay out all relevant information in an organized manner. It also allows staff to identify any items that need additional explanation. In this way, it improves the communication between the staff and applicants as well as increases the efficiency in reviewing the applications. However, to simplify the application where possible, changes have been made in the Notice of the Modified Text to allow the Executive Officer to waive the requirements not applicable to a given control strategy.

7. **Comment:** Section 2702(g) "Extensions of an Existing Verification" and Section 2702 (h) "Design Modifications" should be better defined in light of the wide variety of engines and applications typical of the off-highway market. The DOC/ DPF products manufactured for the off-highway market are usually low volume items which will have a very wide variety of muffler canning designs. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. The "Extensions of an Existing Verification" in Section 2702(g) describes the requirements for applicants who wish to increase the scope of an emission control group for a verified technology and have sufficient data to support such a request. For instance, under this process, a diesel emission control strategy could initially be verified for school bus application, for engine model years between 1998

and 2001. Later, with more supporting field data, such verified system could be extended to earlier model year engines.

The “Design Modification” in Section 2702(h) refers to the design change of the diesel emission control system. One example might be a new formulation of the catalyst that increases the overall efficiency of the catalyst. To support such claims, applicants may need to submit additional data, engineering justification, and analysis deemed necessary by the Executive Officer to address the original and modified designs. The diesel oxidation catalyst or diesel particulate filter for the off-road market may have different designs to fit in a variety engines; however, as long as the underlying fundamental operating principles remain the same, the modified design of the system should be verified rather easily. In short, it is not practical to give specific details for the “Extension of an Existing Verification” and “Design Modification,” rather it must be reviewed on a case by case basis.

8. **Comment:** This proposed rule gives an enormous amount of discretion and authority to an individual Executive Officer. If a company disagrees with the Executive Officer on one or more points when preparing a testing protocol etc., there appears to be no formal appeals process. Since no matter how much we hope and expect all employees to be honest and above reproach, there will always be the possibility of an EO with a conflict of interest or worse who has been bought off. Would it not be prudent to make this much less likely by having an appeals board within the CARB that requires three independent EOs including one managerial level officer to review any disagreements and make a final ruling? This could be done quickly by a hearing with both parties present. It may also be prudent to have an independent review panel that can randomly check an EO’s findings from time to time. This would ensure consistency in application of the regulations and would greatly diminish the possibility of misdeeds. It would also greatly strengthen the credibility of the process. (Bio-Friendly).

**Agency Response:** The staff disagrees with this comment. The law does not authorize the formation of the type of additional bureaucracy the commentator refers to, nor does there appear to be the need for it. The Executive Officer has been certifying vehicular emissions control systems for many years and during this time a need for such a process has not become apparent. Parties who may disagree with the Executive Officer’s actions taken in the context of the proposed procedure, have other avenues to contest them, including in court. Also, the public hearing provided in the rulemaking process provides ample opportunities for the public to comment on the content of the proposed rule, and the public is always free to make their views known to the Board.

### **C. Emission Testing Requirements**

9. **Comment:** Engine power derate and/or efficiency loss including a reduction in vehicle operating range should be held limited to a nominal value – say 5%

since efficiency loss at the expense of emission reduction has a negative impact. (Olson Engineering)

**Agency Response:** The staff disagrees with this comment. Current test procedures for engine or chassis testing do not have a specific limit for the power or efficiency loss that may occur during testing. Under these procedures, the test will not be considered invalid if the engine power loss exceeds certain levels. Instead, the engine or vehicle being tested must meet the specific test conditions. The intent of the Procedure is to allow consumers greatest possible choice of verified strategy. For some applications, reduction in maximum power output may be acceptable.

10. **Comment:** The NO/NO<sub>2</sub> ratio for a given NO<sub>x</sub> level need not be measured for dual fuel systems, diesel fuel additives and alternative fuels. This is because these control strategies (contrary to diesel particulate traps) do not significantly affect the NO/NO<sub>2</sub> ratio for NO<sub>x</sub> emissions compared to operation on diesel fuel alone. (Olson Engineering)

**Agency Response:** The staff disagrees with this comment and believes that all proposed strategies should be tested to determine whether they result in changes in emissions of NO<sub>x</sub> or other pollutants. The Procedure also requires measurements of PM, HC or NMHC, NO<sub>x</sub>, NO<sub>2</sub>, CO, and CO<sub>2</sub> regardless of the type of diesel emission control strategy, to guarantee that use of any diesel emission control strategy to reduce PM does not negatively impact air quality. As noted in the staff report, in Section 4.3.4, the purpose of measuring NO<sub>2</sub> is to ensure that NO<sub>2</sub> levels after the installation of the diesel emission control strategy are not high enough to increase ambient levels of ozone, when the strategy is used on a large scale.

11. **Comment:** We also support ARB's intent to allow verification of technologies using test data generated on alternative test procedures where ARB has determined this is appropriate. Permitting the use of alternative test procedures to generate data will provide manufacturers greater flexibility in verifying retrofit emission control technologies and as a consequence, result in the broadest range of cost-effective retrofit emission control technologies being available to reduce emissions from in-use diesel engines in California. (MECA)

**Agency Response:** The staff agrees with this comment.

12. **Comment:** The verification procedure requires additional testing where an engine is equipped with an auxiliary emission control device (AECD) in order to determine the impact of the retrofit device on the emission performance of an engine equipped with an AECD. Some retrofit NO<sub>x</sub> emission control technologies operate completely independently of the operation of an engine that may be equipped with an AECD and will not impact the engine out emissions. We look forward to working with ARB to define criteria under which the requirements for additional NO<sub>x</sub> emission testing for engines incorporating AECDs could be waived by the Executive Officer in those cases

where the NOx retrofit device operates completely independent of an engine that may be equipped with an AECD. (MECA)

**Agency Response:** The staff agrees with this comment in part and disagrees with it in part. Staff acknowledges that some retrofit NOx emission control technologies operate completely independently of the operation of an engine that may be equipped with an AECD. Accordingly, staff modified the test requirements for strategies intended to reduce NOx from on-road applications to account for this.

First, staff added a requirement to discuss the effects of elevated NOx emissions on the strategy. This information would assist staff in determining the necessity of conducting the additional testing described in Section 2703(e)(1)(c), and the appropriate factors to weight the test results from the additional testing in calculating an overall emission reduction.

Second, staff replaced the requirement to use an additional test cycle that triggers all defeat devices with a requirement to use a test cycle likely to give rise to significant periods of elevated NOx emissions. Requiring that the cycle trigger *all* defeat devices does not accurately portray staff's intent, which was instead to determine performance of a strategy under high-NOx emission conditions that are typical on the road, but not observed during standard test cycles. Such a determination does not require that all possible high-NOx conditions be covered in a test cycle. Also, because of the widely-acknowledged difficulty in identifying the operating parameters that give rise to those conditions, it is unrealistic to require a cycle that includes them all.

Finally, staff added a provision allowing the applicant to request that this additional testing be waived. The Executive Officer's determination regarding such a request is based on all relevant information, such as the nature of the strategy and the availability of an appropriate test cycle. Originally, the Procedure did not provide an opportunity for this additional testing to be waived. As such, it erroneously indicated that staff wanted testing to be required for all cases, even those cases in which there may be little to no meaningful information gained from such testing. To assist in identifying those exceptional cases, staff chose to give applicants an opportunity to make a case for waiving the additional testing. With this opportunity, applicants may also be able to significantly lessen the financial burden associated with testing.

13. **Comment:** The proposal outlines that on-road engines should be tested over current engine based FTP heavy-duty transient cycle or alternatively, chassis based test cycles (Urban Dynamometer Driving Schedule and low-speed test cycle). I commend the ARB in its flexibility to offer both engine-based and chassis-based test procedures. The flexibility will facilitate the verification of in-use strategies for non-road vehicles. (MECA)

**Agency Response:** The staff agrees with this comment.

14. **Comment:** The proposal also outlines that non-road engines should be tested over the current steady-state test cycle as prescribed by ARB non-road regulations. There are several faults with the current steady state test used for non-road engines. Specifically, these faults are due to the steady state nature of the test. The faults include:

- Exaggerated high exhaust temperatures which are not represented in-use transient equipment operation
- Weightings of individual modes which exhibit high exhaust temperatures occur, which may not accurately reflect transient equipment operation
- Potential to understate the PM emissions, and
- Potential to poorly characterize the PM composition with respect to actual PM composition over transient operation. (Lubrizol)

**Agency Response:** The staff acknowledges the limitations of the steady-state cycle, but does not believe that the proposed regulation should be amended in response to it. The steady-state cycle is the accepted test cycle for all off-road engine certification. As such, there is a large body of existing engine data based on that cycle. Those certified data provide additional information for comparison when evaluating the effectiveness of the diesel emission control strategy. Nevertheless, the steady-state test cycles may not fully depict real-life operation in the field. In recognition of such limitations, the Procedure does allow the applicant to propose an alternative test cycle or method in place of a required test cycle or method. In reviewing such requests, the Executive Officer may consider all relevant information, such as the body of existing data using the alternative cycle, and the characteristics of the alternative cycle compared to the in-use duty cycle. It should be noted that efforts to improve the off-road certification test cycle are underway, and the Procedure has the flexibility to accept data on improved cycles.

Finally, in recognition of the limitations of various test cycles, staff encourages manufacturers to conduct durability demonstrations in the field. For those technologies whose durability demonstration is conducted entirely in the laboratory, an additional field demonstration of 200 hours is required. The extra field demonstration would provide more assurance that the diesel emission control system is indeed working well in the field.

15. **Comment:** The test method can produce results, which do not truly represent the performance of in-use strategies to control emissions from diesel engines. Examples of such results include:

- Underestimation of diesel oxidation catalyst performance due to excessively high exhaust temperatures that can occur over this test as well as the reduced soluble organic fraction which characterizes diesel particulate generated over steady state tests. The exhaust temperature can be elevated by as much as 200 degrees Celsius over exhaust temperatures observed over normal in-use transient equipment operation
- Possible underestimation and overestimation of regeneration performance of diesel particulate filter based technologies

- Possible underestimation and over estimation of performance of NOx reduction technologies.
- Poor correlation between on-road and non-road engine based tests in regard to the 20% limit on the increase in NOx emissions or increases in other regulated and unregulated emissions. The higher exhaust temperatures that occur over heavily weighted steady state modes of the non-road test procedure require further examination in regards to their effect on NOx and other emissions. Further examination is required to ensure that the test results over the non-road test method accurately represent the emissions reduction performance observed over in-use exhaust temperature profiles.

For these reasons it is recommended that the ARB define in advance an optional transient test procedure for the verification of strategies for non-road engines which operate in a transient manner. (Lubrizol)

**Agency Response:** See the response to Comment 14, which is incorporated by reference here.

16. **Comment:** I would encourage the use of highway engines where appropriate to verify strategies for transient non-road applications. This would further encourage the early development, verification, and market introduction of strategies for non-road engine applications. (Lubrizol)

**Agency Response:** The staff acknowledges such concern, but does not believe that the proposed procedure should be amended in response to it. The engines used for on-road and off-road applications may be similar; however, the design of the diesel emission control strategies could depend on the applications as well as the engine. For instance, a similar engine may be used in a bus or in a construction equipment. Nevertheless, because of the different exhaust temperature and backpressure experienced by a bus or a construction equipment, the design of the diesel emission control strategies for these different applications may vary. The Procedure does allow the flexibility to consider the use of highway engines to verify off-road applications where it deems appropriate. However, in not all cases would the use of highway engines be suitable for verifying off-road applications.

17. **Comment:** In the current draft verification procedure, the testing requirements for chassis and engine dynamometers differ (§2703(e)). Two test cycles (the Urban Dynamometer Driving Schedule and a second transient test) are required for systems demonstrated on a chassis dynamometer, but just one test cycle (the heavy-duty FTP) is required for systems tested on an engine dynamometer. The second transient test cycle is intended to demonstrate the emission control system performance during periods of stop-and-go driving, maximum vehicle acceleration and extended idling. The single test cycle for the engine dynamometer does not include extended idling, and thus an emission control system tested on an engine dynamometer could have a serious emission defect during extended idling or stop-and-go driving which would not be detected during the verification

process. Or, an oxidation catalyst verified on an engine dynamometer for “use in all duty cycles” might not provide at least 25% PM control on real transit buses and refuse trucks because the exhaust temperature during the FTP cycle is much hotter than that of a typical stop-and-go vehicle. If ARB is concerned about the performance of an emission control system during applications which involve extended idling, all systems should be tested under such conditions, not just those verified on chassis dynamometers. (Claire)

**Agency Response:** The staff disagrees with this comment. Staff recognizes that the engine test cycle may not fully reflect actual driving conditions in the field; however, it does provide a common basis for comparing different diesel emission control strategies and is consistent with engine certification. In addition, the engine test cycle requirements are designed to allow harmonization with the U.S. EPA verification protocol, so that applicants may be able to submit test results fulfilling both the ARB’s and the U.S. EPA’s requirements.

While applications such as transit buses or refuse trucks involve extended idling which may not be reflected in the engine dynamometer testing, staff believes that those concerns can be addressed during the field demonstration reflecting the engine or vehicle’s normal operation. Through the field demonstration, staff would be assured of the functionality of the diesel emission control strategy, for a given application, including during conditions not easily observed in the laboratory.

18. **Comment:** In the staff report about the verification procedure, staff has stated that a second cycle is not required for the engine dynamometer because they do not have RPM/torque maps for any stop-and-go cycle (see first paragraph on page 26 of the staff report). Using ARB’s chassis dynamometer in Los Angeles, ARB could generate these maps. Alternatively, ARB could hire a consultant to develop the test cycles. In our opinion, the lack of a proven test cycle is not a sufficient reason to have unequal standards for chassis and engine dynamometer testing. (Claire)

**Agency Response:** Testing requirements for the engine dynamometer have been harmonized with the U.S. EPA requirements to reduce costs to applicants. Chassis testing is allowed under the verification Procedure to allow additional flexibilities to applicants who do not intend to seek U.S. EPA verification. However, the chassis test does not have as large a body of data associated with it as the engine test, which is used for new engine certification. Therefore, some additional data is needed to provide the same confidence regarding the emissions results. Various low-speed chassis dynamometer test cycles are in use today, and thus the low-speed cycle requirement provides another point of comparison to existing data, increasing the confidence of the validity of the ultimate verification level given to a strategy.

Developing an additional engine test cycle specifically for this program would enable collection of data, but there is no body of existing data for comparison. Thus, the data would not be as useful in establishing a verification level.

Nevertheless, applicants may propose alternative test cycles that incorporate such conditions in place of a required test cycle or method.

Finally, due to resource and funding constraints at ARB, staff is unable to develop an engine test cycle depicting the stop-and-go driving conditions within the foreseeable future. See also the response to Comment 19, which is incorporated by reference here.

19. **Comment:** The draft regulations should be amended to require the ARB Retrofit Branch to develop low temperature [sic] test cycles for the engine dynamometer. In the time before additional engine dynamometer test cycle is developed, one of the following two actions should be mandated: 1) the requirements for a second chassis dynamometer test cycle should be waived (and the UDDS be the only cycle required), or 2) manufacturers that test on an engine dynamometer should also be required to demonstrate their device over the low-speed cycle on a chassis dynamometer. (Claire)

**Agency Response:** The staff disagrees with this comment. Additionally, staff believes that the comment was misstated, as no low temperature cycle was ever mentioned in the Procedure. The context would indicate that the commentator meant to refer to low-speed cycles. Staff modified the low-speed chassis test cycle requirements to allow the applicant to request that the Executive Officer waive the low-speed chassis test cycle requirement. In considering the request, the Executive Officer may consider all relevant information such as the nature of the emission control group selected for verification and the operating principles of the applicant's system. This modification lessens the financial burden on those applicants for whom testing with the low-speed cycle would not provide meaningful information.

Staff did not require applicants to conduct both engine and chassis tests as this would create a significant financial burden on the applicants. The choice of whether to use an engine dynamometer or a chassis dynamometer to verify lies with the applicant, so the most economic course can be taken. Nevertheless, applicants are encouraged to provide additional data as appropriate.

20. **Comment:** We feel that Section 2703 (l) and 2703 (n) should be better defined and that the Executive Officer should advise the candidate company well in advance of any additional exhaust analyses/testing requirements. Additional exhaust testing/testing requirements are usually expensive and should be minimized in order to avoid testing requirements costs (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. While it is impossible for staff to define additional testing needs prior to reviewing and understanding individual technologies, applicants are encouraged to contact staff and discuss their proposed test plans, prior to any testing. The verification procedure is intended to verify emission reductions from an extremely diverse range of technologies, ranging from DPFs to alternative diesel fuels, that may have unforeseen side-effects on diesel emissions.

Therefore, staff deems it essential that additional analyses be required as necessary. Upon reviewing all relevant information, the Executive Officer may require the applicant perform additional exhaust analyses if there is reason to believe that the use of a diesel emission control strategy may result in the increase of toxic air contaminants, other harmful compounds, or a change in the nature of the emitted PM. The following criteria form the basis for ARB's determination if any additional analyses are required:

- The nature of any substance added to the fuel, intake air, or exhaust stream,
- Whether a catalytic reaction is known or reasonably suspected to increase toxic air contaminants or ozone precursors,
- Results from scientific literature,
- Field experience, and
- Any additional data.

Additional analyses may include, but are not limited to, measurement of benzene, 1,3-butadiene, formaldehyde, acetaldehyde, polycyclic aromatic hydrocarbons (PAH), nitro-PAHs, dioxins, and furans.

21. **Comment:** It could be perceived as onerous and unnecessary expense to require testing of fuel for composition when a company is only adding very small quantities of an additive to "regular" diesel fuel. There should be a provision here for the Executive Officer (EO) to waive this requirement if the company can show the product makes no substantial change to the "regular" fuel composition. (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. If an applicant requests verification of the emissions reductions effects of an additive, it is essential to determine that if the fuel additive is indeed present in the fuel even it is in a small quantity. If the fuel additive is pre-mixed with diesel fuel and produced in bulk quantity, it is regarded as an alternative diesel fuel and will be subject to testing of its fuel composition. Please see page 36 of the Staff Report, which is incorporated by reference here.

22. **Comment:** We have talked to the staff once or twice before about the issue we have with the verification process. And it has to do with the cold test you are running at the beginning of Urban Dynamometer Driving Schedule (UDDS). From an operational point of view, if you are doing a cold UDDS, it is very hard to control the vehicle because the brakes don't work as well. (Clean Air Vehicle Technology Center)

**Agency Response:** The staff agrees with this comment. As the brake of a heavy heavy-duty vehicle may not function properly during the cold-start, it is not practical and unsafe to conduct the cold-start testing on a chassis dynamometer. Staff has deleted such requirement as stated in the Notice of Modified Text.

23. **Comment:** We don't support the use of a cold-start test on a chassis dynamometer testing because we just don't think it is necessarily practical nor safe. (Cleaire)

**Agency Response:** The staff agrees with this comment and this change has been made in the Notice of Modified Text.

#### D. Durability Testing Requirements

24. **Comment:** We feel that Section 2704(d) should be simplified with the onus on reduced durability testing costs. To reduce costs, we feel that the Minimum Durability Demonstration Periods should be reduced to 500 hours for off-road and stationary emergency generator engine types. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff acknowledges the concern but does not believe that the proposed regulation should be amended in response to it. The minimum durability demonstration period for stationary emergency generator is 500 hours because the local Air Pollution Control Districts have restrictions on annual hours of operation for stationary generators. Typically, the stationary emergency generator is limited to 200 hours of operation per year. On the contrary, off-road emergency generators are mobile and could be moved from district to district and thus are likely to have more hours of operation per year. Therefore, an off-road generator is treated like any off-road diesel equipment and is subject to the minimum durability demonstration of 1000 hours.

25. **Comment:** With respect to Section 2704(j), we feel that the Conditional Verification should be granted to all candidates upon completion of 33% of the minimum durability period. The authority of the Executive Officer should be minimized in this regard. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. Compared to the market share of diesel engines for on-road applications, the market share of diesel engines for off-road and stationary applications is relatively small. Thus, there is less economic incentive to develop and verify diesel emission control strategies for those applications. Therefore, to encourage the development of such strategies, staff proposed conditional verification be allowed for off-road and stationary applications. Please see pages 32 – 33 of the Staff Report, which are incorporated by reference here.

26. **Comment:** Full verification requirements should be extended to 2+ years to complete laboratory testing and 4+ years for field testing after conditional verification is granted. The extension of time would allow the small off-highway emission control device manufacturers to re-coup testing costs and spread costs over a greater period of time. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with the comment. As specified in the Procedure, after receiving conditional verification, applicants must meet full verification requirements within one year if laboratory testing is chosen and within three years if field-testing is chosen. An applicant can easily fulfill the remaining durability demonstration requirement within these periods. After receiving conditional verification, an applicant would have to accumulate approximately 670 additional hours of operation to receive full verification. This would require no more than 13 hours a week on an engine dynamometer or 5 hours a week on an in-field piece of equipment to complete within the allotted times.

27. **Comment:** Must the system that is tested at zero miles have the identical system that are tested in the post-durability phase, or rather can one test separate but identical systems? In this way, we can take systems that are in the field and have been accumulating mileage, and when they reach a 50,000 mile mark, test them; and then test an identical yet separate system. I think that would greatly speed up the verification process. I think that is particularly important when we are considering application of systems that are running on, for example, refuse or transit buses while mileage accumulation could be as low as 10,000 to 20,000 miles a year. What that may lead to is requiring three to five years to achieve the durability requirements. So I think the offer would be that if we could ensure that we had identical but separate systems, we could then begin accumulating mileage. And once we achieve that mileage, test the systems and then test the zero-mileage system and compare those for deterioration effects. (Cleaire)

**Agency Response:** This Procedure allows what is proposed in the comment.

## E. Field Demonstration Requirements

28. **Comment:** With respect to Section 2705(b). We feel that the test period requirements should be minimized to control costs. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff agrees in principle that testing requirements should be minimized to control costs, but disagrees that the test period requirements in Section 2705(b) should be modified. For the diesel emission control systems with durability conducted in the field, an additional field demonstration is not needed. However, for the diesel emission control strategies with durability demonstration conducted entirely in the laboratory, the staff needs adequate assurance that those systems are indeed compatible with the specific application in the field. Durability demonstrations on the engine dynamometer in the laboratory may not necessarily provide adequate information on how diesel emission control systems operate in the field. Thus, it is essential that additional field operating information is available to insure that the diesel emission control systems are not causing problems undetected under the laboratory conditions.

The field demonstration requirement of 200 hours or 10,000 miles is less than the full term durability demonstration of 1000 hours or 50,000 miles. It is also less strenuous to complete and yet it provides field operating information that is practical and robust. A field demonstration of less than 200 hours or 10,000 miles would not provide sufficient information to ascertain that the system will be fully operational in the field.

## F. Other Requirements

29. **Comment:** With respect to Section 2706(j), the degree of exhaust noise attenuation may not meet OEM off-highway muffler standards especially in the case of retrofit diesel oxidation catalyst or diesel particulate filter installations. The volume of the control device will usually consume some of the internal muffler volume required for noise control. Alternatively, in some cases the entire muffler may have to be replaced with the emission control device. The emission control device is usually not an ideal sound attenuation device. This section should be altered to reflect this reality especially in the case of off-highway engine and vehicle applications. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. While ARB does not have the jurisdiction to enforce the Vehicle Code requirements for noise level control, Section 2706(j) puts applicants on notice that their systems need to meet the exhaust noise attenuation requirements contained in the Vehicle Code. Manufacturers may need to address the noise limits when designing the diesel emission control systems.

30. **Comment:** Section 2706 (c) requires a company to disclose the exact chemical formulation of an additive. This may be asking for proprietary knowledge that if released could give competition an unfair advantage. What guarantee is CARB prepared to make in return for such information that strict confidentiality will be kept? And what recourse will a company have if confidentiality is broken? (Bio-Friendly)

**Agency Response:** All confidential material should be marked as such by the applicant, and such proprietary information or trade secrets shall be strictly handled by ARB in accordance with the procedures specified in Title 17, California Code of Regulations, Sections 91000 to 91022.

31. **Comment:** In Section 2706 (c)(4)(a), what is the point of this required test? Most additive companies have gone to great lengths to define the optimum concentration range for an additive. Most are also aware that increasing the concentration beyond a certain level makes the additive ineffective. If CARB is concerned that consumers will use the old adage that: "More is Better," and ignore instructions to use the additive, CARB should do the testing, not the company. If adequate instructions and warnings are given by a company about overuse, why should a company be expected to pay the bill for a test that might prove nothing and could be destructive to an engine? (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. As described in Section 2706(c)(4)(a), staff proposed emission testing of fuel additives at a dose of 50 parts per million (ppm) or ten times the dose rate stipulated for verification, whichever is greater. Testing at a higher dose than the strategy specifies is intended to identify any possible problems that might occur either due to misfueling or build up of the fuel additives in the system over time, as described in the Staff Report in Section 4.3.5.1. Since testing at extremely high additive concentrations can result in filter plugging, staff has attempted to identify an appropriate level through review of existing data.

If the higher dose would result in catastrophic damage to the engine, the applicant can petition to use less than 50 ppm. The applicant must supply information on failure modes, and the dose that triggers failure. The applicant must also supply information and data supporting the highest feasible dose for testing. An increase in emissions is not by itself sufficient to justify a dose lower than 50 ppm and must be correlated to potential engine damage. After reviewing information substantiating a lower dose, the Executive Officer would determine if testing at a lower level could be accepted, or if testing would need to be conducted at 50 ppm or ten times the specified dose rate.

32. **Comment:** In the proposed verification procedure, the section says, "In order to be verified, the diesel emission control strategy must not increase emissions of criteria pollutants including non-methane, hydrocarbons, CO, and NOx. We got this dilemma where there may be more than 10 percent increase of CO, as long as natural gas engine retrofit kit is concerned. My recommendation would be CO and nonmethane hydrocarbons are allowed to go up, but not anymore than that which is allowed to certify a new engine. (Clean Air Partners)

**Agency Response:** The staff agrees with the comment. As stated in the Notice of Modified Text, a strategy must not increase CO emissions beyond the current CO emission standard adopted by the ARB.

Additionally, staff has made changes to address the issue of nonmethane hydrocarbons. Because hydrocarbons are ozone precursors, care must be taken to ensure that overall ozone precursors are limited. This typically should involve atmospheric modeling. However, because such modeling may be complex and costly, the staff has allowed a simpler procedure in the near term. Prior to July 1, 2006, the Procedure allows a slight increase of nonmethane hydrocarbons provided that it is offset by a decrease of NOx (i.e., the sum of the two after control is equal to or lower than the baseline sum). However, after July 1, 2006, a strategy that exceeds the ten-percent limit must be verified by use of atmospheric modeling demonstrating the widespread use of its strategy will not adversely impact the public's exposure to ozone.

33. **Comment:** The diesel engines have extremely low CO emissions. So that the 10 percent increase in CO is basically zero. And that problem will only get worse. Our recommendation would be that, at least for CO, since CO is

not a significant concern from diesel engines anyhow, simply to say that you cannot exceed the emission standard rather a percentage increase (Christopher Weaver)

**Agency Response:** The staff agrees with the comment and this change has been made in the Notice of Modified Text.

## **G. Warranty Requirements**

34. **Comment:** With respect to Section 2707(a), we feel that warranty requirements are far too generous to the engine/vehicle end user. The warranty requirements would place the vast bulk of the potential financial liability on the emission control manufacturers. We feel that the warranty should be limited to replacement cost of the diesel emission control device and/or related control device parts/components only. The warranty should not cover labor, damage to the engine or damage to other vehicle components. The end-user should be required to return the diesel emission control device to the manufacturer for inspection. The end-user should be required to pay for all shipping costs relating to the diesel emission control device to and from the manufacturer facility. The manufacturer of the diesel emission control strategy should have the exclusive and final right to determine the cause of failure. The vehicle or engine owner should be required to keep all maintenance records as proof that they maintained the vehicle or engine in accordance to engine manufacturer requirements. (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. This procedure was developed to protect end-users, to the maximum extent possible, as they may be required to install diesel emission control systems by the in-use diesel emission control rules (e.g., the transit bus rule). While developing this Procedure, staff determined that defective diesel emission control strategies may cause damage to the engines with which they are used. Thus, to fully protect the end-users from the damage that may be caused by defective diesel emission control strategies, the warranty should not only cover the diesel emission control strategies but also the engines and other related components.

To avoid the potential for abuse of the warranty coverage, end-users must perform proper maintenance and should retain all necessary maintenance records and receipts, as stated in the Procedure. The staff believes that this approach provides adequate protection against abuse of the warranty while retaining the necessary coverage against damage that defective diesel emissions control systems may cause to vehicles or engines. Staff made a number of clarifications to the warranty provisions to better delineate responsibilities. The staff incorporates its responses to Comments 37 – 49 by reference here.

35. **Comment:** The Minimum Warranty Periods for off-road engines and stationary engines should be reduced to 2 years or 2000 hours (whichever occurs first). (Catalytic Exhaust Products Limited)

**Agency Response:** The staff disagrees with this comment. As noted in Section 7.3 of the Staff Report, staff believes that the minimum warranty periods for off-road engines and stationary engines are reasonable to protect end-users without creating an excessive burden on the emission control manufacturers. Please see this discussion, which is incorporated by reference here, as is the response to Comment 34.

36. **Comment:** In Section 2707(b), the general theme of this whole section appears to be aimed at systems that would be attached to an engine to reduce emissions. Most of it seems very onerous and almost impossible to realistically enforce for a company that is adding a product directly to the “regular fuel.” Oil companies do not have to warrantee that gasoline or diesel we buy everyday will not damage an engine. They already add a wide range of additives. They give no warranty against any of these additives. However, we all know that by the very nature of the combustion engine, burning fuel damages an engine over time. Therefore, the Executive Officer should be given the discretion to exempt certain products from warranty rules, after suitable analysis of the product and its use. (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. The purpose of subjecting additives and alternative diesel fuels to rigorous testing is to ensure that the emission reductions attributable to them are, in fact, real and that they would not cause any adverse effects to the vehicles or engines. As the fuel additive and the alternative diesel fuel are both considered as diesel emission control strategies in this Procedure, they must meet the same warranty requirements just like other any strategies. Regular gasoline or diesel is not considered as a strategy for emission control, and they undergo different certification procedures which are more extensive and statistically rigorous. Moreover, the same concerns noted in the response to Comment 34 hold for additives as well as systems attached to an engine. The response to Comment 34 is incorporated by reference here.

37. **Comment:** The California Trucking Association (CTA) is opposed to the adoption of the Diesel Emission Control Strategy Verification Procedure, Warranty, and In Use Compliance Requirements as they come before the Board on May 16, 2002. Of particular concern to the trucking industry are the insufficient and unacceptable warranty periods for the emission control devices (ECD). CTA has expressed concerns about warranty issues since CARB first proposed its verification procedure and disclosed plans to force certain sectors of the trucking industry to retrofit their fleets. However, CARB has seemingly ignored our concerns and continues to propose an unreasonable, almost non-existent warranty period. (CTA)

**Agency Response:** The staff disagrees with this comment and believes that the warranty periods strike an appropriate balance among the interests of the vehicle owners, device manufacturers and vehicle and engine manufacturers.

In developing the Procedure, ARB has worked with a number of stakeholders including emission control industry and engine manufacturing industry, as well as end-users.

In fact, the adopted warranty period for a heavy heavy-duty engine is 150,000 miles or 5 years, which was extended from the 100,000 miles or 4 years warranty period proposed in the initial workshops. Throughout this process, ARB has always had protection of the end-users in mind and believes that the proposed language accomplishes this goal. However, ARB must find the balance between protecting end-users and not creating an excessive burden on the diesel emission control manufacturers. Staff believes that the adopted warranty period strikes this balance, and is reasonable and feasible.

Note that the emission control warranty for new heavy heavy-duty engines is compulsory and covers 100,000 miles or 5 years as required by ARB regulations. In general, it covers all emission control components to be free from defects in design, workmanship. It also covers repair or replacement, including parts and labor. Manufacturers are responsible for damage to other components proximately caused by failure of warranted part.

On the other hand, the basic engine mechanical warranty for new heavy heavy-duty engines is a voluntary marketing strategy and covers typically 250,000 miles, or 2 years, depending on the manufacturer. Such warranty covers the engine to be free from defect. It also covers repair or replacement, including parts and labor. The purchasers have the option to purchase extended warranty coverage increasing the warranty to 500,000 miles, or 5 years coverage in most cases.

In short, staff believes the warranty coverage proposed by the Procedure is consistent with the new engine emission control warranty. The responses to Comments 34 and 35 are incorporated by reference here.

38. **Comment:** For heavy heavy-duty vehicles, which are the vehicles operated by the average CTA member, the proposed warranty period on an ECD is 5 years or 150,000 miles. A CTA survey taken in April 2002 among California's petroleum carriers indicated that the minimum number of miles traveled per truck closer to 350,000 miles per year. This yields a warranty of just a little more than 5 months for the average petroleum carrier. Considering the general trucking population, including long-haul truckers, the annual miles traveled would increase, decreasing the warranty time period considerably. National engine manufacturers provide warranties that last through the first rebuild or 500,000 miles, yet manufacturers of ECDs are required to provide virtually no warranty on their systems. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to Comment 34, 35, 37, 40 – 49 here. No matter how long the time period involved, 150,000 miles is a substantial mileage accumulation that will put considerable demands on a diesel emissions control device. From one point of view, the fact that this mileage is accumulated over a relatively brief time period may place a more significant demand on a device

than if the same mileage were accumulated over a longer period. Also, there is a balance to be struck here. There is definitely a huge variation in terms of the vehicle-mile-traveled per year for different diesel engines based on their application. While an interstate long-haul truck may commute on average 350,000 miles per year, a typical school bus travels about 30,000 miles per year. For inter-state long haul trucks, it may be worthwhile to purchase an extended warranty from the diesel emission control manufacturers, similar to extended warranties offered by the engine manufacturers. Staff also believes that the competition in the market will eventually become the driving force for emission control manufactures to increase their warranty coverage. For instance, the original warranty for mechanical engines was driven by the market from 100,000 miles to where it is today, 250,000 miles.

39. **Comment:** CTA respectfully requests that the proposed warranty periods be reevaluated before the verification procedure is adopted by CARB. (CTA)

**Agency Response:** See the response to Comment 38, which is incorporated by reference here.

40. **Comment:** The proposed warranty periods will not only hinder user acceptance of the systems, but it will also cause fleet operators to avoid retrofitting older engines until they are forced to do so, leaving dirtier engines on the road longer. Emission control devices are unproven in long-term, daily trucking operations. If anything, it would be more appropriate to offer a longer warranty period now and reevaluate it once the emission control devices have been proven reliable and effective in on-road use. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to Comments 34, 38- 39, 41 – 49 here. Staff is convinced that certain emission control systems work well in long-haul trucking operations, as shown by field demonstration data from various emission control manufacturers. Further, the durability demonstration and field demonstration provide solid evidence to substantiate a diesel emission control strategy's durability. Finally, the in-use compliance program insures that the emission reduction of the diesel emission control strategy is durable and maintaining consistent emission reduction. Please also see page 85 of the transcript of the testimony by Mr. Bruce Bertelsen at the public hearing on May 16, 2002, representing MECA. The transcript is incorporated as follows:  
"There are 50,000 filter-equipped vehicles around the world. They are operating effectively. And to my knowledge, there has not been on instance in which a particulate filter failure caused an engine to fail."

41. **Comment:** For carriers that do retrofit their engines, their engine warranty is subject to nullification by engine manufacturers unless they prove the retrofit did not harm the engine. CARB has created a fatal flaw with regard to warranties where the end-user is no longer protected due to mandatory state modifications to engines. The proposed warranties act as a reprieve from liability for manufacturers and a delegation of all responsibility and liability to the consumer. The approach is harmful to the consumer, who needs to be protected from trap and engine manufacturers blaming each other. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates the responses to Comments 34, 37 – 40, and 42 – 49 here. No provision in the Procedure directly nullifies the engine warranty, or has the other effects the commentator cites. Instead, the warranty proposed by the Procedure creates rights for the end-users with respect to the manufacturers of the diesel emission control devices. Specifically, the warranty is intended to protect the rights of end-users who are mandated to retrofit their in-use diesel vehicles or equipment.

It is not ARB's intent to require the use of technologies that would jeopardize the engine warranty and will address this in the mandatory implementation programs. In fact, the Procedure extends protection to diesel engines that are installed with a diesel emission control strategy. As stated in Section 2707 (a)(1)(C) of the Procedure, "The warranty must also cover the full repair or replacement to return the vehicle, equipment, or engine components to the condition they were in prior to the failure, including parts and labor, for damage to the engine or other vehicle components proximately caused by the verified diesel emission control strategy. Repair or replacement of any warranted part, including the engine and other parts, must be performed at no charge to the vehicle or engine owner. This includes only those relevant diagnostic expenses in the case in which a warranty claim is valid. The applicant may, at its option, instead pay the fair market value of the vehicle, equipment, or engine prior to the time the failure occurs."

42. **Comment:** The California trucking industry should not be responsible for ECD failure or damage that the systems may cause to their engines. (CTA)

**Agency Response:** The staff agrees that end-users should not be responsible for ECD failure or damage that the systems may cause to their engines according to the terms of the proposed regulation and has made some changes to the proposed regulation in the Notice of Modified Text to clarify the protections created by the regulation. As noted in Section 2707 (a)(1)(A), "The applicant must warrant to all owners, for ownership within the warranty period and lessees, for lease contract within the warranty period, that its verified diesel emission control strategy is free from defects in design, materials, workmanship, or operation of the diesel emission control strategy which cause the diesel emission control strategy to fail to conform to the emission control performance level it was verified to." The staff also incorporates its responses to Comments 34, 37 – 41, 43 – 49 here.

43. **Comment:** A 1987 truck has one gram per brake-horsepower-hour of PM standard. The cost of the market value of that vehicle right now is \$2,500. The 1991 PM standard is 0.6, I believe, I think. The cost of a 1991 vehicle, with fair market value today, is \$5000. A 1994 engine, which is the latest best available technology for PM control sold on the certification, is \$10,000 for a heavy-duty truck. And a 1998 vehicle today sells for between \$35,000 to \$45,000, depending on if it's a sleeper unit or not. My car would cost the same as a 1998 truck. My children's cars cost the same as the 1991 trucks. So we are dealing with an economic situation that is the same as the end

user. And we are the end user. We are the truckers. And this is a consumer-protection issue, and I believe this proposal does not protect the consumer. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to comments 37 – 42 here. Staff has worked extensively with the stakeholders in developing regulatory language to provide adequate protection to consumers. For example, the warranty period for heavy heavy-duty engines has been augmented to 150,000 miles from the 100,000 miles originally discussed in workshops with various stakeholders. Moreover, the warranty covers not only the diesel emission control strategies, but also vehicle or engine parts if damage is caused by the diesel emission control strategies. Finally, staff has also added an installation warranty to ensure that the diesel emission control strategies are installed properly. Staff is convinced that the warranty coverage provides protection to end-users and strikes a proper balance among all stakeholders.

44. **Comment:** Let me start with petroleum tank trucks. The average petroleum truck goes between 120,000 miles and 390,000 miles a year. 390,000 miles a year is the 90<sup>th</sup> percentile on our data. So let's just the 90<sup>th</sup> percentile and work from that. For a particulate trap on a 1994 petroleum tank truck, it would cost \$8500 for a 350 or 450 Hp truck. If you put the backpressure device to gauge if there is a problem, the cost would go up to \$10,000. So the trap is the equivalent to the price of the entire truck. And we are asking to have a warranty on the device, which is four, five, six months. That is unacceptable consumer protection. You would not do that to the end user of a car (CTA)

**Agency Response:** This Procedure only establishes criteria for the diesel emission control strategy to be verified, not any requirements that such strategy be used in any particular application. The implementation of the diesel emission control strategy will be fully addressed in the context of those individual rules. Staff also recognizes that for certain older vehicles, the cost of a trap could be equivalent to the price of a truck, but believes that the numbers involved are limited and that the cost of the traps should decline as the traps are produced in greater numbers. Nevertheless, the staff disagrees with the rest of this comment and incorporates the responses to Comments 34, 37 – 43, 45 – 49.

45. **Comment:** Why would we bring in this new regulation. We are talking about retrofitting brand new vehicles? Why would we bring in a warranty that has, you know, six months. And the, on top of that, if you have a brand new vehicle that is under warranty, all right. Let say, accidentally you are using your vehicle in a different way, it used to be stop and go, so they put the particulate trap on. But your driver decides he is going to go across town on the freeway, maybe he wants to go to San Diego to pick up something up, that is a different type of operation. So the particulate trap has problems, backpressure, catastrophic engine failure, who is responsible? The particulate trap manufacturer will point to the engine manufacturer; the engine manufacturer will point to the particulate. The end user is stuck with an invalid warranty. So you have taken away the warranty that he purchased,

the 500,000 miles warranty, and left him with the bag. This is unfair consumer protection. It needs to go back to the drawing board and look in our favor. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates the responses to Comments 34, 37 – 44, 46 – 49 here. This Procedure only establishes criteria for the diesel emission control strategy to be verified, not any requirements that such strategy be used in any particular application. The verification of each diesel emission control strategy will specify the operating conditions that are required for the strategy to function properly. It is the responsibility for the operator to follow such operating conditions in order to be covered by the warranty. The warranty simply does not cover conditions under which it is unsuitable for the diesel emission control system to operate. Also, the operator has the option to purchase an extended warranty of 500,000 miles for the diesel emission control strategy, if extended warranty coverage is needed. Finally, it is not ARB's intent to nullify the engine warranty. The engine manufacturers may claim that that diesel emission control strategies may harm those engines which are not designed to be retrofitted. To address such issue, staff intends to proceed on two paths: 1) Consideration of the issue in the implementation regulations, and 2) a possible future modification to the verification Procedure to include engine manufacturer approval in the verification process.

46. **Comment:** It does not work to put the liability, the responsibility on the end user, because the end user has no way to protect themselves against something like this. So what you need to do, in my opinion, and the position of the California Trucking Association, is to take warranty to 500,000 miles. And we would not have a problem with it. And make sure that the liability and responsibility in any type of catastrophic failure goes where it belongs: with the engine manufacturer or the trap manufacturer. And, it does not have to go to court to decide whose fault it was when the engine does have problems, that we are not stuck with the bag and then have to pay legal fees on top of that to determine whether it was the engine manufacturer's problem. Clearly, state the liability. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to comments 34, 37 – 45, 47 – 49 by reference here. The warranty is designed to protect the end-users provided the diesel emission control system is used in the operating conditions specified for the verification and is maintained on a regular basis. Staff understands the need for consumer protection and has extended the warranty period. For instance, prior to the public hearing, the warranty period for a heavy heavy-duty vehicle was extended from 100,000 miles, as discussed in the initial public workshops, to 150,000 miles. End-users who need more coverage may contact the emission control manufacturers for extended coverage, similar to the extended warranty offered by the engine manufacturers.

47. **Comment:** If there is a technology that has a problem, you are going to be aware of it before 150,000 miles. And if an individual user wants some additional protection, they want to pay for an extended warranty, that is

certainly an option. But whether it makes sense from a public policy point of view to require everyone to accept the cost of the extended warranty, I think is an open question. From our perspective, 150,000 miles as a mandatory requirement is a rigorous level. It is going to weed out the problem technologies. (MECA)

**Agency Response:** The staff agrees with this comment.

48. **Comment:** With 150,000 miles warranty, if something comes through and there is an issue, we are going to know. And our industry, and I believe the engine manufacturers have said the same thing, we have committed to coming up with solutions that are going to be protective of the end user. Now Stephanie can respectfully disagree with our perspective, but we are committed to that. And as an industry, we have committed to that position for over 30 years. And we have delivered it time and time again. So we are confident we can do it. We are concerned with the end user has a product that is effective. And we are very confident that we can do it, and we think this verification process provides the necessary safeguards to ensure the products that are out there work. (MECA)

**Agency Response:** The staff agrees with this comment.

49. **Comment:** I'll speak for Caterpillar because I'm closely related. I can tell you what their warranty – base warranty is two years unlimited miles on the engine. And you need to think about the engine. The truck doesn't matter in this particular case. Two years unlimited. In the case of Caterpillar, it is around \$1000 to go from two years unlimited miles to 500,000 miles. I have been on the receiving end of this warranty thing because we do conversions of Caterpillar engines. Anything we do that causes a catastrophic failure of the engine is our problem. It is not covered under Caterpillar's warranty. So whether you are talking to a new truck with a new engine warranty or a truck that is out of warranty, if the catalytic converter or soot trap would fail, albeit not very often, and cause through back pressure a catastrophic engine failure, I'll promise you there isn't an engine manufacturer on the globe that is going to say, "Our warranty covers that. We'll rebuild the engine for you, \$15000." And the catalytic converter maker's warranty is going to say it is a material and workmanship warranty. They are not going to say, "We'll cover the engine if it destroys the engine." That is an issue. I don't know how big it is. You ought to quantify it and be aware of it, because if it does not come to the point where you make a rule, and somebody forces people to put these on their engine and the engine fails and there's a \$15,000 repair bill, that truck driver is going to go looking for somebody to pay that \$15,000. And it is not going to be the catalyst converter maker and it is not going to be the engine maker. (Clean Air Partners)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to Comments 34, 37 – 48 by reference here. The proposed warranty has taken the situation cited in the comment into account. The warranty requirements in Section 2707 clearly establish the responsibilities of the end-users, installation parties, and emission control manufacturers. The

emission control manufacturer must honor the warranty and repair the engine if there is adequate evidence indicating a defective or malfunctioning diesel emission control system is the cause of the problems. If the applicant demonstrates that the diesel emission control strategy, vehicle or engine has been abused, neglected, or improperly maintained resulting in the need for the repair or replacement of the engine or diesel emission control strategy, the end-user may have to bear the cost of the damage. ARB will continue to evaluate warranty issues and propose any changes necessary in future rulemakings.

## H. In-Use Compliance Requirements

50. **Comment:** It is recommended that ARB reserve the right to entertain at their discretion the ability to use other in-use test methods to verify technologies or meet durability requirements for on-road and non-road engines. Such in-use methods would allow a better determination of the effectiveness and performance of control strategies. (Lubrizol)

**Agency Response:** The staff agrees with this comment. The in-use compliance program is designed to verify the emission reductions achieved by verified diesel emission control strategies at two stages. The methods preferred for in-use testing are consistent with the original methods of testing which the verifications are based upon. Yet, for certain engines, because of their size and unique in-use applications, it may not be feasible to undergo the same testing again. Manufacturers may, therefore, propose alternative in-use testing methods to demonstrate to ARB staff that the emission reductions in-use are consistent with the verified level.

51. **Comment:** With respect to Section 2709 (a), (b), (c), and (d), we feel that the applicability requirements should be accurately defined and relaxed in general. We feel that the testing requirement of 50 units should be decreased to a reasonable level, so that test cost expenses can be justified by a small emission control device manufacturer. Section 2709 requires more clarification, definition, and simplification with an emphasis on minimizing costs. (Catalytic Exhaust Products Limited).

**Agency Response:** The staff disagrees with this comment and believes the commentator has misunderstood the regulation. The manufacturers are not required to participate in the in-use compliance program until more than 50 units of a diesel emission control strategy have been sold. There are two phases of in-use compliance testing in which four to ten units are tested in each phase. See Section 4.4.2 of the staff report for more information on the in-use compliance testing, which is incorporated by reference here.

As the U.S. EPA's voluntary diesel retrofit verification procedure establishes a cut-off number for in-use compliance testing of 500 units and California's automotive market represents about 10 percent of the of the nation's automotive market, staff determined that it is reasonable to use 50 units as the cut-off to start the in-use compliance testing in California.

Nonetheless, there are other options for applicants to minimize the costs of conducting in-use compliance tests. As stated in Section 2709(f), the Executive Officer may approve alternative in-use testing, on a case-by-case basis if the applicant experiences hardship in conducting the in-use compliance tests. Furthermore, staff has aligned the in-use compliance testing with the U.S. EPA's program so that the same test results may satisfy the requirements for in-use compliance program from both agencies. In this way, applicants may minimize the testing expenses.

52. **Comment:** In Section 2709, the list of required testing seems to be onerous and will be expensive. Will CARB or some state entity either pay for this testing or set limits on the costs of such tests. It seems unfair for CARB to require a company that voluntarily undergoes verification and passed to continue taking comprehensive tests every two years without some control on the cost. Perhaps a program of random testing administered by the CARB through accredited testing facilities could be used instead if the intent is to stop the unscrupulous business from cheating with its products. This would be less costly and would put companies on notice that they can be tested anytime and would give CARB control of the process. (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. The commentator is confusing two separate requirements. The in-use compliance testing intends to insure the emission reduction levels and the durability of the diesel emission control systems are maintained within the warranty period. Two phases of in-use compliance testing will be conducted within the warranty period. Note that the applicants are not required to conduct such in-use compliance testing every two years. Instead, every two years, the applicants must submit to the Executive Officer environmental, toxicological, epidemiological, and other health-related data from literature pertaining to a fuel additive or alternative diesel fuel that is verified. This provision does not require additional testing. The additional data is intended to inform Executive Officer the latest research activities from the health science community regarding any adverse environmental impact from the fuel additive or alternative diesel fuel.

#### I. **Verification of Emission Reductions for Alternative Diesel Fuels**

53. **Comment:** ARB should consider the use of biodiesel as an alternative fuel replacement for #2 Diesel. (Kris Steinke)

**Agency Response:** The staff agrees with this comment. The Procedure allows the verification of biodiesel provided it meets the alternative diesel fuel requirements as specified in the Procedure.

## J. Harmonization with U.S. EPA

54. **Comment:** MECA supports ARB's willingness to consider accepting test data generated under the U.S. EPA's voluntary retrofit program. Allowing data generated by manufacturers seeking to verify technologies and strategies under both the ARB and EPA programs will substantially reduce the overall costs and time that otherwise would be needed to generate two sets of data – one for ARB and one for the U.S. EPA. The time and resources saved can be devoted to generating test data to support verifying a greater number of technologies and/or a broader range of engine applications on which these technologies can be utilized. (MECA)

**Agency Response:** The staff agrees with this comment.

55. **Comment:** It appears that the federal EPA is also about to issue rules for a voluntary verification program at the federal level. Will ARB accept EPA tests in lieu of the CARB required tests? It seems that to require a company to perform both complete sets of test would be onerous, very expensive, and repetitive. Language should be added to the ARB regulations saying EO's have discretion to accept certain EPA rules to be determined in some appendix to be added. (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. There is significant overlap between the two programs in terms of the test, durability, and in-use compliance requirements. Accordingly, manufacturers may coordinate with both agencies and submit one set of test data to fulfill the requirements of both procedures. Please see pages 50 - 54 of the Staff Report regarding the harmonization of ARB and EPA's verification program, which are incorporated by reference here.

While the ARB and the U.S. EPA share the same ultimate goals of reducing PM from in-use diesel vehicles or equipment, the nature of the programs is different. In particular, the Procedure is intended to support the Diesel Risk Reduction Plan, which mandates the application of diesel emission control strategies to in-use vehicles and equipment in on-road, off-road, and stationary applications. On the other hand, the U.S. EPA's procedure is intended for U.S. EPA's voluntary retrofit programs.

56. **Comment:** EMA and its members first discussed the need for such a procedure with Dr. Lloyd and Mr. Kenny almost two years ago. Since that time, ARB has created the International Diesel Retrofit Advisory Committee (IDRAC), on which we serve, has worked with various stakeholders to develop a workable verification protocol, and has worked to try to minimize any potential differences between ARB's protocol and that being developed by the EPA. Harmonization is just as critical in the retrofit arena as it is in the regulation of new engines. (EMA)

**Agency Response:** The staff agrees with this comment. ARB recognizes that there are two verification procedures and will continue to work with the U.S. EPA to harmonize in the implementation of the procedures and minimize expense.

## **K. Miscellaneous**

57. **Comment:** I have been experiencing serious trouble breathing whenever diesel vehicles are around. (Jim Boeger)

**Agency Response:** This comment is not directed at the specific regulatory proposal, but without waiving this objection, the staff responds as follows. The purpose of the Procedure is to verify the diesel emission control strategies that may be applied to existing diesel vehicles or engines. Those verified strategies will, in turn, support the implementation of diesel retrofit rules to reduce diesel exhaust emissions.

58. **Comment:** An effective diesel emission control verification and in-use compliance program must address two critical elements. First, the program must ensure that the technology verification procedures and the in-use performance are sufficiently rigorous to ensure that the technologies and strategies approved by ARB meet the emission control performance levels not only initially, but in-use as well. Second, the procedures should not be overly burdensome such that manufacturers with effective technology could provide significant reductions are dissuaded from attempting to verify their technologies in California. We believe the application process, the emission testing requirements, the durability testing requirements, the field demonstration requirements, the warranty requirements, and other provisions in the proposed regulations have effectively addressed both of these important considerations. (MECA)

**Agency Response:** The staff agrees with this comment.

59. **Comment:** The ARB staff has made significant improvements to it, and has developed a workable and technically sound verification process. Cleaire appreciates the retrofit group's efforts to find a balance between high standards and manageable procedure. (Cleaire)

**Agency Response:** The staff agrees with this comment.

60. **Comment:** The proposal makes no mention of the concerns over ultrafine particles in diesel exhaust. PM reductions are specified only for mass. This may be achieved with little reduction in ultrafine particles. As an encouragement to equipment manufacturers, perhaps the document should acknowledge the limitation and look towards incorporating a particle size factor into future verifications. (Hartridge Test Products)

**Agency Response:** While staff recognizes the importance of reducing ultrafine particles in diesel exhaust, staff believes that it is premature to

include them in this regulation. Diesel PM was identified as a toxic air contaminant in 1998. Mass, rather than particle size, was used in the exposure assessment, risk assessment, and other health-related studies. Further, the Diesel Risk Reduction Plan, promulgated in 2000, outlined measures to reduce the mass of diesel PM emitted. Finally, all engine or vehicle certification standards for PM are mass-based, in gram/mile or gram/brake-horsepower. For these reasons, the PM reduction proposed in the Procedure is also mass-based.

The body of knowledge regarding ultrafine particles is not sufficiently developed to allow their inclusion in the regulation at this time. A number of studies are underway in various research communities to further understand the characteristics of PM ultrafine particles. Before proposing emission standards based on ultrafine particle size and number, a standard methodology to measure the ultrafine particles must be developed. Moreover, we need more in-depth understanding the mechanisms for exposure to ultrafine particles, as well as the health impacts from prolonged exposure to them. Staff will definitely take those factors into account if a new PM standard based on particle and size is proposed in future.

61. **Comment:** Given that CARB is currently allowing companies to get verification under an “interim set of regulations,” will such companies be exempt for some period of time from the full set of new regulations? Also, if they are in the process of performing the interim set of tests, will they be required to start over or will the EO meet with them and work out how to move from one to the other without undue extra costs? (Bio-Friendly)

**Agency Response:** This is a voluntary process. Companies are not required to obtain verification under either the proposed regulations or the interim guidelines. If companies in the process of performing testing under the interim program wish to obtain verification under the proposed regulations, the ARB will work with them and help them minimize any undue costs.

62. **Comment:** If the proposed verification regulations are adopted, when will they come into effect? Can a company start the interim procedure until the new rule come into effect? (Bio-Friendly)

**Agency Response:** The proposed verification Procedure was adopted on May 16, 2002, with non-substantive changes and clarification. The Procedure will come into full effect either thirty days (if an early effective date is requested) or sixty days (if no early effective date is requested) after it is submitted to the Office of Administrative Law (OAL). The staff expects that the Procedure will be submitted to OAL some time around the end of March 2003. Any company may start the interim application process prior to the new rule coming into effect.

63. **Comment:** This document is very extensive and could be very expensive and time consuming for a company to comply with fully. It appears designed to favor large companies with large resources. CARB and California need

innovative solutions to the emissions problems. Small and start-up businesses often are the source of unique and revolutionary ideas. The present form of the regulations puts small businesses at a distinct disadvantage. CARB should include language that allows them to pursue funding from the state that could be made available by a granting process to small businesses who are determined to have products worthy of complete verification. This would level the playing field somewhat, and may bring more unique products to market. (Bio-Friendly)

**Agency Response:** The staff disagrees with this comment. Testing must be rigorous to guarantee that emission reductions claimed by the various diesel emission control strategies are real and durable. The proposed procedure was designed for this overriding goal, not to favor companies of one size or another. The proposed procedure welcomes innovation, but it treats all diesel emission control strategies equally by subjecting them to the same rigorous testing requirements. However, the proposed regulations do contain several opportunities for applicants to request that alternative testing approaches be approved by the Executive Officer, thereby encouraging innovation and possibly relieving some of the burden of obtaining verification.

Moreover, a number of sources of funds are available, through the state or local agencies, to assist small companies. For instance, the Innovative Clean Air Technology Fund, administered by the ARB, provides financial support for companies to commercialize any products designed to clean up the air. Other technology demonstration programs, funded via local air pollution districts, also provide funding for small companies. Applicants may use test data from those funded programs to support the verification procedure and thus indirectly reduce the cost of the verification application.

64. **Comment:** As I believe, many of you are aware, EMA has been a strong proponent of retrofit programs. Principally, we think those programs can be successful on a voluntary, incentivized basis. The Carl Moyer Program is an excellent example of such success. The Carl Moyer program is an excellent example of such success. However, in order to for retrofit programs to be successful on a large scale, retrofit technologies that are proven, durable, and cost-effectiveness must be available in the marketplace. And, the key for helping to assure that such technologies exist and are available for use, is a workable, cost-effectiveness verification procedure. (EMA)

**Agency Response:** The staff agrees with this comment.

65. **Comment:** As you can imagine, It is in our best interests to prevent inferior retrofit technologies from being integrated with the engines our members produce. And, it is also in our best interests to assure that the owner of the engine being retrofitted has a choice of vendors and as much product availability as possible. We also want to avoid having a regulatory program that unnecessarily interferes with commercial issues best addressed by the marketplace. (EMA)

**Agency Response:** The staff agrees with this comment. It is also in the best interest of ARB to prevent inferior retrofit technologies from being applied to the diesel vehicles or engines. The Procedure is designed to prevent inferior retrofit technologies from obtaining verification by requiring the manufacturers to fully explain the principles of operation including the scientific basis of the diesel emission control strategy. In addition, manufacturers must demonstrate that the diesel emission control strategy has already surpassed the research and development stage and ready for commercialization.

66. **Comment:** Many of the issues that we have discussed with the staff to assure the proper balance between product availability and foolproofness are included in the various issues that are part of the 15-day notice recommendations. Our intent is to review those recommendations closely and continue to work with you and the staff to insure the prompt adoption of verification protocols that are sound, cost-effective, and balanced. In doing so, we hope and ask that you give the staff direction to continue to work with us and other stakeholders to strike the appropriate balance to find the “happy medium.” (EMA)

**Agency Response:** Staff agrees with this comment and is committed to work with EMA and other stakeholders to find the appropriate balance in the regulations.

67. **Comment:** Engine manufacturers have invested an enormous effort in producing new engines that are extraordinarily low emitting, and will soon be producing even cleaner products. Much of what has been learned has potential application to existing engine designs. As you know, the engines that EMA members produce typically are used in long-lived, capital goods and are designed to be rebuilt. The more we work together to implement cost-effective, voluntary programs that encourage owners to turn-over their fleets faster and to upgrade their fleets to lower emitting technologies, through retrofits, repowers, or the like, the sooner that we will reap the benefits of the new emission control technologies that we have developed. (EMA)

**Agency Response:** The staff agrees with this comment.

68. **Comment:** We are pleased to be here today to support the proposed regulations. We think the verification process is fair, it’s flexible, it’s a balanced approach, and it is indeed challenging. We think it is going to be an effective program that will serve the objectives of the Diesel Risk Reduction Program as well. (MECA)

**Agency Response:** The staff agrees with this comment.

69. **Comment:** We think that and really our philosophy from the very beginning was that an effective program should achieve two very important objectives. First, it has to be rigorous enough to ensure that the products are effective and durable, that they achieve the objectives for which they were designed.

Second, the program shouldn't be so overly burdensome that it would discourage manufacturers to certify effective products that could provide significant emission reductions. And we really think that the end result of the considerable effort on the part of the stakeholders and the ARB staff is a program that accomplishes quite well both of those objectives. (MECA)

**Agency Response:** The staff agrees with this comment.

70. **Comment:** Successful implementation of in-use strategies will depend on the user acceptance. You are right, we don't accept this. We don't feel protected. So we would ask that you take this rule back or extend the warranty period to something that is similar to cars and similar to the cost of the retrofit devices based on the value of the vehicle. And neither of these are represented in the proposal, and they should be. This is the first step of regulating and requiring controls on diesel vehicles. If this is not tied with the waste rule and the petroleum carriers rule, both rules will fail. This could be a catastrophic disaster. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to comments 34, 37 – 49 here by reference here. This Procedure focuses only on the requirements to verify a specific diesel emission control strategy and establishes no requirements on waste haulers, fuel tankers, or any other end-users. Separate rulemakings are planned and issues of retrofit implementation will be addressed therein. Furthermore, the staff will evaluate the effects of extended warranty in a future rulemaking.

71. **Comment:** Talking about environmental justice, this should be in the environmental justice arena when you look at the value of these vehicles and the people that are buying them. They need to be protected by ARB. (CTA)

**Agency Response:** The staff disagrees with this comment and incorporates its responses to comments 34, 37 – 49 by reference here. Environmental justice issues, which are outside the scope of this Procedure, will be addressed when in-use diesel emission control rules are proposed.

72. **Comment:** Talking about filter technology, there are 50,000 filter-equipped vehicles around the world. They're operating effectively. And to my knowledge, there has not been one instance in which a particulate filter failure has caused an engine to fail. (MECA)

**Agency Response:** The staff agrees with this comment. This comment illustrates that particulate filters have been widely used around the world with little or no evidence of engine failure.

73. **Comment:** I want to commend the Board, of course, and the staff the work they've done on this verification procedure. I believe it is really a major step forward in terms of reducing emissions and cleaning air in California. And I mean that sincerely on the basis of what I have seen. (Olson Engineering)

**Agency Response:** The staff agrees with this comment.

74. **Comment:** I want to commend the staff for the work they have done to put together the rule. We do think it is fair and reasonable and also challenging. And I think what will accomplish is you'll get durable technologies but you'll also open the procedure up to be competitive so that issues such as engine durability, aftertreatment system durability will be addressed sheerly through the nature of competition. (Cleaire)

**Agency Response:** The staff agrees with this comment.

### III. **MODIFICATIONS TO THE ORIGINAL PROPOSAL - NOTICE OF MODIFIED TEXT.**

At the hearing, the Board approved the Procedure and proposed modifications and clarifications to sections 2700 through 2710, Title 13, Code of California Regulations. Further, the Board directed the staff to collaborate with stakeholders regarding modifications or clarifications to the approved Procedure. The following is a description of the modifications and clarifications, by section number.

#### **Section 2701. Definitions**

**(a)(2):** Staff clarified the definition of "alternative diesel fuel" to include diesel fuel pre-mixed with a fuel additive. Specifically, a diesel emission control strategy using a fuel additive is to be treated as an alternative-diesel-fuel-based strategy unless: (1) the fuel additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or (2) the fuel additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or (3) the additive and base fuel are not mixed until vehicle or engine fueling commences, and no more additive is mixed with the base diesel fuel than is required for a single fueling of a single engine or vehicle. This clarification removes the previous ambiguity concerning how fuel additives are distinguished from alternative diesel fuels.

**(a)(6):** Recognizing that not all diesel emission control strategies include or require the use of backpressure monitors (e.g. alternative diesel fuels), as the original language may have suggested, staff clarified the definition of "backpressure monitor." Backpressure monitors are used only with some hardware-based diesel emission control strategies that have a component installed in the exhaust system of a diesel engine.

**(a)(9):** Staff deleted the definition of "defeat device." "Auxiliary Emission Control Device" (AECD), defined in subsection (a)(4), is the more appropriate term and is sufficient for the purposes of this Procedure.

**(a)(17):** The original definition for "fuel additive" included substances that are added to fuel or fuel systems only. Staff has since learned, however, of additives that are added via the intake air. They are designed to alter the chemistry of combustion, as are their fuel-borne counterparts, and thus merit the same consideration and treatment under the Procedure. Staff therefore

extended the definition of “fuel additive” to include substances added to engine-related systems such that they are present in-cylinder during combustion.

Consistent with the change to section 2701(a)(2), staff added a reminder that fuel additives used in conjunction with diesel fuel may be treated as an alternative diesel fuel.

**(a)(19):** Staff deleted the definition of “fuel borne catalyst” because the term is not used in the Procedure. Fuel borne catalysts are a subset of fuel additives, which are defined and referred to in the Procedure.

**(a)(20):** For consistency with the change to subsection (a)(19), staff replaced the reference to “fuel borne catalysts” with “fuel additives.”

**(a)(24):** Staff added the definition of “verification” to clarify the meaning of the word as used in the Procedure. Verification is a determination by the Executive Officer that a diesel emission control strategy meets the requirements of the Procedure. Such a determination is based on data submitted or otherwise known to the Executive Officer and engineering judgement.

## **Section 2702. Application Process**

**(a):** Staff clarified the language that the in-use compliance testing of the diesel emission control strategy is required after a specified number of units are sold or leased.

**(b):** To further clarify one of the functions served by the proposed verification testing protocol, staff added language indicating that the Executive Officer will use information submitted with the protocol to assist in determining if any additional analyses beyond the basic requirements are necessary, and if it is appropriate to allow alternatives to the prescribed requirements.

**(b)(2):** The original language in this section required a description of the operating principles of the diesel emission control strategy and/or a schematic depicting operation. As such, it erroneously suggested that an applicant may choose to submit a schematic alone with no description of the operating principles. Staff corrected the language to specifically require the applicant to submit a description and indicate that a schematic should be included as appropriate.

**(d):** This section originally required the applicant to follow the application format and to indicate which sections called for information that was not applicable to the applicant’s system. Staff added the clarification that information deemed non-applicable by the applicant need not be submitted on the condition that the Executive Officer concurs with the applicant’s judgement.

**(d)(2.1.2):** Staff added the words “as appropriate” to the schematics requirement for consistency with the change to subsection (b)(2), described above.

**(d)(2.):** Staff made the words “threshold” and “reduction” plural to clarify that (1) backpressure monitors may have more than one significant threshold which performs some function, and (2) there may be more than one form of reduction in the performance of a strategy that arises from unfavorable operating conditions.

**(d)(2.2.7):** Staff deleted the word “all” from the requirement to provide “complete discussion of all potential safety issues.” This clarification more accurately represents staff’s intent that applicants must discuss potential safety issues, but not undertake the unrealistic task of analyzing each and every imaginable scenario for safety issues that could potentially exist.

**(d)(5.1.3):** To both avoid the introduction of new terminology and to be consistent with that used in section 2703, staff replaced the word “de-greening” with “pre-conditioning.”

**(d)(7.A.1):** For clarification, staff changed “Raw test data” to “Actual laboratory test data.” This modification more clearly communicates that staff needs to review the actual laboratory reports issued to the applicant, and not just a table made by the applicant which summarizes test results.

**(d)(7.D):** To avoid redundancy and inconsistency, staff deleted the owner’s manual requirements from the application format and added a reference indicating that these requirements are described in section 2706(i).

**(f):** Staff removed the upper bounds for the Level 1 and 2 verification classifications, thus defining the levels only by the minimum PM reduction achieved. This modification gives the Procedure more flexibility and accuracy in classifying strategies that have reductions which may vary from one level to another (under the previous definition) depending on the exact nature of the application. The use of upper limits to define Levels 1 and 2 miscommunicated staff’s intent by suggesting that a diesel emission control strategy had to fit into narrow emission reduction windows for it to be verified. Removing the upper limits more accurately represents staff’s priorities, which are that the prescribed minimum reductions be met and that overestimation of reductions is avoided.

### **Section 2703. Emission Testing Requirements**

**(c):** To clarify that neither engine nor chassis testing is being singled out or required, staff added the words “or vehicle” to the language “The engine or vehicle installed with a diesel emission control system.”

**(e):** Staff updated Table 2 to be consistent with the changes to section 2703(e)(1)(B), described below.

**(e)(1)(B)(i):** Staff deleted the cold-start Urban Dynamometer Driving Schedule (UDDS) test requirement. It was pointed out at the public hearing that running a cold-start UDDS cycle with a truck was not only unrepresentative given typical warm-up practices, but also problematic because heavy-duty trucks have air brakes which may not have adequate time during a cold-start test to build the air pressure required for normal operation.

**(e)(1)(B)(ii):** Staff modified the low-speed chassis test cycle requirements to allow the applicant to request that the Executive Officer waive the low-speed chassis test cycle requirement. In considering the request, the Executive Officer may consider all relevant information such as the nature of the emission control group selected for verification and the operating principles of the applicant's system. This modification lessens the financial burden on those applicants for whom testing with the low-speed cycle would not provide meaningful information.

**(e)(1)(B)(iii):** In its original form, the Procedure provided no guidance concerning how closely a driver had to follow a given chassis test cycle. To address this, staff added tolerances for chassis test cycles, which were taken from the Code of Federal Regulations, Title 40, section 86.1215-85(b).

**(e)(1)(C):** Staff modified the test requirements for strategies intended to reduce NO<sub>x</sub> from on-road applications. First, staff added a requirement to discuss the effects of elevated NO<sub>x</sub> emissions on the strategy. This information would assist staff in determining (1) the necessity of conducting the additional testing described in this section, and (2) the appropriate weighting factors for test results from the additional testing that would be used in calculating an overall emission reduction. Second, staff replaced the requirement to use an additional test cycle that triggers all defeat devices with the requirement to use one that simply gives rise to significant periods of elevated NO<sub>x</sub> emissions. Requiring that the cycle trigger *all* defeat devices mischaracterized staff's intent, which was to determine performance of a strategy under high-NO<sub>x</sub> emission conditions that are typical on the road, but not observed during standard test cycles. Such a determination does not require that all possible high-NO<sub>x</sub> conditions be covered in a test cycle. Also, because of the widely-acknowledged difficulty in identifying the operating parameters that give rise to those conditions, it is unrealistic to require a cycle that includes them all. Last, staff added a provision allowing the applicant to request that this additional testing be waived. The Executive Officer's determination regarding such a request is based on all relevant information, such as the nature of the strategy and the availability of an appropriate test cycle. Originally, the Procedure did not provide an opportunity for this additional testing to be waived. As such, it erroneously indicated that staff wanted testing to be required for all cases, even those in which there may be little to no meaningful information gained from such testing. To assist staff in identifying those exceptional cases, staff chose to give applicants an opportunity to make a case for waiving the additional testing. With this opportunity, applicants may also be able to significantly lessen the financial burden associated with testing.

**(g):** Instead of stating that exhaust temperature and backpressure must be recorded for “filter-based” strategies, staff clarified that the requirement applies to strategies that “include exhaust aftertreatment.” This clarification removes the ambiguity surrounding what constitutes a “filter” and more broadly applies the requirement to strategies that include a component which reduces emissions via treating the exhaust in some manner. Staff’s original understanding had been that only filter-based strategies could potentially create significant backpressure increases, and that their operation was especially sensitive to exhaust temperature. There is, however, ambiguity concerning the definition of a “filter” as well as a broad range of existing aftertreatment system designs that may affect backpressure in various degrees. In addition, while proper functioning of passive filters is utterly dependent on adequate exhaust temperatures, the performance of all strategies that involve catalysis in general (i.e., most exhaust aftertreatment systems) is a function of exhaust temperature. Knowing the conditions under which a strategy achieves a given level of performance is important information for staff to have when evaluating a strategy. Staff therefore chose to more broadly apply this requirement to all systems that treat exhaust. For consistency, staff made the same change to sections 2704(d)(1), 2704(g), and 2705(c)(1).

**(j):** Originally, this section required applicants to report test results “for all completed emission tests.” Staff clarified this language such that only results from “all valid emission tests used to support emission reduction claims” need to be reported. As such, applications will not be cluttered with results from prototype development or other testing that may not meet the test requirements of the Procedure.

**(l):** Staff deleted the word “exhaust” from the “Additional Exhaust Analyses” section. The Procedure is intended to evaluate a host of diesel emission control strategies of unspecified nature, ranging from chemically-active filters to alternative diesel fuels and fuel additives. Because of its breadth, the Procedure requires a provision to allow for a potentially broad spectrum of additional analyses should there be grounds to believe that there may be a negative side effect associated with the use of a strategy. By not specifying that such additional analyses be limited to engine exhaust alone, staff’s modification provides language that aligns itself more accurately with the original intention underlying the section. The part of the Staff Report that discusses additional exhaust analyses accurately states that, “staff deems it essential that additional analyses be required as necessary.”

**(l)(3):** Staff added a subsection to section 2703(l) which indicates that the Executive Officer will work with the applicant in determining appropriate test methods for any additional analyses that may be required. A number of stakeholders had expressed confusion as to which test methods must be used to measure each of the substances listed (for illustrative purposes only) in the previous subsection (l)(2). The added language resolves this confusion by explicitly indicating that test methods will be determined as needed.

Furthermore, by not specifying the test methods up front, applicants gain the benefit of greater flexibility in how to conduct additional analyses.

**(m):** Staff replaced an incorrect reference to the Code of Federal Regulations with the correct one.

#### **Section 2704. Durability Testing Requirements**

**(c)(4):** A reference was made in this section to Table 6, which is not located in section 2704. For clarity, staff added a reference to the section where it actually appears.

**(d):** Staff deleted language that referred to “periodic” emission testing (an artifact of an older version of the Procedure). The Procedure only requires testing before and after the service accumulation. To clarify what is meant by the “service accumulation,” staff added the following language: “Service accumulation begins after the first emission test and concludes before the final emission test.” For further clarification, staff indicated that no pre-conditioning time may be used towards the service accumulation requirement.

**(d)(1):** To afford applicants greater flexibility, staff modified the data-logging requirement during service accumulation for filter-based strategies. Instead of specifying a maximum sampling period, the applicant may propose a sampling scheme for approval by the Executive Officer. The added language lists some elements that may be included in sampling schemes. The intent behind imposing a maximum sampling period was to avoid sampling so infrequently as to render the logged data meaningless. However, whether a given sampling frequency below the two minute cap will provide meaningful data or not depends on the specifics of the application (compare a stop-and-go solid waste collection vehicle and a steady-state electric power generator set, for instance). Thus, the Executive Officer must be able to review the proposed sampling scheme to ensure that meaningful data are obtained. The added language also removes the implicit suggestion that data must be logged on a strictly periodic basis. As such, it gives consideration for efficient schemes that average parameters, log only significant changes in a parameter, minimum and maximum values, etc. Doing so, the amount of data that must be gathered and handled by the applicant and reviewed by staff can be minimized.

**(f)(1):** Staff updated the testing requirements for on-road applications to make them consistent with the changes to sections 2704(d) and 2703(e)(1)(B)(i) and (ii).

**(g):** Staff updated the test run section to be consistent with the changes to sections 2704(d) and 2703(e)(1)(B)(i) and (ii).

**(i)(2):** For clarity, staff specified that the 0.01 g/bhp-hr emission level refers to PM. Also, staff deleted a redundant reference to “emission level.”

**(i)(4):** In addition to not causing damage to the engine, as stated in the original language, staff added the clarification that the diesel emission control

strategy must neither cause damage to the vehicle nor to the equipment on which it is installed.

**Section 2705. Field Demonstration Requirements.**

**(c):** Staff updated the data-logging requirements for filter-based strategies to make them consistent with the changes to section 2704(d)(1).

**Section 2706. Other Requirements.**

**(a)(1):** In the original language, the NO<sub>2</sub> emissions limit would take effect immediately. Most diesel particulate filters (DPFs) today, however, cannot meet this limit. Staff nevertheless recognizes the significant emissions reductions that today's DPFs provide and the substantial investments made by manufacturers in those designs. Thus, after discussion with manufacturers, staff proposed at the public hearing that the NO<sub>2</sub> limit take effect starting on January 1, 2004. After January 1, 2004, all verified and installed systems must meet the NO<sub>2</sub> limit. That proposal, adopted by the Board at the hearing, allows limited penetration of current designs into the market and gives manufacturers time to re-design systems to be compliant with the limit in the near future. That will allow for near-term reductions of PM and other toxic emissions at the street and neighborhood level, immediately reducing exposure to those most directly impacted by diesel emissions. The potential increases in ozone and other regional-scale pollutants will not be measurable unless an extremely large number of are retrofitted with DPFs that do not meet the NO<sub>2</sub> limit. Under the schedule proposed in the Diesel Risk Reduction Plan, widespread application of DPFs will not occur for several years, by which time the NO<sub>2</sub> limit will be in effect.

**(a)(2):** Originally, the Procedure indicated that two chemiluminescence analyzers must be used to measure NO<sub>2</sub>. Stakeholders had requested a method for measuring NO<sub>2</sub> during a workshop, and therefore staff included one in the Procedure. However, it was not intended by staff that the method be exclusive. For clarification of intent, staff added language which indicates that a dual-path chemiluminescence analyzer or other methods may be used, subject to approval by the Executive Officer.

**(a)(3):** Staff updated the description of the method for measuring NO<sub>2</sub> to be consistent with the changes to section 2706(a)(2). Also, staff added language to clarify that the instrument used for NO and NO<sub>x</sub> measurement must be calibrated in accordance with the appropriate Code of Federal Regulations procedure.

**(a)(4):** Consistent with the changes to section 2706(a)(2), staff added a section concerning alternative methods for measuring NO<sub>2</sub>. In reviewing an applicant's request to use an alternative method, the Executive Officer may consider all relevant information.

**(b)(1):** Staff placed language describing the limits on emissions of non-methane hydrocarbons (NMHC) and NO<sub>x</sub> into a subsection of its own. Originally, the Procedure limited increases in these and other pollutants to no more than ten percent above the baseline level. Stakeholders pointed out,

however, that this limit would prevent a number of viable, proven strategies that achieve significant PM and NO<sub>x</sub> reductions (such as conversion to bi-fuel natural gas/diesel operation) from being verified because they increase the low baseline emission level of NMHC intrinsic to diesel engines by more than ten percent. To allow short-term implementation of effective emission control strategies facing that issue, staff proposed at the public hearing that for a strategy verified prior to July 1, 2006, a decrease of NO<sub>x</sub> be permitted to offset the increase of NMHC provided the final sum of the two is lower than the baseline sum. After July 1, 2006, a strategy that exceeds the ten-percent limit may be verified provided the applicant submits atmospheric modeling data demonstrating that widespread use of its strategy will not adversely impact the public's exposure to ozone. The Board approved staff's proposal.

**(b)(2):** Staff placed language describing the limits on emissions of carbon monoxide (CO) into a subsection of its own. At the Board's direction, staff modified the limit for CO: a strategy must not increase emissions beyond the current CO emission standard adopted by ARB for new diesel engines. This replaces the previous ten percent cap which, as mentioned above, would exclude some promising strategies from the verification process. Since CO emissions from diesel engines are typically low, this revision will not adversely affect California's CO attainment status.

**(b)(3):** A stakeholder at the public hearing voiced the concern that the restriction of increases in emissions of pollutants to ten percent above the baseline would prevent selective catalytic reduction (SCR) systems from being verified. Baseline emissions of ammonia from diesel engines are essentially zero, but a small amount of ammonia often goes unused in SCR systems and ends up in the exhaust, thereby creating an increase in excess of ten percent. At the Board's direction, staff addressed this concern with the addition of a separate subsection for the limit on emissions of ammonia.

It should be noted that the primary focus of the Procedure is to verify PM reductions, and that the prevalent technologies for PM reduction do not increase ammonia emissions. However, it is desirable, where possible to achieve NO<sub>x</sub> reductions in addition to PM reductions. Therefore, it is most appropriate to set an ammonia level that both keeps emissions at a safe level and allows for a relatively wide spectrum of potential NO<sub>x</sub> reductions.

After reviewing exposure limits for ammonia established by occupational health agencies and published data on the performance of modern SCR systems over transient test cycles, staff determined that the appropriate limit for ammonia emissions should be expressed in terms of the average concentration in the exhaust, rather than as a percentage of baseline emissions. The appropriate allowable level was determined to be 25 parts per million by volume (ppmv). For comparison, the Recommended Exposure Limit (REL) for ammonia set by the National Institute for Occupational Safety and Health (NIOSH) is 25 ppmv as a time weighted average. The REL set by the Occupational Safety and Health Administration (OSHA) is 50 ppmv. In

addition, the Agency for Toxic Substances and Disease Registry (ATSDR) cites two values, 25 and 48 ppm, for the odor threshold of ammonia in air<sup>1</sup>.

Staff opted for the lower bound of 25 ppmv to insure minimal exposure while still enabling significant NOx reductions through use of SCR. Data published in 2002 on the performance of modern SCR systems for mobile applications show that a number of systems are capable of achieving large NOx reductions (72-82 percent) on transient test cycles with average ammonia emissions of less than 10 ppmv<sup>2,3,4</sup>. One such system<sup>3</sup> was demonstrated to maintain those levels of performance after having accumulated six months of field use. Staff's selection of 25 ppmv provides a cushion to allow for variation in ammonia emissions from one test cycle to another, as well as the use of alternate urea/ammonia injection strategies that may achieve NOx reductions in excess of 80 percent. In addition, because the limit selected by staff refers to the concentration of ammonia in the exhaust, safety is further insured owing to dilution of the exhaust upon exiting the tailpipe.

**(b)(4):** Staff retained the original language that limits increases in emissions of other pollutants and placed it in its own subsection.

**(c):** Originally, fuel additives had to be used in combination with a diesel particulate filter unless they could be proven safe for use alone. The original language did not, however, include an efficiency requirement for the diesel particulate filter, thus creating some ambiguity. The modified language resolves this ambiguity by requiring a Level 3 diesel particulate filter. As such, the requirement is in line with staff's original intent that fuel additives be used with a high-efficiency filter, and not simply any strategy bearing the name "diesel particulate filter."

**(c)(4) & (c)(4)(A):** The original language in this section required fuel additives that contain metals to undergo additional emission testing at an elevated concentration. This requirement was motivated by experience in which some metal-containing additives were found to clog a number of diesel particulate filters when high concentrations were used. The potential for use of a higher-than-intended additive concentration in the field, however, is certainly not limited only to those additives containing metals. User error, a faulty dosing mechanism, and other causes may result in operation of engines with an additive dosage that differs significantly from the concentration used during verification testing. Staff recognizes the importance of understanding the consequences of such operation, especially given that a broad, unspecified range of substances may be considered a fuel additive under this Procedure.

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<sup>1</sup> ATSDR, 2002. Draft Toxicological Profile for Ammonia, September 2002, U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry.

<sup>2</sup> Gekas, I., et al., 2002. "Performance of a Urea SCR System Combined With a PM and Fuel-Optimized, Heavy-Duty Diesel Engine Able to Achieve the Euro V Emission Limits," Society of Automotive Engineers, SAE Technical Paper Series, Paper Number 2002-01-2885.

<sup>3</sup> Helden, R. van, et al., 2002. "Engine Dynamometer and Vehicle Performance of a Urea SCR-System for Heavy-Duty Truck Engines," Society of Automotive Engineers, SAE Technical Paper Series, Paper Number 2002-01-0286.

<sup>4</sup> Majewski, W.A., 2002. "Selective Catalytic Reduction," Ecopoint Inc., DieselNet Technology Guide, Revision 2002.05.

For these reasons, staff changed the requirement for high-concentration testing to include all fuel additives.

**(c)(4)(B):** Two references to a fuel additive dosage of “50 ppm” incorrectly omitted the possibility that the dosage to be used, as specified in subsection (c)(4)(A), could be 10 times higher than that specified for normal use. Staff corrected those references by pointing to the more complete requirements of subsection (c)(4)(A).

**(c)(5):** Staff added language to remind applicants that fuel additives must be in compliance with applicable federal, state, and local government requirements. The added language helps to make the applicant aware that verification of a fuel additive under this Procedure does not mean that the product automatically satisfies all other governmental requirements.

**(d)(1):** The Procedure gave accumulation of ash as an example of a way in which engine backpressure could gradually increase over time, but did not indicate where this accumulation took place. Staff added “in a filter” to the example to clarify the intended meaning.

**(f):** Staff clarified that the applicant is not required to submit cost information for any normal maintenance items that the applicant does not intend to provide free of charge. Some stakeholders had inferred that such cost information was required, but this was not staff’s intent.

**(g):** Staff clarified that the applicant must ensure that a label is affixed to the diesel emission control system and the engine. Thus, the applicant is not itself required to affix the labels, but is responsible for seeing that they are affixed, for example, by the system installer. If the month and year of manufacture can be readily obtained from the applicant by reference to the serial number, that information is not required on the label. If the applicant would like to use an alternative label format or would rather not affix a label to both the system and the engine, the applicant may request to be relieved from these requirements. The Executive Officer may consider the request and make a determination based on all relevant information. Finally, staff made minor clarifications to the section that explain the meaning of the symbols in the diesel emission control strategy family name.

**(i):** For clarification and consistency with the owner’s manual requirements in the application format in section 2702(d), staff added that the installation procedure (not just the installation requirements) and all fuel requirements (not just the fuel sulfur limit) must be included in the owner’s manual.

**(j):** Recognizing that ARB does not regulate noise level, staff recast the noise level control subsection to serve as a reminder that all strategies must be in compliance with applicable government requirements. Staff also corrected the language to state that a strategy which replaces a muffler must provide at least the same noise attenuation as the muffler with which the vehicle was originally equipped by the “vehicle or engine manufacturer,” not the applicant.

**(k):** At the public hearing, the Board adopted staff’s proposal that all strategies which rely on fuel changes either through the use of additives or alternative diesel fuels must undergo an evaluation of the multimedia effects resulting from use of the strategy. To be part of a verified diesel emission control strategy, the California Environmental Policy Council must determine that use of the additive or fuel will not cause a significant adverse impact on the public health or the environment, consistent with section 43830.8 of the Health and Safety Code. This modification requires that the same level of investigation that is required for regulations which propose a specification for motor vehicle fuel be used when evaluating fuel-based strategies that are intended to satisfy ARB regulations for control of emissions from in-use diesel engines. Thus, significant safeguards to prevent the use of harmful substances are built into the verification process.

### **Section 2707. Warranty Requirements**

**(a):** Staff divided this subsection into two separate subsections, one for the product warranty and the other for the added installation warranty. To improve readability, staff further organized the contents of the product warranty subsection into five subsections, 2707(a)(1)(A) through (E).

**(a)(1)(A):** For clarity, staff reworded the requirement that the applicant provide a warranty to the “ultimate purchaser and to each subsequent purchaser” to read “all owners, for ownership within the warranty period and lessees, for lease contract within the warranty period.” Also, to reinforce that the first instance of the word “operation” in this subsection is not intended to mean operation of a vehicle or equipment, staff added “of the diesel emission control strategy.” Finally, the original language did not address the potential situation in which a strategy is used in a manner inconsistent with the conditions of use listed in the Executive Order. Staff added language, therefore, to clarify that use in a consistent manner is a condition for warranty coverage.

**(a)(1)(B):** For consistency with other references in section 2707(a) that indicate warranty coverage includes “repair or replacement,” staff added “repair” to this subsection, which only mentioned replacement in the original language.

**(a)(1)(C):** For clarification, staff added a limitation to coverage required for damage caused by the diesel emission control strategy such that coverage extends only to returning the damaged item(s) to the condition they were in prior to the failure. This clarification is intended to prevent an owner from exploiting the warranty by having a damaged item replaced with one of greater value, such as a brand new engine. Also, staff added a related limitation to coverage of diagnostic expenses such that coverage extends to “only those relevant diagnostic expenses in the case in which a warranty claim is valid.” This clarification is intended to prevent applicants from being charged for diagnostic testing that is superfluous and in those cases in which their product was not responsible for the damages claimed. Finally, staff added a provision that gives the applicant the option of simply paying the fair market value of the damaged items prior to the time the failure occurred. This

provision would lessen the financial burden on the applicants in those cases where the cost of returning damaged items to their previous condition exceeds the fair market value of those items.

**(a)(1)(D):** The original language stated that under certain conditions, the repair or replacement of a warranted part “shall” be excluded from warranty coverage. Use of the word “shall” implied that exclusion was required, which was not staff’s intent. For clarification, staff replaced “shall” with “may” and added that exclusion was “at the applicant’s discretion” if the appropriate conditions are met.

**(a)(1)(E):** Staff clarified the statement that failure to perform maintenance-related activities shall not, per se, be grounds for disallowing a warranty claim by specifying that such activities pertain to the vehicle or equipment, engine, and the diesel emission control strategy itself. There was ambiguity in the original language as to which items the maintenance was referring to. Also, staff added language to clearly indicate that although failure to perform maintenance-related activities is not, per se, grounds for denying a claim, it nevertheless “may” be grounds for denying a claim. Use of such language does not change the meaning of the original statement, but rather makes explicit the possibility that not ensuring maintenance could potentially support denial of a claim.

**(a)(2):** Staff added language requiring the installer of a verified diesel emission control system to provide the same type of warranty coverage for the installation that the applicant provides for the product itself. If they are to operate properly, diesel emission control systems must be both in good working order and correctly installed. However, the manufacturers and installers may be distinct entities. The added language acknowledges these circumstances and resolves the ambiguity surrounding with whom the responsibility for the product and the installation lies. Note that because the language broadly states that “a person or company who installs” a system must bear the responsibility for the installation, an installation performed by the owner is the owner’s responsibility.

**(b):** In parallel with the restructuring of section 2707(a), staff divided this subsection into two separate subsections, one for the product warranty statement and the other for the added installation warranty statement.

**(b)(1):** Staff made minor clarifications to the “YOUR WARRANTY RIGHTS AND OBLIGATIONS” statement which the applicant must include in the owner’s manual. To further clarify the nature of the warranty coverage to the owner, staff inserted language from subsection (a)(1)(A) which describes the warranty. Staff corrected the reference to abuse, neglect, and improper maintenance to reference the diesel emission control system, not just the owner’s vehicle or equipment. Staff also indicated that the various owner’s manuals associated with the strategy and vehicle or equipment are a source for more information on what is meant by abuse, neglect, and improper maintenance. Regarding the coverage of damage to a vehicle or piece of equipment caused by a diesel emission control system, staff added the

clause “where a warrantable condition exists” for clarification. To alert the owner that there may be other warranty information beyond that required by ARB, staff added the language, “Please review your owner’s manual for other warranty information.”

Staff made clarifications to the “APPLICANT’S WARRANTY COVERAGE” statement which the applicant must include in the owner’s manual. Staff deleted subsection (1) because the warranty coverage section is not an appropriate place to include references to corrective action an applicant would take if it failed its in-use compliance test. That information is included in section 2709. For consistency, staff added language similar to that in section 2707(a)(1)(A) to subsection (2). Finally, staff added the language from section 2707(a)(1)(C), thus giving the owner further information on the coverage of damage caused by the diesel emission control system.

Staff made clarifications to the “OWNER’S WARRANTY RESPONSIBILITY” statement which the applicant must include in the owner’s manual. The recommendation that the owner keep all receipts for maintenance performed on the diesel emission control strategy was expanded by staff to include maintenance records and receipts for the vehicle or equipment, because that maintenance may also have an impact on the functioning of the strategy. Staff made the statement concerning the owner’s failure to keep receipts consistent with the changes to subsection (a)(1)(E). The original language gave a 30-day time limit for the applicant to perform a warranty repair or replacement. This limit does not adequately address situations in which replacements are not readily available and thus require more time (as may be the case with systems that are custom-made to meet the needs of unique applications). To lessen the burden on applicants under such circumstances, the replacement time limit was extended to 90 days in the event that a replacement is not available. Finally, to encourage the owner to submit warranty information requested by the applicant for the applicant’s records, staff added language indicating that failure to do so within 30 days of installation may void the warranty.

**(b)(2):** For consistency with the product warranty statement and to better inform the owner, staff added language requiring the installer of a verified diesel emission control system to provide the owner with an installation warranty statement. The original language did not require the owner to be directly informed about the installation warranty.

**(c):** At the Board’s suggestion, staff added the requirement that if warranty claims exceed four percent of the number of diesel engines using the strategy, an additional warranty report must be submitted within 30 calendar days of that time. This modification is intended to give ARB early notice if any verified strategies are experiencing significant problems in the field.

**(c)(1):** Staff clarified that the annual diesel emission control strategy warranty report should include the annual and cumulative sales as well as annual and cumulative leases of diesel emission control systems.

**(c)(3):** For clarification and consistency, staff added the qualification “California only” to the requirement for the annual summary of warranty claims.

### **Section 2708. Determination of Emissions Reduction**

**(a):** For clarification, staff moved the sentence in subsection (a)(1)(A), regarding the situation in which the applicant only performs one of the two durability baseline tests, out of (a)(1)(A) and into subsection (a), as the applicability of that sentence extends beyond what its original location might suggest. Also, staff corrected the wording to be consistent with section 2704(g), which states that baseline testing is required for either the initial or final test, not both.

**(a)(1):** Staff deleted the reference to a cold-start UDDS test to be consistent with the changes to section 2703(e)(1)(B)(i).

**(a)(1)(B):** Staff added a section addressing the determination of NO<sub>x</sub> reductions from on-road applications. The test results from the additional testing for NO<sub>x</sub> reductions (described in section 2703(e)(1)(C)) must be weighted using weighting factors that are determined by the Executive Officer in consultation with the applicant. The original language provided no special guidance on how to account for the test results from this additional testing, and thus suggested that they be given the same weight as results from the standard required tests. The use of weighting factors would enable staff to more accurately estimate the NO<sub>x</sub> reductions that a given strategy would realize in the field, based on factors such as the amount of time that vehicles within the emission control group are expected to have elevated NO<sub>x</sub> emissions.

**(b):** For consistency with the changes to section 2702(f), staff deleted the upper bounds for Level 1 and Level 2.

### **Section 2709. In-Use Compliance Requirements**

**(a):** Staff clarified that the in-use compliance testing is required after 50 units of diesel emission control strategy are sold or leased.

**(d)(1):** Staff clarified the reference to an emission level of 0.011 g/bhp-hr by indicating that it is an emission level for PM.

**(h):** Staff corrected the in-use compliance report language to be consistent with the language and intent in the Staff Report. The original language erroneously suggested that the applicant was required to submit an in-use compliance report after completing “both” phases of in-use compliance testing. Staff replaced “both” with “each,” as in the Staff Report. To reinforce that a report must follow each phase of testing, staff modified the informational requirements such that they must be met for each of the minimum of four, not eight, systems tested.

**(i):** Staff increased the warranty claim threshold above which the Executive Officer may request the applicant to perform additional in-use testing from two to four percent. Staff concurred with stakeholders' comments that two percent was too low a threshold to trigger additional testing. As a reminder, staff added language stating that the applicant must submit a warranty report if warranty claims exceed four percent, consistent with the changes to section 2707(c).

### **Section 2710. Verification of Emission Reductions for Alternative Diesel Fuels**

**(a):** To eliminate redundancy, staff deleted the definition for alternative diesel fuels from this section. The definition already appears in section 2701.

**(b)(1):** The original language required that the references to sampling and analyses in the proposed test protocol be consistent with the requirements of the Procedure. For clarification and specificity, staff changed the reference to the requirements of the Procedure to those in section 2703 (Emission Testing Requirements).

**(b)(2)(D):** In the original language, a toxic analysis of the diesel base fuel in emulsified diesel fuels was not necessary. Staff expanded this beyond emulsified diesel fuels to all alternative diesel fuels that are in part comprised of standard diesel fuel.

**(b)(3)(A):** For clarification, staff corrected the first reference fuel option to indicate a "10 percent aromatic California diesel reference fuel" as compared to the original language which described a "California produced 10% reference fuel."

**(b)(3)(C):** To clarify the meaning of "80:20 biodiesel fuel," staff parenthetically added "(80 percent diesel/20percent biodiesel)." As with the proposed clarification in (3)(A) above, staff changed "10 percent reference fuel" to "10 percent aromatic California diesel reference fuel." Also, staff modified the title of Table 6 to read "Fuel Test Methods and Reference Fuel Specifications" to be more consistent with the contents of the table.

**(d)(1):** In order to be consistent with the requirements in section 2703(j), staff added NO<sub>2</sub>, carbon monoxide, and carbon dioxide to the list of species that must be measured.

**(d)(2):** In the original language, no guidance was provided on the required number of test samples for toxic emissions testing. Staff clarified that this testing must be performed with a minimum of three test samples collected from separate emission test repetitions, which is consistent with the three repetitions called for in section 2703 for hot-start test cycles.

**(d)(3)(A):** The original language in this section described the test sequences to be followed, but provided no guidance on the nature of the testing itself. Staff, therefore, added references to the relevant test requirements in section 2703 and indicated that the Federal Test Procedure (FTP) Heavy-duty

Transient Cycle must be used. Also, staff added the alternative test sequence “RC RC RC RC RC” to subsection (i). This sequence had been mistakenly omitted in the original language.

**(d)(3)(A)(iii):** Subsection (d)(3)(A) originally offered no consideration for alternative test sequences beyond those listed in (d)(3)(A)(i) and (ii). Staff added section (iii) to clarify staff’s intention that alternatives may be considered, and to be consistent with the similar consideration offered for alternative test cycles and methods in section 2703(f).

**(e):** The original language suggested that an applicant had to fulfill all of the durability requirements in section 2704. Thus, it appeared as though emission testing was required both before and after the service accumulation of 1,000 hours or 50,000 miles. For clarification, staff delineated the subsections of 2704 that the applicant must follow and excluded the emission testing and fuel requirements in those subsections. For consistency with the Procedure’s treatment of hardware-based systems, staff added the condition that the emission testing requirements in section 2704 apply if the applicant’s product includes hardware components. The original language was also unclear as to when test data should be gathered to show the effect of the alternative diesel fuel on the test engine. Staff clarified that the data must be obtained after completion of the service accumulation.

**(f):** Consistent with section 2706(k), staff added a subsection describing multimedia assessment requirements for fuel-related strategies. The added language is identical to that described above for section 2706(k).

**(g):** To eliminate redundancy, staff deleted the statement that “the candidate fuel must be in compliance with applicable federal, state, and local government requirements.” For clarification, staff specified that applicants must not only contact but register with the U.S. EPA and the California Department of Food and Agriculture.

**(h):** Staff added conditional verification requirements for alternative diesel fuels. If an alternative diesel fuel has completed all the requirements of the Procedure (including the multimedia assessment) except for completion of the U.S. EPA registration process, but has received some form of permission from U.S. EPA for the fuel to be used, then that fuel may be granted conditional verification. Conditional verification may be granted for off-road and stationary applications only after it is granted for on-road applications. Full verification is contingent on completion of the U.S. EPA registration process within one year after receiving conditional verification. During this one-year period, conditional verification is equivalent to verification for the purposes of satisfying the requirements of the in-use emission control regulations. The addition of conditional verification for alternative diesel fuels is an acknowledgement by staff that completion of the U.S. EPA registration process may require a considerable amount of time, and that if an applicant satisfactorily meets all of the other requirements of the Procedure, then the alternative diesel fuel should be acceptable for use in California to the extent of the permission granted by U.S. EPA.

(i): Staff added requirements for extending an existing verification to include other emission control groups. In addition to referencing the general guidelines in section 2702(g) for extension of a verification, staff clarified that the applicant may request a reduced number of emission tests relative to that performed for the original verification. This clarification is staff's response to concerns raised by stakeholders that the large number of test runs required for alternative diesel fuels would have to be repeated for each subsequent extension of verification to other emission control groups.

#### IV. SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES - NOTICE OF MODIFIED TEXT

Written comments for the Notice of Modified Text were submitted as follows:

Mr. James Valentine, Clean Diesel Technology  
Mr. Tom Davis, Catalytica  
Mr. Michael Roach, CleanAIR Systems  
Mr. Daniel KabelClean Air Partners (CAP)  
Dr. Marc Rumminger, Cleaire Advanced Emission Control (Cleaire)  
Ms. Dawn Friest, Engine Manufacturers Association (EMA)  
Mr. Christopher Weaver, Engine, Fuel, and Emissions Engineering (EF &EE)  
Mr. John Egan, G.K. Distribution & Trucking  
Mr. Marty Lassen, Johnson Matthey  
Mr. Christopher Walker, Lubrizol  
Mr. Dale McKinnon, Manufacturers of Emission Control Association  
Dr. James Birakos, Nanotech  
Mr. Werner Kalischewski, Octel  
Mr. Andrea Mayer, Technik Thermische Maschinen  
Ms. Stephanie Williams, California Trucking Association  
Dr. Barry Wallerstein, South Coast Air Quality Management District (SCAQMD)  
Ms. Ladyhawkharmonys, citizen  
Mr. Stan Ross, citizen

Set forth below 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 the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed toward the modifications made or to the procedures followed by the ARB in this Notice of Modified Text are not summarized below.

##### A. Definitions

75. **Comment:** In Section 2701(a)(17), the definition of "fuel additive" has been expanded to include substances added to other engine-related systems in

addition to substances added to fuel or fuel systems. As a result, the term “fuel additive” is misleading and a different term such as “combustion additive” would be more appropriate. (EMA)

**Agency Response:** The staff disagrees with this comment. The term “fuel additive” has been widely used in the literature. The revised definition simply allows flexibility for a fuel additive to enter the cylinder during combustion. Staff has no intention to define a new term; namely, “combustion additive” to replace the commonly accepted term “fuel additive.”

76. **Comment:** We recognize that a fuel borne catalyst may fall under the broad category of a fuel additive, we recommend ARB distinguish between the two when referring to a fuel borne catalyst used in conjunction with an exhaust emission control device like a particulate filter and under section 2701 leave definition of fuel borne catalyst in place. (MECA)

**Agency Response:** The staff disagrees with the comment. Instead of creating a new category for every fuel additive that is application specific, staff determines that the fuel borne catalyst falls under the general definition of a fuel additive as defined in Section 2701(17). The term “fuel borne catalyst” is not used anywhere in the Procedure, and so staff deleted the definition.

77. **Comment:** All fuel borne catalysts are now considered as fuel additives, why? (A. Mayer)

**Agency Response:** See the response to Comment 76 which is incorporated by reference here.

78. **Comment:** The proposed regulation specifically addresses both fuel and after-treatment equipment options. The definition “Diesel Emission Control Strategy” cites as examples: particulate filters, diesel oxidation catalysts, selective catalytic reductions systems, fuel additives in combinations with particulate filters, alternative fuels and combinations of the above. While we agree that all emission control strategies need to be considered, we are concerned that certain key aspects of the regulations are written with a more singular focus on equipment option. (Lubrizol and ECS)

**Agency Response:** The staff disagrees with the comment. The diesel emission control strategy is not limited to specific hardware systems but to any technology, or any combination thereof, capable of reducing diesel PM by at least 25 percent. The Procedure was developed with flexibility to allow verification of any type of technology, provided it is based on sound scientific principles and verifiable emission reductions and durability.

## **B. Application Process**

79. **Comment:** Section 2702 (b) requires that “Before formally submitting an application for the initial verification of a diesel emission control strategy, the applicant *must submit* a proposed verification testing protocol *at the Executive*

*Officer's discretion.*" (Emphasis added). The italicized language is contradictory. In order to remove this contradiction, the following change is suggested: "Before formally submitting an application for the initial verification of a diesel emission control strategy, the Executive Officer may require an applicant to submit a proposed verification testing protocol." Or, in the alternative, "Before formally submitting an application for the initial verification of a diesel emission control strategy, the applicant must submit a proposed verification testing protocol. This requirement may be waived at the discretion of the Executive Officer." (EMA)

**Agency Response:** The language identified was not modified in the Notice of Modified Text, so this comment is not pertinent to the notice. Staff notes that the purpose of the language is to emphasize that the Executive Officer has the capacity to waive the requirement of a proposed verification testing protocol.

80. **Comment:** Section 2702(b) describes information that the EO "shall use ... to help determine the need for additional analyses and the appropriateness of allowing alternatives to the prescribed requirements." ARB should consider verification of the strategy under EPA's Voluntary Diesel Retrofit Program Verification Process, in determining the appropriateness of allowing alternatives to the prescribed requirements. Successful completion of EPA's process should be considered by the EO in support of allowing reduced testing burden for the applicant. This section should include the following language: "Successful completion of EPA's Voluntary Diesel Retrofit Program Verification Process shall be considered by the EO in determining the need for additional analyses and the appropriateness of allowing alternatives to the prescribed requirements." (EMA)

**Agency Response:** The staff disagrees with the comment. Though not specified explicitly in the language, the Procedure intends to harmonize with the U.S. EPA's Voluntary Diesel Retrofit Program to the extent possible. Applicants are encouraged to coordinate with both agencies prior to conducting any testing. In most cases, results from emission tests and durability demonstration can be shared and thus reduce the expense of verification. For further information regarding the harmonization of ARB and U.S. EPA's verification program, see pages 50 – 54 of the Staff Report, which are incorporated by reference here.

81. **Comment:** The 15 percent minimum emission reduction threshold as applied to verification eligibility for NOx emission reduction strategy is too low, in order that to be certain that real and verifiable emissions be generated. (SCAQMD)

**Agency Response:** Staff objects to this comment because it is in response to the original 45-day notice and was received after the close of the 45-day comment period. Without waiving this objection, staff responds as follows. Staff believes that the 15 percent minimum emission reduction is reasonable and statistically robust. To maintain the same confidence level for a small percent change of emissions, additional tests are

needed. In fact, the number of tests has been augmented from 3 to 9 and 3 to 5, for NOx reduction between 15 to 20 percent, and 20 to 25 percent, respectively. Staff estimates the number of tests on the same statistical basis used for PM control. That is, the same level of confidence that is attained by 3 tests of a PM strategy achieving a 25 percent reduction should also be attained prior to verification of NOx reduction. Please see the Appendix D in the Staff Report, which is incorporated by reference here.

82. **Comment:** We believe that the 5 percent increment (i.e., verification occurring at NOx emission reductions of 15 percent, 20 percent, 25 percent, etc.) is too low since it assumes a level of precision that is normally not experienced in vehicle emissions testing. (SCAQMD)

**Agency Response:** Staff objects to this comment because it is in response to the original 45-day notice and was received after the close of the 45-day comment period. Without waiving this objection, staff responds as follows. Based on the typical test-to-test variability for NOx emissions from engine and chassis testing, staff is convinced that the 5 percent increment is the acceptable and reasonable. See also the response to Comment 81, which is incorporated by reference here.

### C. Emission Testing Requirements

83. **Comment:** In the 15 day notice ARB is proposing to change section 2703(j) such that test results are required for all “valid emission tests used to support emission reduction claims...” The previous language required results “For all completed emission tests...” Similarly, to be consistent, the same change should be made to section 2702(d) Appendix A, so that Laboratory test report information is required only “(for all valid emission tests used to support emission reduction claims)”, not “(for all tests).” (EMA)

**Agency Response:** The staff disagrees with the comment. In Section 2703(j), only valid emission tests are used to calculate emission reductions. However, in Section 2702(d), Appendix A, results from all tests must be reported, and may include those that are aborted during testing. Such information may help the staff to determine any anomalies during testing.

84. **Comment:** Lubrizol and Emission Control Systems, Inc. (ECS) appreciate the efforts and willingness of CARB staff to consider alternate test plans for non-road applications. ECS encourages CARB to consider further developments in alternate test plans. This is due to the greater cost, technical variation, and difficulty to find appropriate non-road test engines. (Lubrizol and ECS)

**Agency Response:** The staff acknowledges the concern for further development of alternate test plan for off-road applications. As stated in Section 2703 (f), the Procedure is flexible to allow alternative test cycle and methods upon approval from the Executive Officer.

85. **Comment:** There is a need to define the list of secondary emissions required for testing and their limits. (A. Mayer)

**Agency Response:** The staff disagrees with the comment. First, the Procedure covers a multitude of diesel emission control strategies. Second, the secondary emissions are highly dependent on the nature of those strategies. Therefore, it would be impossible to define all possible secondary emissions and their limits in advance. Nevertheless, staff has provided a suggested list of toxic air contaminants in Section 2703(l)(3) that have major health implications. See also the response to Comment 20, which is incorporated by reference here.

86. **Comment:** Emission during regeneration should be analyzed, as different substances may be emitted during the soot-burning phase. (A. Mayer)

**Agency Response:** The staff agrees with the comment. Section 2703(i) requires that the emissions during regeneration be taken into account when determining the emission reduction efficiency. In addition, Section 2703(l) requires the testing of secondary emissions when there is reason to believe the diesel emission control strategy is associated with the increase of toxic air contaminants.

87. **Comment:** In Section 2703(e), ARB has removed the cold-start test requirement from chassis test requirements. Similarly, to be consistent, the cold-start test requirement must be removed from the engine test requirements. Maintaining the cold-start test requirement for engine testing, but not chassis testing, creates a bias in favor of chassis testing. This is especially true for aftertreatment systems, which typically operate at lower efficiency during engine warm-up. (EMA)

**Agency Response:** The staff disagrees with the comment. To be consistent, the cold-start is required for the engine testing as it is also required by the U.S. EPA Voluntary Diesel Retrofit Program. Moreover, there is a large body of engine certification data based on cold- and hot-start engine testing. Those data could be referenced as baseline emissions when evaluating the emission reduction efficiency of a diesel emission control strategy. See also the responses to Comments 17 – 20, which are incorporated by reference here.

88. **Comment:** Relaxing the NO<sub>x</sub> test cycle to make the verification process less expensive promotes off-cycle emissions and threatens the federally mandated State Implementation Plan. Identifying all of the operating parameters that give rise to high NO<sub>x</sub> conditions are an important part of the verification procedure. (CTA)

**Agency Response:** The staff disagrees with the comment. The modifications did not relax the requirement that high NO<sub>x</sub> conditions be addressed. Section 2703(e)(1)(c) was modified to address the possible elevated NO<sub>x</sub> emissions that are typical on the road, but not observed under standard test cycles. Additional test cycle is required to detect such elevated

NOx emissions and test results are weighted appropriately in calculating the overall emission reduction. See the response to Comment 12, which is incorporated by reference here.

#### **D. Durability Testing Requirements**

89. **Comment:** Section 2704 (d)(1) requires that data “be submitted electronically in columns as a text file or another format approved by the Executive Officer.” In order to reduce uncertainty surrounding the approved format and improve consistency of data submission, ARB should adopt a recommended template. (EMA)

**Agency Response:** The staff acknowledges this comment. However, staff believes it in the best interest of the applicant to allow flexibility in the format.

90. **Comment:** We recommend that the minimum durability demonstration for on-road diesel applications should be restricted to 50,000 miles.

**Agency Response:** Staff objects to this comment because it is in response to the original 45-day notice and was received after the close of the 45-day comment period. Without waiving this objection, staff responds as follows. Staff proposed the minimum durability requirement to be 50,000 miles or 1000 hours. The 1000 hours durability requirement is retained in the Procedure as it is consistent with the minimum durability requirement for engine certification.

#### **E. Limit of NO<sub>2</sub> Issue**

91. **Comment:** CleanAir Systems supports ARB’s limits of NO<sub>2</sub> emissions to 20 percent of total NOx baseline. CleanAir Systems along with Clean Diesel Technology has invested significant resources to develop lightly catalyzed emission control systems that meet the CARB proposed NO<sub>2</sub> cap as well as that imposed separately by the Mining Safety Health Administration (MSHA) which calls for no increase of NO<sub>2</sub> above baseline levels. Clean Diesel Technology has demonstrated systems meeting Level 1, 2, and 3 PM reductions which do not increase NO<sub>2</sub> emissions above 20% of baseline NOx levels. (CleanAir Systems and CDT)

**Agency Response:** The comment supports the staff’s proposal that the post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NOx emissions on a mass basis.

92. **Comment:** Testing at Southwest Research Institute on both a 1990 medium heavy-duty engine and a 1998 heavy heavy-duty engine have shown baseline NO<sub>2</sub> levels at only 13 to 16% of baseline NOx levels. Therefore, the ARB staff proposal is reasonable. The combination of FBC and special catalyst formulation used on ceramic particulate filters has recently been approved by

MSHA for 85%+ PM reduction with no NO<sub>2</sub> increase over baseline. (CleanAir Systems and CDT)

**Agency Response:** The comment support staff's proposed limit of NO<sub>2</sub>. First, it provides NO<sub>2</sub> baseline data for typical diesel engines, which is within the proposed NO<sub>2</sub> limit. Second, it shows there is a technology capable of reducing PM without increasing NO<sub>2</sub> over baseline, as recognized by the MSHA, under the United States Department of Labor. The MSHA administers the provisions of the Federal Mine Safety and Health Act of 1977 (Mine Act) and enforces safety and health standards for the mining industry.

93. **Comment:** The changes in language with regard to the extent of allowable NO<sub>2</sub> slip have made it impossible for catalyzed filter systems to meet the requirement. With Section 2706 (a)(1), the wording changed from limiting the increase in NO<sub>2</sub> baseline emissions "associated with the use of a diesel emission control strategy" to be no more than 20%, to one that effectively caps NO<sub>2</sub> emissions at 20%. (Lubrizol and ECS)

**Agency Response:** The staff disagrees with the comments. Staff modified the language establishing the NO<sub>2</sub> limit to clarify its consistency with the intent as discussed in Section 4.3.4 of the Staff Report and at the public hearing. The modified language elucidates that the post-control NO<sub>2</sub> emissions must not exceed 20 percent of the total baseline (pre-control) NO<sub>x</sub> emissions.

The issue of NO<sub>2</sub> emissions was first brought up at the International Diesel Retrofit Advisory Committee (IDRAC) in 2001. Consequently, ARB conducted a study using an atmospheric model to evaluate the impact of various increase of NO<sub>2</sub> on levels of ambient ozone concentration. It was determined that at a NO<sub>2</sub>/NO<sub>x</sub> ratio of 20 percent (twice the baseline NO<sub>2</sub>/NO<sub>x</sub> ratio of a diesel engine without a filter), population exposure to ozone levels above 1-hour state ozone standard would be reduced slightly.

Based on the results of the study, staff proposed a cap of 20 percent of NO<sub>2</sub> to NO<sub>x</sub> emission ratio for all diesel emission control technologies. To determine that the cap does not penalize retrofit strategies that reduce total NO<sub>x</sub> emissions, the 20 percent cap is determined from the baseline (pre-control) emissions. Such determination was made with the inputs from IDRAC members as well as stakeholders from emission control manufacturers and engine manufacturers.

Staff has explained the reasons for choosing the NO<sub>2</sub> limit and cited an example in the Staff Report to ensure there is no misunderstanding. The following quote from page 35 of the Staff Report further explains staff's approach: "Consider, for example, an engine that has total baseline NO<sub>x</sub> emissions of 3.5 g/bhp-hr. A diesel emission control strategy that reduces total NO<sub>x</sub> by 40 percent would lower emissions to 2.1 g/bhp-hr NO<sub>x</sub>. If the post-control NO<sub>2</sub> level is at or below 0.7 g/bhp-hr, the system could receive verification. Although 0.7 g/bhp-hr is 33 percent of the controlled level, it is only 20 percent of the baseline level and therefore would comply with the Procedure." See also Section 4.3.4 of the Staff Report for additional

information and Comments 88 and 89 in support of the NO<sub>2</sub> limit, which are incorporated by reference here.

Furthermore, to clarify the staff's intent to limit NO<sub>2</sub>, the following quote from the transcript at the public hearing on May 16, 2002 is presented: "An issue that arose during development of this proposal concerns measurements of NO<sub>x</sub> (which consists of NO and NO<sub>2</sub>) from diesel vehicles equipped with passive catalyzed filters that have shown an increase of NO<sub>2</sub>, though the total NO<sub>x</sub> emissions remain approximately the same.

This issue was raised with the International Diesel Retrofit Advisory Committee. Because the increase of NO<sub>2</sub> may produce increased ozone, ambient NO<sub>2</sub>, and PM, atmospheric modeling was used to determine an appropriate limit of NO<sub>2</sub>/NO<sub>x</sub> ratio for the passive catalyzed filters.

Some results of the study are shown here. At an NO<sub>2</sub>/NO<sub>x</sub> ratio of 20 percent, the population exposure to ozone levels above 24-hour state ozone standard would be slightly reduced. Simulated winter peak NO<sub>2</sub> would increase, but remain well below the state ambient air quality standard, and both summer and fall PM<sub>2.5</sub> would decrease. Based on this study, staff proposes a limit of 20% for NO<sub>2</sub>/NO<sub>x</sub> for any diesel emission control strategy.

Manufacturers of catalyzed systems are working to reduce NO<sub>2</sub> emissions. To provide time for development of revised systems while maintaining the aggressive reduction of public exposure to diesel PM called for in the Diesel Risk Reduction Plan, staff proposes that this limit go into effect with systems verified after January 1, 2004. This would allow the continued marketing of PM control strategies developed in good faith prior to this hearing, but limit overall NO<sub>2</sub> increase."

94. **Comment:** The staff, in the 15-day rule proposal, has altered this requirement and effectively caps tailpipe NO<sub>2</sub> emissions at 20 percent of the total baseline NO<sub>x</sub> mass emissions (NO + NO<sub>x</sub>). Rather than adopt such a sweeping change to the NO<sub>2</sub> requirement at this time, we strongly recommend that ARB leave the language adopted by the Board in place. (MECA)

**Agency Response:** See the response to Comment 93 which is incorporated by reference here.

95. **Comment:** When the Board considered and adopted the proposed rule at the May 16<sup>th</sup>, 2002 public meeting, CARB staff's testimony referenced the fact that they were seeing an increase in nitrogen dioxide (NO<sub>2</sub>) emissions associated with the use of catalyzed filters. In the public record, the staff recommendation to the board at that time was to place "*a limit of 20 percent for NO<sub>2</sub> to NO<sub>x</sub> ratio for any diesel emission control strategy.*". Lubrizol and ECS supported this limit, as it was explained to the board, and as it applied to the output ratio of NO<sub>2</sub> to NO<sub>x</sub> from the "emission control strategy" itself. The problem is, contrary to the public discussion at the May 16<sup>th</sup> Board meeting, this ratio is now being applied to the sum total of the original engine NO<sub>2</sub>

output in addition to the emission control strategy NO<sub>2</sub> output. This effectively forces retrofit technology providers to extend their responsibility for their own products to an entirely new and unregulated emission for “in-use” engines. Lubrizol and ECS believe this constitutes a fundamental change in the regulation which is inconsistent with the regulatory record and counter to the Board’s intent. (Lubrizol and ECS)

**Agency Response:** See the response to Comment 90 which is incorporated by reference here.

96. **Comment:** The magnitude of the change in the definition and the limited time remaining to meet the limit (if even possible), precludes the retrofit industry from providing compliant products by the original Jan 1, 2004 deadline. (Lubrizol and ECS)

**Agency Response:** As noted in the response to Comment 90 – 92, which are incorporated by reference here, the modification is not a change from the original proposal. The staff recognizes the limited time to meet the NO<sub>2</sub> limit. Staff is aware of the critical balance of reducing diesel PM without increasing the levels of ambient ozone. Such a NO<sub>2</sub> limit will encourage the industry to look for innovative technological solutions and optimize the designs of catalyzed diesel particulate filters.

97. **Comment:** Holding the retrofit industry responsible for engine-out NO<sub>2</sub> emissions, reduces the ability of retrofit strategy providers to read across engine families when certifying their products. The revised language could thus result in retrofit providers having to test dozens of engine families with a cost of \$40 to \$50 thousand each. This will cause a substantial increase in the cost of product certification/verification and is particularly injurious to smaller technology companies. *Bottomline: Far fewer products from far fewer manufacturers (if any) will be available in the California marketplace. Those that may be available will be at a significantly higher cost to owner/operators of “in-use” engines.* (Lubrizol and ECS)

**Agency Response:** The staff recognizes more funding will be put into research and development in order to optimize the design for a catalyzed particulate filter to meet the NO<sub>2</sub> limit. While such limit may create technical challenges, staff believes it is in the best interest of public health that the NO<sub>2</sub> limit be sustained. While the initial research and development expenses will likely pass down to the end-users, the competition among the products will finally determine the cost for a particular diesel emission control strategy in the market. Obviously, the technology meeting all verification requirements with minimum environmental impact will be most likely to flourish in the marketplace.

98. **Comment:** The variability of engine-out NO<sub>2</sub> levels create the need for specific technology innovations and developments for different engine families. These systems will have to be “tailored” to fit each engine family thereby again significantly increasing cost to the owner/operator of retrofitting

“in-use” engines and/or reducing availability of technology development for many applications or entire engine families. (Lubrizol and ECS)

**Agency Response:** Please see the response to Comment 94, which is incorporated by reference here.

99. **Comment:** This revised language creates inequity in marketplace between the NO<sub>2</sub> requirements which OEMs and larger providers must obey when they seek new engine certifications in California versus the NO<sub>2</sub> requirements which retrofit manufacturers must meet when they seek retrofit verifications. If an engine manufacturer was to voluntarily certify a new engine with an optional emission control strategy ahead of the date the engine was required to meet an emissions limit which required the technology (i.e. a catalyzed filter), the engine manufacturer would not have to provide NO<sub>2</sub> emissions data to CARB nor would they be required to comply with NO<sub>2</sub> limits established in this regulation. In contrast, a retrofit emission control manufacturer would be required to comply with the NO<sub>2</sub> requirement. This allows the engine manufacturer to compete unfairly in the retrofit market through the supply of new engines with optional PM and/or NO<sub>x</sub> controls, which could increase NO<sub>2</sub> beyond the limit; whereas, the retrofit provider would potentially be restricted to compete to supply an equivalent product as a retrofit to the same new engine supplied without the optional emissions controls. (Lubrizol and ECS)

**Agency Response:** The staff disagrees with the comment. The Procedure will be applicable only to in-use diesel engines and not new diesel engines. While there is no specific requirement on the limit of NO<sub>2</sub> in the new diesel engine standards, those standards are becoming more stringent. For instance, the NO<sub>x</sub> standard for a 2007 urban transit bus is 0.2 g/bhp-hr, whereas the NO<sub>x</sub> standard for a 2004 urban transit bus is 0.5 g/bhp-hr. With such a stringent NO<sub>x</sub> standard, the overall contribution of NO<sub>x</sub> from those new diesel engines is significantly reduced.

On the other hand, a diesel emission control strategy is designed to retrofit in-use diesel engines that are likely to have high diesel PM and NO<sub>x</sub> emissions. It is our goal to reduce diesel PM, but not at the expense of increasing the levels of ozone concentrations. As a result, the NO<sub>2</sub> limit was determined deliberately for such purpose.

End-users will be mandated to retrofit the diesel engines with most viable diesel emission control strategy; however, they have the options to purchase new diesel engines. Nevertheless, the specific implementation of diesel emission control is outside the scope of the Procedure, and will be addressed in separate rules.

100. **Comment:** The new language, as contained in the 15 day rule proposal, has altered this requirement and effectively caps tailpipe NO<sub>2</sub> emissions at 20 percent of the total baseline NO<sub>x</sub> mass emissions (NO + NO<sub>2</sub>). This makes it virtually impossible for technology providers to verify technologies for the broad spectrum of diesel engines in California regardless of proposed deadline extensions. For example, if baseline NO<sub>2</sub> emissions on

an engine already exceeded the 20 percent limit of total NO<sub>x</sub> emissions, then that vehicle could not be retrofitted for the control of PM emissions. As stated earlier, it is our understanding that engines already exceeding this cap exist in California today. Further, engine manufacturers will be allowed to circumvent these NO<sub>2</sub> limits and unfairly compete and/or undermine retrofit technology providers without any corresponding benefit to air quality. (Lubrizol and ECS)

**Agency Response:** The staff recognizes that there is a possibility that for some diesel engines the pre-control NO<sub>2</sub> may be greater than 20 percent of total NO<sub>x</sub>. As a result, those engines installed with particulate filters would definitely be unable to meet the 20 percent NO<sub>2</sub> limit based on pre-control NO<sub>x</sub>. However, other technologies may be available to control emissions from those engines. The staff incorporates its responses to Comments 88, 89, and 92 by reference here. Staff believes that further investigation is warranted. If the NO<sub>2</sub> limit becomes a major barrier for implementing diesel emission control strategies for the above diesel engines, staff will make any necessary amendments in a future rulemaking.

101. **Comment:** Today, there are engines operating in California where the percentage of NO<sub>2</sub> in the exhaust is greater than 20%. This would eliminate the ability to retrofit these higher base NO<sub>2</sub> emitting engine with a catalyzed filter such as the CRT filter. (Johnson Matthey)

**Agency Response:** See the response to Comment 98 which is incorporated by reference here.

## F. Other Requirements

102. **Comment:** Clean Diesel Technology recognizes CARB's potential concerns with fuel additives used with low efficiency systems but believes the requirement for a "level 3 diesel particulate filter" is unreasonably restrictive and potentially limits the development and use of high efficiency Level 2 systems designed for use with EPA registered fuel borne catalysts. Clean Diesel Technology suggests that wording be modified to state the fuel additive must be used in conjunction with a level 2 diesel particulate filter unless they can be proven to the satisfaction of the Executive Officer to be safe for use alone or with a Level 1 device. (CleanAir System and CDT)

**Agency Response:** The Procedure requires that a level 3 diesel particulate filter must be used in conjunction with a fuel additive unless there is substantial evidence indicating the fuel additive is safe to use alone. If a fuel additive has been proven safe to use alone, there is no restriction on combining the fuel additive with a level 1 or level 2 strategy.

103. **Comment:** Clean Air Partners supports the proposed 15-day changes. In particular, we very strongly support the proposed changes to the "limits on other pollutants" in section 2706 of the proposed regulations. (CAP)

**Agency Response:** The comment support the staff's view that the proposed "limits on other pollutants" are reasonable.

104. **Comment:** We would suggest the rule allow for other demonstration short of full-blown photochemical modeling if these are satisfactory to the Executive Officer. For example, one could conceive of satisfying this requirement by demonstrating that the Carter Maximum Incremental Reactivity of the non-methane hydrocarbon (NMHC) emissions after the retrofit would not increase, even though mass emissions of NMHC were higher. (CAP)

**Agency Response:** The Procedure does not specify an atmospheric model that must be used to estimate the levels of ambient ozone concentration from the increase of NMHC or NOx. The applicant may use any atmospheric model provided it is approved from the Executive Officer. This flexibility allows for the use of improved or simplified models as appropriate.

105. **Comment:** To avoid imposing burdensome new testing requirements, it should be made clear that concentration limit applies to the time-weighted average of ammonia concentrations in the raw exhaust, rather than the volume-weighted or mole-weighted average. (Engine, Fuel, and Emissions Engineering, Inc.)

**Agency Response:** Staff agrees with the comment. Though the term "time-weighted average" is not explicitly specified, the Procedure set a 25 ppm limit by volume over any test cycle, which is based on time-weighted average.

106. **Comment:** The guideline for multimedia assessment is not defined. The cost of carrying out multimedia assessment is unknown. (Octel)

**Agency Response:** The staff acknowledges the lack of information regarding the specific guidelines for multimedia assessment. However, the requirement mirrors that of the Health and Safety Code Section 43830.8. Staff is preparing guidelines for the implementation of the multimedia assessment.

107. **Comment:** There is a need to clarify the how the multimedia assessment should be conducted. (A. Mayer)

**Agency Response:** See the response to Comment 106, which is incorporated by reference here.

108. **Comment:** Even with the multimedia assessment completed, there is always a risk that every two years the verification of the fuel additive may be revoked.

**Agency Response:** For many fuel additives, environmental risks and health risks are poorly described. Additionally, long term data regarding health risks and environment fate and transport are incomplete. Some additives

might have potential to bioaccumulate and/or biotransform. The biennial review of the verified fuel additive is to ensure that proper health-related, epidemiological, environmental, or toxicological data are updated to prevent any undesirable emissions and exposure to the general public. See Section 4.3.5.1 of the Staff Report, which is incorporated by reference here.

109. **Comment:** The health, environmental, epidemiological status update every two years is burdensome for manufacturers. (A. Mayer)

**Agency Response:** See the response to Comment 108, which is incorporated by reference here.

110. **Comment:** The testing of fuel additives with 10-fold increase in concentration is not necessary. The VERT program requires testing for only 2-fold increase of the concentration. (A. Mayer)

**Agency Response:** The staff disagrees with the comment. Testing the fuel additive with 10-fold increase in concentration is intended to identify any possible problems that might occur due to misfueling or build up of the fuel additive in the engine over time. Nevertheless, if the higher dosage would result in catastrophic damage to the engine, the applicant can petition to test the fuel additive at less than a 10-fold increase in concentration. See the response to Comment 31, which is incorporated by reference here.

111. **Comment:** The proposed modifications are unfair to fuel additive companies. As presented, the proposed modifications essentially outlaw fuel additives for diesel fuel, unless that fuel and fuel additives are produced and supplied to users by a refinery, pre-mixed. The proposed modifications make the use of proven fuel additives by fuel additive companies intentionally cumbersome and burdensome. (Nanotech)

**Agency Response:** The procedure is intended to verify any strategies, including fuel additives, capable of reducing diesel PM by a minimum of 25 percent. The procedure and the modifications documented in the notice of modified text do not prohibit verification of a fuel additive that is not pre-mixed and supplied by a refinery. Fuel additives that are pre-mixed will be treated as alternative diesel fuels, and must follow a testing path consistent with existing evaluations of alternative diesel fuels. The pre-mixed product might be transported, stored and dispensed as any other fuel, and so should be treated as a single product under the fuel rules.

If a fuel additive is not pre-mixed, it will not be treated as an alternative diesel fuel. Since product mixing would not be done beforehand, there would be only an extremely small chance of the fuel additive/fuel combination going into a vehicle with which it was not intended to be used. There would be some sort of hardware to administer correct dosing, and that hardware would need to be evaluated as any other type of emissions control hardware. Thus, the case of additive that is mixed later would follow the same testing path as a diesel emission control strategy that does not include a fuel additive.

In all cases, the fuel additive must undergo all other requirements intended to protect the public from unintended consequences, including the multimedia assessment prescribed by Health and Safety Code Section 43830.8. See the response to Comments 106 and 108, which are incorporated by reference here.

112. **Comment:** If California diesel fuel is not negatively altered with the use of a fuel additive, why must it be identified as an “Alternative Diesel Fuel?” (Nanotech)

**Agency Response:** The staff disagrees with the comment. There is no guarantee that the California diesel fuel will not be altered with the use of a fuel additive. To reduce emissions, the additive must alter the base fuel and its combustion in some way. A fuel additive added to the base fuel may change the characteristics of a base fuel and may cause adverse impact to the environment if not handled carefully. For instance, the leakage of a on-site underground storage tank containing a fuel additive pre-mixed with a base fuel may cause undesirable impacts to the environment and the public health. Therefore, a fuel additive pre-mixed with a diesel fuel will undergo more extensive testing, consistent with the ARB’s fuel certification program, and meet additional safeguards to protect the end-users and the environment. Those safeguards include additional exhaust analyses, biennial update on environmental and health data, and a multimedia assessment to prevent any adverse impacts to the environment or public health

113. **Comment:** Order should be amended to allow a dedicated diesel fuel tank at one site to have fuel additive mixed and ready to go for use by an identified truck fleet and/or engines. The proposed modifications favor individual vehicle and/or individual engine application and rejects the most certain method of accurate dosing of base diesel fuel with the fuel additive. Dedicated diesel fuel tanks, at specific locations, should be allowed to provide base diesel fuel mixed with the fuel additive for an identified vehicle fleet or engine. (Nanotech)

**Agency Response:** The Procedure does not favor any method of dosing and does allow for the scenario identified in the comment. If the fuel additive is pre-mixed with the diesel fuel, it will be treated as an alternative diesel fuel, consistent with other ARB’s fuel certification program, and meet the additional safeguards to prevent adverse environmental or health impacts. See the response to Comment 112, which is incorporated by reference here.

114. **Comment:** Fuel additive is not part of a system requiring system review. The Nanotech product is not used as part of a system, and thus does not require extensive compatibility and durability testing. Any misfueling effect, if it occurs, will simply result in more use of a costly product to the users, without resulting in any detrimental environmental impacts. The product

does not require filters, nor does it require an engine adjustments.  
(Nanotech)

**Agency Response:** The staff disagrees with the comment. Unless supported by scientific evidence, staff cannot conclude that any fuel additive would cause no detrimental environmental or health impacts. The Health and Safety Code Section 43830.8 specifically requires a multimedia assessment for fuel additives. Furthermore, as noted in Comments 108, 110, and 112, and the responses thereto, which are incorporated by reference here, the Procedure must protect end-users and provide assurance regarding the compatibility of a fuel additive with an engine, and its effect on engine durability.

## **G. Warranty Requirements**

115. **Comment:** Engine manufacturers typically and currently warrant the workmanship and materials of their product (including emission control) and do not pay for repair or replacement of vehicles or vehicle parts which incurred secondary damage proximately caused by the engine failure. Why does the proposed CARB regulation require a more inclusive warranty for new emission control systems for diesels? (Catalytica)

**Agency Response:** Consumers may purchase any diesel vehicles or equipment on a voluntary basis. However, under the proposed retrofit rules, end-users may be mandated to retrofit their in-use diesel vehicles or equipment with a diesel emission control strategy. Therefore, the warranty should at least cover the workmanship and materials of the diesel emission control strategy. Further, the warranty should cover damage to the engine proximately caused a defective diesel emission control strategy. See the responses to Comments 34, 37 – 49, and 121, which are incorporated by reference here.

116. **Comment:** The installation warranty requirements impose new requirements on a group of stakeholders (installers of emission control strategies) that were not engaged in the development of The Procedures. These stakeholders may not have been notified of these requirements and may not have had adequate opportunity to comment on these new requirements. Their input and perspective is important and should be obtained. (EMA)

**Agency Response:** Most installers or dealers are affiliated with the emission control manufacturers for sales or service. Staff has made effort to contact relevant stakeholders including emission control manufacturers and solicit their input in developing the Procedure. This Procedure was developed over a two-year period, taking into consideration of the input and feedback from all stakeholders. Staff has made appropriate changes accordingly from those comments.

117. **Comment:** Installation is strictly confined to the physical labor performed by an installer and is not in any way inclusive of parts, design or technology. (EMA)

**Agency Response:** Staff disagrees with the comment. The installation warranty ensures that the installation of the diesel emission control strategy is free from defects in workmanship. A failed installation may indirectly cause damage to the diesel emission control strategy. For this reason, the installation warranty must provide the same coverage as the product warranty. The response to Comment 118 is incorporated by reference here.

118. **Comment:** Section 2707(a)(2), provides that “The extent of the warranty coverage provided by installers must be the same as the warranty provided by the applicant as established in subsection (a)(1) and the same exclusions must apply.” However, 2702(a)(1) describes a warranty relating to defects in the design, materials, workmanship, or operation of the verified diesel emission control strategy. Clearly, this is well beyond the control of the installer and should not be included or referenced under the installation warranty. (EMA)

**Agency Response:** The installer is not responsible for the design, materials, workmanship, or operation of the diesel emission control strategy, but is responsible for the installation, including the design, materials, workmanship, and operation of any parts it has supplied for the installation (e.g., support brackets). A failed installation may cause damage to the diesel emission control strategy and consequently prevent it from functioning. Under such circumstances, the installer should be responsible for the damages incurred by the end-users.

119. **Comment:** The Installation Warranty Statement should not include blanket references to the “warranty period” and “the extent of the warranty coverage” provided by the product manufacturer. The warranty period should reference Table 5 (minimum warranty periods). Installers should not be bound by a longer warranty period in the event that a product manufacturer elects to extend a product warranty beyond the minimum requirements. Further, the extent of the coverage should not be equivalent to the product warranty which includes the design, materials, workmanship and operation of the emission control strategy, but rather, should be confined to the physical labor performed by an installer, not inclusive of parts, design or technology. (EMA)

**Agency Response:** Staff would like to clarify that the installation warranty is bound by the minimum warranty period in the Procedure. There is no requirement that the installation warranty must be bound by a longer warranty period if a product manufacturers elects to extend a product warrant beyond the minimum requirements, unless otherwise agreed upon between the installers and end-users. See also the response to Comment 115.

120. **Comment:** Johnson Matthey understands the ARB's interest in protecting the owner of the vehicle. However, this protection should not unfairly penalize retrofit technology verifiers and providers. Today, an engine original equipment (OE) must certify an engine with a filter in California in order to meet the requirements of the California Transit Rule and that engine OE would have to provide a warranty of 100,000 miles for a period of five years. This liability would be limited to only the product that the OE supplied, no progressive damage. However, in order to meet the requirements of the California Transit Rule for existing engines, the owner must retrofit existing engines with a verified filter. If the engine or vehicle is still under warranty, the engine or vehicle OE's warranty would still be 100,000 miles and five years on the product they supplied, but the retrofit provider's warranty and liability obligations would be 150,000 miles or five years and it would not only cover the retrofit device, but it would extend to the engine and vehicle as well. This places an unfair burden upon retrofit technology providers and with approval, California would have made retrofit more onerous than new engine supply. This clearly contradicts California's prior practice where retrofit programs face less stringent requirements than new product supply. (Johnson Matthey)

**Agency Response:** The staff disagrees with the comment. A typical certified in-use engine has an emission control warranty of 100,000 miles or 5 years, and is limited to the engine and its related accessories covered by the warranty. The product warranty for the diesel emission control strategy is primarily designed to protect the end-users. The product warranty does not automatically cover the engine or vehicle unless it has been proven that a defective diesel emission control strategy proximately caused the damage to the engine or vehicle. While end-users purchase diesel engines or equipment on a voluntary basis, they may be mandated to retrofit their diesel engines or equipment as required by in-use diesel emission control rules. Thus, there is a need to protect the end-users to the maximum extent possible. See the responses to Comments 34, and 37 – 49 which are incorporated by reference here.

121. **Comment:** The extension of the warranty liability to the engine and the vehicle is that many of these retrofits will occur on vehicles/engines that are already out of warranty with either the vehicle or engine OE. The effect of the warranty liability provisions contained in this document would be to provide extraordinary benefits to the owners of this used, out-of-warranty equipment, all at the expense of retrofit technology providers. (Johnson Matthey)

**Agency Response:** The staff disagrees with the comment. Under the retrofit rules, end-users may be mandated to retrofit their in-use diesel vehicles or equipment with diesel emission control strategy. Therefore, to fully protect the end-users, the Procedure requires product and installation warranties. See the responses to Comments 34, 37 – 49 which are incorporated by reference here.

122. **Comment:** The user of an emulsion fuel may be given application, storage and usage guidelines relating to such fuel. It needs to be clear that any warranty is subject to a user adhering to such guidelines. Currently, the warranty has exclusions for “abuse, neglect [and] improper maintenance,” but there should also be an exclusion from the warranty for a failure to follow the application, usage and storage guidelines provided by the applicant. (Lubrizol and ECS)

**Agency Response:** As specified in Section 2707(b)(1), owners are obligated to follow the maintenance schedule as listed in the owner’s manual. The maintenance schedule may include guidelines to proper handle and store the emulsified fuels. Damage not attributable to the fuel would not need to be covered by the fuel supplier.

123. **Comment:** When an after-treatment device is installed, the installation occurs once, and then the device either continues to work as planned or not. When fuel is used, a new “installation” occurs each time the fuel tank is refilled. When the warranty is applied to fuel, it should be clear that the applicant can look to the particular point in time when defective fuel is supplied. If a particular batch of fuel is defective, the applicant should only need to supply replacement fuel to fulfill its obligation to “repair or replace the diesel emission control system.” If the defective fuel caused damage to the fuel system, then applicant should only be required to pay the prorated cost of the repair to the system. Since all diesel engines will eventually fail due to wear, the cost of repair paid by the fuel supplier should only be the increased cost associated with a failure that occurs earlier than it would have occurred had the engine been run on ordinary diesel. (Lubrizol and ECS)

**Agency Response:** As specified in Section 2707(a)(1)(C), if the fuel causes damage to the engine, the applicant must repair, replace, or pay the fair market value of the vehicle prior to the time the failure occurs. Damage not attributable to the fuel would not need to be covered by the fuel supplier.

124. **Comment:** The warranty provisions for retrofit systems are unacceptable and lack consumer protection. A 150,000 miles warranty is just over 10 months on a truck used for two shifts a day, yet the cost of the capital investment is not reflected in length of the warranty. (CTA)

**Agency Response:** The warranty provisions is designed to protect the end-users who are mandated by in-use retrofit rules to install diesel emission control strategies while considering the burden to the emission control manufacturers. A long-haul truck may accumulate over 150,000 miles within ten months, whereas a waste hauler travels about 30,000 miles per year. The minimum warranty period is intended to find the right balance between protecting all the end-users and not imposing unreasonable restrictions on a supplier. For long-haul truck operators that accumulate large amounts of mileage a year, it may be worthwhile to purchase extended warranty for the diesel emission control strategy. See the

responses to Comments 34, and 37 – 49 which are incorporated by reference here.

125. **Comment:** ARB’s warranty period is too long. (A. Mayer)

**Agency Response:** The staff disagrees with the comment and incorporates its responses to Comments 34, and 37 to 39 by reference here. The warranty period is designed to cover a typical operation for five years. Staff has consulted with MECA before determining such minimum period. MECA was supportive in making such determination (see Comment 37). Nevertheless, the California Trucking Association contends that the warranty period is insufficient to cover typical long-haul operation (see Comment 124).

## H. Determination of Emissions Reduction

126. **Comment:** The proposed Section 2708(a)(1) allows the Executive Officer to assign weighting factors for standard cycle (i.e., FTP or UDDS) and the cycle which “gives rise to significant periods of elevated NOx emissions” (Section 2703(e)(1)(C)). However, the regulation contains no guidance about how to assign NOx reduction for systems tested on the UDDS and a low-speed cycle (i.e., those tested on chassis dynamometers). Since the low-speed cycle may be largely unrepresentative of real-world application, similar flexibility to determine weighting factors should be specified in the regulations for cases in which the low speed cycle requirement has not been waived. (Cleaire)

**Agency Response:** The staff disagrees with the comment. For emission tests without the cycle with elevated NOx emissions, an average of the test results from the standard cycles (UDDS and low-speed cycle) will be used. However, when the cycle with elevated NOx emissions is required, the Executive Officer will determine an appropriate weighing factor for the standard cycles (UDDS or low-speed cycle) and the cycle with elevated NOx emissions. In determining the weighing factor, the Executive Officer will consider factors such as the amount of time that vehicles within the emission control group are expected to have elevated NOx emissions.

## I. In-Use Compliance Requirements

127. **Comment:** The additional warranty report and additional in-use testing requirements provide an incentive for companies to not spend the necessary resources on product testing. A 4% failure rate is unacceptable. Even the 2% proposed fail rate is not protective of the consumer. (CTA)

**Agency Response:** The ARB’s warranty program for in-use light-duty vehicles requires a warranty report when the warranty claims exceed four percent. This Procedure requires reporting at the same cut-point. Regardless of the number of warranty claims, manufacturers must also

report annually. This will ensure the ARB has regularly updated information about any problems that arise in use, and allow for any necessary corrective action. See Section 4.4.1.1 of the Staff Report, which is incorporated by reference here.

128. **Comment:** With regards to in-use compliance requirements, we recommend that compliance testing be conducted when vehicles using verified diesel emission control strategies have achieved 80 to 100 percent of their minimum warranty period. (SCAQMD)

**Agency Response:** Staff objects to this comment because it is in response to the original 45-day notice and was received after the close of the 45-day comment period. Without waiving this objection, staff responds as follows. There are two phases of in-use compliance testing. The first phase must be conducted for those systems that are at the end of the first year operation or within three months of their first maintenance. The second phase must be conducted when those systems have been operated between 60 to 80 percent of their minimum warranty period. The reason being that staff would like to find out if the verified systems are indeed functioning before it reaches the full warranty period. In this way, should a problem exist, it can be addressed adequately through repair or replacement to ensure that the rights of end-users are protected.

**J. Miscellaneous**

129. **Comment:** MECA supports in general the proposed changes to sections 2700 through 2710. We believe the staff's recommended changes help clarify the rights and obligations requirements in the warranty requirements. (MECA)

**Agency Response:** The comment supports the changes proposed in the Notice of Modified Text.

130. **Comment:** The ARB has failed to provide the operational data for test vehicles hiding behind the Public Records Act, and is acting unlawfully in promulgating a final rule. (CTA)

**Agency Response:** This comment is outside the scope of the Procedure. Without waiving this objection the staff responds as follows. The staff disagrees with this comment. The staff believes that ARB is in compliance with all requirements of the Public Records Act.

131. **Comment:** CARB has failed to provide cost effectiveness in comparing the high costs of traps to the cost of a new engine. (CTA)

**Agency Response:** The staff report provides a detail analysis of the cost associated with the verification process, but the cost of a particular control technology is outside the scope of this Procedure. Note that participation in this Procedure is voluntary. Applicants participate in this Procedure because it is advantageous for them to market diesel emission control strategies that have been verified. When staff proposes rules to implement the in-use

controls for the various categories of diesel engines, it will provide more detailed estimates, taking into consideration the specific issues associated with each category.

132. **Comment:** The definitions and specifications of the Retrofit Rule are arbitrary and capricious. (CTA)

**Agency Response:** The staff disagrees with this comment and believes that the definitions and specifications in the proposed rule are reasonable and based on fact, sound judgment and experience. The Procedure was developed over a period of two and half years. There were three workshops discussing the specific requirements of the Procedure. Staff has considered and incorporated comments from stakeholders and developed the Procedure to protect the end-users without unduly increasing the burden on the emission control manufacturers. Further, staff has worked closely with the U.S. EPA to ensure the Procedure harmonizes with the U.S. EPA's verification protocols. Finally, the Procedure is consistent with other ARB programs, including new engine emission certification warranties.

133. **Comment:** Lack of durability testing on retrofit devices overestimate emission reductions and create incentives for untested and unproven emission control devices. (CTA)

**Agency Response:** The staff disagrees with the comment. The purpose of the Procedure is to ensure only proven strategies are verified. The durability testing requirement is consistent with new engine certification. The durability demonstration of a minimum 1000 hours or 50,000 miles should ensure the emission reduction for any diesel emission control strategy is indeed durable. See the response to Comment 134, which is incorporated by reference here.

134. **Comment:** CARB's Retrofit Warranty places the motoring public at risk of increased truck accidents and injury. Consumers are burdened by delegation of the identification of all safety issues after a device has already been verified. (CTA)

**Agency Response:** The staff disagrees with the comment. The Procedure requires the applicant to discuss all potential safety issues in the application report as required in Section 2702(d). Moreover, the Procedure contains extensive installation and product warranties that protect the end-users from improper installation and defective diesel emission control strategies. The product warranty even cover engines damaged by the failed diesel emission control strategies. Additionally, there are two phases of in-use compliance testing programs to ensure the diesel emission control strategies are indeed functioning and achieving the emission reductions as verified. Finally, the emission control manufacturers are required to submit an annual warranty report and must inform ARB immediately whenever warranty claims exceed four percent.

135. **Comment:** Diesel particulate filter (DPF) technology is not ready for commercialization. (CTA)

**Agency Response:** The staff disagrees with the comment. Diesel particulate filters have been widely used throughout the world. There are plenty examples of successful applications of diesel particulate filters in countries such as Switzerland, Sweden, Germany, United States, and Japan. In addition, several diesel particulate filters have been verified by the ARB and the U.S. EPA for specific applications. The verification procedure will further ensure that only mature products are approved. See the response to Comment 134, which is incorporated by reference here.

136. **Comment:** Cost of participation in ARB's verification is not clear. (Ociel)

**Agency Response:** Pages 61 to 63 of the Staff Report summarize the cost estimates for engine and chassis testing, including cold- and hot-start emission testing, durability testing, and in-use compliance testing, and are incorporated by reference here. Participation is voluntary, so any company has the ability to choose not to verify a diesel emission control technology if it is not economically advantageous to do so.

137. **Comment:** Staying with the historically mass-based PM definition is no way to success. Distinction should be made regarding the volatile and solids. (A. Mayer)

**Agency Response:** Staff recognizes the significance of distinguishing the volatile and solid fractions of the diesel PM. However, this issue is outside the scope of the Procedure. See the response to Comment 61, which is incorporated by reference here.

138. **Comment:** We support a nationwide diesel fuel standard. In this way, truck operators will not purchase cheaper diesel fuel from other states which may indirect affect the State's tax revenue from the diesel. (G.K. Distribution and Trucking)

**Agency Response:** Nationwide diesel fuel policy is outside the scope of the proposed modifications to the Procedure.

139. **Comment:** CARB agreed to a national fuel standard of 15-ppm sulfur. Referring to the 10% aromatic standard for this fuel is not only a false standard, which was never implemented, but also a serious double-cross to the trucking industry in California. (CTA)

**Agency Response:** This issue is outside the scope of the proposed modifications to the Procedure.

140. **Comment:** Everyone knows how the dangers of toxic smoke especially diesel fuel with full intention to cause harm. (Ladyhawkharmonys)

**Agency Response:** This issue is outside the scope of the proposed modifications to the procedure. It appears that the commentator is confusing the smoke coming from diesel fuel and a typical diesel engine. The Procedure intends to verify diesel emission control strategies that reduce diesel PM, which is considered as a toxic air contaminant.

141. **Comment:** Market behavior will cause truckers to avoid new truck purchases and change their operating practices to avoid high cost and threat to their businesses. (CTA)

**Agency Response:** This issue is beyond the scope of the proposed modifications to the Procedure. This issue will be addressed and considered in future rulemakings related to in-use diesel emission controls.

142. **Comment:** The increase of trucks on the road has been tremendous and is threatening the great strides made in the air quality movement. (Stan Ross)

**Agency Response:** The staff agrees with the comment.