

**SUMMARY OF BOARD ITEM**

**ITEM # 00-12-3:** PUBLIC HEARING TO CONSIDER REQUIRING CERTAIN CALIFORNIA LIGHT- AND MEDIUM-DUTY VEHICLES TO BE SUBJECT TO FEDERAL TIER 2 STANDARDS, AND ADOPTING ADDITIONAL EXHAUST EMISSION STANDARDS FOR HEAVY-DUTY GASOLINE VEHICLES AND ENGINES

**STAFF RECOMMENDATION:** Staff recommends that the Board adopt the proposals both to require qualifying federal light- and medium-duty vehicles to be certified in California, and to adopt the federal exhaust emission standards for heavy-duty gasoline vehicles and engines.

**DISCUSSION:** In 1998 California adopted the second phase of its Low-Emission Vehicle Program (LEV II) for light- and medium-duty vehicles. In 1999 the U.S. Environmental Protection Agency (U.S. EPA) followed suit and adopted new emission standards for light- and medium-duty passenger cars and trucks – the Tier 2 standards – that mirror California standards. Earlier this year, EPA also adopted more stringent standards for heavy-duty gasoline vehicles and engines. The purpose of this rulemaking is to incorporate portions of the recently promulgated federal programs into California's exhaust emission requirements for light-, medium-, and heavy-duty vehicles and engines to ensure that California continues to receive only the cleanest vehicles in every vehicle category.

**SUMMARY AND IMPACTS:** Staff has determined that the emission impacts from this rulemaking would be small emission reductions for light- and medium-duty vehicles and an emissions benefit from adopting the federal heavy-duty gasoline standards of about 1 ton per day. Overall, staff believes that manufacturers would not incur any significant additional costs in making these vehicles available in California and there would be no noticeable impact on California employment, business status or competitiveness.



**TITLE 13. CALIFORNIA AIR RESOURCES BOARD****NOTICE OF PUBLIC HEARING TO CONSIDER REQUIRING CERTAIN CALIFORNIA LIGHT- AND MEDIUM-DUTY VEHICLES TO BE SUBJECT TO FEDERAL TIER 2 EXHAUST STANDARDS, AND ADOPTING ADDITIONAL EXHAUST EMISSION STANDARDS FOR HEAVY-DUTY GASOLINE VEHICLES AND ENGINES**

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider amendments to its exhaust emissions regulations for light-, medium- and heavy-duty engines and vehicles. One set of amendments would require that where a manufacturer has certified a light- or medium-duty vehicle model to a federal Tier 2 emissions bin that is more stringent than a California emissions category and does not have an identical California emissions category counterpart, the equivalent model in California would have to be certified either to a more stringent California vehicle emissions category or to the federal standards for the Tier 2 emissions bin. The second set of amendments would adopt additional exhaust emission standards for heavy-duty gasoline engines to align with recently promulgated federal standards. These proposed amendments are designed to implement the principle that only the cleanest available vehicles should be offered in California because of the state's unique air quality challenges.

**DATE:** December 7, 2000  
**TIME:** 9:00 a.m.  
**PLACE:** Air Resources Board  
Board Hearing Room, Lower Level  
2020 L Street  
Sacramento, California

This item will be considered at a two-day meeting of the Board, which will commence at 9:00 a.m., December 7, 2000, and may continue at 8:30 a.m., December 8, 2000. This item may not be considered until December 8, 2000. Please consult the agenda for the meeting, which will be available at least 10 days before December 7, 2000, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact the Clerk of the Board at (916) 322-5594, or TDD (916) 324-9531 or (800) 700-8326 for TDD calls from outside the Sacramento area by November 22, 2000, to ensure accommodation.

**INFORMATIVE DIGEST OF PROPOSED ACTION AND PLAIN ENGLISH POLICY STATEMENT OVERVIEW**

**Sections Affected:** Amendments to title 13, California Code of Regulations (CCR), section 1961 and the incorporated "California Exhaust Emission Standards and Test

Procedures for 2001 and Subsequent Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," and section 1956.8 and the incorporated "California Exhaust Emission Standards and Test Procedures for 1987 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles." Adoption of the incorporated new "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles."

### **Proposed Amendments Affecting Light- and Medium-Duty Vehicles**

**Background – The California LEV I and LEV II Programs.** The Board adopted the second phase of its Low-Emission Vehicle (LEV II) program for passenger cars, light-duty trucks and medium-duty vehicles following a November 1998 hearing. These regulations are a continuation of the original Low-Emission Vehicle (LEV I) program adopted in 1990. Both the LEV I and LEV II regulations include three primary elements: (1) tiers of exhaust emission standards for increasingly more stringent categories of low-emission vehicles, (2) a mechanism requiring each manufacturer to phase-in a progressively cleaner mix of vehicles from year to year with the option of credit banking and trading, and (3) a requirement that a specified percentage of passenger cars and lighter light-duty trucks be ZEVs, vehicles with no emissions.

*The LEV I regulations.* The LEV I program established four low-emission vehicle categories to which a car or light truck could be certified: Transitional Low-Emission Vehicle (TLEV), Low-Emission Vehicle (LEV), Ultra Low-Emission Vehicle (ULEV) and ZEV. The medium-duty vehicle categories are LEV, ULEV, Super Ultra Low-Emission Vehicle (SULEV) and ZEV. Vehicles could also be certified to the preexisting "Tier 1" exhaust emission standards. Each low-emission vehicle category has a progressively more stringent standard for exhaust emissions of nonmethane organic gas (NMOG), a precursor of ozone pollution. For example, passenger car LEVs and ULEVs have to meet standards for NMOG that are respectively about one-third and one-sixth of the corresponding 1994 Tier 1 standard. The identical LEV and ULEV standard for oxides of nitrogen (NOx) represents a 50% reduction from the 1994 Tier 1 NOx standard.

All cars have been subject to the same low-emission vehicle standards, regardless of weight. However, heavier light-duty trucks and medium-duty vehicles were allowed to have greater emissions for a given low-emission vehicle category. There were two weight categories for light-duty trucks (LDT1 and LDT2) and four weight categories for medium-duty vehicles (MDV2, MDV3, MDV4 and MDV5).

Under LEV I, each year a manufacturer may produce cars and LDT1s certified to any combination of emission categories – TLEV, LEV, etc. – as long as its full model line meets the annual NMOG fleet average requirement. The required fleet average NMOG emissions level starts at the Tier 1 level for the 1994 model year. It then becomes incrementally more stringent through the 2003 model year, when the level for cars and LDT1s was derived from a potential mix of 75% LEVs, 15% ULEVs and 10% ZEVs. The heavier light trucks in the LDT2 category are subject to numerically higher fleet

average NMOG emissions requirements reflecting the numerically higher TLEV, LEV and ULEV standards and the absence of a ZEV requirement for these vehicles. Medium-duty vehicles have separate requirements based on a percent phase-in schedule. The standards for chassis-certified medium-duty vehicles are phased in between the 1998 and the 2004 model years, at which point a manufacturer is required to certify at least 60% LEVs and 40% ULEVs.

*The LEV II regulations.* The LEV II amendments include three major interrelated exhaust emissions elements. The first is restructuring the light-duty truck category so that all former light-duty trucks, and all former medium-duty vehicles having a gross vehicle weight (GVW) of less than 8,500 lbs., will generally be subject to the same exhaust emission standards as passenger cars. Only vehicles having a GVW of 8,500-14,000 lbs. would remain as medium-duty vehicles in LEV II. These include the heaviest SUVs and pickup trucks, such as the Ford Excursion and Dodge Ram 2500.

Second, the Board adopted new LEV II standards for the LEV, ULEV and SULEV categories which are more stringent than the corresponding LEV I standards in several respects. Most importantly, the NOx standard for LEV and ULEV cars was reduced by 75% compared to LEV I. The Board eliminated the car and light truck TLEV standards after the 2003 model year; it concluded that the more stringent standards for the remaining vehicle emission categories could be met by a full range of gasoline and alternative fuel vehicles, making it inappropriate to allow substantially higher NOx and particulate levels to assure availability of diesel cars and light trucks. The overall LEV II emission standards for medium-duty vehicles were tightened to be substantially equivalent in stringency to the light-truck standards (although numerically higher).

Manufacturers are generally required to phase-in certification of vehicles to the LEV II emission standards in place of the LEV I standards between the 2004 and 2007 model years. Car and current light truck models are to be certified to the LEV II standards at a rate of at least 25/50/75/100% during 2004-2007, although alternative plans can be approved. A manufacturer of vehicles classified as medium-duty under both LEV I and LEV II (8501-14,000 lbs. GVWR) must phase-in at least one test group a year to the LEV II standards, with full compliance by 2007. Vehicles that are medium-duty under LEV I but will be in the light truck category under LEV II do not have to be certified to the LEV II standards until the 2007 model year, when 100% compliance is required.

Third, the LEV II regulations provide for continuing yearly reductions in the annual fleet average NMOG requirement from the 2004 through 2010 model years. The 2010 level for cars and LDT1s was derived from a possible mix of 18% LEVs, 47% ULEVs, 25% SULEVs and 10% ZEVs. LEV II changes the required mix of medium-duty LEVs and ULEVs to at least a 40/60 starting with the 2004 model year. Because of the stringent LEV II NOx standards, most of the LEV II emission benefits are NOx reductions.

**The Federal Tier 2 Program.** On December 21, 1999, the U.S. Environmental Protection Agency (U.S. EPA) issued its Tier 2 regulations, which establish new more

stringent exhaust emission requirements for all U.S. light- and medium-duty vehicles not subject to the California standards, starting with the 2004 model year. They are contained in 40 CFR Part 86 Subpart S. Although differing in several respects from the California program, the regulations were designed to be compatible with LEV II and to allow harmonization of federal and California vehicle technology. The Tier 2 regulations establish 10 different emission standard “bins” for cars and light trucks that function in the same manner as the vehicle emission categories (e.g., LEV and ULEV) in the California program. The emission levels for some federal bins fall between those for California’s vehicle emission categories, and the least stringent bins allow emissions greater than is allowed for any California LEV II emission category. It is expected that moderately well-controlled diesel engines in SUVs and pickup trucks could meet the federal Tier 2 standards for the least stringent bins.

The Tier 2 regulations employ a fleet average requirement for NO<sub>x</sub> instead of NMOG. When phase-ins are complete in the 2009 model year, all of the vehicles subject to the LEV II standards for cars and light trucks, along with heavier “medium-duty passenger vehicles” (MDPVs) such as the Ford Excursion, will have to meet a fleet average NO<sub>x</sub> requirement of 0.07 gram per mile (gm/mi) for each manufacturer. In earlier years there are “interim non-Tier 2” fleet average NO<sub>x</sub> requirements that must be met by various vehicle categories. All 2004 and later model-year cars, light-trucks and MDPVs must be certified to one of the Tier 2 bins (including an eleventh bin for pre-2008 MDPVs only). There are also mechanisms for early banking of NO<sub>x</sub> credits.

U.S. EPA’s “heavy light-duty truck” category, or HLDT, is equivalent to what California has called MDV2 and MDV3 – the vehicles that are treated as medium-duty vehicles under LEV I but as light-duty trucks under LEV II. Under Tier 2, none of these vehicles can be certified to a NO<sub>x</sub> standard greater than 0.6 g/mi after the 2003 model year. During the 2004-2006 model years an increasing proportion (25/50/75%) are grouped with the manufacturer’s MDPVs and made subject to an “interim non-Tier 2” fleet average NO<sub>x</sub> requirement of 0.20 g/mi. They do not all become subject to the Tier 2 fleet average NO<sub>x</sub> requirement of 0.07 g/mi until the 2009 model year.

**The Proposed Regulatory Action.** Although the LEV II program is ultimately more stringent than Tier 2, U.S. EPA’s treatment of the HLDT category during 2004-2006 is significantly more aggressive than under LEV II. Instead of adopting interim requirements or a graduated phase-in, the ARB chose to allow manufacturers to focus most resources on developing emission control systems to meet the LEV II light truck standards. This meant the vehicles could be certified to 120,000 mile LEV I NO<sub>x</sub> standards of 0.6 g/mi (for MDV2) and 0.9 g/mi (for MDV3) until the 2007 model year when the LEV standard for these vehicles will be 0.07 g/mi. In estimating the emission impacts of the LEV II program, the ARB staff projected that manufacturers would in practice certify at least one model to the LEV II light-duty truck standards each year to avoid excessive workload demands for the 2007 model year. But now that manufacturers will be required to make progressively cleaner federal HLDTs during

2004-2006 under Tier 2, staff is proposing amendments to assure that these cleaner vehicles are marketed in California.

The proposed amendments would provide that, whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to a federal Tier 2 emissions bin that is more stringent than an applicable California emissions category and does not have an identical California emission counterpart, the equivalent model in California will have to be certified either to a more stringent California emissions category or to the federal standards for the Tier 2 emissions bin. Model equivalency would be determined based on whether the federal model is identical to the California with respect to manufacturer, make and model, cylinder block configuration (L-6, V-8 etc.), displacement, combustion cycle, and transmission class. Comparative stringency would be based on the combined NMOG plus NOx standards for 100,000 or 120,000 miles. For purposes of compliance with the fleet average NMOG requirements and calculating vehicle emission credits, the vehicles would be considered to be certified to the next less stringent LEV II vehicle emissions category. The manufacturer would still be required to meet other applicable California emissions and phase-in requirements, such as evaporative emission standards, on-board diagnostics, emissions warranty, and California emission labels.

Since the Tier 2 program allows manufacturers to build higher-emitting SUVs and pickup trucks as long as their emissions are offset by cleaner cars, staff expects manufacturers may at times certify federal vehicles with especially low emissions. The amendments would assure that equivalent California models would have the same emissions performance. The Tier 2 requirements may also trigger some lower-emitting MDPVs in the 2004-2006 model years, and these vehicles would also be covered.

Staff is also proposing several minor amendments to the LEV II provisions to correct errors and update the certification language consistent with the Tier 2 requirements. For example, proposed amendments would eliminate unintended instances where requirements for small volume manufacturers are more stringent than those for other manufacturers. As with LEV I, small volume manufacturers would be allowed to delay implementation until the end of the phase-in years.

### **Proposed Amendments Affecting Heavy-Duty Gasoline Vehicles and Engines**

On July 31, 2000, U.S. EPA issued new regulations reducing the exhaust emission standards for non-methane hydrocarbons (NMHC) plus NOx from heavy-duty Otto-cycle (gasoline) engines (over 8,500 pounds GVW) from 4.0 grams per brake horsepower-hour (g/bhp-hr) to 1.0 g/bhp-hr. Although the existing California 2003 and later model standard of 2.5 g/bhp-hr is more stringent than the preexisting federal standard, California would benefit by adopting the new federal 1.0 g/bhp-hr standard. Therefore, staff is proposing that California's standards be harmonized with the more stringent emission standards now being required federally.

There are three compliance options in the federal rule that allow a manufacturer to select the best approach for its product line. Option 3 has been designated as the primary NMHC plus NOx standard at 1.0 g/bhp-hr and is scheduled for introduction with the 2005 model year. The other two options allow manufacturers to delay compliance with this standard by certifying to an interim emission level in the 2003 or 2004 model years but at a less stringent level of 1.5 g/bhp-hr. Staff is proposing adoption of all of these options with a few minor adjustments.

Although the federal regulations treat all heavy-duty engines over 8,500 pounds GVW as one category, the California regulations divide these engines into two categories – one for engines used in incomplete medium-duty gasoline vehicles 8,500 to 14,000 pounds GVW and another for engines used in all gasoline vehicles over 14,000 pounds GVW. The new federal standards apply to both categories of engines for NMHC and NOx. However, staff is proposing that the existing California medium-duty carbon monoxide (CO) standard of 14.4 g/bhp-hr be retained for ULEVs, and is proposing new standards of 0.5 g/bhp-hr NMHC + NOx, 7.2 g/bhp-hr CO, and 0.025 g/bhp-hr formaldehyde for optional medium-duty SULEV engines.

Finally, staff is also proposing a reorganization of the test procedures that govern the certification of heavy-duty Otto-cycle engines. These modifications follow the approach used in the earlier revisions to the test procedures for light- and medium-duty vehicles, tracking the organizational structure of the federal certification procedures to make it easier for manufacturers to compare them.

#### **AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSON**

The ARB staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action that includes a summary of the environmental and economic impacts of the proposal. Copies of the Staff Report and the full text of the proposed regulatory language may be obtained from the ARB's Public Information Office, 2020 L Street, Sacramento, CA 95814, (916) 322-2990. The Board staff has also compiled a record that includes all information upon which the proposal is based. This material is available for inspection upon request to the agency contact person identified below.

The ARB staff has determined that it is not feasible to draft the regulation in plain English due to the technical nature of the regulation; however, a plain English summary of the regulation is available from the agency contact person named in this notice, and is also contained in the ISOR for this regulation action.

To obtain the ISOR in an alternate format, please contact the Air Resources Board's ADA Coordinator at (916) 323-4916, TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area. This notice, the ISOR, and subsequent regulatory documents will also be available on the ARB's Internet site for this rulemaking at: <http://www.arb.ca.gov/regact/mdv-hdgc/mdv-hdgc.htm>.

Further inquiries regarding the proposed amendments should be directed to the agency contact person for this rulemaking, Paul Hughes, Manager, LEV Implementation Section, Mobile Source Control Division at (626) 575-6977.

### **COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED**

The determinations of the Board's Executive Officer concerning the costs or savings necessarily incurred in reasonable compliance with the proposed regulations are presented below.

The Executive Officer has determined that the proposed 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.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on private persons and businesses. The Executive Officer has determined that proposed regulatory action will not have a significant cost impact on directly affected persons or businesses. With regard to the LEV II amendments, the requirements would only apply to vehicles that have already been certified to the federal standards; they accordingly do not independently require any California model to be certified to a new standard. Since the models will already have been federally-certified, the additional costs from marketing the vehicles should be minimal. With regard to the heavy-duty standards, U.S. EPA estimated that the new federal standards will result in a less than \$300 cost increase for heavy-duty Otto-cycle engines by 2010. Since a manufacturer will already have to incur these costs for engines sold in the rest of the country, and there are significant costs incurred in certifying federal and California engines to different standards, adoption of the standards for California should not result in increased costs for manufacturers.

The Executive Officer 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. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within California, or the expansion of businesses currently doing business within California. An assessment of the economic impacts of the proposed regulatory action can be found in the Staff Report.

The Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the proposed regulatory action will affect small business.

Before taking final action on the proposed regulatory action, the Board must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

### **SUBMITTAL OF COMMENTS**

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions must be addressed to and received by the Clerk of the Board, Air Resources Board, P.O. Box 2815, Sacramento, CA 95812, or 2020 L Street, 4th Floor, Sacramento, California 95814, no later than 12:00 noon, December 6, 2000, or received by the Clerk of the Board at the hearing. To be considered by the ARB, e-mail submissions must be addressed to [mdv-hdgc@listserv.arb.ca.gov](mailto:mdv-hdgc@listserv.arb.ca.gov) and received at the ARB no later than 12:00 noon, December 6, 2000.

The Board requests but does not require 30 copies of any written submission. Also the ARB requests that written and e-mail statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

### **STATUTORY AUTHORITY**

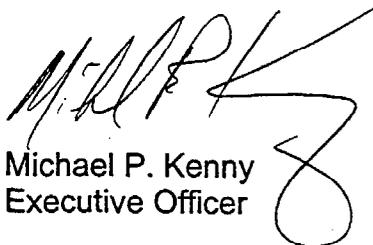
This regulatory action is proposed under that authority granted in sections 39600, 39601, 43013, 43018, 43101, 43104, 43105, and 43806 of the Health and Safety Code; and section 28114 of the Vehicle Code. This action is proposed to implement, interpret and make specific sections 39002, 39003, 39667, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43107, 43204, 43205, 43205.5, and 43806 of the Health and Safety Code.

### **HEARING PROCEDURES**

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Title 2, Division 3, Part 1, Chapter 3.5 (commencing with section 11340) of the Government Code. Following the public hearing, the Board may adopt the regulatory language as originally proposed, or with nonsubstantial or grammatical modifications. The Board may also adopt the proposed regulatory language with other modifications if the text as modified is sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action; in such event the full regulatory text, with the modifications clearly indicated, will be made available to the public, for written comment, at least 15 days before it is adopted. The public may

request a copy of the modified regulatory text from the Board's Public Information Office, 2020 L Street, Sacramento, CA 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD



Michael P. Kenny  
Executive Officer

Date: October 10, 2000

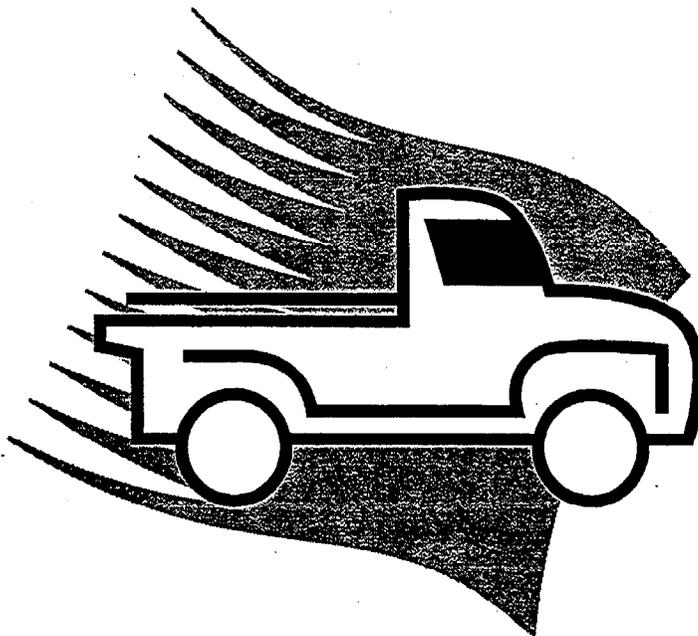


State of California  
AIR RESOURCES BOARD

**STAFF REPORT: INITIAL STATEMENT OF REASONS**

**PROPOSAL TO CONSIDER REQUIRING CERTAIN FEDERAL LIGHT-  
AND MEDIUM-VEHICLES TO CERTIFY IN CALIFORNIA, AND THE  
ADOPTION OF EXHAUST EMISSION STANDARDS FOR HEAVY-DUTY  
GASOLINE VEHICLES AND ENGINES**

Date of Release: October 20, 2000  
Scheduled for Consideration: December 7, 2000



Mobile Source Control Division  
9528 Telstar Avenue  
El Monte, California 91731

This document has been reviewed by the staff of the California Air Resources Board. Publication does not signify that the contents necessarily reflect the views and policies of the Air Resources Board.

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## EXECUTIVE SUMMARY

In 1998 California adopted the second phase of its Low-Emission Vehicle program (LEV II) for light- and medium-duty vehicles. In 1999 the United States Environmental Protection Agency (U.S. EPA) followed suit and adopted new emission standards for light- and medium-duty passenger cars and trucks (Tier 2 standards) that mirror the California standards. Earlier this year, U.S. EPA also adopted more stringent standards for heavy-duty gasoline engines. The purpose of this rulemaking is to incorporate portions of the recently promulgated federal programs into California's exhaust emission standards for light-, medium-, and heavy-duty vehicles and engines to ensure that California continues to receive only the cleanest vehicles available in every vehicle category.

**Proposal for Light- and Medium-Duty Vehicles.** While the California LEV II standards are generally more stringent than the comparable federal requirements, there are some features of the Tier 2 program that could result in manufacturers certifying certain vehicle models to a more stringent federal exhaust emission standard than is required in California. This can occur, for example, because LEV II program flexibilities built into the phase-in years (2004 through 2006) for heavier light trucks do not require full implementation until 2007. Thus, it is expected that manufacturers will certify some of these vehicles to a cleaner intermediate federal standard before all California vehicles in the category must meet the LEV II standards in 2007. In addition, U.S. EPA does not require each larger sport utility vehicle model to meet the same emission standards as passenger vehicles, as is the case in California. Rather, U.S. EPA allows sport utility vehicles to certify to higher emission standards if manufacturers offset them with other vehicles that are much cleaner. Some of the vehicles providing the offset might be cleaner than required in California. Thus staff is proposing a requirement that if a manufacturer certifies a cleaner federal vehicle model and offers an equivalent model in California, the California model must be certified to the same federal exhaust emission standards.

**Proposal for Heavy-Duty Gasoline Engines.** The standards being proposed for heavy-duty gasoline engines are intended to align with the recently promulgated federal standards. Although the current California standard (2.5 grams per brake horsepower-hour (g/bhp-hr)) is more stringent than the current federal requirement (4.0 g/bhp-hr), U.S. EPA has recently adopted an even more stringent standard of 1.0 g/bhp-hr effective with the 2005 model year. Staff is proposing to harmonize with the recently promulgated federal standards for heavy-duty Otto-cycle engines. This will allow manufacturers to make one vehicle that meets both California and federal standards.

**Emission Impact.** This proposal will reduce emissions by assuring that cleaner light- or medium-duty federal vehicles with equivalent California models will be sold in California. The emissions benefit from adoption of the federal heavy-duty gasoline standards will also reduce emissions.

## I. INTRODUCTION

Since adoption of California's second generation Low-Emission Vehicle (LEV II) program in 1998, the federal government has adopted stringent exhaust emission standards that affect the entire vehicle fleet, ranging from passenger cars and light- and medium-duty vehicles to heavy-duty gasoline and diesel vehicles and engines. The federal standards affecting light- and medium-duty vehicles (passenger cars, light trucks and sport utility vehicles) are set forth in a portion of the federal Tier 2 standards. This staff report contains proposals to modify the LEV II standards to take advantage of some elements of the Tier 2 program where they would be beneficial to California. U.S. EPA also finalized the heavy-duty Otto-cycle (gasoline) standards earlier this year. Staff proposes that the federal standards for this category of vehicles and engines be incorporated into the California program.

The proposed regulations affecting light- and medium-duty vehicles will be reviewed first followed by a discussion of the proposed heavy-duty amendments.

## II. PROPOSED LIGHT- AND MEDIUM-DUTY AMENDMENTS

### A. Background

The Air Resources Board (ARB or Board) adopted the second phase of its Low-Emission Vehicle program (LEV II) in November 1998. These regulations are a continuation of the Low Emission Vehicle (LEV I) program originally adopted in 1990. Both the LEV I and LEV II regulations include three primary elements: (1) tiers of exhaust emission standards for increasingly more stringent categories of low-emission vehicles, (2) a mechanism requiring each manufacturer to phase-in a progressively cleaner mix of vehicles from year to year with the option of credit banking and trading, and (3) a requirement that a specified percentage of passenger cars and lighter light-duty trucks be ZEVs, vehicles with no emissions.

The LEV I program established four low-emission vehicle categories to which a car or light truck could be certified: Transitional Low-Emission Vehicle (TLEV), Low-Emission Vehicle (LEV), Ultra Low-Emission Vehicle (ULEV) and ZEV. The medium-duty vehicle categories are LEV, ULEV, Super Ultra Low-Emission Vehicle (SULEV) and ZEV. Vehicles could also be certified to the preexisting "Tier 1" exhaust emission standards. Each low-emission vehicle category has a progressively more stringent standard for exhaust emissions of nonmethane organic gas (NMOG), a precursor of ozone pollution. For example, passenger car LEVs and ULEVs have to meet standards for NMOG that are respectively about one-third and one-sixth of the corresponding 1994 Tier 1 standard. The identical LEV and ULEV standard for oxides of nitrogen (NOx) represents a 50% reduction from the 1994 Tier 1 NOx standard.

All cars have been subject to the same low-emission vehicle standards, regardless of weight. However, heavier light-duty trucks and medium-duty vehicles

were allowed to have greater emissions for a given low-emission vehicle category. There were two weight categories for light-duty trucks (LDT1 and LDT2) and four weight categories for medium-duty vehicles (MDV2, MDV3, MDV4 and MDV5).

Under LEV I, each year a manufacturer may produce cars and LDT1s certified to any combination of emission categories – TLEV, LEV, etc. – as long as its full model line meets the annual NMOG fleet average requirement. The required fleet average NMOG emissions level starts at the Tier 1 level for the 1994 model year. It then becomes incrementally more stringent through the 2003 model year, when the level for cars and LDT1s was derived from a potential mix of 75% LEVs, 15% ULEVs and 10% ZEVs. The heavier light trucks in the LDT2 category are subject to numerically higher fleet average NMOG emissions requirements reflecting the numerically higher TLEV, LEV and ULEV standards and the absence of a ZEV requirement for these vehicles. Medium-duty vehicles have separate requirements based on a percent phase-in schedule.

Whereas the LEV I program set forth increasingly stringent vehicle tailpipe emission standards from 1994 through 2003, LEV II continued that trend by setting even more stringent emission requirements for 2004 through 2010. The State Implementation Plan (SIP) for California was adopted by the Board in 1994 and contains California's blueprint for achieving healthful air quality in California by 2010. The LEV II program was adopted with the intent of satisfying the requirements of measure M2 of the SIP and a significant portion of the SIP's so-called "black box" by achieving a 57 ton per day reduction in ozone precursors in the South Coast Air Basin by 2010.

Developing the emission requirements for the LEV II program was a challenge to ARB staff. One of the principal goals of the program was to ensure that the increasingly popular sport utility vehicles and pickup trucks that are being used primarily as passenger cars be required to meet the same emission requirements as passenger cars. Thus all former light-duty trucks, and all former medium-duty vehicles having a gross vehicle weight (GVW) of less than 8,500 pounds, will be subject to the LEV II passenger car exhaust emission standards. Only vehicles having a GVW of 8,500-14,000 pounds – the MDV4 and MDV5 categories – will remain as medium-duty vehicles. Another goal of the program was to dramatically reduce NOx emissions for all vehicles below 8,500 pounds to a level 75 percent below that allowed for passenger cars in the LEV I program. The LEV II standards for the various vehicle emissions categories are phased in during the 2004-2007 model years.

ARB staff worked with catalytic converter suppliers to obtain the best technology available to demonstrate that even the very large sport utility vehicles could indeed meet very stringent passenger vehicle standards that were being proposed under the LEV II program. The ARB staff conducted an extensive test program utilizing some of the largest Ford sport utility vehicles (the best emission performance of sport utility vehicles available in 1998) equipped with prototype catalytic converters and other

modifications to demonstrate that the emission standards being proposed were indeed feasible for all vehicles below 8,500 pounds GVW.

Subsequent to adoption of the LEV II program, ARB staff assisted the U.S. EPA in developing a similar program for federal vehicles that would achieve maximum emission reductions for vehicles in other states. ARB staff met with U.S. EPA staff to review the engineering approach taken in our test program, provide them with emission test data, loan them experimental catalysts, and provide other assistance. U.S. EPA staff demonstrated that emission levels adopted in LEV II could also be achieved cost-effectively on vehicles nationwide. The program that was subsequently adopted by the U.S. EPA is referred to as the Tier 2 standards.

## **B. Rationale for Current Proposal**

While Tier 2 was patterned after the LEV II program, it contains some unique features and program elements that differ from the California program. Some of these include setting a NOx fleet average requirement rather than an NMOG fleet average requirement as in California, different rates of phasing-in new emission standards, allowing diesel sport utility vehicles and pick-up trucks to emit at higher emission levels than passenger vehicles as long as their emissions are offset by lower emissions from other vehicles, and not including a zero-emission vehicle requirement. The Tier 2 regulations establish 10 different emission standard "bins" for cars and light trucks that function in the same manner as the vehicle emission categories (e.g., LEV and ULEV) in the California program. The emission levels for some federal bins fall between those for California's vehicle emission categories, and the least stringent bins allow emissions greater than is allowed for any California LEV II emission category.

The differences in the federal Tier 2 emission standards and compliance requirements could result in a higher-emitting model being produced for sale in California than is sold in other states. This could occur in two primary ways: 1) some of the vehicles that have been classified as medium-duty vehicles but will be light-duty trucks under LEV II are allowed to certify to a less stringent LEV I emission standard in California during model years 2004-2006 than is required under the federal Tier 2 standards; and 2) some cars may be certified federally to a more stringent standard than is required in California in order to provide offsets that allow sale of a much higher-emitting federal vehicle outside of California (e.g. a diesel SUV that cannot meet California's uniformly stringent NOx emission standards).

The staff's proposal would change the LEV II regulations to require that a manufacturer may not certify a California vehicle model to a California vehicle emissions category that is less stringent than the federal emissions bin to which an equivalent vehicle model has been federally certified. In such a circumstance, the manufacturer would instead have to market in the state the model certified to the federal exhaust emission standards. This will result in lower emissions in California. These situations and how the proposed amendments will result in lower emissions are discussed in more detail in the paragraphs that follow.

Differences in light truck standards: The California LEV II and federal Tier 2 regulations typically provide a phase-in of new emission standards so that not all models must be redesigned to comply with lower emission standards in a single model year. The vehicle manufacturers' lack of engineering and testing resources sufficient to redesign hundreds of models in one year provides the rationale for providing a multi-year phase-in of more stringent emission standards.

The LEV II regulations require a phase-in of LEV II compliant cars and lighter light-duty truck models beginning in the 2004 model year. All models must be compliant with the LEV II requirements by 2007. However, the regulations do not require any current medium-duty vehicles in the MDV2 and MDV3 categories to comply with the LEV II passenger car standards until the 2007 model year. Because there are fewer models in this heavier category, staff concluded a mandatory phase-in of a specified percentage of models each year from 2004 to 2006 could eliminate flexibility that would benefit individual manufacturers. Staff expected, however, that some phase-in would occur naturally because of the engineering resource limitations mentioned above. During the 2004-2006 period, those models not certified to the LEV II standards remain subject to the LEV I standards.

In Tier 2, U.S. EPA chose to require a phase-in of the heavier light trucks. During the phase-in, which starts in the 2004 model year, any model not yet complying with the new Tier 2 standards must meet an interim NOx fleet average standard. This standard is more stringent than the California LEV I standard. Also, Tier 2 imposes a cap on NOx emissions from vehicles in this weight category that is more stringent than the LEV I NOx limits for vehicles in the current MDV3 category. Thus it is expected that in some instances during the 2004-2006 model years, manufacturers will market outside of California heavier light trucks that are cleaner than the equivalent models sold in California. The proposed changes to the LEV II regulations will prevent this from occurring by requiring manufacturers to sell the cleaner federal model in California.

Other cleaner federal vehicles: As noted above, the federal Tier 2 program has ten different standards categories ("emissions bins"), some of which allow much higher emissions than the California LEV program standards. The principal reason for this is U.S. EPA wanted to provide categories with NOx standards lax enough that diesel engines used in large pick-up trucks and SUVs could meet. The Board rejected higher emitting standards categories when it adopted the LEV II program in 1998. To sell a significant number of vehicles certified to the federal higher-emitting categories, a manufacturer must also sell vehicles certified to much lower standards, in order to comply with the NOx fleet average requirement. This could result in some cleaner models being sold outside of California, while a higher-emitting identical model is sold here. The cleaner federal model would not need to be sold in California because the higher emitting models it is offsetting federally can not be sold here, eliminating the need for offsets. To enable California to benefit from these lower emitting models, the proposed amendments would require manufacturers to offer for sale the cleanest model in California.

The Tier 2 regulations also establish a new vehicle category called "medium-duty passenger vehicle," or MDPV, which is a complete vehicle (it comes directly from the factory fully assembled) and has a GVW between 8,500 and 10,000 pounds. This category was specifically designed by U.S. EPA to include the heaviest SUVs such as the Ford Excursion. The Tier 2 program groups these vehicles with the heavier light trucks and makes them subject to a stringent interim fleet average NOx standard starting in the 2004 model year. California has LEV II emission standards for these vehicles, but compliance is not required completely until the 2007 model year. Vehicles in the MDPV category would be subject to the proposed amendments, thus assuring that cleaner federal MDPVs are also marketed in California.

A summary of the original LEV I and LEV II programs and the federal Tier 2 program is contained in Appendix B to this Staff Report.

### **C. Summary Of Proposed Amendments**

The amendments proposed by staff would be triggered whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to a federal Tier 2 emissions bin that is more stringent than an applicable California emissions category. In this circumstance, the equivalent model in California would have to be certified either to (i) the California standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the federal exhaust emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a vehicle emissions category are equally stringent, the California model could only be certified to either the California standards for that vehicle emissions category or more stringent California standards.

Model equivalency would be determined based on whether the federal vehicle is identical to the California model in the following respects:

- (A) Vehicle manufacturer;
- (B) Vehicle make and model;
- (C) Cylinder block configuration (L-6, V-8, and so forth);
- (D) Displacement;
- (E) Combustion cycle; and
- (F) Transmission class.

The new vehicle fleet composition is not expected to differ significantly between California and the rest of the nation and, furthermore, it is reasonable to assume that manufacturers will make few California specific models other than those used to satisfy the California ZEV requirements. Therefore, staff expects that under this proposal manufacturers will make available in California the same vehicle models offered nationwide that meet any cleaner standards required under Tier 2. California would accordingly receive the benefits from the cleanest vehicle models available.

In order to assist staff in administering these requirements, the manufacturer would be required, prior to vehicle certification, to submit information sufficient to enable the Executive Officer to determine whether there is a federally-certified vehicle model for the model year that is equivalent to the California model in question, based on the criteria set forth above. If the Executive Officer determines that there is an equivalent federal model, then the next step would be to compare the stringency of the federal and corresponding California exhaust emission standards. This is done by comparing the sum of the 100,000, 120,000 or 150,000 mile NMOG and NOx gram per mile emission standard values of the federal standard with that of the California 100,000, 120,000 or 150,000 mile NMOG plus NOx gram per mile standards.

For purposes of determining compliance with NMOG fleet average requirements, phase-in requirements, and calculating vehicle emission credits (VECs), California vehicles certified to the federal exhaust emission standards for a particular emissions bin would be considered to be certified to the next higher applicable Low Emission Vehicle standard category (based on the sum of the NMOG and NOx emission standards), where applicable. For example, a federal vehicle certified to a combined 0.110 gram per mile NMOG plus NOx standard would be considered to be certified to the LEV II program ULEV (0.125 g/mi NMOG + NOx) category, which is the next highest California emission category. Requiring certification to the next highest LEV program emission category rather than to the federal bin level incentivizes manufacturers to introduce new advanced technologies more rapidly in California. This is because the declining fleet average NMOG requires increasing numbers of ULEVs and SULEVs whereas the additional credits obtained by allowing the federal bin emission levels in the fleet average would allow manufacturers to delay introduction of ULEVs and SULEVs in California.

The manufacturer would have to provide evidence of federal exhaust emission certification, including compliance with the standards for the particular emissions bin, federal SFTP emissions, cold carbon monoxide (CO) emissions, and highway NOx emissions. Manufacturers would still be required to meet other applicable California emission and phase-in requirements such as applicable evaporative emissions standards, emission warranty, and California label requirements and would also be required to obtain a California Executive Order.

Staff is also proposing several minor amendments to the LEV II provisions to correct errors and update the certification language consistent with the Tier 2 requirements. For example, proposed amendments would eliminate unintended instances where requirements for small volume manufacturers are more stringent than those for other manufacturers. As with LEV I, small volume manufacturers would be allowed to delay implementation until the end of the phase-in years. These proposed amendments are described in Attachment C.

### **III. PROPOSED HEAVY-DUTY ENGINE AMENDMENTS**

#### **A. Background**

On July 31, 2000, U.S. EPA adopted new regulations designed to reduce emissions of non-methane hydrocarbons (NMHC) and NOx from heavy-duty Otto-cycle (gasoline) engines (over 8,500 pounds GVW) from 4.0 grams per brake horsepower-hour (g/bhp-hr) to 1.0 g/bhp-hr. The regulations were published in the October 6, 2000 Federal Register (65 F.R. 59896). In its analysis, U.S. EPA estimates that the emission inventory for heavy-duty gasoline vehicles will increase by 43 percent and 14 percent nationwide for NOx and NMHC, respectively, between 2005 and 2030 if additional controls are not required. Although current California regulations are more stringent (2.5 g/bhp-hr) than the current federal standards, California would further benefit from the 1.0 g/bhp-hr standard adopted by U.S. EPA. Therefore, staff is proposing to harmonize California's regulations with the more stringent emission standards now being required for federally-certified vehicles and engines.

#### **B. Description Of The Proposal**

The U.S. EPA regulations are structured to reduce exhaust emissions from heavy-duty Otto-cycle engines and vehicles through adoption of new exhaust emission standards for both chassis- and engine-certified vehicles in this category, on-board diagnostic requirements (OBD) for vehicles 8,500 to 14,000 pounds GVW, and on-board refueling vapor recovery (ORVR) requirements. The only element of this federal rulemaking that staff is proposing be adopted for California is the exhaust NMHC + NOx standards for heavy-duty Otto-cycle engines above 8,500 pounds GVW. This is because California already has stringent exhaust emission standards for complete vehicles, and OBD II systems and ORVR controls are already required as well.

There are three compliance options in the federal rule that allow a manufacturer to select the best approach for its product line. Option 3 has been designated as the primary standard at 1.0 g/bhp-hr and is scheduled for introduction with the 2005 model year. The other two options allow manufacturers to delay compliance with this standard by certifying to an interim emission level earlier (either 2003 or 2004) than under Option 3 but at a less stringent level of 1.5 g/bhp-hr. Staff is proposing adoption of all of these options with a few minor adjustments.

Although the federal regulations treat all heavy-duty engines as one category over 8,500 pounds GVW, California has existing regulations that divide these engines into two categories – one for engines used in incomplete medium-duty gasoline vehicles 8,500 to 14,000 pounds GVW and another for engines used in all gasoline vehicles over 14,000 pounds GVW. The proposed federal standards would apply to both categories of engines for NMHC and NOx; however, staff is proposing that the existing medium-duty carbon monoxide (CO) standard of 14.4 g/bhp-hr for ULEVs be kept and is

proposing new standards (which are not required) for medium-duty SULEV engines of 0.5 g/bhp-hr NMHC + NO<sub>x</sub>; 7.2 g/bhp-hr CO; and 0.025 g/bhp-hr formaldehyde.

Staff also does not expect to see any major hurdles to achieving these requirements. It is expected that many of the technologies currently being used for light- and medium-duty gasoline vehicles will be the basis for achieving compliance with the standards. Technology changes expected to occur as a result of the new regulations include: improved durability catalysts with increased precious metal loading, optimization of the catalyst and fuel metering systems (including improved fuel injection and heated oxygen sensors), increased use of air injection and retarded spark timing to control cold start emissions, and improved exhaust gas recirculation for better NO<sub>x</sub> control.

U.S. EPA estimates that the purchase price of a heavy-duty Otto-cycle engine will increase by \$256 for 2010 and subsequent model years due to the proposed regulations. However, staff does not anticipate increased costs to certify these vehicles for sale in California.

#### **IV. AIR QUALITY, ENVIRONMENTAL AND ECONOMIC IMPACTS**

##### **A. Air Quality And Environmental Impacts**

Staff anticipates that California will obtain emission benefits from the three elements of this proposal. First, when the air quality benefit of the LEV II program was estimated 1998, staff believed that the large number of engine families and vehicles in the medium-duty vehicle category (sport utility vehicles and large trucks) would cause manufacturers to phase-in some of these vehicles early. Given the large workload and limited engineering resources available to revise the numerous vehicle platforms in this category, staff believes this remains a reasonable assumption. However, due to flexibility in the LEV II program, manufacturers do not have to phase these vehicles into the LEV II requirements until 2007. Should manufacturers choose a more relaxed phase-in schedule, this proposal will ensure that California benefits by requiring the cleaner interim Tier 2 vehicles produced prior to 2007 to also be marketed here. Second, due to the built-in flexibility of the Tier 2 program, manufacturers may decide beyond 2007 to produce very clean passenger cars and light-duty trucks to offset their heavier sport utility vehicles and trucks meeting higher emission standards than permitted in California. Should this occur, California would benefit by requiring these cleaner light-duty vehicles to also be sold here. Third, the emission benefit realized by alignment with federal standards for heavy-duty Otto-cycle engines will be approximately one tpd reactive organic gas (ROG) plus NO<sub>x</sub>.

##### **B. Economic Impact**

The staff expects that the proposed amendments will not have a significant cost impact on directly affected persons or businesses. With regard to the LEV II amendments, the requirements would only apply to vehicles that have already been

certified to the federal standards; they accordingly do not independently require any California model to be certified to a new standard. Since the models will already have been federally-certified, the additional costs from marketing the vehicles should be minimal. With regard to the heavy-duty standards, U.S. EPA estimated that the new federal standards will result in a less than \$300 cost increase for heavy-duty Otto-cycle engines by 2010. Since a manufacturer will already have to incur these costs for engines sold in the rest of the country, and there are significant costs incurred in certifying federal and California engines to different standards, adoption of the standards for California should not result in increased costs for manufacturers.

Since only those qualifying vehicles that have already been federally certified would be required to be sold in California, the technical feasibility and cost-effectiveness of these vehicles have already been demonstrated under the federal Tier 2 program and in the heavy-duty Otto-cycle rulemaking. In fact, U.S. EPA relied on much of the emission test data and cost information developed in support of the California LEV II program to demonstrate the technical feasibility and cost-effectiveness of the Tier 2 and heavy-duty standards. Except for some minor differences, the federal and California emission requirements are fairly well harmonized in the 2004 and beyond time frame. Therefore, staff believes that manufacturers would not incur any additional cost in making these vehicles available in California and there would be no noticeable impact in California employment, business status, and competitiveness.

**1. Legal requirement.** Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment includes a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination, or creation, and the ability of California business to compete.

State agencies are required to estimate the cost or savings to any state or local agency, and school districts. The estimate is to include any nondiscretionary cost or savings to local agencies and the cost or savings in federal funding to the state.

**2. Affected businesses.** Any business involved in manufacturing or purchasing passenger cars, light-duty trucks, medium-duty vehicles or heavy-duty engines or vehicles could be affected by the proposed amendments. There are 34 companies worldwide that manufacture California-certified light- and medium-duty vehicles and heavy-duty gasoline engines. Only one motor vehicle manufacturing plant is located in California, the NUMMI facility, which is a joint venture between GM and Toyota.

**3. Potential impact on manufacturers and consumers.** The proposed California requirements are not expected to impact automobile manufacturers significantly, since manufacturers are only being required to certify vehicles to standards that their federal vehicles will have already met. Manufacturers also experience some

economies when producing "50-state" vehicles. The impact on consumers is also expected to be minimal.

4. **Potential impact on business competitiveness.** The proposed amendments would have no adverse impact on the ability of California businesses to compete with businesses in other states because we are proposing to allow certain federal vehicles to be sold in California and to harmonize with the federal standards for heavy-duty engines. The requirements will also apply to manufacturers nationwide if the manufacturers sell vehicles in California.

5. **Potential impact on employment.** The proposed amendments are not expected to cause a noticeable change in California employment because all but a very small portion of automobile manufacturing is conducted in other states.

6. **Potential impact on business creation, elimination or expansion.** The proposed amendments are not expected to affect business creation, elimination or expansion.

7. **Potential costs to local and state agencies.** The proposed amendments are not expected to have a fiscal impact on state and local agencies or on funding to state agencies.

## V. REGULATORY ALTERNATIVES

Staff considered the following regulatory alternatives to the proposed amendments.

1. **Do not amend current California LEV program.** The recently promulgated federal standards present California with the opportunity to help ensure achieving the full expected emission benefit of LEV II by requiring manufacturers to sell a federal vehicle in California, if it is cleaner than required by California. In the absence of a regulation, emission reductions would be lost. These are needed to help assure implementation of the California SIP. For heavy-duty vehicles, we would be losing emission benefit by not requiring the more stringent federal standard.

2. **Adopt the federal program in its entirety.** Many aspects of the California LEV regulations are more stringent than their federal counterpart. Examples include more stringent hydrocarbon exhaust emission requirements for all vehicle categories, more stringent evaporative emission standards, and the zero-emission vehicle program. Accordingly, adoption of the Tier 2 standards in place of the LEV II program would provide less emission benefit.

## VI. STAFF RECOMMENDATION

For the reasons stated above, staff recommends that the Board adopt the proposals set forth in this staff report.

## REFERENCES

1. Staff Report: Initial Statement of Reasons, "Proposed Amendments to California Exhaust and Evaporative Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles "LEV II" and Proposed Amendments to California Motor Vehicle Certification, Assembly Line and In-Use Test Requirements "CAP 2000"," California Air Resources Board September 18, 1998,
2. Final Statement of Reasons, "'LEV II" and "CAP 2000" Amendments to the California Exhaust and Evaporative Emission Standards and Test Procedures for Passenger cars, Light-Duty Trucks and Medium-Duty Vehicles, and to the Evaporative Emission Requirements for Heavy-Duty Vehicles," California Air Resources Board, September 1999.
3. Preamble and Final Rule, "Control of Air Pollution From New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements; Final Rule," Federal Register, Vol. 65, No. 28, Thursday, February 10, 2000 pp 6698-6870.
4. Preamble and Final Rule, "Emissions Control, Air Pollution From 2004 and later Model year Heavy-Duty Highway Engines and vehicles; Light-Duty On-Board Diagnostics Requirements, Revision; Final Rule," Federal Register, Vol. 65, No. 195, Friday, October 6, 2000 pp 59896-59978.

**APPENDIX A**

**PROPOSED REGULATION ORDER**

## APPENDIX A

## PROPOSED REGULATION ORDER

## Amendments to Sections 1956.8 and 1961, Title 13, California Code of Regulations

Set forth below are the proposed amendments to title 13 of the California Code of Regulations. Proposed additions are shown in underline and proposed deletions are shown in ~~strikeout~~.

1. Amend section 1956.8, title 13, California Code of Regulations, to read as follows:

**§ 1956.8. Exhaust Emission Standards and Test Procedures - 1985 and Subsequent Model Heavy-Duty Engines and Vehicles.**

(a) [No change.]

(b) [No change.]

(c)(1)(i) The exhaust emissions from (A) new 1987 through ~~2003~~ 2004 model heavy-duty Otto-cycle engines (except methanol-fueled engines and except heavy-duty Otto-cycle natural-gas-fueled and liquefied-petroleum-gas-fueled Otto-cycle engines derived from diesel-cycle engines) and (B) from new 1993 through ~~2003~~ 2004 model heavy-duty methanol-fueled Otto-cycle engines (except in all cases engines used in medium-duty vehicles) shall not exceed:

**Exhaust Emission Standards for Heavy-Duty Otto-Cycle Engines**  
(grams per brake horsepower-hour or g/bhp-hr)

<i>Model Year</i>	<i>Total Hydrocarbons or OMHCE<sup>A</sup></i>	<i>Optional Non-methane Hydrocarbons<sup>A</sup></i>	<i>Carbon Monoxide<sup>B</sup></i>	<i>Oxides of Nitrogen</i>
1987 <sup>C</sup>	1.1 <sup>D</sup>	--	14.4 <sup>D</sup>	10.6
	1.9 <sup>E</sup>	--	37.1 <sup>E</sup>	10.6
1988-1989	1.1 <sup>D</sup>	--	14.4 <sup>D</sup>	6.0
	1.9 <sup>E</sup>	--	37.1 <sup>E</sup>	6.0
1990	1.1	0.9 <sup>D</sup>	14.4 <sup>D</sup>	6.0
	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	6.0
1991 - 1994	1.1 <sup>D</sup>	0.9 <sup>D</sup>	14.4 <sup>D</sup>	5.0
	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	5.0
1995 - 1997	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	5.0
	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	2.5 to 5.0 <sup>F</sup>
1998 - 2003	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	4.0
	1.9 <sup>E</sup>	1.7 <sup>E</sup>	37.1 <sup>E</sup>	1.5 to 0.5 <sup>F</sup>
	<u>Non-Methane Hydrocarbons plus Oxides of Nitrogen</u>		<u>Carbon Monoxide</u>	
<u>2004</u>	<u>2.4 g/bhp-hr; or 2.5 with 0.5 g/bhp-hr cap on NMHC</u>		<u>37.1</u>	

<sup>A</sup> The total or optional non-methane hydrocarbon standards apply to petroleum-fueled, natural gas-fueled and liquefied-petroleum-gas-fueled engines and methanol-fueled engines beginning in 2004. The Organic Material Hydrocarbon Equivalent, or OMHCE, standards apply to 1987 through 2003 methanol-fueled engines.

<sup>B</sup> Prior to the 2002 model year, carbon monoxide emissions from engines utilizing exhaust aftertreatment technology shall also not exceed 0.5 percent of the exhaust gas flow at curb idle.

<sup>C</sup> Manufacturers with existing heavy-duty Otto-cycle engines certified to the California 1986 steady-state emission standards and test procedures may as an option certify those engines, for the 1987 model year only, in accordance with the standards and test procedures for 1986 heavy-duty Otto-cycle engines established in Section 1956.7.

<sup>D</sup> These standards are applicable to Otto-cycle engines intended for use in all heavy-duty vehicles.

<sup>E</sup> Applicable to heavy-duty Otto-cycle engines intended for use only in vehicles with a gross vehicle weight rating greater than 14,000 pounds. Also, as an option, a manufacturer may certify one or more 1988 through 1994 model Otto-cycle heavy-duty engine configurations intended for use in all heavy-duty vehicles to these emission standards, provided that the total model-year sales for such configuration(s) being certified to these emission standards represent no more than 5 percent of total model-year sales of all

Otto-cycle heavy-duty engines intended for use in vehicles with a Gross Vehicle Weight Rating of up to 14,000 pounds by the manufacturer.

F These are optional standards and apply to all heavy-duty engines intended for use only in vehicles with a gross vehicle weight greater than 14,000 pounds. A manufacturer may elect to certify to an optional standard between the values, inclusive, by 0.5 grams per brake horsepower-hour increments.

(ii) The exhaust emissions from new 2005 and subsequent model heavy-duty Otto-cycle engines shall not exceed:

**California Emission Standards for 2005 and Subsequent Model  
Heavy-Duty Otto-Cycle Engines<sup>A</sup>**  
(in g/bhp-hr)

<i>Model Year</i>	<i>Emission Category</i>	<i>NMHC + NOx</i>	<i>CO</i>	<i>HCHO</i>
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Incomplete Medium-Duty Vehicles 8,500 - 14,000 pounds GVW<sup>B</sup></b>				
2005 and subsequent	LEV	1.0 <sup>C</sup>	37.1	0.05
	ULEV	1.0 <sup>C</sup>	14.4	0.05
	SULEV	0.5	7.2	0.025
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW</b>				
2005 and subsequent	n/a	1.0 <sup>C</sup>	37.1	0.05 <sup>D</sup>

<sup>A</sup> These standards apply to petroleum-fueled, alcohol-fueled, liquefied petroleum gas-fueled and natural gas-fueled Otto-cycle engines.

<sup>B</sup> A manufacturer of engines used in incomplete medium-duty vehicles may choose to comply with these standards as an alternative to the primary emission standards and test procedures for complete vehicles specified in section 1961, title 13, CCR. A manufacturer that chooses to comply with these optional heavy-duty engine standards and test procedures shall specify, in the Part I application for certification, an in-use compliance test procedure, as provided in section 2139(c), title 13 CCR.

<sup>C</sup> A manufacturer may request to certify to the Option 1 or Option 2 federal NMHC + NOx standards as set forth in 40 CFR §86.005-10(f). However, for engines used in medium-duty vehicles 8,500 - 14,000 lbs. GVW, the formaldehyde and carbon monoxide standards must meet the levels specified above.

<sup>D</sup> This standard only applies to methanol-fueled Otto-cycle engines.

(c)(2) [No change.]

~~(c)(3) The exhaust emissions from new 2004 and subsequent model heavy-duty Otto-cycle engines shall not exceed<sup>A</sup>:~~

(a) ~~Non-Methane Hydrocarbons plus Oxides of Nitrogen: 2.5 grams per brake horsepower hour with non-methane hydrocarbons not to exceed 0.5 grams per brake horsepower hour; or 2.4 grams per brake horsepower hour;~~

(b) ~~Carbon Monoxide: 37.1 grams per brake horsepower-hour.~~

~~^The U.S. EPA is considering the adoption of amendments to the federal emission standards for engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles as they existed June 24, 1996. If the U.S. EPA promulgates amendments to the emission standards for this category, the ARB will hold a noticed public hearing within one year of such promulgation to consider the adoption of similar or identical standards in California.]~~

(d) The test procedures for determining compliance with standards applicable to 1987 and subsequent model heavy-duty Otto-cycle engines and vehicles are set forth in the "California Exhaust Emission Standards and Test Procedures for 1987 and Subsequent through 2003 Model Heavy-Duty Otto-Cycle Engines and Vehicles," adopted April 25, 1986, as last amended ~~June 24, 1996~~ [insert date of amendment], and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," adopted [insert date of adoption], which is are incorporated by reference herein.

(e) A manufacturer may elect to certify complete heavy-duty vehicles of ~~10,000~~ 14,000 pounds or less maximum gross vehicle weight rating as medium-duty vehicles under Section 1960.1 or Section 1961 of this chapter, in which event the heavy-duty emission standards and test procedures in this section shall not apply.

(f) [No change.]

(g) The exhaust emissions from new 1995 through 2003 ~~and subsequent~~ model-year engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles shall not exceed:

**Exhaust Emission Standards<sup>A</sup>**  
(grams per brake horsepower-hour, or g/bhp-hr)

<i>Model Year</i>	<i>Carbon Monoxide</i>	<i>NMHC + NOx<sup>B</sup></i>	<i>Particulates<sup>C</sup></i>
1995 <sup>D</sup> <del>and subsequent</del> <u>through 2003</u>	14.4	3.9	0.01

[No change to remainder of subsection (g).]

(h) The exhaust emissions from new (a) 1992 ~~and subsequent~~ through 2004 model-year Otto-cycle engines used in incomplete medium-duty low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles, and (b) 1992 ~~and subsequent~~ model ~~for~~ diesel engines used in medium-duty low-emission vehicles, ultra-low-emission vehicles and super-ultra-low-emission vehicles shall not exceed:

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Board Hearing: December 7, 2000

**Exhaust Emission Standards for Engines Used in Incomplete Otto-Cycle Medium-Duty  
Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and Super  
Ultra-Low-Emission Vehicles, and for Diesel Engines Used in Medium-Duty  
Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and  
Super Ultra-Low-Emission Vehicles<sup>A,F</sup>**  
(grams per brake horsepower-hour)

<i>Model Year</i>	<i>Vehicle Emissions Category<sup>B</sup></i>	<i>Carbon Monoxide</i>	<i>Non-Methane Hydrocarbons and Oxides of Nitrogen<sup>C</sup></i>	<i>Formaldehyde</i>	<i>Particulates<sup>D</sup></i>
1992 <sup>E</sup> - 2001	LEV	14.4	3.5 <sup>K</sup>	0.050	0.10 <sup>K</sup>
2002-2003 <sup>E</sup>	LEV	14.4	3.0 <sup>K</sup>	0.050	0.10 <sup>K</sup>
1992-2003 <sup>E,H</sup>	ULEV	14.4	2.5 <sup>K</sup>	0.050	0.10 <sup>K</sup>
2004 and subsequent	ULEV - Opt A.	14.4	2.5 <sup>G,I,J,K</sup>	0.050	0.10 <sup>J,K</sup>
2004 and subsequent	ULEV - Opt B	14.4	2.4 <sup>G,I,J,K</sup>	0.050	0.10 <sup>J,K</sup>
1992 and subsequent	SULEV	7.2	2.0 <sup>K</sup>	0.025	0.05 <sup>K</sup>

<sup>A</sup> This set of standards is optional. Manufacturers of engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles from 8501-14,000 pounds gross vehicle weight rating may choose to comply with these standards as an alternative to the primary emission standards and test procedures specified in section 1960.1, Title 13, California Code of Regulations. Manufacturers that choose to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

<sup>B</sup> "LEV" means low-emission vehicle.  
"ULEV" means ultra-low-emission vehicle.  
"SULEV" means super ultra-low-emission vehicle.

<sup>C</sup> This standard is the sum of the individual non-methane hydrocarbon emissions and oxides of nitrogen emissions. For methanol-fueled engines, non-methane hydrocarbons shall mean organic material hydrocarbon equivalent ("OMHCE").

<sup>D</sup> This standard shall only apply to diesel engines and vehicles.

<sup>E</sup> Manufacturers may certify engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles to these standards to meet the requirements of section 1965.8(g) 1956.8(g), Title 13, California Code of Regulations.

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- F In-use compliance testing shall be limited to vehicles or engines with fewer than 90,000 miles.
- G ~~{The U.S. EPA is considering the adoption of amendments to the federal emission standards for engines used in incomplete medium duty vehicles or diesel engines used in medium duty vehicles as they existed June 24, 1996. If the U.S. EPA promulgates amendments to the emission standards for this category, the ARB will hold a noticed public hearing within one year of such promulgation to consider the adoption of similar or identical standards in California.}~~ [Reserved]
- H For engines certified to the 3.5 grams per brake horsepower-hour (g/bhp-hr) LEV standards, the in-use compliance standard shall be 3.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 2002 and 2003 model year LEV standards, the in-use compliance standard shall be 3.2 g/bhp-hr. For engines certified to the 1992 through 2003 model year ULEV standards, the in-use compliance standard shall be 2.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 1992 and subsequent SULEV standards, the in-use compliance standard shall be 2.2 g/bhp-hr for the first two model years of introduction.
- I Manufacturers have the option of certifying to either option A or B. Manufacturers electing to certify to Option A must demonstrate that the NMHC emissions do not exceed 0.5 g/bhp-hr.
- J Emissions averaging may be used to meet these standards for diesel engines, using the requirements for participation in averaging, banking and trading programs, as set forth in the "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles", adopted April 8, 1985, as last amended April 15, 1999 [insert date of amendment], incorporated by reference in paragraph (b), above.
- K Engines of 1998 and subsequent model years may be eligible to generate averaging, banking and trading credits based on these standards according to the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles", adopted April 8, 1985, as last amended April 15, 1999 [insert date of amendment], incorporated by reference in paragraph (b), above.

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NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43103, 43104, and 43806, Health and Safety Code, and section 28114, Vehicle Code. Reference: Sections 39002, 39003, 43000, 43013, 43018, 43100, 43101, 43101.5, 43102, 43103, 43104, 43106, 43204, and 43806, Health and Safety Code.

2. Amend section 1961, title 13, California Code of Regulations, to read as follows:

**§ 1961. Exhaust Emission Standards and Test Procedures - 2004 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.**

*Introduction.* [No change]

(a) *Exhaust Emission Standards.*

(a)(1) through (13): [No change]

(14) *When a Federally-Certified Vehicle Model is Required in California.* Whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to the standards for a particular emissions bin that is more stringent than the standards for an applicable California emission category, the equivalent California model may only be certified to (i) the California standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the exhaust emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a vehicle emissions category are equally stringent, the California model may only be certified to either the California standards for that vehicle emissions category or more stringent California standards. The federal emission bins are those contained in Tables S04-1 and S04-2 of 40 CFR § 86.1811-04(c) as adopted February 10, 2000. The criteria for applying this requirement are set forth in Part I. Section H.1 of the California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” as incorporated by reference in section 1961(d).

(b) *Emission Standards Phase-In Requirements for Manufacturers.*

(1) *Fleet Average NMOG Requirements for Passenger Cars and Light-Duty Trucks.*

(A) [No change]

(B) *Calculation of Fleet Average NMOG Value.*

1. *Basic Calculation.*

a. Each manufacturer’s PC and LDT1 fleet average NMOG value for the total number of PCs and LDT1s produced and delivered for sale in California shall be calculated as follows:

$$\frac{\Sigma[\text{Number of vehicles in a test group} \times \text{applicable emission standard}] + \Sigma[\text{Number of hybrid electric vehicles in a test group} \times \text{HEV NMOG factor}]}{\text{Total Number of Vehicles Produced, Including ZEVs and HEVs}}$$

b. Each manufacturer's LDT2 fleet average NMOG value for the total number of LDT2s produced and delivered for sale in California shall be calculated as follows:

$$\frac{\Sigma[\text{Number of vehicles in a test group} \times \text{applicable emission standard}] + \Sigma[\text{Number of hybrid electric vehicles in a test group} \times \text{HEV NMOG factor}]}{\text{Total Number of Vehicles Produced, Including ZEVs and HEVs}}$$

2. *HEV NMOG Factor.* The HEV NMOG factor for light-duty vehicles is calculated as follows:

$$\begin{aligned} \text{LEV HEV Contribution Factor} &= 0.075 - [(\text{Zero emission VMT Factor}) \times 0.035] \\ \text{ULEV HEV Contribution Factor} &= 0.040 - [(\text{Zero emission VMT Factor}) \times 0.030] \end{aligned}$$

where Zero-emission VMT Factor for HEVs is determined in accordance with section 1962.

3. *Federally-Certified Vehicles.* A vehicle certified to the federal standards for a federal exhaust emissions bin in accordance with Section H.1 of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as incorporated by reference in section 1961(d), shall use the corresponding intermediate useful life NMOG standard to which the vehicle is deemed certified in the fleet average calculation.

(C) *Requirements for Small Volume Manufacturers.*

1. In 2001 through ~~2003~~ 2006 models, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 g/mi for PCs and LDTs from 0-3750 LVW or 0.100 g/mi for LDTs from 3751-5750 lbs. LVW calculated in accordance with section 1962(b)(1)(B). In ~~2004-2007~~ and subsequent model years, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 for PCs and LDTs from 0-3750 lbs. LVW or 0.075 for LDTs from 3751 lbs. LVW - 8,500 lbs. GVW calculated in accordance with section 1961(b)(1)(B).

2. [No change]

3. [No change]

(2) *LEV II Phase-In Requirement for PCs and LDTs.* [No change]

(3) *Medium-Duty Vehicle Phase-in Requirements.*

(A) A manufacturer of MDVs, other than a small volume manufacturer, shall certify an equivalent percentage of its MDV fleet according to the following phase-in schedule:

[No change to table]

(B) Beginning with For the 2004 through 2006 model years, a manufacturer, other than a small volume manufacturer must shall phase-in at least one test group per model year to

the MDV LEV II standards. All 2007 and subsequent model year MDVs, including those produced by a small volume manufacturer, are subject to the LEV II MDV standards.

(C) [No change]

(D) *Requirements for Small Volume Manufacturers.* In 2001 ~~and subsequent through~~ 2003 model years, a small volume manufacturer shall certify, produce and deliver for sale in California ~~LEV~~ vehicles or engines certified to the MDV Tier 1 standards in a quantity equivalent to 100% of its MDV fleet. In 2004 and subsequent model years, a small volume manufacturer shall certify, produce and deliver for sale in California vehicles or engines certified to the MDV LEV standards in a quantity equivalent to 100% of its MDV fleet.

(c) *Calculation of NMOG Credits/Debits* [No change]

(d) *Test Procedures.* The certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," ~~adopted on August 5, 1999 as amended~~ [Insert date of amendment], which is incorporated herein by reference. In the case of hybrid electric vehicles, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962(e).

(e) *Abbreviations.* [No change]

Note: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43104, Health and Safety Code.  
Reference: Sections 39002, 39003, 39667, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43104, 43105, 43106, 43107, 43204, and 43205.5, Health and Safety Code.

**APPENDIX B**

**SUMMARY OF THE CALIFORNIA AND FEDERAL  
LIGHT- AND MEDIUM-DUTY VEHICLE PROGRAMS**

**APPENDIX B****SUMMARY OF THE CALIFORNIA LEV II AND FEDERAL TIER 2 PROGRAMS TO CONTROL EMISSIONS FROM LIGHT- AND MEDIUM-DUTY VEHICLES****I. The California LEV II Program****A. The Original California Low-Emission Vehicle (LEV I) Program**

In September 1990, the Air Resources Board (ARB or Board) adopted the original California Low-Emission Vehicle (LEV I) regulations, requiring automobile manufacturers to introduce progressively cleaner light- and medium-duty vehicles with more durable emission controls from 1994 through 2003. The LEV program is California's long-term plan to achieve the greatest possible emission reductions in the most efficient manner. The LEV I regulations provided manufacturers with the stability needed to optimize resources for accomplishing product changes and advance notice for them to invest in developing advanced vehicle technologies to meet California's clean air goals.

The LEV I regulations included three primary elements:

- (1) Tiers of exhaust emission standards for increasingly stringent categories of low-emission vehicles;
- (2) A mechanism requiring each manufacturer to phase-in a progressively cleaner mix of vehicles from year to year with the option of credit trading; and
- (3) A requirement that a specified percentage of passenger cars and lighter light-duty trucks be ZEVs, vehicles with no emissions. Since the current rulemaking does not affect the ZEV requirements, a very abbreviated discussion of ZEVs is provided.

**1. The LEV I Exhaust Emission Standards**

The LEV I program established four low-emission vehicle categories to which a passenger car or lighter light-duty truck could be certified: Transitional Low-Emission Vehicle (TLEV), Low-Emission Vehicle (LEV), Ultra Low-Emission Vehicle (ULEV) and ZEV. For medium-duty vehicles, there are four categories: LEV, ULEV, Super Ultra Low-Emission Vehicle (SULEV) and ZEV. Light- and medium-duty vehicles could also be certified to the preexisting exhaust emissions standards, which were called the "Tier 1" standards.

Each low-emission vehicle category has had a progressively more stringent standard for exhaust emissions of nonmethane organic gas (NMOG), a precursor of ozone pollution in the lower atmosphere. For example, a passenger car TLEV has had to meet an NMOG emission standard that is about one-half of the corresponding basic standard for 1994 model vehicles. Passenger car LEVs and ULEVs have had to meet standards for NMOG that are respectively

about one-third and one-sixth of the corresponding 1994 standard. The identical LEV and ULEV standard for oxides of nitrogen (NOx) has represented a 50% reduction from the basic NOx standard for 1994 passenger cars, and the ULEV standard for carbon monoxide (CO) also represents a reduction of about 50% from the basic 1994 CO standard.

All passenger cars were subject to the same low-emission vehicle standards, regardless of weight. However, for light-duty trucks and medium-duty vehicles, the numerical standards for each low-emission vehicle category depended on the weight classification of the vehicle. As shown in Table 1, there were two weight categories (LDT1 and LDT2) for light-duty trucks, which can have a gross vehicle weight (GVW) of up to 6,000 pounds. For medium-duty vehicles, which have a GVW of 6,000-14,000 pounds, there were effectively four weight categories: MDV2, MDV3, MDV4 and MDV5.

The lightest light trucks making up the LDT1 category, such as the Toyota RAV4 and Ford Ranger, had to meet the same standards as passenger cars. The medium-light trucks in the LDT2 category, such as the Jeep Grand Cherokee and essentially all mini-vans, were allowed to emit about 25-33% more NMOG and CO, and 75-100% more NOx, than passenger cars in the same low-emission vehicle categories. The MDV2 category included heavier vehicles such as the Ford F150, which were subject to the same NOx standards as LDT2s, but could emit about 110-150% more NMOG than equivalent passenger cars. The MDV3 category included vehicles such as the Dodge Ram 1500 truck, Ford Expedition and most Suburbans, which were subject to LEV emission levels for NMOG and NOx that were 160% and 200% higher than those for passenger cars. The MDV4 and MDV5 categories included vehicles such as the Ford Excursion, the largest Suburban model, and the Dodge Ram 2500 and 3500 trucks.

The complete set of LEV I 50,000-mile emission standards to which vehicles could be certified under the LEV I program is shown in Table 1. There are additional emission standards at 100,000 miles for passenger cars and light-duty trucks and at 120,000 miles for medium-duty vehicles. The 100,000 and 120,000 mile standards included standards for particulate from diesel vehicles.

## **2. The LEV I Requirements for Phasing-in a Cleaner Vehicle Fleet**

The LEV I regulations feature an increasingly stringent annual fleet average NMOG emission requirement, which provides a flexible mechanism for phasing-in low-emission vehicles. For each model year, an auto manufacturer may produce passenger cars and light-duty trucks certified to any combination of emission levels – Tier 1, TLEV, LEV, ULEV, and SULEV – as long as the NMOG fleet average requirement is met across the manufacturer's full model line. The required annual fleet average NMOG emissions levels, based on the 50,000-mile NMOG standards, start at the Tier 1 level for the 1994 model year, and then become incrementally more stringent through the 2003 model year. Table 2 shows the fleet average NMOG requirements for passenger cars and light-duty trucks for each model year. The 2003 model-year level was derived from a potential vehicle mix of 75% LEVs, 15% ULEVs and 10% ZEVs. The heavier light-duty trucks have been subject to numerically higher fleet average NMOG emissions requirements reflecting the numerically higher TLEV, LEV and ULEV standards and the absence of ZEV requirements.

Table 1: The California LEV I Exhaust 50,000-Mile Emission Standards

Exhaust Mass Emission Standards for TLEV, LEV, and ULEV Passenger Cars and Light-Duty Trucks and LEV, ULEV and SULEV Medium-Duty Vehicles							
Vehicle Type	Mileage for Compliance	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)	Formaldehyde (mg/mi)	Diesel Particulate (g/mi)
All PCs; LDT1s (0-3750 lbs. LVW)	50,000	Tier 1	0.25	3.4	0.4	n/a	0.08
		TLEV	0.125	3.4	0.4	15	n/a
		LEV	0.075	3.4	0.2	15	n/a
		ULEV	0.040	1.7	0.2	8	n/a
LDT2s (3751-5750 lbs. LVW)	50,000	Tier 1	0.32	4.4	0.7	n/a	0.08
		TLEV	0.160	4.4	0.7	18	n/a
		LEV	0.100	4.4	0.4	18	n/a
		ULEV	0.050	2.2	0.4	9	n/a
MDV2s (3751-5750 lbs. TW)	50,000	Tier 1	0.32	4.4	0.7	18	n/a
		LEV	0.160	4.4	0.4	18	n/a
		ULEV	0.100	4.4	0.4	9	n/a
		SULEV	0.050	2.2	0.2	9	n/a
MDV3s (5751-8500 lbs. TW)	50,000	Tier 1	0.39	5.0	1.1	22	n/a
		LEV	0.195	5.0	0.6	22	n/a
		ULEV	0.117	5.0	0.6	11	n/a
		SULEV	0.059	2.5	0.3	6	n/a
MDV4s 8501 -10,000 lbs. TW	50,000	Tier 1	0.46	5.5	1.3	28	n/a
		LEV	0.230	5.5	0.7	28	n/a
		ULEV	0.138	5.5	0.7	14	n/a
		SULEV	0.069	2.8	0.35	7	n/a
MDV5s 10,001-14,000 lbs. TW	50,000	Tier 1	0.60	7.0	2.0	36	n/a
		LEV	0.300	7.0	1.0	36	n/a
		ULEV	0.180	7.0	1.0	18	n/a
		SULEV	0.09	3.5	0.5	9	n/a

**Table 2: Fleet Average NMOG Requirements  
(gram/mile, based on 50,000-mile standards)**

Vehicle Category	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003+
PC and LDT1 (0-3750 LVW)	0.250	0.231	0.225	0.202	0.157	0.113	0.073	0.070	0.068	0.062
LDT2 (3751-5750 LVW)	0.320	0.295	0.287	0.260	0.205	0.150	0.099	0.098	0.095	0.093

Medium-duty vehicles have separate requirements based on a percent phase-in schedule, because the numerous vehicle weight classifications and relatively low sales volumes make a fleet average requirement approach more difficult to implement. Table 3 shows the phase-in requirements for medium-duty vehicles. There are two types of MDVs – those that are certified using the chassis dynamometer (the left column of Table 3) and those certified using an engine dynamometer (the right column of Table 3). Chassis-certified vehicles make up about 80 percent of the MDV category, and generally gasoline-powered. The remaining 20 percent of the MDV category are engine-certified vehicles, mostly diesel-powered.

**Table 3: Medium-Duty Vehicle Phase-In Requirements**

Model Year	Chassis Certified Vehicles (% Sales)			Engine Certified Vehicles (% Sales)		
	Tier 1	LEV	ULEV	Tier 1	LEV	ULEV
1998	73	25	2	100	0	0
1999	48	50	2	100	0	0
2000	23	75	2	100	0	0
2001	0	80	20	100	0	0
2002	0	70	30	0	100	0
2003	0	60	40	0	100	0
2004 +	0	40	60	0	0	100

The regulations also establish a system for earning marketable credits for use in complying with the phase-in requirements.

### 3. ZEV requirements

As originally adopted, the LEV regulations required that specified percentages of the passenger cars and lightest light-duty trucks produced by each of the seven largest manufacturers be ZEVs, starting in 1998. The percentages were 2% for the 1998-2000 model years and 5% for

the 2001-2002 model years. A requirement of 10% ZEVs applied to all but small-volume manufacturers starting in model-year 2003. In 1996 the Board eliminated the regulatory ZEV requirements applicable prior to the 2003 model year. The ZEV element also includes a marketable credits system.

## **B. The LEV II Program**

The Low-Emission Vehicle II (LEV II) program, adopted following a November 1998 hearing, is an extension of the original LEV I program and is structured to provide additional reductions needed to achieve California's long term goal of healthful air quality by 2010.

The LEV II amendments include three major interrelated elements designed to reduce exhaust emissions: (1) restructuring the light-duty truck category so that most SUVs, mini-vans and pick-up trucks are subject to the same low-emission vehicle standards as passenger cars, (2) strengthening the NO<sub>x</sub> standard for passenger car and light-duty truck LEVs and ULEVs, and changing other emission standards, and (3) establishing more stringent 2004 and subsequent model year phase-in requirements for passenger cars, light-duty trucks and medium-duty vehicles. They also contain various other changes, including elimination of the TLEV standard after the 2003 model year and a program for generating partial ZEV allowances.

### **1. Passenger car standards for light and medium trucks**

Under the restructuring of vehicle weight classifications, all current light-duty trucks, and all current medium-duty vehicles having a GVW of less than 8,500 lbs. – basically the MDV2 and MDV3 categories – will be subject to the same LEV and ULEV standards as passenger cars. Only the very heaviest sport-utility vehicles (SUVs) and pick-up trucks in the MDV4 category will remain subject to separate medium-duty vehicle standards, along with MDV5s. When the vehicle categories were first established, the majority of vehicles in the LDT2 and medium-duty categories were primarily used for work purposes. More lenient gram per mile emission standards were developed that account for heavier loads and a potentially more rigorous duty cycle of work trucks. However, it is now very common for trucks and SUVs to be used primarily for personal transportation (i.e., as passenger cars), and light trucks (including SUVs) have increased from 20% of the California vehicle market in 1980 to almost 46% in 1997. This trend has a substantial impact on California's air quality because, although these vehicles are used as passenger cars, they are certified to the more lenient gram per mile emission standards designed for work trucks.

Since most pick-up trucks and SUVs have a curb weight less than 5,500 lbs. and a payload of approximately 1,000-2,000 lbs., it is anticipated that the majority of the heavier trucks will fall in the new LDT2 category below 8,500 lbs. GVW. (Although the same low-emission vehicle standards will apply, the preexisting LDT1 category is retained because of the different fleet average NMOG requirements described below and because only LDT1s are subject to the ZEV requirements.) It appears unlikely that manufacturers will unnecessarily add payload to trigger a numerically higher standard because of the negative impact on fuel economy, performance and cost. In recognition of the fact that some of the heavier trucks in the new truck category will be engineered for more rigorous duty, the regulations allow a small percentage (up

to 4%) of a manufacturer's truck sales in the LDT2 category to be certified to a marginally higher NOx emission standard.

## 2. New LEV II Standards

The LEV II amendments establish new LEV II standards for the current LEV, ULEV and SULEV categories. The LEV II standards, which are shown in Table 4, are more stringent than the corresponding LEV I standards in several respects.

- Most importantly, the LEV II NOx standard for passenger cars and light-duty trucks certified to the LEV and ULEV standards has been reduced by 75% from the prior 0.2 g/mi level to 0.05 g/mi. The 120,000 mile LEV II particulate emission standard is 0.01 g/mi for diesel LEVs, ULEVs and SULEVs, compared to 0.08 g/mi for LEVs and ULEVs under LEV I.
- The overall LEV II emission standards for medium-duty vehicles have been tightened to be substantially equivalent in stringency to the light-truck standards (although numerically higher).
- The useful life for LEV II passenger cars and light-duty trucks has been increased from the current 100,000 miles to 120,000 miles. Manufacturers must show compliance with the full useful life standards over this mileage.
- A new light-duty SULEV category has been created with an NMOG standard less than one-fourth of the level for ULEVs; recent technology developments indicate that gasoline, alternative fuel and hybrid electric vehicles could potentially reach these emission levels.
- Manufacturers will have the option of certifying any LEV, ULEV or SULEV to a 150,000-mile certification standard, in which case the vehicle will generate greater NMOG credits for the fleet average NMOG determination. A manufacturer electing this option will have to provide an 8-year/100,000-mile warranty for high cost parts rather than for the normal 7 years/70,000 miles. (The 150,000-mile standards are not shown in Table 4).
- Manufacturers can receive credit for the early introduction of larger trucks and SUVs meeting a 0.2 g/mi NOx emission level and certified to the LEV I LEV and ULEV standards; this credit can be used in the 2004-2008 model years on like vehicles certifying to the LEV and ULEV 0.05 g/mi NOx standards. A similar option is available for MDVs.

The Board eliminated the TLEV standards after the 2003 model year, concluding that the more stringent standards for the other vehicle emission categories could be met by gasoline and alternative fuel vehicles, and it was inappropriate to allow substantially higher NOx and particulate levels to assure availability of diesel vehicles. In the 1999 model year, only a small number of new diesel passenger cars were being sold in California, and no new diesel light-duty

trucks were being marketed. There were also no California diesel models in the MDV2 and MDV3 categories that would be subject to the passenger car standards under LEV II; diesel pickup trucks being sold in the MDV 4 and MDV5 weight categories would not become subject to the passenger car standards and are not affected by elimination of the TLEV category.

<b>Table 4: LEV II Exhaust Mass Emission Standards for New 2004 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes</b>							
<i>Vehicle Type</i>	<i>Mileage for Compliance</i>	<i>Vehicle Emission Category</i>	<i>NMOG (g/mi)</i>	<i>Carbon Monoxide (g/mi)</i>	<i>Oxides of Nitrogen (g/mi)</i>	<i>Formaldehyde (mg/mi)</i>	<i>Diesel Particulate<sup>1</sup> (g/mi)</i>
All PCs; LDTs <8,500 lbs. GVW	50,000	LEV	0.075	3.4	0.05	15	n/a
		ULEV	0.040	1.7	0.05	8	n/a
	120,000	LEV	0.090	4.2	0.07	18	0.01
		ULEV	0.055	2.1	0.07	11	0.01
		SULEV	0.010	1.0	0.02	4	0.01
MDVs 8501 – 10,000 lbs. GVW (MDV4) Vehicles in this category are tested at their adjusted loaded vehicle weight	120,000	LEV	0.195	6.4	0.2	32	0.12
		ULEV	0.143	6.4	0.2	16	0.06
		SULEV	0.100	3.2	0.1	8	0.06
MDVs 10,001-14,000 lbs. GVW (MDV5) Vehicles in this category are tested at their adjusted loaded vehicle weight	120,000	LEV	0.230	7.3	0.4	40	0.12
		ULEV	0.167	7.3	0.4	21	0.06
		SULEV	0.117	3.7	0.2	10	0.06

*Phasing in the LEV II standards.* Over the 2004-2007 model years, manufacturers are required to phase in certification of models to the LEV II emission standards in place of the LEV I standards. For passenger cars and vehicles currently classified light-duty trucks, a manufacturer must certify its vehicles to the LEV II standards at a rate of at least 25/50/75/100% during 2004-2007. A manufacturer may use an alternative phase-in schedule if it achieves equivalent NOx reductions by the 2007 model year. A manufacturer of vehicles classified as MDVs under both LEV I and LEV II (8501 – 14,000 lbs. GVWR) must phase-in at least one test group a year to the LEV II standards, with full compliance by the 2007 model year. Vehicles that were treated as MDVs under LEV I but will be in the LDT2 category under LEV II – i.e. the MDV2 and MDV3 categories – do not have to be certified to the LEV II standards until the 2007 model year, when 100 percent compliance is required. In California, the MDV2 and MDV3 categories each make up about 8% of the total number of vehicles that will be subject to the passenger car standards under LEV II.

### 3. Requirements for phasing-in a cleaner vehicle fleet

For passenger cars and light-duty trucks, the LEV I annual fleet average NMOG requirements continue to apply through the 2003 model year. The LEV II regulations provide for continuing yearly reductions from the 2004 through 2010 model years as shown in Table 5. Although each manufacturer can select its own vehicle mix, one approach in meeting the 2010 requirement for passenger cars and LDT1s would be a fleet made up of 18% LEVs, 47% ULEVs, 25% SULEVs and 10% ZEVs. The fleet average NMOG levels are numerically higher because no ZEVs are projected in this class and a longer phase-in period for ULEVs and SULEVs is provided.

**Table 5: LEV II Fleet Average NMOG Requirements for PCs and LDTs (g/mi)**

<i>Vehicle Category</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010+</i>
PCs; LDT1s	0.053	0.049	0.046	0.043	0.040	0.038	0.035
LDT2s	0.085	0.076	0.062	0.055	0.050	0.047	0.043

For medium-duty vehicles, the requirement of a 60/40 mix of LEVs and ULEVs in 2004 and subsequent model years – shown in Table 3 – is changed to 40/60.

## II. The Federal Tier 2 program

### A. Background

The federal Tier 2 program grew out of requirements and limitations imposed by the 1990 amendments to the federal Clean Air Act (CAA). In 1990, Congress mandated the exhaust emission standards that would apply to passenger cars, light-duty trucks and lighter medium-duty vehicles after the 1993 model year. Passenger cars and light-duty trucks would be subject to “Tier 1” standards essentially identical to the California standards applicable to 1994 model-year vehicles – California’s use of the term “Tier 1” is actually borrowed from the federal program. The Tier 1 standards were to be phased in over the 1994-1996 model-years. (CAA § 202(g).) The category of vehicles California calls MDV2 and MDV3 is called “heavy light-duty truck” or “HLDT” under the federal program; these vehicles were to be subject to Tier 1 standards that were phased-in over during the 1996 and 1997 model years. Again, these standards were essentially identical to the California Tier 1 standards for these vehicle classes. (CAA § 202(h).)

Congress prohibited U.S. EPA from adopting more stringent standards for passenger cars, light-duty trucks and medium-duty vehicles prior to the 2004 model year. (CAA § 202(b)(1)(C).) Instead, the Clean Air Act directed U.S. EPA to conduct what became known as the “Tier 2” study to examine the need for and technological feasibility and cost-effectiveness of more stringent standards beginning between the 2004 and 2006 model years.

In February 1993, the 13 northeastern states making up the Ozone Transport Region (OTR) submitted a petition to the U.S. EPA requesting the federal agency to require all OTR states to adopt the California LEV program under section 177 of the CAA. In response, U.S.

EPA worked with vehicle manufacturers, various states and other parties to develop a "National LEV" program, under which the manufacturers would voluntarily agree to market cars and light trucks with emissions averaging at the LEV I LEV level in all states outside California. The advantage to the OTR states was that not only would the vehicles sold in those states have emissions substantially lower than under Tier 1, but the vehicles migrating in from other states would be cleaner as well. The advantage to the automakers was that the National LEV program would not require cars or light trucks meeting the California ULEV or ZEV standards. In addition, the eight major automakers who had been subject to the California requirement for 2% ZEVs starting in 1998 entered into Memoranda of Agreement with the ARB, committing to offset the emissions loss in the state from postponement of the ZEV requirements by participating in the National LEV program (or the equivalent) and thus assuring that cleaner cars would migrate to California. U.S. EPA designed the National LEV program with the objective that the additional benefits to the northeastern states from the introduction of cleaner cars nationwide would be at least as great as the additional benefits from the states' adoption of the California LEV program with its ZEV requirements and its fleet average NMOG requirement dropping below the LEV level starting in model-year 2000.

After much activity on a variety of fronts, U.S. EPA issued a final National LEV rule in 1997 (62 F.R. 31192 (June 6, 1997)) and a supplemental final rule in 1998 (63 F.R. 926 (January 7, 1998).) Ultimately, 9 of the 13 OTR states and all 23 vehicle manufacturers agreed to participate in the National LEV program, which U.S. EPA found to be in effect in March 1998 (63 F.R. 11347 (March 9, 1998).) Four OTR states – New York, Massachusetts, Vermont and Maine – chose instead to adopt the California LEV program pursuant to CAA section 177.

The National LEV program required the introduction of cleaner cars and light trucks in the 9 participating OTR states starting in the 1999 model year, and nationwide starting in the 2001 model year (except for California and the four states administering the California program). Manufacturers can certify vehicles to the California Tier 1, TLEV, LEV, ULEV and ZEV standards, as long the fleet average reaches the LEV NMOG standards of 0.075 g/mi for passenger cars and LDTs and 0.100 g/mi for LDTs by the 2001 model year. The National LEV standards would end after the 2003 model year, or apply until Tier 2 takes effect, depending on what action U.S. EPA took on Tier 2.

The National LEV program did not apply to the federal heavy light-duty truck (HLDT, made up of LDT3 and LDT4) category, which is equivalent to California's MDV 2 and MDV3 categories. Through the 2003 model year, these vehicles were subject to Tier 1 exhaust emission full life NOx standards of 0.98 g/mi (LDT3/MDV2) and 1.53 g/mi (LDT4/MDV3); the 50,000 mile NOx standards were 0.7 g/mi and 1.1 g/mi respectively.

## **B. The Federal Tier 2 Regulations**

On December 21, 1999, the U.S. EPA issued its Tier 2 regulations, which establish new more stringent exhaust emission requirements for all U.S. light- and medium-duty vehicles not subject to the California standards. (65 F.R. 6698 (February 10, 2000).) Although differing in several respects from the California program, the Tier 2 regulations were designed to be compatible with LEV II and to allow harmonization of federal and California vehicle technology.

Like the LEV II regulations, the Tier 2 regulations are complex, reflecting U.S. EPA's interest in providing vehicle manufacturers with as much flexibility as possible given the overall emission-reduction goals. The key elements of the Tier 2 exhaust emissions requirements are:

- (1) A set of 10 different emission standard "bins" for cars and light trucks that function in the same manner as the vehicle emission categories (e.g. LEV and ULEV) in the California program;
- (2) A fleet average requirement for NO<sub>x</sub> instead of NMOG, under which all of the vehicles subject to the car and light truck LEV II standards, along with heavier "medium-duty passenger vehicles" (MDPVs), will have to meet a 120,000 mile fleet average NO<sub>x</sub> requirement of 0.07 g/mi for each manufacturer when phase-ins are complete starting in the 2009 model year; and
- (3) Several interim phase-in requirements for various classes of vehicles, which in some cases include interim standards and fleet average requirements.

#### **1. The Tier 2 emission bins.**

Tables 6 and 7 show the 10 Tier 2 emission standards bins, plus the eleventh bin that applies only to pre-2008 MDPVs only. Except in the case of MDPVs, bins 9 and 10 apply only through the 2006 model year. Bins 1 through 10 are available to vehicles in all weight categories. Bins 8, 9 and 10 have optional less stringent NMOG standards that apply for qualifying LDT4s and MDPVs only; for bin 10 that is the case with CO and HCHO as well. It is expected that moderately well-controlled diesel engines in SUVs and pickup trucks could meet the standards for the least stringent bins.

#### **2. The final fleet average NO<sub>x</sub> requirements.**

The Tier 2 regulations employ a fleet average requirement for NO<sub>x</sub> instead of NMOG. When phase-ins are complete starting in the 2009 model year, all of the vehicles subject to the LEV II standards for cars and light trucks, along with MDPVs, will have to meet a fleet average NO<sub>x</sub> requirement of 0.07 g/mi for each manufacturer. The Tier 2 program includes a credit feature similar to that in the LEV II program. In years when a manufacturer's corporate average NO<sub>x</sub> emissions fall below 0.07 g/mi, it will generate credits. It can trade or sell those credits to other manufacturers or use them in years when its fleet average NO<sub>x</sub> level is greater than 0.07 g/mi.

#### **3. Interim fleet average requirements for various weight categories.**

All 2004 and subsequent model vehicles subject to the Tier 2 program must be certified to the standards for one of the available emission bins. This means that no 2004 or subsequent model HLDT may be certified to a 120,000 mile NO<sub>x</sub> standard greater than 0.6 g/mi. In comparison, the California LEV I NO<sub>x</sub> standard for MDV3s is 0.9 g/mi NO<sub>x</sub>, and manufacturers are allowed to certify California MDV3s to the 0.9 g/mi NO<sub>x</sub> standard through

the 2006 model year. In addition, various weight categories are subject to interim fleet average phase-in requirements.

**Table 6: Tier 2 Intermediate Useful Life (50,000 mile) Exhaust Emission Standards (grams per mile)**

<i>Bin Number</i>	<i>NO<sub>x</sub></i>	<i>NMOG</i>	<i>CO</i>	<i>HCHO</i>	<i>PM</i>
11	0.6	0.195	5.0	0.022	--
10	0.4	0.160	4.4	0.018	--
9	0.2	0.140	3.4	0.015	--
8	0.14	0.125	3.4	0.015	--
7	0.11	0.075	3.4	0.015	--
6	0.08	0.075	3.4	0.015	--
5	0.05	0.075	3.4	0.015	--

**Table 7: Tier 2 Full Useful Life (120,000 mile) Exhaust Emission Standards (grams per mile)**

<i>Bin Number</i>	<i>NO<sub>x</sub></i>	<i>NMOG</i>	<i>CO</i>	<i>HCHO</i>	<i>PM</i>
11	0.9	0.280	7.3	0.032	0.12
10	0.6	0.230	6.4	0.027	0.08
9	0.3	0.180	4.2	0.018	0.06
8	0.20	0.156	4.2	0.018	0.02
7	0.15	0.090	4.2	0.018	0.02
6	0.10	0.090	4.2	0.018	0.01
5	0.07	0.090	4.2	0.018	0.01
4	0.04	0.070	2.1	0.011	0.01
3	0.03	0.055	2.1	0.011	0.01
2	0.02	0.010	2.1	0.004	0.01
1	0.00	0.000	0.0	0.000	0.00

1. Light-duty vehicles and light light-duty trucks (California passenger cars, LDT1s and LDT2s)

During the 2004-2007 model years, the following percentages of a manufacturer's fleet of passenger cars and LLDTs must meet the Tier 2 fleet average NOx requirement of 0.07 g/mi: 25/50/75/100%. During model years 2004-2006, the manufacturer's remaining vehicles in this class must meet an "interim non-Tier 2" fleet average NOx requirement of 0.30 g/mi. Model-year 2001-2003 vehicles in this class are subject to the National LEV standards that are equivalent to average full life NOx levels of about 0.3 g/mi for passenger cars and LDT1s and 0.5 g/mi for LDT2s. The manufacturer may also use an alternative phase-in schedule, and pre-2004 model-year vehicles that the manufacturer elects to have subject to the Tier 2 standards will generate NOx credits.

2. HLDTs (California MDV2s and MDV3s)

For HLDTs, the following percentages of a manufacturer's fleet must meet an "interim non-Tier 2" fleet average NOx standard of 0.20 g/mi over the 2004-2007 model years, aggregated with any MDPVs: 25/50/75/100%. Model-year 2004-2006 HLDTs not certified to the interim non-Tier 2 standard will have to be certified to bin 10 or another bin of greater stringency; this has the effect of imposing a NOx cap of 0.60 g/mi. starting with model-year 2004. During model-year 2008, 50% of the manufacturer's HLDTs will have to meet the Tier 2 fleet average NOx requirement of 0.07 g/mi, with the rest meeting the interim non-Tier 2 fleet average NOx requirement. All 2009 and subsequent model-year HLDTs will be counted under the fleet average NOx requirement of 0.07 g/mi. This category of vehicles is not included in National LEV, so 2001-2003 model-year HLDTs were subject to Tier 1 standards that permit NOx emissions of 0.98 g/mi for LDT3/MDV3s, and 1.53 g/mi for LDT4/MDV3.

3. MDPVs (portion of California MDV4s)

MDPVs are basically grouped with HLDTs during the model years 2004-2009 phase-in. During model years 2004-2007, a manufacturer of MDPVs must certify them to the fleet average NOx requirement of 0.20 g/mi, aggregated with the manufacturer's HLDTs, based on a phase-in of 25/50/75/100%. During these years, the remaining MDPVs may be certified to bin 11 with its 120,000 mile NOx standard of 0.9 g/mi.



**APPENDIX C**

**SUMMARY OF PROPOSED MINOR AMENDMENTS**

## APPENDIX C

**A. Summary of Proposed Modifications to §1961, title 13, CCR and to the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles”**

The proposed regulatory language setting forth the criteria for certifying certain cleaner federally-certified vehicles in California is contained in Appendix A of this Staff Report. The proposed modifications to subparagraphs (a)(14) and (b)(1)(B)3 amend the California LEV II program standards to allow a manufacturer to certify a cleaner federal vehicle in California (see the Staff Report for a full description on the proposed modification). The certification requirements for these cleaner vehicles are set forth in Section H of the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles (hereinafter LDV/MDV TPs),” which is set forth below (in italics for clarity).

*1.4 Certification of a Federal Vehicle in California. Whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to the standards for a particular emissions bin that are more stringent than the standards for an applicable California vehicle emissions category, the equivalent California model may only be certified to (i) the California standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the exhaust emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a vehicle emissions category are equally stringent, the California model may only be certified to either the California standards for that vehicle emissions category or more stringent California standards. The federal emission bins are those contained Tables S04-1 and S04-2 of 40 CFR section 86.1811-04(c) as adopted February 10, 2000. A California vehicle model is to be treated as equivalent to a federal vehicle model if all of the following characteristics are identical:*

- (a) Vehicle make and model;*
- (b) Cylinder block configuration (e.g., L-6, V-8);*
- (c) Displacement;*
- (d) Combustion cycle; and*
- (e) Transmission class.*

*The comparative stringency of the standards for the federal exhaust emissions bin and for the California vehicle emissions category shall be based on a comparison of the sum of the 100,000, 120,000, or 150,000 mile standards for NMOG and NOx.*

*1.4.1 If a federally-certified vehicle model is certified in California in accordance with subparagraph 1.4, the model shall be subject to the federal requirements for exhaust emissions, SFTP emissions, cold CO emissions and highway NOx. The vehicle model shall be subject to all other California requirements including evaporative emissions, OBD II, and emissions warranty.*

*1.4.2 Prior to certification of a 2004 or subsequent model-year vehicle, a manufacturer must submit information sufficient to enable the Executive Officer to determine whether there is a federally-certified vehicle model for that model year that is*

equivalent to the California vehicle model based on the criteria listed in subparagraph 1.4.

1.4.3 If the Executive Officer determines that there is a federally-certified vehicle model for that model year that is equivalent to the California vehicle model, the following information shall be submitted with the Part I or Part II Application for Certification as set forth below:

(a) Part I Application for Certification: (i) Evidence of federal certification including, but not limited to, federal certification exhaust emission levels and compliance with federal SFTP, cold CO and highway NOx emission levels; and (ii) evidence of compliance with California evaporative emission requirements and California OBD II requirements.

(b) Part II Application for Certification: evidence of a warranty on emission-related parts in accordance with sections 2035 et seq., title 13 CCR as they apply to vehicles certified under the primary California standard.

1.4.4 For purposes of meeting the California NMOG fleet average phase-in requirements or for determining vehicle equivalent credits, the applicable California NMOG value for passenger cars and light-duty trucks or vehicle equivalent credits for medium-duty vehicles shall be determined as follows:

(a) The sum of the federal full useful life (100,000, 120,000 or 150,000) NMOG and NOx value shall be compared with the next less stringent California full useful life NMOG plus NOx value to determine which emission category (e.g., LEV, ULEV or SULEV) is to be used for the fleet average value or vehicle equivalent credit calculation.

(b) For passenger cars and light-duty trucks, once the equivalent California emission category is determined (e.g., whether the vehicle is considered a LEV, ULEV or SULEV), the applicable NMOG value to be used in the fleet average calculation is set forth in the table in section E.2.1.2 of these test procedures for passenger cars and light-duty trucks. For example, if the full useful life (120,000 miles) NMOG plus NOx standard to which the federal vehicle is certified is 0.110 grams per mile, that vehicle would be considered a LEV II ULEV for fleet average purposes because the combined LEV full useful life NMOG plus NOx value is 0.125 and is the next less stringent emission category. The applicable emission standard to be used in the fleet average calculation would therefore be 0.040 grams per mile.

1.4.5 The vehicle shall be subject to the federal in-use requirements and the emission standard applicable for in-use compliance purposes shall be the federal standard to which the vehicle was federally-certified.

1.4.6 The tune label shall meet the federal requirements applicable to such a vehicle with an additional sentence which reads: "This vehicle conforms to federal regulations and is certified for sale in California." The value used in the smog index label shall be the California emission category to which the vehicle was deemed certified for fleet average NMOG purposes.

In addition to the requirements for cleaner federal vehicles, there are several proposed minor amendments to the LEV II provisions to correct errors and update the certification language consistent with the Tier 2 requirements in keeping with the CAP 2000 harmonization.

process that began several years ago more closely aligning the U.S. EPA and California certification requirements to reduce the compliance burden on a manufacturer. The proposed modifications to subparagraph (b)(1)(B)1 amend the existing language for the fleet average NMOG calculation to clarify that there are two calculations -- one for passenger cars and light-duty trucks (0-3750 pounds loaded vehicle weight (LVW)) and another for light-duty trucks from 3751 pounds LVW to 8,500 pounds gross vehicle weight. Staff is also proposing a clarification to the implementation requirements for medium-duty vehicles that specifies that a manufacturer must certify at least one test group per model year to the LEV II standards.

Amendments to subsection 1961(b)(C) eliminate unintended instances where phase-in requirements for small volume manufacturers are more stringent than those for other manufacturers. As with LEV I, small volume manufacturers of passenger cars and light-duty trucks would be allowed to delay implementation until the end of the phase-in years in model year 2007. During the 2004-2006 model years, small volume manufacturers of these vehicles would be subject to the preexisting LEV I requirements. In the case of medium-duty vehicles, small volume manufacturers would be able to market vehicles subject to the MDV Tier 1 standards through the 2003 model year; starting with the 2004 model year, they would have to be certified to the MDV LEV standards in a quantity equivalent to 100 percent of its MDV fleet. During the 2004-2006 model years, the medium-duty vehicle could be certified to the LEV I LEV standards (or the equivalent using vehicle emission credits). Starting in the 2007 model years, they could only be certified to the LEV II standards or the equivalent.

Subsequent to the adoption of the LEV II program, U.S. EPA adopted the federal Tier 2 standards which incorporate substantial portions of the LEV II program. The majority of the modifications in the California test procedures update the California provisions to align with the Code of Federal Regulations.

Finally, staff is proposing a correction to the LEV I NMOG and formaldehyde standards at 50°F. The values in the current table double the 120,000 mile standard rather than the 50,000 mile standard as set forth in the original LEV I proposal.

**B. Summary of Proposed Modifications to §1956.8, Title 13, CCR and to the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines”**

The proposed addition of subparagraph (c)(1)(ii) amends the medium- and heavy-duty Otto-cycle (gasoline) engine exhaust emission standards to align with the recently promulgated federal exhaust emission standard of 1.0 gram per brake horsepower-hour non-methane hydrocarbons plus oxides of nitrogen. The test of the proposed modification is in Appendix A to this staff report.

In addition, staff is proposing a reorganization of the test procedures that govern the certification of medium- and heavy-duty Otto-cycle engines. These modifications follow the approach used in the earlier revisions to the test procedures for light- and medium-duty vehicles, tracking the organizational structure of the federal certification procedures to make it easier for manufacturers to compare them. Part I contains the requirements for certification (40 CFR Subpart A) and Part II contains the engine test procedures (40 CFR Subparts N and P and Appendices I and XII). The new test procedures would apply to 2004 and subsequent model year engines, and the existing test procedures would sunset after the 2003 model year.

In the current version of the test procedures, reference is made to a specific Code of Federal Regulation (CFR) section in the text. If the section is applicable to several model years, all the CFR sections are listed. In the new test procedures, if a CFR section for a specific model year is set forth and that section references previous CFR sections, then all previously referenced CFR sections are deemed to be incorporated unless otherwise noted. Thus, if §86.098-10 is the governing section, and that section references previous sections, those previous sections are deemed incorporated in the California test procedures. In order to facilitate a comparison of these test procedures to the 1987 and subsequent heavy-duty Otto-cycle test procedures, only the proposed regulatory modifications and any language that differs from the 1987 version have been indicated in underline and ~~strikeout~~. Please note that some of the text indicated by ~~strikeout~~ has been deleted because the exact requirement is set forth in the corresponding CFR section so that inclusion in these test procedures would be redundant.

In some cases there are several entries for the same section of the CFR (e.g., for different model years). For this reason, the generic notation §86.xxx-#, is used followed by the appropriate reference. For example, §86.xxx-1 is used in the title and §86.001-1 and §86.005-1 are used in the text.

The CFR sections referenced in Part II of the Test Procedures have also been updated. Under the new numbering proposal, previous sections of the CFR are no longer listed but still apply if referenced in the most current CFR section. In addition, the fuel specifications language has been reorganized and updated consistent with the language contained in the light- and medium-duty test procedures.



**REQUEST FOR DOCUMENTS**

An electronic version of the staff report and supporting regulatory materials can be found on ARB's website at [www.arb.ca.gov/regact/mdv-hdge/mdv-hdge.htm](http://www.arb.ca.gov/regact/mdv-hdge/mdv-hdge.htm). If you would like a hard copy of these documents please fill out this form and mail or fax to:

Ms. Donna Barragan  
Mobile Source Control Division  
9528 Telstar Ave.  
El Monte, CA 91731  
fax: (626) 575-7012

Proposed Amendments to the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" \_\_\_\_\_

Proposed Amendments to the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines" \_\_\_\_\_

Proposed "California Exhaust Emissions Standards and Test Procedures for 1985-2003 Model Heavy-Duty Otto-Cycle Engines and Vehicles" \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

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California Environmental Protection Agency  
AIR RESOURCES BOARD

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES  
FOR 2001 AND SUBSEQUENT MODEL  
PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES**

Adopted: August 5, 1999

Amended: \_\_\_\_\_

NOTE: This document is incorporated by reference in sections 1960.1(k) and 1961(d), title 13, California Code of Regulations (CCR). It contains the majority of the requirements necessary for certification of a passenger car, light-duty truck or medium-duty vehicle for sale in California, in addition to containing the exhaust emission standards and test procedures for these motor vehicles. However, reference is made in these test procedures to other ARB documents that contain additional requirements necessary to complete an application for certification. These other documents are designed to be used in conjunction with this document. They include:

1. "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes" (incorporated by reference in section 1962(e), title 13, CCR);
2. "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" (incorporated by reference in section 1976(c), title 13, CCR);
3. "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" (incorporated by reference in section 1978(b), title 13, CCR);
4. OBD II (section 1968.1, title 13, CCR);
5. "California Motor Vehicle Emission Control and Smog Index Label Specifications" (incorporated by reference in section 1965, title 13, CCR);
6. Warranty Requirements (sections 2037 and 2038, title 13, CCR); and
7. "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" (incorporated by reference in section 2235, title 13, CCR).

The section numbering conventions for this document are set forth in Part I, section A.3 on page A-2.

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**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES  
FOR 2001 AND SUBSEQUENT MODEL  
PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES**

The provisions of Subparts B, C, and S, Part 86, Title 40, Code of Federal Regulations, as adopted or amended on May 4, 1999, and last amended October 6, 2000 or on such other date set forth next to the 40 CFR Part 86 section title listed below, and to the extent they pertain to exhaust emission standards and test procedures, are hereby adopted as the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," with the following exceptions and additions.

**PART I: GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE  
VERIFICATION OF EMISSIONS**

**A. General Applicability**

**1. §86.1801 Applicability.**

1.1 §86.1801-01. Amend as follows:

1.1.1 Amend subparagraph (a) as follows: Except as otherwise indicated, the provisions of this subpart apply to new 2001 and later model year Otto-cycle and diesel-cycle passenger cars, light-duty trucks and medium-duty vehicles, including alternative fuel and hybrid electric vehicles. In cases where a provision applies only to a certain vehicle group based on its model year, vehicle class, motor fuel, engine type, or other distinguishing characteristics, the limited applicability is cited in the appropriate section or paragraph.

1.1.2 ~~Delete~~ Subparagraph (b) *Aftermarket conversions*. [n/a]

1.1.3 ~~Amend~~ subparagraph (c) *Optional Applicability* as follows:

(a) ~~Delete~~ subparagraph (c)(1) Amend subparagraph (c)(1) as follows:  
A manufacturer must certify any heavy-duty complete Otto-cycle vehicle of 14,000 pounds Gross Vehicle Weight Rating (GVWR) or less in accordance with the medium-duty chassis-standards of Section E.1. of these test procedures. A manufacturer must certify all heavy-duty diesel engines or vehicles of 14,000 pounds GVWR or less to the medium-duty engine standards in title 13, CCR, section 1956.8(g) or (h). A manufacturer may request to certify heavy-duty complete diesel vehicles to the chassis-standards in Section E.1 of these test procedures. Heavy-duty engine or heavy-duty vehicle provisions of 40 CFR subpart A do not apply to such a vehicle or engine.

(b) Subparagraph (c)(2) [No change.]

(c) Subparagraph (c)(3) [No change.]

(d) Subparagraph (c)(4) [n/a]

(e) Subparagraph (c)(5) [n/a]

1.1.4 Amend subparagraph (d) as follows: Small volume manufacturers. Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the

average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For manufacturers certifying for the first time in California, model-year production volume shall be based on projected California sales. The small-volume manufacturer's light- and medium-duty vehicle and truck certification procedures are described in 40 CFR §86.1838.

- 1.1.5 ~~Delete s~~ Subparagraph (e). [n/a; NLEVs.]
- 1.1.6 Subparagraph (f) [n/a; Tier 2 phase-in provisions]
- 1.1.7 Subparagraph (g) [n/a; Tier 2 phase-in provisions]
- 1.1.8 Subparagraph (h) [No change.]

## 2. California Provisions

2.1 References to "light-duty trucks" in 40 CFR 86 shall apply to both "light-duty trucks" and "medium-duty vehicles" in these procedures. References to "light-duty vehicles" shall apply to "passenger cars" in these procedures. References to dual fuel vehicles shall also mean bi-fuel vehicles.

2.2 Any reference to vehicle sales throughout the United States shall mean vehicle sales in California.

2.3 Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, evaporative emissions, high-altitude vehicles and testing, particulate and oxides of nitrogen averaging and test group standards applicable in such averaging, alternative useful life, selective enforcement audit, Certification Short Test, and heavy-duty engines and vehicles shall not be applicable to these procedures, except where specifically noted.

2.4 Regulations both herein and in Title 40, CFR Part 86, Subparts B, C, and S, concerning Otto-cycle and diesel-cycle vehicles shall be applicable to ethanol vehicles, including dual fuel, bi-fuel and fuel-flexible vehicles, except where specifically noted otherwise.

2.5 For engines used in medium-duty vehicles that are not distinctly diesel engines nor derived from such, the Executive Officer shall determine whether the engines shall be subject to diesel or Otto-cycle engine regulations, in consideration of the relative similarity of the engines' torque-speed characteristics and vehicle applications with those of Otto-cycle and diesel engines.

2.6 Regulations concerning federal OBD system requirements shall mean the California OBD requirements, except where specifically noted otherwise.

## 3. §86.1802 Section Numbering; Construction.

3.1 §86.1802-01. [No change.]

3.2 The section numbering convention employed in these test procedures, in order of priority, is A.1.1.1. in order to distinguish California procedures and requirements from those of the U.S. EPA. References in these test procedures to specific sections of the Code of Federal Regulations maintain the same numbering system employed in the Code of Federal Regulations.

3.3 In cases where the entire CFR section is incorporated by reference with no modifications, the notation "[No change.]" is used. In cases where there are no changes to the CFR language but there are additional California requirements, the notation "[No change.]" is

used and the additional California requirements are then noted in a separate subsection with the numbering convention set forth in subparagraph 3.2, above.

3.4 The notation "[n/a]" indicates that the subject matter of the federal regulation does not apply to California passenger cars, light-duty trucks or medium-duty vehicles. In some cases the subject of the federal regulation is indicated in the bracket for clarity.

## B. Definitions, Acronyms and Abbreviations

### 1. §86.1803 Definitions

1.1 §86.1803-01 Definitions. [No change, except as otherwise noted below.]

### 2. California Definitions

"**AB 965 vehicle**" means a vehicle certified pursuant to section 1960.5, title 13, CCR.

"**Administrator**" means the Executive Officer of the Air Resources Board (ARB).

"**Alcohol fuel**" means either methanol or ethanol as those terms are defined in these test procedures.

"**All-Electric Range Test**" means a test sequence used to determine the range of an electric or hybrid electric vehicle without the use of its auxiliary power unit. The All-Electric Range Test is described in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(e), title 13, CCR.

"**Battery assisted combustion engine vehicle**" means any vehicle which allows power to be delivered to the driven wheels solely by a combustion engine, but which uses a battery pack to store energy which may be derived through remote charging, regenerative braking, and/or a flywheel energy storage system or other means which will be used by an electric motor to assist in vehicle operation.

"**Bi-fuel vehicle**" is any motor vehicle that is engineered and designed to be capable of operating on two fuels wherein the two fuels are stored on board in separate fuel tanks and metered separately, but in operation the two fuels are combusted together.

"**Certificate of Conformity**" means Executive Order certifying vehicles for sale in California.

"**Certification**" means certification as defined in section 39018 of the Health and Safety Code.

"**Certification level**" means the official exhaust or evaporative emission result from an emission-data vehicle which has been adjusted by the applicable mass deterioration factor and is submitted to the Executive Officer for use in determining compliance with an emission standard for the purpose of certifying a particular test group. For those test groups that are certified using reactivity adjustment factors developed by the manufacturer pursuant to Part II, Section D of these test procedures, the exhaust NMOG certification level shall include adjustment by the ozone deterioration factor.

"**Conventional gasoline**" means any certification gasoline which meets the specifications of 40 CFR 86.113-94(a), but does not include gasoline that meets the specifications of California reformulated gasoline as set forth in Part II, section A.100.3.1. of these test procedures. For the purpose of determining the ozone-forming potential of conventional gasoline vehicle exhaust emissions, gasoline meeting the specifications of Part II, Section D of these test procedures shall be used.

"**Dedicated Ethanol Vehicle**" means any ethanol-fueled motor vehicle that is engineered and designed to be operated solely on ethanol.

**"Dedicated Methanol Vehicle"** means any methanol-fueled motor vehicle that is engineered and designed to be operated solely on methanol.

**"Diesel Engine"** means any engine powered with diesel fuel, gaseous fuel, or alcohol fuel for which diesel engine speed/torque characteristics and vehicle applications are retained.

**"Dual-fuel vehicle"** means any motor vehicle that is engineered and designed to be capable of operating on gasoline or diesel and on compressed natural gas or liquefied petroleum gas, with separate fuel tanks for each fuel on-board the vehicle. In operation, only one fuel is used at a time.

**"Ethanol"** means any fuel for motor vehicles and motor vehicle engines that is composed of either commercially available or chemically pure ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ) and gasoline as specified in Part II, section A.100.3 (Certification Fuel Specifications) of these test procedures. The required fuel blend is based on the type of ethanol-fueled vehicle being certified and the particular aspect of the certification procedure being conducted.

**"Ethanol vehicle"** means any motor vehicle that is engineered and designed to be operated using ethanol as a fuel.

**"Fuel-Flexible Vehicle"** or **"FFV"** means any motor vehicle engineered and designed to be operated on a petroleum fuel and an alcohol fuel, or any mixture of the two. Alcohol-fueled vehicles that are only marginally functional when using gasoline (e.g., the engine has a drop in rated horsepower of more than 80 percent) are not flexible fuel vehicles.

**"Heavy-duty engine"** means an engine which is used to propel a heavy-duty vehicle.

**"Heavy-duty vehicle"** means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6,000 pounds for vehicles certifying to the standards in Section E.1.1.1 or any motor vehicle having a manufacturer's gross vehicle weight rating greater than 8,500 pounds for vehicles certifying to the standards in Section E.1.1.2, except passenger cars.

**"High-priced part"** means a part determined to be high-priced in accordance with section 2037(c), title 13, CCR.

**"Hybrid electric vehicle"** or **"HEV"** means any vehicle which is included in the definition of a "series hybrid electric vehicle," a "parallel hybrid electric vehicle," or a "battery assisted combustion engine vehicle."

**"Incomplete vehicle"** means any vehicle which does not have the primary load carrying device or container attached. In situations where individual marketing relationships makes the status of the vehicle questionable, the Executive Officer shall determine whether a specific model complies with the definition of incomplete vehicle.

**"Intermediate volume manufacturer"** means any pre-2001 model year manufacturer with California sales between 3,001 and 35,000 new light- and medium-duty vehicles per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1993; any 2001 through 2002 model year manufacturer with California sales between 4,501 and 35,000 new light- and medium-duty vehicles per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1993; and any 2003 and subsequent model year manufacturer with California sales between 4,501 and 35,000 new light- and medium-duty vehicles based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model year sales shall be based on projected California sales.

**"Large volume manufacturer"** means a manufacturer that is not a small volume manufacturer or an intermediate volume manufacturer.

**"LEV I"** refers to the low-emission vehicle standards that were initially adopted by the Board on July 12, 1991 and are set forth in Section E.1.1.1 of these test procedures.

**"LEV II"** refers to the standards that were initially adopted by the Board on August 5, 1999 and are set forth in Section E.1.1.2 of these test procedures.

**"Light-duty truck"** or **"LDT"** means any 2000 and subsequent model motor vehicle certified to the standards in Section E.1.1.2 rated at 8,500 pounds gross vehicle weight or less, and any other motor vehicle rated at 6,000 pounds gross vehicle weight or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.

**"LDT1"** means a light-duty truck with a loaded vehicle weight of 0-3750 pounds.

**"LDT2"** means a "LEV II" light-duty truck with a loaded vehicle weight of 3751 to a gross vehicle weight of 8500 pounds or a "LEV I" light-duty truck with a loaded vehicle weight of 3751-5750 pounds.

**"Low-emission vehicle"** or **"LEV"** means any vehicle certified to low-emission standards.

**"Medium-duty vehicle"** or **"MDV"** means any pre-1995 model year heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8,500 pounds or less; any 1992 through 2006 model-year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in Section E.1.1.1, or in title 13, CCR, section 1962, having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; any 1995 through 2002 model year heavy-duty vehicle certified to the Tier 1 standards in Section E.1.1.1 having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and any 2000 and subsequent model heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in Section E.1.1.2, or in title 13, CCR, section 1962, having a manufacturer's gross vehicle weight rating between 8,501 and 14,000 pounds.

**"Methane Reactivity Adjustment Factor"** means a factor applied to the mass of methane emissions from natural gas fueled vehicles for the purpose of determining the gasoline equivalent ozone-forming potential of the methane emissions.

**"Methanol"** means any fuel for motor vehicles and motor vehicle engines that is composed of either commercially available or chemically pure methanol ( $\text{CH}_3\text{OH}$ ) and gasoline as specified in Part II, section A.100.3.1 (Certification Fuel Specifications) of these procedures. The required fuel blend is based on the type of methanol-fueled vehicle being certified and the particular aspect of the certification procedure being conducted.

**"Natural gas vehicle"** means any motor vehicle that is engineered and designed to be operated using either compressed natural gas or liquefied natural gas.

**"Non-methane organic gas"** (or **"NMOG"**) means the sum of non-oxygenated and oxygenated hydrocarbons contained in a gas sample as measured in accordance with the "California Non-Methane Organic Gas Test Procedures," as incorporated by reference in Part II, section A.100.5.4 of these test procedures.

**"Organic material non-methane hydrocarbon equivalent"** (or **"OMNMHCE"**) for methanol-fueled vehicles means the sum of the carbon mass contribution of non-oxygenated hydrocarbons (excluding methane), methanol, and formaldehyde as contained in a gas sample, expressed as gasoline-fueled hydrocarbons. For ethanol-fueled vehicles, "organic material

non-methane hydrocarbon equivalent" (or "OMNMFCE") means the sum of carbon mass contribution of non-oxygenated hydrocarbons (excluding methane), methanol, ethanol, formaldehyde and acetaldehyde as contained in a gas sample, expressed as gasoline-fueled hydrocarbons.

**"Ozone deterioration factor"** means a factor applied to the mass of NMOG emissions from TLEVs, LEVs, ULEVs or SULEVs which accounts for changes in the ozone-forming potential of the NMOG emissions from a vehicle as it accumulates mileage.

**"Parallel hybrid electric vehicle"** means any vehicle which allows power to be delivered to the driven wheels by either a combustion engine and/or by a battery powered electric motor.

**"Passenger car"** or **"PC"** means any motor vehicle designed primarily for transportation of persons and having a design capacity of 12 persons or less.

**"Reactivity adjustment factor"** or **"RAF"** means a fraction applied to the mass of NMOG emissions from a vehicle powered by a fuel other than conventional gasoline for the purpose of determining a gasoline-equivalent NMOG emission value. The reactivity adjustment factor is defined as the ozone-forming potential of the exhaust from a vehicle powered by a fuel other than conventional gasoline divided by the ozone-forming potential of conventional gasoline vehicle exhaust.

**"Series hybrid electric vehicle"** means any vehicle which allows power to be delivered to the driven wheels solely by a battery powered electric motor, but which also incorporates the use of a combustion engine to provide power to the battery and/or electric motor.

**"Small volume manufacturer"** means any manufacturer whose projected or combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. A manufacturer's California sales shall consist of all vehicles or engines produced by the manufacturer and delivered for sale in California, except that vehicles or engines produced by the manufacturer and marketed in California by another manufacturer under the other manufacturer's nameplate shall be treated as California sales of the marketing manufacturer.

**"Specific reactivity"** is defined as the grams of ozone created per gram of NMOG emitted. This term is also known as ozone-forming potential.

**"Super-Ultra-Low-Emission Vehicle"** or **"SULEV"** means any vehicle certified to super-ultra-low-emission standards.

**"Tier 1 vehicle"** means any passenger car and light-duty truck certified to the standards in section 1960.1(f)(2), title 13, CCR, and any medium-duty vehicle certified to the standards in section 1960.1(h)(1), title 13, CCR.

**"Transitional low-emission vehicle"** or **"TLEV"** means any vehicle certified to transitional low-emission standards.

**"Ultra-low-emission vehicle"** or **"ULEV"** means any vehicle certified to ultra-low emission standards.

**"Zero-emission vehicle"** or **"ZEV"** means any vehicle certified to the zero-emission standards set forth in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(d), title 13, CCR.

### 3. §86.1804 Acronyms and Abbreviations

3.1 §86.1804-01 Acronyms and Abbreviations. [No change.]

#### 3.2 California Acronyms and Abbreviations

"ALVW" means adjusted loaded vehicle weight which is the average of a vehicle's curb weight and gross vehicle weight.

"CCR" means California Code of Regulations.

"CFR" means Code of Federal Regulations.

"HEV" means hybrid-electric vehicle.

"LDT" means light-duty truck.

"LDT1" means a light-duty truck with a loaded vehicle weight of 0-3750 pounds.

"LDT2" means a "LEV II" light-duty truck with a loaded vehicle weight of 3751 to a gross vehicle weight of 8500 pounds or a "LEV I" light-duty truck with a loaded vehicle weight of 3751-5750 pounds.

"LEV" means low-emission vehicle.

"LVW" means loaded vehicle weight.

"MDV" means medium-duty vehicle.

"n/a" means not applicable.

"Non-Methane Organic Gases" or "NMOG" means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.

"OBD" means on-board diagnostic system.

"PC" means passenger car.

"SULEV" means super ultra-low-emission vehicle.

"TLEV" means transitional low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

## C. General Requirements for Certification

1. **§86.1805 Useful Life**
  - 1.1. Amend §86.1805-01 as follows:
    - 1.1.1 Subparagraph (a). [No change.]
    - 1.1.2 Amend ~~§86.1805-01~~ subparagraph (b) to add the following: For vehicles certified to the LEV II emission standards in Section E.1.1.2 of these test procedures, full useful life is as follows:
      - ~~1.2.1~~ (a) For passenger cars, light-duty trucks, and medium-duty vehicles (including hybrid electric vehicles), the full useful life shall be 10 years or 120,000 miles, whichever occurs first.
      - ~~1.2.2~~ (b) The full useful life of LEV, ULEV and SULEV passenger cars, light-duty trucks and medium-duty vehicles certified to the optional LEV II 150,000 mile standards in section E.1.1.2 shall be 15 years or 150,000 miles, whichever occurs first.
  - 1.2 Amend §86.1805-04 as follows:
    - 1.2.1 Subparagraph (a). [No change.]
    - 1.2.2 Amend subparagraph (b) as follows: The full useful life of LEV, ULEV and SULEV passenger cars, light-duty trucks and medium-duty vehicles certified to the optional LEV II 150,000 mile standards in section E.1.1.2 shall be 15 years or 150,000 miles, whichever occurs first.
    - 1.2.3 Subparagraph (c) [No change.]
    - 1.2.4 Subparagraph (d) [No change.]
    - 1.2.5 Subparagraph (e) [n/a]
    - 1.2.6 Subparagraph (f) [n/a]
2. **§86.1806 On-Board Diagnostics**
  - 2.1. ~~§86.1806-01; §86.1806-05 Delete.~~
  - 2.2. **California On-Board Diagnostic System Requirements.** All vehicles shall be subject to the provisions of section 1968.1, title 13, CCR. No vehicle shall be certified unless the Executive Officer finds that the vehicle complies with the requirements of section 1968.1, title 13, CCR.
3. **§86.1807 Vehicle Labeling**
  - 3.1. §86.1807-01. [No change.]
  - 3.2. **California Labeling Requirements.** In addition to the federal requirements set forth in §86.1807, labeling shall conform with the requirements specified in section 1965, title 13, CCR and the "California Motor Vehicle Emission Control and Smog Index Label Specifications" as incorporated by reference in section 1965, title 13, CCR. In cases where there is conflict with the federal label specifications, the California requirements shall apply.
4. **§86.1808 Maintenance Instructions**
  - 4.1 §86.1808-01. [No change.]
5. **§86.1809 Prohibition of Defeat Devices**
  - 5.1. §86-1809-01. [No change except that subparagraph (e) shall apply to vehicles subject to the California TLEV, LEV, ULEV and SULEV standards.]

~~5.2 Emission Control System Continuity at Low Temperature.~~ For each test group certified to TLEV, LEV, ULEV, or SULEV standards, the manufacturer shall submit, with the Part II certification application, an engineering evaluation demonstrating that a discontinuity in emissions of non-methane organic gases, carbon monoxide, oxides of nitrogen and formaldehyde measured on the Federal Test Procedure (40 CFR Part 86) does not occur in the temperature range of 20°F to 86°F. For diesel vehicles, the engineering evaluation shall also include particulate emissions.

**D. §86.1810 General standards; increase in emissions; unsafe conditions; waivers**

1. §86.1810-01; ~~§86.1810-04~~. Amend §§86.1810-01 and ~~86.1810-04~~ as follows:

This section applies to model year 2001 and later light-duty vehicles, and light-duty trucks, ~~and medium-duty vehicles~~ fueled by gasoline, diesel, methanol, ethanol, natural gas and liquefied petroleum gas fuels. Multi-fueled vehicles (including bi-fueled, dual-fueled and flexible-fueled vehicles) shall comply with all requirements established for each consumed fuel (or blend of fuels in the case of flexible-fueled vehicles). ~~This section also applies to hybrid electric vehicles.~~ The standards of this subpart apply to both certification and in-use vehicles unless otherwise indicated.

(a) through (d) [No change.]

(e) On-board diagnostics. Delete and replace with:

All passenger cars, light-duty trucks and medium-duty vehicles must have an on-board diagnostic system as required in section 1968.1, title 13, CCR.

(f) Altitude Requirements. Delete and replace with:

Altitude Requirements. Except for supplemental exhaust emission standards (which apply only at low altitude conditions), all emission standards apply at low altitude conditions and only CO emission standards apply at high altitude conditions.

(g) [No change.]

(h) [Delete; see D.1.1 below.]

(i) **Supplemental FTP general provisions.** [Delete; see D.2. below]

(j) **Evaporative emissions general provisions.** [Delete. (The provisions of this section are contained the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, Heavy-Duty Vehicles and Motorcycles.")]

(k) through (n) [Delete. (The provisions of these sections are contained the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.")]

(o) through (p) [Delete. See D.1.1 below]

**1.1 Measurement of Hydrocarbon Emissions.**

1.1.1 Except as otherwise indicated in these test procedures, for vehicles fueled by gasoline, methanol, ethanol, natural gas, or liquefied petroleum gas and certified to the Tier 1 standards, hydrocarbon emissions shall mean non-methane hydrocarbons (NMHC) and shall be measured in accordance with Part B (Determination of NMHC Emissions by Flame Ionization Detection) of the "California Non-Methane Organic Gas Test Procedures," as incorporated by reference in Part II, section A.100.5.4 of these test procedures. For vehicles fueled by gasoline, methanol, ethanol, natural gas, or liquefied petroleum gas and certified to the TLEV, LEV, ULEV and SULEV standards, hydrocarbon emissions shall mean non-methane organic gases (NMOG) and shall be measured in accordance with the "California Non-Methane Organic Gas Test Procedures" as incorporated by reference in Part II, section A.100.5.4 of these test procedures.

1.1.2 For diesel vehicles, NMOG shall mean non-methane hydrocarbons and shall be measured in accordance with Part B of the "California Non-Methane Organic Gas Test Procedures," as incorporated by reference in Part II, section A.100.5.4 of these test procedures."

1.1.3 For vehicles certifying to the SFTP standards set forth in Section E.1.2.1 of these test procedures, hydrocarbon emissions shall be measured as follows: for PCs and LDTs certified to the Tier 1 exhaust standards, hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures," as last amended May 15, 1990, which is incorporated herein by reference. For PCs and LDTs certified to the TLEV exhaust standards hydrocarbon emissions shall be measured in accordance with Part B (Determination of Non-Methane Hydrocarbon Mass Emissions by Flame Ionization Detection) of the "California Non-Methane Organic Gas Test Procedures," as incorporated by reference in Part II, section A.100.5.4 of these test procedures. For alcohol-fueled vehicles certifying to the standards in Section E.1.2.1., "Non-Methane Hydrocarbons" shall mean "Organic Material Non-Methane Hydrocarbon Equivalent."

## 2. Supplemental FTP General Provisions for California.

2.1 Amend 40 CFR §86.1810-01(i) and ~~§86.1810-04(i)~~ as follows:

2.1.1 Delete subparagraphs (1) through (3) [The implementation schedules for SFTP are set forth in Section E.2 of these test procedures.]

2.1.2 Subparagraph (4) [No change.]

2.1.3 Subparagraph (5) [No change.]

2.1.4 Delete subparagraph (6); replace with: **Air to Fuel Ratio Requirement.**

With the exception of cold-start conditions, warm-up conditions and rapid-throttle motion conditions ("tip-in" or "tip-out" conditions), the air to fuel ratio shall not be richer at any time than, for a given engine operating condition (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters), the leanest air to fuel mixture required to obtain maximum torque (lean best torque) with a tolerance of six percent of the fuel consumption. The Executive Officer may approve a manufacturer's request for approval to use additional enrichment in subsequent testing if the manufacturer demonstrates that additional enrichment is needed to protect the vehicle, occupants, engine, or emission control hardware.

2.1.5 Delete subparagraph (7); replace with: **Single Roll Electric Dynamometer Requirement.** For all vehicles certified to the SFTP standards, a single-roll electric dynamometer or a dynamometer which produces equivalent results, as set forth in 40 CFR §86.108-00, must be used for all types of emission testing to determine compliance with the applicable emission standards.

2.1.6 Delete subparagraph (8); replace with: **Small Volume Provisions.** Small volume manufacturers of PCs, LDTs, and MDVs shall certify 100% of their PC and LDT fleet in 2004 and subsequent model years, and 100% of their MDV fleet in 2005 and subsequent model years under the supplemental FTP requirements.

2.1.7. Subparagraphs (9) through (12) [No change.]

2.1.8. Subparagraph ~~(10)~~ (13) [No change, except that references to Tier 2 and non-Tier 2 vehicles shall mean California LEVs, ULEVs and SULEVs.]

~~2.2 A/C-on Specific Calibrations.~~ A manufacturer may use A/C-on specific calibrations (e.g. air to fuel ratio, spark timing, and exhaust gas recirculation) which differ from A/C-off calibrations for given engine operating conditions (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters). Such calibrations must not unnecessarily reduce the NMHC+NO<sub>x</sub> emission control effectiveness during A/C-on operation when the vehicle is operated under conditions which may reasonably be expected to be encountered during normal operation and use. If reductions in control system NMHC+NO<sub>x</sub> effectiveness do occur as a result of such calibrations, the manufacturer shall, in the Application for Certification, specify the circumstances under which such reductions do occur, and the reason for the use of such calibrations resulting in such reductions in control system effectiveness:

~~A/C-on specific "open-loop" or "commanded enrichment" air-fuel enrichment strategies (as defined below), which differ from A/C-off "open-loop" or "commanded enrichment" air-fuel enrichment strategies, may not be used, with the following exceptions: cold-start and warm-up conditions, or, subject to Executive Officer approval, conditions requiring the protection of the vehicle, occupants, engine, or emission control hardware. Other than these exceptions, such strategies which are invoked based on manifold pressure, engine speed, throttle position, or other engine parameters shall use the same engine parameter criteria for the invoking of this air-fuel enrichment strategy and the same degree of enrichment regardless of whether the A/C is on or off.~~

~~"Open-loop" or "commanded" air-fuel enrichment strategy is defined as enrichment of the air to fuel ratio beyond stoichiometry for the purposes of increasing engine power output and the protection of engine or emissions control hardware. However, "closed-loop biasing," defined as small changes in the air-fuel ratio for the purposes of optimizing vehicle emissions or driveability, shall not be considered an "open-loop" or "commanded" air-fuel enrichment strategy. In addition, "transient" air-fuel enrichment strategy (or "tip-in" and "tip-out" enrichment), defined as the temporary use of an air-fuel ratio rich of stoichiometry at the beginning or duration of rapid throttle motion, shall not be considered an "open-loop" or "commanded" air-fuel enrichment strategy.~~

2.1.9. Add the following sentence to sSubparagraph (11) (14): [No change.]

~~2.3 "Lean-On-Cruise" Calibration Strategies.~~ In the Application for Certification, the manufacturer shall state whether any "lean-on-cruise" strategies are incorporated into the vehicle design. A "lean-on-cruise" air-fuel calibration strategy is defined as the use of an air-fuel ratio significantly greater than stoichiometry, during non-deceleration conditions at speeds above 40 mph. "Lean-on-cruise" air-fuel calibration strategies shall not be employed during vehicle operation in normal driving conditions, including A/C-usage, unless at least one of the following conditions is met:

- ~~1. Such strategies are substantially employed during the FTP or SFTP, or~~
- ~~2. Such strategies are demonstrated not to significantly reduce vehicle NMHC + NO<sub>x</sub> emissions control effectiveness over the operating conditions in which they are employed, or~~
- ~~3. Such strategies are demonstrated to be necessary to protect the vehicle, occupants, engine, or emissions control hardware.~~

If the manufacturer proposes to use a "lean-on-cruise" calibration strategy, the manufacturer shall specify the circumstances under which such a calibration would be used, and the reason or reasons for the proposed use of such a calibration. The above provisions shall not apply to

vehicles powered by "lean-burn" engines or Diesel-cycle engines. A "lean-burn" engine is defined as an Otto-cycle engine designed to run at an air-fuel ratio significantly greater than stoichiometry during the large majority of its operation.

## **E. California Exhaust Emission Standards**

Delete 40 CFR §§86.1811 through 86.1819.

**Introduction.** The following Section E. contains the exhaust emission standards, phase-in requirements and reactivity adjustment factors applicable to California passenger cars, light-duty trucks and medium-duty vehicles. A manufacturer must demonstrate compliance with the exhaust standards applicable to specific test groups, and with the composite phase-in requirements applicable to the manufacturer's entire fleet.

A manufacturer has the option of certifying engines used in incomplete and diesel MDVs with a gross vehicle weight rating of greater than 8,500 lbs. to the heavy-duty engine standards and test procedures set forth in sections 1956.8(g) and (h), title 13, CCR.

The procedures for meeting the ZEV phase-in requirements and for earning ZEV credits are contained in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(d), title 13, CCR.

### **1. Exhaust Emission Standards**

#### **1.1 FTP Exhaust Emission Standards for Light- and Medium-Duty Vehicles.**

The exhaust emission standards set forth in this section refer to the exhaust emitted over the driving schedule set forth in title 40, CFR, Subparts B and C, except as amended in these test procedures.

**1.1.1 LEV I and Tier 1 Exhaust Standards.** The following standards represent the maximum exhaust emissions for the intermediate and full useful life from new 2001 through 2003 model-year Tier 1 passenger cars, light-duty trucks and medium-duty vehicles, and from new 2001 through 2003 model year "LEV I" TLEV passenger cars and light-duty trucks, 2001 through 2006 model year "LEV I" LEVs and ULEVs in the light- and medium-duty vehicle classes and 2001 through 2006 model year "LEV I" SULEVs in the medium-duty vehicle classes, including bi-fuel, fuel-flexible and dual fuel vehicles when operating on the gaseous or alcohol fuel they are designed to use:

**Exhaust Mass Emission Standards for New 2001 - 2003 Model Year Tier 1 Vehicles and  
TLEV Passenger Cars and Light-Duty Trucks; 2001 - 2006 Model Year LEV I  
LEV and ULEV Passenger Cars and Light-Duty Trucks;  
2001-2003 Model Year Tier 1 Medium-Duty Vehicles; and  
2001-2006 Model Year LEV I LEV, ULEV and SULEV Medium-Duty Vehicles**

Vehicle Type	Durability Vehicle Basis (mi.)	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)	Formaldehyde (mg/mi)	Particulate from diesel vehicles** (g/mi)
All PCs; LDTs (0-3750 lbs. LVW)	50,000	Tier 1	0.25*	3.4	0.4	n/a	0.08
		TLEV	0.125	3.4	0.4	15	n/a
		LEV	0.075	3.4	0.2	15	n/a
		ULEV	0.040	1.7	0.2	8	n/a
	100,000	Tier 1	0.31	4.2	0.6	n/a	n/a
		Tier 1 - diesel option	0.31	4.2	1.0	n/a	n/a
		TLEV	0.156	4.2	0.6	18	0.08
		LEV	0.090	4.2	0.3	18	0.08
		ULEV	0.055	2.1	0.3	11	0.04
LDTs (3751-5750 lbs. LVW)	50,000	Tier 1	0.32	4.4	0.7	n/a	0.08
		TLEV	0.160	4.4	0.7	18	n/a
		LEV	0.100	4.4	0.4	18	n/a
		ULEV	0.050	2.2	0.4	9	n/a
	100,000	Tier 1	0.40	5.5	0.97	n/a	n/a
		TLEV	0.200	5.5	0.9	23	0.10
		LEV	0.130	5.5	0.5	23	0.10
		ULEV	0.070	2.8	0.5	13	0.05
MDVs (3751-5750 lbs. ALVW)	50,000	Tier 1	0.32	4.4	0.7	18	n/a
		LEV	0.160	4.4	0.4	18	n/a
		ULEV	0.100	4.4	0.4	9	n/a
		SULEV	0.050	2.2	0.2	4	n/a
	120,000	Tier 1	0.46	6.4	0.98	n/a	0.10
		LEV	0.230	6.4	0.6	27	0.10
		ULEV	0.143	6.4	0.6	13	0.05
		SULEV	0.072	3.2	0.3	13	0.05

Vehicle Type	Durability Vehicle Basis (mi.)	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)	Formaldehyde (mg/mi)	Particulate from diesel vehicles** (g/mi)
MDVs (5751-8500 lbs. ALVW)	50,000	Tier 1	0.39	5.0	1.1	22	n/a
		LEV	0.195	5.0	0.6	22	n/a
		ULEV	0.117	5.0	0.6	11	n/a
		SULEV	0.059	2.5	0.3	6	n/a
	120,000	Tier 1	0.56	7.3	1.53	n/a	0.12
		LEV	0.280	7.3	0.9	32	0.12
		ULEV	0.167	7.3	0.9	16	0.06
		SULEV	0.084	3.7	0.45	8	0.06
MDVs 8501 -10,000 lbs. ALVW	50,000	Tier 1	0.46	5.5	1.3	28	n/a
		LEV	0.230	5.5	0.7	28	n/a
		ULEV	0.138	5.5	0.7	14	n/a
		SULEV	0.069	2.8	0.35	7	n/a
	120,000	Tier 1	0.66	8.1	1.81	n/a	0.12
		LEV	0.330	8.1	1.0	40	0.12
		ULEV	0.197	8.1	1.0	21	0.06
		SULEV	0.100	4.1	0.5	10	0.06
MDVs 10,001-14,000 lbs. ALVW	50,000	Tier 1	0.60	7.0	2.0	36	n/a
		LEV	0.300	7.0	1.0	36	n/a
		ULEV	0.180	7.0	1.0	18	n/a
		SULEV	0.09	3.5	0.5	9	n/a
	120,000	Tier 1	0.86	10.3	2.77	n/a	n/a
		LEV	0.430	10.3	1.5	52	0.12
		ULEV	0.197	10.3	1.5	26	0.06
		SULEV	0.130	5.2	0.7	13	0.06

\* For Tier 1 vehicles, NMOG shall mean NMHC as set forth in Section I.D.1.1 of these test procedures.

\*\* Particulate standards are determined on a 50,000 mile basis for Tier 1 passenger cars and light-duty trucks, on a 100,000 mile basis for all other passenger cars and light-duty trucks and on a 120,000 mile basis for medium-duty vehicles.

1.1.2 **LEV II Exhaust Standards.** The following LEV II standards represent the maximum exhaust emissions for the intermediate and full useful life from new 2004 and subsequent model-year LEVs, ULEVs, and SULEVs, including fuel-flexible, bi-fuel and dual fuel vehicles when operating on the gaseous or alcohol fuel they are designed to use. Prior to the 2004 model year, a manufacturer that produces vehicles meeting these standards has the option of certifying the vehicles to the standards, in which case the vehicles will be treated as LEV II vehicles for purposes of the fleet-wide phase-in requirements.

<b>LEV II Exhaust Mass Emission Standards for New 2004 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes</b>							
Vehicle Type	Durability Vehicle Basis (mi)	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)	Formaldehyde (mg/mi)	Particulate from Diesel Vehicles (g/mi)
All PCs; LDTs <8,500 lbs. GVW  Vehicles in this category are tested at their loaded vehicle weight.	50,000	LEV	0.075	3.4	0.05	15	n/a
		LEV, Option 1	0.075	3.4	0.07	15	n/a
		ULEV	0.040	1.7	0.05	8	n/a
	120,000	LEV	0.090	4.2	0.07	18	0.01
		LEV, Option 1	0.090	4.2	0.10	18	0.01
		ULEV	0.055	2.1	0.07	11	0.01
		SULEV	0.010	1.0	0.02	4	0.01
	150,000 (optional)	LEV	0.090	4.2	0.07	18	0.01
		LEV, Option 1	0.090	4.2	0.10	18	0.01
		ULEV	0.055	2.1	0.07	11	0.01
		SULEV	0.010	1.0	0.02	4	0.01
	MDVs 8,500 - 10,000 lbs. GVW  Vehicles in this category are tested at their adjusted loaded vehicle weight.	120,000	LEV	0.195	6.4	0.2	32
ULEV			0.143	6.4	0.2	16	0.06
SULEV			0.100	3.2	0.1	8	0.06
150,000 (Optional)		LEV	0.195	6.4	0.2	32	0.12
		ULEV	0.143	6.4	0.2	16	0.06
		SULEV	0.100	3.2	0.1	8	0.06

Vehicle Type	Durability Vehicle Basis (mi)	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)	Formaldehyde (mg/mi)	Particulate from Diesel Vehicles (g/mi)
MDVs 10,001-14,000 lbs. GVW  Vehicles in this category are tested at their adjusted loaded vehicle weight.	120,000	LEV	0.230	7.3	0.4	40	0.12
		ULEV	0.167	7.3	0.4	21	0.06
		SULEV	0.117	3.7	0.2	10	0.06
	150,000 (Optional)	LEV	0.230	7.3	0.4	40	0.12
		ULEV	0.167	7.3	0.4	21	0.06
		SULEV	0.117	3.7	0.2	10	0.06

**1.2. Supplemental Federal Test Procedure ("SFTP") Exhaust Emission Standards for Light- and Medium-Duty Vehicles.**

1.2.1 The following standards represent the maximum SFTP exhaust emissions for the intermediate and full useful life from new 2001 through 2003 model year Tier 1 and TLEV passenger cars and light-duty trucks:

**SFTP EXHAUST EMISSION STANDARDS FOR 2001 THROUGH 2003 MODEL-YEAR  
TIER 1 AND TLEV PASSENGER CARS AND LIGHT-DUTY TRUCKS  
(grams per mile)**

Vehicle Type	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Fuel Type	NMHC + NOx Composite	CO		
					A/C Test	US06 Test	Composite Option
PC	All	50,000	Gasoline	0.65	3.0	9.0	3.4
			Diesel	1.48	n/a	9.0	3.4
	100,000	Gasoline	0.91	3.7	11.1	4.2	
		Diesel	2.07	n/a	11.1	4.2	
LDT	0-3750	50,000	Gasoline	0.65	3.0	9.0	3.4
			Diesel	1.48	n/a	9.0	3.4
	100,000	Gasoline	0.91	3.7	11.1	4.2	
		Diesel	2.07	n/a	11.1	4.2	
LDT	3751-5750	50,000	Gasoline	1.02	3.9	11.6	4.4
			Diesel	n/a	n/a	n/a	n/a
	100,000	Gasoline	1.37	4.9	14.6	5.5	
		Diesel	n/a	n/a	n/a	n/a	

1.2.2 The following standards represent the maximum SFTP exhaust emissions at 4,000 miles for new 2001 and subsequent model LEVs, ULEVs, and SULEVs in the passenger car and light-duty truck class, and new 2003 and subsequent model year LEV, ULEV and SULEV medium-duty vehicles less than 8,500 pounds gross vehicle weight rating:

**SFTP EXHAUST EMISSION STANDARDS  
FOR LEVs, ULEVs, AND SULEVs IN THE PASSENGER CAR, LIGHT-DUTY  
TRUCK, AND MEDIUM-DUTY VEHICLE CLASSES**  
(grams per mile)

Vehicle Type**	LVW/ALVW (lbs.)	US06 Test*		A/C Test*	
		NMHC + NOx	CO	NMHC + NOx	CO
PC	All	0.14	8.0	0.20	2.7
LDT	0-3750 lbs.(LVW)	0.14	8.0	0.20	2.7
LDT	3751-5750 lbs. (LVW)	0.25	10.5	0.27	3.5
MDV	3751-5750 lbs. (ALVW)	0.40	10.5	0.31	3.5
MDV	5751-8500 lbs. (ALVW)	0.60	11.8	0.44	4.0

\* For certification purposes, testing shall be conducted at 4000 miles  $\pm$ 250 miles or at the mileage determined by the manufacturer for emission-data vehicles.

\*\* The following definitions apply for purposes of this SFTP standards table only:

“LDT” (light-duty truck) is any motor vehicle rated at 6,000 pounds gross vehicle weight or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.

“MDV” (medium-duty truck) is any motor vehicle having a manufacturer’s gross vehicle weight rating of greater than 6,000 pounds and less than 14,001 pounds, except passenger cars.

### 1.3. NMOG Standards for Fuel-Flexible, Bi-Fuel and Dual-Fuel Vehicles Operating on Gasoline.

For fuel-flexible, bi-fuel and dual-fuel PCs, LDTs and MDVs, compliance with the NMOG exhaust mass emission standards shall be based on exhaust emission tests both when the vehicle is operated on the gaseous or alcohol fuel it is designed to use, and when the vehicle is operated on gasoline. A manufacturer must demonstrate compliance with the applicable exhaust mass emission standards for NMOG, CO, NO<sub>x</sub> and formaldehyde set forth in the tables in Section E.1.1 when certifying the vehicle for operation on the gaseous or alcohol fuel.

The following standards represent the maximum NMOG emissions when the vehicle is operating on gasoline. A manufacturer shall not apply a reactivity adjustment factor to the exhaust NMOG mass emission result when operating on gasoline. Testing at 50°F is not required for fuel-flexible, bi-fuel and dual-fuel vehicles when operating on gasoline. The applicable CO, NO<sub>x</sub> and formaldehyde standards are set forth in Section E.1.1 above.

**1.3.1 LEV I Standards for 2001 through 2006 Model Year Bi-Fuel, Fuel-Flexible and Dual Fuel Vehicles Operating on Gasoline.** The applicable exhaust mass emission standards for NMOG when certifying the vehicle for operation on gasoline (as specified in Part II, Section A. paragraph 100.3.1) are:

LEV I NMOG Standards for Bi-Fuel, Fuel-Flexible and Dual-Fuel Vehicles Operating on Gasoline (g/mi)			
Vehicle Type, LVW/ALVW	Emission Category	Durability Vehicle Basis	
		50,000 mi	100,000 mi
All PCs, LDTs, 0-3750 lbs. LVW (2001 through 2003 model years only, for TLEVs)	TLEV	0.25	0.31
	LEV	0.125	0.156
	ULEV	0.075	0.090
LDTs, 3751-5750 lbs. LVW (2001 through 2003 model years only, for TLEVs)	TLEV	0.32	0.40
	LEV	0.160	0.200
	ULEV	0.100	0.130
MDVs, 3751-5750 lbs. ALVW	LEV	0.32	0.46
	ULEV	0.160	0.230
	SULEV	0.100	0.143

Vehicle Type, LVW/ALVW	Emission Category	Durability Vehicle Basis	
		50,000 mi	100,000 mi
MDVs, 5751-8500 lbs. ALVW	LEV	0.39	0.56
	ULEV	0.195	0.280
	SULEV	0.117	0.167
MDVs, 8501-10,000 lbs. ALVW	LEV	0.46	0.66
	ULEV	0.230	0.330
	SULEV	0.138	0.197
MDVs, 10,001-14,000 lbs. ALVW	LEV	0.60	0.86
	ULEV	0.300	0.430
	SULEV	0.180	0.257

**1.3.2 LEV II Standards for 2004 and Subsequent Model Year Bi-fuel, Fuel-Flexible and Dual Fuel Vehicles Operating on Gasoline.** The applicable exhaust mass emission standards for NMOG when certifying the vehicle for operation on gasoline (as specified in Part II, Section A. paragraph 100.3.1) are:

LEV II NMOG Standards for Bi-Fuel, Fuel-Flexible and Dual-Fuel Vehicles Operating on Gasoline (g/mi)			
Vehicle Type	Vehicle Emission Category	Durability Vehicle Basis	
		50,000 mi	120,000 mi
All PCs; LDTs, 0-8500 lbs. GVW	LEV	0.125	0.156
	ULEV	0.075	0.090
	SULEV	0.010	0.040
MDVs, 8501-10,000 lbs. GVW	LEV	n/a	0.230
	ULEV	n/a	0.167
	SULEV	n/a	0.117
MDVs, 10,000-14,000 lbs. GVW	LEV	n/a	0.280
	ULEV	n/a	0.195
	SULEV	n/a	0.143

#### 1.4. 50°F Exhaust Emission Standards.

All light- and medium-duty TLEVs, LEVs, ULEVs and SULEVs must demonstrate compliance with the following exhaust emission standards for NMOG and formaldehyde measured on the FTP (40 CFR, Part 86, Subpart B) conducted at a nominal test temperature of 50°F, as modified by Part II, Section C of these test procedures. The NMOG mass emission result shall be multiplied by the applicable reactivity adjustment factor, if any, prior to comparing to the applicable adjusted 50,000 mile certification standards set forth in subparagraphs 1.4.1 and 1.4.2 below. Emissions of CO and NO<sub>x</sub> measured at 50°F shall not exceed the standards set forth in Section E.1.1 applicable to vehicles of the same emission category and vehicle type subject to a cold soak and emission test at 68° to 86°F. Natural gas and diesel-fueled vehicles are exempt from the 50° F test requirements.

##### 1.4.1. Standards for Vehicles Certified to the LEV I Standards.

Vehicle Weight Class	Vehicle Emission Category (g/mi)							
	TLEV		LEV		ULEV		SULEV	
	NMOG	HCHO	NMOG	HCHO	NMOG	HCHO	NMOG	HCHO
PCs; LDTs 0-3750 lbs. LVW	0.25	0.030	0.150	0.030	0.080	0.016	n/a	n/a
LDTs 3751-5750 lbs. LVW	<del>0.312</del> 0.320	0.036	<del>0.180</del> 0.200	0.036	<del>0.110</del> 0.100	0.018	n/a	n/a
MDVs 3751-5750 lbs. TW	n/a	n/a	0.320	0.036	0.200	0.018	0.100	0.008
MDVs 5751-8500 lbs. TW	n/a	n/a	0.390	<del>0.064</del> 0.044	0.234	<del>0.032</del> 0.022	0.118	<del>0.016</del> 0.012
MDVs 8501-10,000 lbs. TW	n/a	n/a	0.460	<del>0.080</del> 0.056	0.276	<del>0.042</del> 0.028	0.138	<del>0.020</del> 0.014
MDVs 10,001-14,000 lbs. TW	n/a	n/a	0.600	0.072	0.360	0.036	0.180	0.018

##### 1.4.2 Standards for Vehicles Certified to the LEV II Standards

Vehicle Weight Class	Vehicle Emission Category (g/mi)					
	LEV		ULEV		SULEV	
	NMOG	HCHO	NMOG	HCHO	NMOG	HCHO
PCs; LDTs 0-8500 lbs. GVW	0.150	0.030	0.080	0.016	0.02	0.008
MDVs 8501-10,000 lbs. GVW	0.390	0.064	0.286	0.032	0.200	0.016
MDVs 10,001-14,000 lbs. GVW	0.460	0.080	0.334	0.040	0.234	0.020

**1.5. Cold CO Standards.** The following standards represent the 50,000 mile cold temperature exhaust carbon monoxide emission levels from new 2001 and subsequent model-year passenger cars, light-duty trucks, and medium-duty vehicles:

**2001 AND SUBSEQUENT MODEL-YEAR COLD TEMPERATURE  
CARBON MONOXIDE EXHAUST EMISSIONS STANDARDS FOR PASSENGER  
CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES**  
(grams per mile)

Vehicle Type	Carbon Monoxide
All PCs, LDTs 0-3750 lbs. LVW	10.0
LDTs 3751 lbs. LVW - 8500 lbs. GVW LEV I and Tier 1 MDVs 8,500 lbs. GVW and less	12.5

These standards are applicable to vehicles tested in accordance with 40 CFR Part 86 Subpart C, as modified in Part II, Section B of these test procedures at a nominal temperature of 20°F (-7°C). Natural gas vehicles, diesel-fueled vehicles, and medium-duty vehicles with a gross vehicle weight rating greater than 8,500 lbs. are exempt from these standards.

**1.6. Highway NO<sub>x</sub> Standard.** The maximum emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR 600 Subpart B, which is incorporated herein by reference) shall not be greater than 1.33 times the applicable PC and LDT standards or 2.0 times the applicable MDV standards set forth in section E.1.1. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 g/mi (or 0.01 g/mi for vehicles certified to the 0.05 or 0.02 g/mi NO<sub>x</sub> standards) before being compared.

**1.7 Requirements for Vehicles Certified to the Optional 150,000 Mile Standards.**

(a) **Requirement to Generate Additional NMOG Fleet Average Credit.** A vehicle that is certified to the 150,000 mile standards in section E.1.1.2 shall generate additional NMOG fleet average credit as set forth in section E.3.1 or additional vehicle equivalent credits as set forth in E.3.2, provided that the manufacturer extends the warranty on high-priced parts to 8 years or 100,000 miles, whichever occurs first, and agrees to extend the limit on high mileage in-use testing to 105,000 miles.

(b) **Requirement to Generate a Partial ZEV Allowance.** A manufacturer that certifies to the 150,000 mile SULEV standards shall also generate a partial ZEV allocation according to the criteria set forth in section C.3 of the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(e), title 13, CCR.

**1.8 Optional LEV NO<sub>x</sub> Standard.** A manufacturer may certify up to 4% of its light-duty truck fleet from 3751 lbs. LVW - 8500 lbs. GVW with a maximum base payload of 2500 lbs. or more, to the LEV, option 1, standard set forth in Section E.1.1.2 based on projected sales of trucks in this category. Passenger cars and light-duty trucks 0-3750 lbs. LVW are not eligible for this option.

**1.9 NMOG Credit for Vehicles with Zero-Evaporative Emissions.** In determining compliance of a vehicle with the applicable exhaust NMOG standard, a gram per mile NMOG factor, to be determined by the Executive Officer based on available data, shall be subtracted from the reactivity-adjusted NMOG exhaust emission results for any vehicle that has been certified to the "zero" evaporative emission standard set forth in title 13, CCR, section 1976(b)(1)(E). This credit shall not apply to a SULEV that generates a partial ZEV allowance.

**1.10 NMOG Credit for Direct Ozone Reduction Technology.** A manufacturer that certifies vehicles equipped with direct ozone reduction technologies shall be eligible to receive NMOG credits that can be applied to the NMOG exhaust emissions of the vehicle when determining compliance with the standard. In order to receive credit, the manufacturer must submit the following information for each vehicle model, including, but not limited to:

- (a) a demonstration of the airflow rate through the direct ozone reduction device and the ozone-reducing efficiency of the device over the range of speeds encountered in the SFTP test cycle;
- (b) an evaluation of the durability of the device for the full useful life of the vehicle; and
- (c) a description of the on-board diagnostic strategy for monitoring the performance of the device in-use.

Using the above information, the Executive Officer shall determine the value of the NMOG credit based on the calculated change in the one-hour peak ozone level using an approved airshed model.

**1.11 NO<sub>x</sub> Credits for Pre-2004 MDVs Certified to the LEV I LEV or ULEV Standards.** Prior to the 2004 model year, a manufacturer may earn a 0.02 g/mi per vehicle NO<sub>x</sub> credit for MDVs between 6,000-8500 lbs. GVW certified to the LEV I LEV or ULEV standards for PCs and LDTs set forth in section E.1.1.1 of these test procedures. The manufacturer may apply the credit on a per vehicle basis to the NO<sub>x</sub> emissions of LDTs between 6,000-8500 lbs. GVW certified to the PC/LDT LEV or ULEV standards in section E.1.1.2 for the 2004 through 2008 model years.

**1.12 Certification of a Federal Vehicle in California.** Whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to the standards for a particular emissions bin that are more stringent than the standards for an applicable California vehicle emissions category, the equivalent California model may only be certified to (i) the California standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the exhaust

emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a vehicle emissions category are equally stringent, the California model may only be certified to either the California standards for that vehicle emissions category or more stringent California standards. The federal emission bins are those contained Tables S04-1 and S04-2 of 40 CFR section 86.1811-04(c) as adopted February 10, 2000. The criteria for applying this requirement are set forth in Part I, Section H.1 of these test procedures.

## 2. Emission Standards Phase-In Requirements for Manufacturers

### 2.1. Fleet Average NMOG Requirements for Passenger Cars and Light-Duty Trucks.

2.1.1 The fleet average non-methane organic gas exhaust mass emission values from the passenger cars and light-duty trucks produced and delivered for sale in California each model year by a manufacturer other than a small volume manufacturer shall not exceed:

FLEET AVERAGE NON-METHANE ORGANIC GAS EXHAUST MASS EMISSION REQUIREMENTS FOR LIGHT-DUTY VEHICLE WEIGHT CLASSES (50,000 mile Durability Vehicle Basis)		
Model Year	Fleet Average NMOG (g/mi)	
	All PCs; LDTs 0-3750 lbs. LVW	LDTs 3751 lbs. LVW - 8500 lbs. GVW
2001	0.070	0.098
2002	0.068	0.095
2003	0.062	0.093
2004	0.053	0.085
2005	0.049	0.076
2006	0.046	0.062
2007	0.043	0.055
2008	0.040	0.050
2009	0.038	0.047
2010+	0.035	0.043

#### 2.1.2. Calculation of Fleet Average NMOG Value.

2.1.2.1 (a) Each manufacturer's PC and LDT1 fleet average NMOG value for the total number of PCs and LDT1s produced and delivered for sale in California shall be calculated as follows:

$$\frac{\sum [\text{Number of vehicles in a test group} \times \text{applicable emission standard}] + \sum [\text{Number of hybrid electric vehicles in a test group} \times \text{HEV NMOG factor}]}{\text{Total Number of Vehicles Produced, Including ZEVs and HEVs}}$$

2.1.2.1 (b) Each manufacturer's LDT2 fleet average NMOG value for the total number of LDT2s produced and delivered for sale in California shall be calculated as follows:

$$\frac{\sum [\text{Number of vehicles in a test group} \times \text{applicable emission standard}] + \sum [\text{Number of hybrid electric vehicles in a test group} \times \text{HEV NMOG factor}]}{\text{Total Number of Vehicles Produced, Including ZEVs and HEVs}}$$

The applicable emission standards to be used in the above equations are as follows:

Model Year	Emission Category	Emission Standard Value	
		All PCs; LDTs 0-3750 lbs. LVW	LDTs 3751-5750 lbs. LVW
2001 and subsequent (AB 965 vehicles only)	Tier 1	0.25	0.32
2001 - 2003	Tier 1	0.25	0.32
2001 - 2006 model year vehicles certified to the "LEV I" standards in E.1.1.1 (For TLEVs, 2001 - 2003 model years only)	TLEVs	0.125	0.160
	LEVs	0.075	0.100
	ULEVs	0.040	0.050
Model Year	Emission Category	All PCs; LDTs 0-3750 lbs. LVW	LDTs 3751 lbs. LVW - 8500 lbs. GVW
2001 and subsequent model year vehicles certified to the "LEV II" standards in E.1.1.2	LEVs	0.075	0.075
	ULEVs	0.040	0.040
	SULEVs	0.01	0.01
2001 and subsequent model year vehicles certified to the optional 150,000 mile "LEV II" standards for PCs and LDTs in E.1.1.2	LEVs	0.06	0.06
	ULEVs	0.03	0.03
	SULEVs	0.0085	0.0085

2.1.2.2 **HEV NMOG Factor.** The HEV NMOG factor for light-duty vehicles is calculated as follows:

$$\text{LEV HEV Contribution Factor} = 0.075 - [(\text{Zero-emission VMT Factor}) \times 0.035]$$

$$\text{ULEV HEV Contribution Factor} = 0.040 - [(\text{Zero-emission VMT Factor}) \times 0.030]$$

where Zero-emission VMT Factor for HEVs is determined in accordance with Section C.3 of the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(e), title 13, CCR.

2.1.2.3 Federally-Certified Vehicles. A vehicle certified to the standards for a federal exhaust emissions bin in accordance with Section H.1 of these test procedures shall use the corresponding NMOG emission category value set forth in the table in Section E.2.1.2 of these test procedures for the fleet average calculation.

### 2.1.3. Phase-in Requirements for Small Volume Manufacturers.

(a) In 2001 through ~~2003~~ 2006 model years, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 g/mi for PCs and LDTs from 0-3750 lbs. LVW or 0.100 g/mi for LDTs from 3751-5750 lbs. LVW calculated in accordance with subsection E.2.1.2. In ~~2004~~ 2007 and subsequent model years, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 for PCs and LDTs from 0-3750 lbs. LVW or 0.075 for LDTs from 3751 lbs. LVW - 8,500 lbs. GVW calculated in accordance with subsection E.2.1.2.

(b) If a manufacturer's average California sales exceeds 4500 units of new PCs, LDTs, MDVs and heavy duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall no longer be treated as a small volume manufacturer and shall comply with the fleet average requirements applicable to larger manufacturers as specified in section E.2.1.2 beginning with the fourth model year after the last of the three consecutive model years.

(c) If a manufacturer's average California sales falls below 4500 units of new PCs, LDTs, MDVs and heavy duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall be treated as a small volume manufacturer and shall be subject to the requirements for small volume manufacturers beginning with the next model year.

2.1.4 ZEVs classified as LDTs (>3750 lbs. LVW) that have been counted toward the ZEV requirement for PCs and LDTs (0-3750 lbs. LVW) as specified in Section C of the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(e), title 13, CCR, shall be included in this equation.

**2.2 LEV II Phase-In Requirement.** Beginning in the 2004 model year, a manufacturer, except a small volume manufacturer, shall certify a percentage of its PC and LDT fleet to the LEV II standards in section E.1.1.2 according to the following phase in schedule:

Model Year	PC/LDT1 (%)	LDT2 (%)
2004	25	25
2005	50	50
2006	75	75
2007	100	100

In determining compliance with the phase-in schedule, the fleet shall consist of LEV I and LEV II PCs and LDT1s for the PC/LDT1 calculation, and LEV I and LEV II LDT2s for the LDT2 calculation. LEV I MDVs are not counted in the calculation until they are certified as LEV II LDT2s.

A manufacturer may use an alternative phase-in schedule to comply with these phase-in requirements as long as equivalent NOx emission reductions are achieved by the 2007 model year from each of the two categories -- PC/LDT1 or LDT2. Model year emission reductions shall be calculated by multiplying the percent of either PC/LDT1 or LDT2 vehicles meeting the LEV II standards in a given model year (based on a manufacturer's projected sales volume of vehicles in each category) by 4 for the 2004 model year, 3 for the 2005 model year, 2 for the 2006 model year and 1 for the 2007 model year. The yearly results for PCs/LDT1s shall be summed together to determine a separate cumulative total for PCs/LDT1s and the yearly results for LDT2s shall be summed together to determine a cumulative total for LDT2s. The cumulative total for each category must be equal to or exceed 500 to be considered equivalent. A manufacturer may add vehicles introduced before the 2004 model year (e.g., the percent of vehicles introduced in 2003 would be multiplied by 5) to the cumulative total.

### 2.3 Medium-Duty Vehicle Phase-In Requirements.

2.3.1 (a) A manufacturer of MDVs, other than a small volume manufacturer, shall certify an equivalent percentage of its MDV fleet according to the following phase-in schedule:

Model Year	Vehicles Certified to Section E.1.1 (%)		Vehicles Certified to title 13 CCR Section 1956.8(g) or (h) (%)		
	LEV	ULEV	Tier 1	LEV	ULEV
2001	80	20	100	0	0
2002	70	30	0	100	0
2003	60	40	0	100	0
2004 +	40	60	0	0	100

(b) **Requirements for Small Volume Manufacturers.** In 2001 through 2003 model years, a small volume manufacturer shall certify, produce, and deliver for sale in

California vehicles or engines certified to the MDV Tier 1 standards in a quantity equivalent to 100% of its MDV fleet. In 2004 and subsequent model years, a small volume manufacturer shall certify, produce, and deliver for sale in California vehicles or engines certified to the MDV LEV standards in a quantity equivalent to 100% of its MDV fleet.

~~(c) **Phase-In Requirements for LEV II MDVs.** 2.3.1—Beginning with For the 2004 through 2006 model years, a manufacturer, other than a small volume manufacturer must shall phase-in at least one test group per model year to the MDV LEV II standards. All 2007 and subsequent model year MDVs, including those produced by a small volume manufacturer, are subject to the LEV II MDV standards.~~

**2.3.2 Identifying a Manufacturer's MDV Fleet.** For the 2001 and subsequent model years, each manufacturer's MDV fleet shall be defined as the total number of California-certified MDVs produced and delivered for sale in California. The percentages shall be applied to the manufacturers' total production of California-certified medium-duty vehicles delivered for sale in California.

~~2.3.3 **Requirements for Small Volume Manufacturers.** In 2001 and subsequent model years, a small volume manufacturer shall certify, produce, and deliver for sale in California LEVs in a quantity equivalent to 100% of its MDV fleet.~~

## 2.4 Implementation Schedules for SFTP Emission Standards

2.4.1 A manufacturers of PCs and of LDTs certified to the Tier 1 and TLEV standards as set forth in Section E.1 of these test procedures, except a small volume manufacturer, shall certify a minimum percentage of its PC and LDT fleet according to the following phase-in schedule.

Model Year	Percentage of PC and LDT Fleet
2001	25
2002	50
2003	85
2004 and subsequent	100

(a) For the purposes of the implementation schedule set forth in this subparagraph 2.4.1, each manufacturer's PC and LDT fleet shall be defined as the total projected number of Tier 1 and TLEV PCs and LDTs from 0-5750 lbs. LVW sold in California. As an option, a manufacturer may elect to have its total PC and LDT fleet defined, for the purposes of this implementation schedule only, as the total projected number of the manufacturer's PCs and LDTs, other than zero-emission vehicles, certified and sold in California.

(b) The phase-in requirements for small volume manufacturers are set forth in Section D.2.1.6 of these test procedures.

2.4.2 (a) A manufacturer of PCs, LDTs, and MDVs certified to the LEV, ULEV and SULEV standards as set forth in Section E.1 of these test procedures, except a small volume manufacturer, shall certify a minimum percentage of its PC and LDT fleet, and a minimum percentage of its MDV fleet, according to the following phase-in schedule.

Model Year	Percentage	
	PC, LDT	MDV
2001	25	NA
2002	50	NA
2003	85	25
2004	100	50
2005 and subsequent	100	100

(b) A manufacturer may use an "Alternative or Equivalent Phase-in Schedule" to comply with the phase-in requirements. An "Alternative Phase-in" is one that achieves at least equivalent emission reductions by the end of the last model year of the scheduled phase-in. Model-year emission reductions shall be calculated by multiplying the percent of vehicles (based on the manufacturer's projected California sales volume of the applicable vehicle fleet) meeting the new requirements per model year by the number of model years implemented prior to and including the last model year of the scheduled phase-in. The "cumulative total" is the summation of the model-year emission reductions (e.g., a four model-year 25/50/85/100 percent phase-in schedule would be calculated as:  $(25\% \times 4 \text{ years}) + (50\% \times 3 \text{ years}) + (85\% \times 2 \text{ years}) + (100\% \times 1 \text{ year}) = 520$ ). Any alternative phase-in that results in an equal or larger cumulative total than the required cumulative total by the end of the last model year of the scheduled phase-in shall be considered acceptable by the Executive Officer under the following conditions: 1) all vehicles subject to the phase-in shall comply with the respective requirements in the last model year of the required phase-in schedule and 2) if a manufacturer uses the optional phase-in percentage determination in Section 2.4.1(a) above, the cumulative total of model-year emission reductions as determined only for PCs and LDTs certified to this Section 2.4.2. must also be equal to or larger than the required cumulative total by end of the 2004 model year. A manufacturer shall be allowed to include vehicles introduced before the first model year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as:  $(10\% \times 5 \text{ years})$  and added to the cumulative total).

2.4.2.1 For the purposes of the implementation schedule set forth in this subparagraph 2.4.2, each manufacturer's PC and LDT fleet shall be defined as the total

projected number of low-emission, ultra-low-emission and super-ultra-low-emission PCs and LDTs from 0-5750 pounds loaded vehicle weight sold in California. Each manufacturer's MDV fleet shall be defined as the total projected number of low-emission, ultra-low-emission, and super-ultra-low-emission MDVs less than 8501 pounds gross vehicle weight rating sold in California.

### 3. Calculation of NMOG Credits/Debits

#### 3.1 Calculation of NMOG Credits for Passenger Cars and Light-Duty Trucks.

3.1.1 In 2001 and subsequent model years, a manufacturer that achieves fleet average NMOG values lower than the fleet average NMOG requirement for the corresponding model year shall receive credits in units of g/mi NMOG determined as:

$$\frac{[(\text{Fleet Average NMOG Requirement}) - (\text{Manufacturer's Fleet Average NMOG Value})]}{(\text{Total No. of Vehicles Produced and Delivered for Sale in California, Including ZEVs and HEVs})}$$

A manufacturer with 2001 and subsequent model year fleet average NMOG values greater than the fleet average requirement for the corresponding model year shall receive debits in units of g/mi NMOG equal to the amount of negative credits determined by the aforementioned equation. For the 2001 through 2006 model year, the total g/mi NMOG credits or debits earned for PCs and LDTs 0-3750 lbs. LVW and for LDTs 3751-5750 lbs. and LDTs 3751 lbs. LVW - 8500 lbs. GVW shall be summed together. For the 2007 and subsequent model years, the total g/mi NMOG credits or debits earned for PCs and LDTs 0-3750 lbs. LVW and for LDTs 3751 lbs. LVW - 8500 lbs. GVW shall be summed together. The resulting amount shall constitute the g/mi NMOG credits or debits accrued by the manufacturer for the model year.

**3.2 Calculation of Vehicle Equivalent NMOG Credits for Medium-Duty Vehicles.** In 2001 and subsequent model years, a manufacturer that produces and delivers for sale in California MDVs in excess of the equivalent requirements for LEVs, ULEVs and/or SULEVs certified to the exhaust emission standards set forth in section E.1 of these test procedures or to the exhaust emission standards set forth in section 1956.8(h), title 13, CCR shall receive "Vehicle-Equivalent Credits" (or "VECs") calculated in accordance with the following equation, where the term "produced" means produced and delivered for sale in California:

$$\begin{aligned} & \{[(\text{No. of LEVs Produced excluding HEVs}) + \\ & (\text{No. of LEV HEVs} \times \text{HEV VEC factor for LEVs})] + \\ & (1.20 \times \text{No. of LEVs certified to the 150,000 mile standards})\} - \\ & (\text{Equivalent No. of LEVs Required to be Produced})\} + \\ & \{[(1.4) \times (\text{No. of ULEVs Produced excluding HEVs}) + \\ & (\text{No. of ULEV HEVs} \times \text{HEV VEC factor for ULEVs})] + \\ & (1.50 \times \text{No. of ULEVs certified to the 150,000 mile standards})\} - \\ & [(1.4) \times (\text{Equivalent No. of ULEVs Required to be Produced})]\} + \\ & \{[(1.7) \times (\text{No. of SULEVs Produced excluding HEVs}) + \\ & (\text{No. of SULEV HEVs} \times \text{HEV VEC factor for SULEVs})] + \\ & (1.75 \times \text{No. of SULEVs certified to the 150,000 mile standards})\} - \\ & [(1.7) \times [(\text{Equivalent No. of SULEVs Required to be Produced})]\} + \end{aligned}$$

[(2.0) x (No. of ZEVs Certified and Produced as MDVs)].

MDVs certified prior to the 2004 model year to the LEV I LEV or ULEV standards for PCs and LDTs 0-3750 lbs. LVW set forth in section E.1 of these test procedures shall receive VECs calculated in accordance with the following equation, where the term "produced" means produced and delivered for sale in California:

$$\begin{aligned} & [(1.6) \times (\text{No. of MDVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW excluding HEVs}) + \\ & (\text{No. of HEVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW} \times \text{HEV VEC factor for MDVs} \\ & \text{meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW})] + \\ & [(1.65 \times \text{No. of MDVs certified to the 150,000 mile LEV I LEV standards for PCs and LDTs 0-3750 lbs.})] + \end{aligned}$$

$$\begin{aligned} & [(1.8) \times (\text{No. of MDVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW excluding HEVs}) + \\ & (\text{No. of HEVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW} \times \text{HEV VEC factor for} \\ & \text{MDVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW})] + \\ & [(1.85 \times \text{No. of MDVs certified to the 150,000 mile LEV I ULEV standards for PCs and LDTs 0-3750 lbs.})]. \end{aligned}$$

3.2.1 The MDV HEV VEC factor is calculated as follows:

$$\begin{aligned} & 1 + [(\text{LEV standard} - \text{ULEV standard}) \times (\text{Zero-emission VMT Factor}) \div \text{LEV standard}] \text{ for LEVs;} \\ & 1 + [(\text{ULEV standard} - \text{SULEV standard}) \times (\text{Zero-emission VMT Factor}) \div \text{ULEV standard}] \text{ for ULEVs;} \\ & 1 + [(\text{SULEV standard} - \text{ZEV standard}) \times (\text{Zero-emission VMT Factor}) \div \text{SULEV standard}] \text{ for SULEVs;} \end{aligned}$$

where "Zero-emission VMT Factor" for an HEV is determined in accordance with Section C.3 of the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes, as incorporated in section 1962(d), title 13, CCR."

The HEV VEC factor for MDVs prior to model year 2004 meeting the LEV I LEV and ULEV standards for PCs and LDTs 0-3750 lbs. LVW is calculated as follows:

$$\begin{aligned} & 1 + [(\text{MDV SULEV standard} - \text{PC LEV I LEV standard}) \times (\text{Zero-emission VMT Factor}) \div \text{PC} \\ & \text{LEV I LEV standard}] \text{ for MDVs meeting the LEV I LEV standards for PCs and LDTs 0-3750} \\ & \text{lbs. LVW;} \\ & 1 + [(\text{MDV SULEV standard} - \text{PC ULEV standard}) \times (\text{Zero-emission VMT Factor}) \div \text{PC LEV I} \\ & \text{ULEV standard}] \text{ for MDVs meeting the ULEV I LEV standards for PCs and LDTs 0-3750 lbs.} \\ & \text{LVW.} \end{aligned}$$

3.2.2 A manufacturer that fails to produce and deliver for sale in California the equivalent quantity of MDVs certified to LEV, ULEV and/or SULEV exhaust emission standards, shall receive "Vehicle-Equivalent Debits" (or "VEDs") equal to the amount of negative VECs determined by the aforementioned equation.

3.2.3 Only ZEVs certified as MDVs and not used to meet the ZEV requirement shall be included in the calculation of VECs.

### 3.3 Procedure for Offsetting Debits.

3.3.1 A manufacturer shall equalize emission debits by earning g/mi NMOG emission credits or VECs in an amount equal to the g/mi NMOG debits or VEDs, or by submitting a commensurate amount of g/mi NMOG credits or VECs to the Executive Officer that were earned previously or acquired from another manufacturer. For 2001 through 2003 and for 2007 and subsequent model years, manufacturers shall equalize emission debits by the end of the following model year. For 2004 through 2006 model years, a manufacturer shall equalize NMOG debits for PCs and LDTs and LEV II MDVs within three model years and prior to the end of the 2007 model year. If emission debits are not equalized within the specified time period, the manufacturer shall be subject to the Health and Safety Code §43211 civil penalty applicable to a manufacturer which sells a new motor vehicle that does not meet the applicable emission standards adopted by the state board. The cause of action shall be deemed to accrue when the emission debits are not equalized by the end of the specified time period. For the purposes of Health and Safety Code §43211, the number of passenger cars and light-duty trucks not meeting the state board's emission standards shall be determined by dividing the total amount of g/mi NMOG emission debits for the model year by the g/mi NMOG fleet average requirement for PCs and LDTs 0-3750 lbs. LVW and LDTs 3751 lbs. LVW - 8500 lbs. GVW applicable for the model year in which the debits were first incurred and the number of medium-duty vehicles not meeting the state board's emission standards shall be equal to the amount of VEDs incurred.

3.3.2 The emission credits earned in any given model year shall retain full value through the subsequent model year. The value of any credits not used to equalize the previous model-year's debit shall be discounted by 50% at the beginning of second model year after being earned, shall be discounted to 25% of its original value if not used by the beginning of the third model year after being earned, and will have no value if not used by the beginning of the fourth model year after being earned.

#### 4. Intermediate In-Use Compliance Standards.

##### 4.1 LEV I Intermediate In-Use Compliance Standards.

4.1.1 **LEV I ULEV Standards.** For 2001 and 2002 model year PCs and LDTs certified to the ULEV standards in Section E.1.1.1, including fuel-flexible, and dual-fuel vehicles when operating on an available fuel other than gasoline, the following intermediate in-use standards shall apply:

Vehicle Type	Durability Vehicle Basis (miles)	Intermediate In-Use Compliance Standards (g/mi)		
		NMOG	CO	NOx
PCs, 0-3750 lbs. LVW LDTs	50,000	0.055	2.1	0.3
	100,000	0.075	3.4	0.4
3751-5750 lb. LVW LDTs	50,000	0.070	2.8	0.5
	100,000	0.100	4.4	0.7

4.1.2 **LEV I Standards for MDVs.** The following intermediate in-use compliance standards for 50,000 miles and 120,000 miles for MDVs from 3751-14,000 lbs. ALVW certified to the LEV I standards in Section E.1.1.1, including fuel-flexible, bi-fuel and dual-fuel vehicles when operating on an available fuel other than gasoline, shall apply for the specified model years only. In-use compliance with standards beyond 50,000 miles shall be waived through the 2001 model year for SULEVs.

Intermediate In-Use Compliance Standards* (in grams per mile)										
Emission Category	Model Year	Durability Vehicle Basis (mi)	3751-5750 lbs.		5751 - 8500 lbs.		8501-10,000 lbs.		10,001-14,000 lbs.	
			NMOG	NOx	NMOG	NOx	NMOG	NOx	NMOG	NOx
ULEV	-2002	50,000	0.128	--	0.156	--	0.184	--	0.240	--
	-2002	120,000	0.160	--	0.195	--	0.230	--	0.300	--
SULEV	through 2002	50,000	0.072	0.3	0.084	0.45	0.100	0.5	0.130	0.7
	2002	120,000	0.100	0.4	0.117	0.6	0.138	0.65	0.180	1.0

\* Dashes mean that the standards in Section E.1.1. apply.

**4.1.3 Intermediate In-Use Compliance Standards for Fuel-Flexible, Bi-Fuel and Dual-Fuel Medium-Duty LEV I SULEVs Operating on Gasoline.** For fuel-flexible, bi-fuel and dual-fuel 2001 model year MDV SULEVs operating on gasoline, the following intermediate in-use compliance standards for NMOG emissions at 50,000 miles, apply:

Fuel-Flexible, Bi-Fuel and Dual-Fuel MDVs Intermediate In-Use Compliance Standards		
Test Weight (lbs.)	Vehicle Emission Category	50,000 (g/mi)
3751-5750	SULEV	0.128
5751-8500	SULEV	0.156
8501-10,000	SULEV	0.184
10,001-14,000	SULEV	0.240

Compliance with the standards beyond 50,000 miles shall be waived for the 2001 model year for SULEVs.

**4.2 Intermediate LEV II In-Use Compliance Standards.** For test groups certified prior to the 2007 model year, the following intermediate in-use compliance standards shall apply for the first two model years the test group is certified to the new standard. For SULEVs certified prior to the 2004 model year, the following intermediate in-use compliance SULEV standards shall apply through the 2006 model year.

Emission Category	Durability Vehicle Basis	LEV II PCs and LDTs		LEV II MDVs 85001 - 10,000 lbs. GVW
		NMOG	NOx	NOx
LEV/ULEV	50,000	n/a	0.07	n/a
	120,000	n/a	0.10	0.3
SULEV	120,000	0.02	0.03	0.15

## 5. Reactivity Adjustment Factors

A reactivity adjustment factor is the ratio of the specific reactivity of a low-emission vehicle designed to operate on a fuel other than conventional gasoline (including a fuel-flexible, bi-fuel or dual-fuel vehicle when operating on any fuel other than conventional gasoline) compared to the NMOG baseline specific reactivity of vehicles in the same vehicle emission category operating on conventional gasoline. The procedure for determining compliance with the standard is set forth in Section H.1.2 of these test procedures.

5.1 The following specific reactivity values and generic reactivity adjustment factors have been established pursuant to the criteria established in Part I.D. of these test procedures. A manufacturer requesting to certify to existing standards utilizing an adjustment factor unique to its vehicle/fuel system must follow the data requirements described in Part II, Section D of these test procedures.

5.1.1 The following reactivity adjustment factors apply through the 2003 model year:

	Light-Duty Vehicles 0-6000 lbs. GVW			Medium-Duty Vehicles 6001- 14,000 lbs. GVW	
	TLEV	LEV	ULEV	LEV	ULEV
<b>Fuel*</b>	<b>Baseline Specific Reactivity (grams ozone / gram NMOG)</b>				
Conventional Gasoline	3.42	3.13	3.13	3.13	3.13
	<b>Reactivity Adjustment Factors</b>				
Phase 2 RFG	0.98	0.94	0.94	0.94	0.94
M85	0.41	0.41	0.41	0.41	0.41
Natural Gas	1.0	0.43	0.43	0.43	0.43
LPG	1.0	0.50	0.50	0.50	0.50
	<b>Methane Reactivity Adjustment Factors</b>				
Natural Gas	0.0043	0.0047	0.0047	0.0047	0.0047

\*The fuel specifications are set forth in Part II. section A.100.3 (reformulated gasoline, M85, CNG and LPG) and Part I.D. (conventional gasoline specification) of these test procedures.

**F. Requirements and Procedures for Durability Demonstration****1. §86.1820 Durability group determination.**

1.1 §86.1820-01 [No change.]

**2. §86.1821 Evaporative/refueling emission family determination.** [Delete. (The provisions of this section are set forth in the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, Heavy-Duty Vehicles and Motorcycles," and "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.")]

**3. §86.1822 Durability data vehicle selection.** [No change.]

**4. §86.1823 Durability demonstration procedures for exhaust emissions**

4.1 §86.1823-01 [No change.]

4.2 **SFTP.** These procedures are not applicable to vehicles certified to the SFTP standards set forth in Section E.1.2.2.

4.3 **HEVs.** A manufacturer shall consider expected customer usage as well as emissions deterioration when developing its durability demonstration for HEVs,

**5. §86.1824 Durability demonstration procedures for evaporative emissions.** [Delete. (The provisions of this section are set forth in the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, Heavy-Duty Vehicles and Motorcycles.")]

**6. §86.1825 Durability demonstration procedures for refueling emissions.** [Delete. (The provisions of this section are set forth in the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles.")]

**7. §86.1826 Assigned Deterioration Factors for Small Volume Manufacturers and Small Volume Test Groups.** [No change.]

## G. Procedures for Demonstration of Compliance with Emission Standards

### 1. §86.1827 Test Group Determination. [No change.]

1.1 §86.1827-01. [No change.]

~~1.2 HEVs. A manufacturer of hybrid electric vehicles shall create separate test groups based on both the type of battery technology employed by the HEV and upon the features most related to their exhaust emission characteristics.~~

### 2. §86.1828 Emission data vehicle selection

2.1 §86.1828-01. [No change.]

#### 2.2 50°F Requirements

2.2.1 Vehicle Selection. A manufacturer shall select at least three emission data and/or engineering development vehicles each year from PC or LDT test groups and at least three emission data and/or engineering development vehicles from MDV test groups.

2.2.2 The same test group shall not be selected in the succeeding two years unless the manufacturer produces fewer than three test groups. If the manufacturer produces more than three TLEV, LEV, ULEV or SULEV test groups per model year, the Executive Officer may request 50°F testing of specific test groups. If the manufacturer provides a list of the TLEV, LEV, ULEV and SULEV test groups that it will certify for a model year and provides a description of the technologies used on each test group (including the information in Section G.2.1.2(1)), the Executive Officer shall select the test groups subject to 50°F testing within a 30 day period after receiving such a list and description. The Executive Officer may revise the test groups selected after the 30 day period if the information provided by the manufacturer does not accurately reflect the test groups actually certified by the manufacturer.

### 3. §86.1829 Durability data and emission data testing requirements; waivers

3.1 §86.1829-01. Amend as follows:

3.1.1 Delete (b)(1)(ii) and replace with: For Otto-cycle vehicles or hybrid vehicles that use Otto-cycle engines, evidence shall be supplied showing that the air/fuel metering system or secondary air injection system is capable of providing sufficient oxygen to theoretically allow enough oxidation to attain the CO emission standards at barometric pressures equivalent to those expected at altitudes ranging from sea level to an elevation of 6000 feet. For fuel injected vehicles or hybrid electric vehicles that use fuel-injected engines, compliance may be demonstrated upon a showing by the manufacturer that the fuel injection system distributes fuel based on mass air flow, rather than volume flow, and is therefore self-compensating. All submitted test proposals will be evaluated on their acceptability by the Executive Officer. As an alternative to the demonstration described above, a manufacturer may demonstrate compliance by testing California vehicle configurations as part of its federal high altitude certification requirements. Engine families that meet all the applicable California low altitude emission standards when tested at the EPA test elevation are deemed to be in compliance. The SFTP standards do not apply to testing at high altitude.

3.1.2 Amend (b)(4)(i) as follows: All 2001 and subsequent model-year emission-data vehicles shall be required to be tail-pipe tested at 4,000 miles or at the mileage at which the vehicle is stabilized as determined in §86.1827-01 and demonstrate compliance with the California Inspection and Maintenance ("I/M") emission standards as specified in the "Mandatory Exhaust Emissions Inspection Standards and Test Procedures," title 16, California Code of Regulations, Section 3340.42. A manufacturer shall have the option of using the I/M test procedures in place at the time of certification or, if the I/M test procedures have been amended within two years of the time of certification, a manufacturer may use the preceding procedures. Test vehicles shall undergo preconditioning procedures prior to the tail-pipe test which consist of idle conditions for a minimum period of ten minutes after the thermostat is open. Preconditioning and test procedures shall be conducted at an ambient temperature from 68° to 86° F. The manufacturer shall, in accordance with good engineering practices, attest that such test vehicles will meet the requirements of this section when preconditioned and tested at ambient temperatures from 35° to 68° F.

3.1.3 Amend (b)(4)(ii) as follows: In lieu of testing vehicles according to the provisions of §86.1829(b)(4)(i), a manufacturer may provide a statement in its application for certification that, based on the manufacturer's engineering evaluation of such I/M testing as the manufacturer deems appropriate, all light-duty vehicles and light-duty trucks comply with the I/M emission standards.

3.1.4 Delete (b)(5). Idle CO Testing.

3.2 **50°F Requirements.** A manufacturer shall demonstrate compliance with the 50°F requirement each year by testing at least three PC or LDT and three MDV emission data and/or engineering development vehicles (with at least 4000 miles) as determined under the provisions of Section G.2.2 of these test procedures. Only TLEVs, LEVs, ULEVs and SULEVs are to be considered for testing at 50°F. It is not necessary to apply deterioration factors (DFs) to the 50°F test results to comply with this requirement.

3.3 **Highway Fuel Economy Test.** The exhaust emissions shall be measured from all exhaust emission data vehicles tested in accordance with the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B). The oxides of nitrogen emissions measured during such tests shall be multiplied by the oxides of nitrogen deterioration factor computed in accordance with 40 CFR §86.1823, and then rounded and compared with the standard as set forth in Section E.1.1 preceding. All data obtained pursuant to this paragraph shall be reported in accordance with procedures applicable to other exhaust emissions data required pursuant to these procedures. In the event that one or more of the manufacturer's emission data vehicles fail the HWFET standard listed in Section E of these test procedures, the manufacturer may submit to the Executive Officer engineering data or other evidence showing that the system is capable of complying with the standard. If the Executive Officer finds, on the basis of an engineering evaluation, that the system can comply with the HWFET standard, he or she may accept the information supplied by the manufacturer in lieu of vehicle test data.

4. **§86.1830 Acceptance of Vehicles for Testing** [No change.]
5. **§86.1831 Mileage accumulation requirements for test vehicles.** [No change.]
6. **§86.1832 Optional equipment and air conditioning.** [No change.]
7. **§86.1833 Adjustable parameters.** [No change.]

**8. §86.1834 Allowable maintenance.**

8.1 §86.1834-01. [No change.]

8.2 HEVs. (a) The manufacturer shall equip the vehicle with a maintenance indicator consisting of a light that shall activate automatically by illuminating the first time the minimum performance level is observed for all battery system components. Possible battery system components requiring monitoring are: (i) battery water level; (ii) temperature control; (iii) pressure control; and (iv) other parameters critical for determining battery condition.

(b) The manufacturer shall equip "off-vehicle charge capable HEVs" with a useful life indicator for the battery system consisting of a light that shall illuminate the first time the battery system is unable to achieve an all-electric operating range (starting from a full state-of-charge) which is at least 75% of the range determined for the vehicle in the Urban Driving Schedule portion of the All-Electric Range Test (see the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(d), title 13, CCR).

**9. §86.1835 Confirmatory certification testing. [Delete.]****10. §86.1836 Manufacturer-supplied production vehicles for testing. [Delete.]****11. §86.1837 Rounding of emission measurements**

11.1 §86.1837-01 [No change.]

11.2 Fleet average NMOG value calculations shall be rounded, in accordance with ASTM E29-67, to four significant figures before comparing with fleet average NMOG requirements.

**12. §86.1838 Small volume manufacturers certification procedures**

12.1 §86.1838-01 [No change, except that the reference to 15,000 units shall mean 4,500 units in California.]

**13. §86.1839 Carryover of certification data. [No change.]****14. §86.1840 Special test procedures**

14.1 §86.1840-01 [No change.]

~~14.2 Vehicles Equipped with Periodically Regenerating Trap Oxidizer Systems. For vehicles equipped with periodically regenerating trap oxidizer systems, the manufacturer shall propose a procedure for certifying those vehicles for advance approval by the Executive Officer.~~

## H. Certification, Information and Reporting Requirements

### 1. §86.1841 Compliance with certification emission standards for the purpose of certification

#### 1.1 §86.1841-01.

##### 1.1.1 Subparagraph (a) through (d) [No Change.]

#### 1.2 1.1.2 Delete subparagraph (e) and replace with: Reactivity Adjustment

**Factors.** ~~1.2.1~~ The NMOG emission results from all TLEVs, LEVs, ULEVs and SULEVs certifying on a fuel other than conventional gasoline, shall be numerically adjusted to establish an NMOG exhaust mass emission value equivalent. A manufacturer shall multiply the NMOG exhaust emission result for each emission-data vehicle by the appropriate reactivity adjustment factor listed in Section E.5. of these test procedures or established by a manufacturer pursuant to Part II, Section D of these test procedures. This product shall be multiplied by, or added to in the case of additive DFs, the applicable deterioration factor to determine compliance with the standard.

~~1.2.2~~1.3 For vehicles operating on natural gas, the product of the methane mass emission value and the methane reactivity adjustment factor shall be add to the result of subparagraph ~~1.2.1~~ 1.1.2. This result shall be compared to the NMOG exhaust emission standards to determine compliance with the standards.

**1.3.2 Scope of Certification.** Certification, if granted, is effective only for the vehicle/test group described in the original manufacturer's certification application. Modifications by a secondary manufacturer to vehicles/engines shall be deemed not to increase emissions above the standards under which those vehicles/engines were certified and to be within the original certification if such modifications do not: (1) increase vehicle weight more than 10 percent above the curb weight, increase frontal area more than 10 percent, or result in a combination increase of weight plus frontal area of more than 14 percent; or (2) include changes in axle ratio, tire size, or tire type resulting in changes in the drive train ratio of more than 5 percent; or (3) include any modification to the emission control system. No originally certified vehicle/engine which is modified by a secondary manufacturer in a manner described in items (1) through (3) of the preceding sentence may be sold to an ultimate purchaser, offered or delivered for sale to an ultimate purchaser, or registered in California unless the modified vehicle/engine is certified by the state board in accordance with applicable test procedures to meet emission standards for the model year for which the vehicle/engine was originally certified. For the purposes of this subsection, "secondary manufacturer" means any person, other than the original manufacturer, who modifies a new motor vehicle prior to sale to the ultimate purchaser.

**1.4.3 SFTP.** For vehicles certified to the SFTP standards in Section E.1.2.2, full and intermediate useful life shall mean 4,000 miles.

**1.4 Certification of a Federal Vehicle in California.** Whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to the standards for a particular emissions bin that are more stringent than the standards for an applicable California vehicle emissions category, the equivalent California model may only be certified to (i) the California standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the exhaust emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a

vehicle emissions category are equally stringent, the California model may only be certified to either the California standards for that vehicle emissions category or more stringent California standards. The federal emission bins are those contained Tables S04-1 and S04-2 of 40 CFR section 86.1811-04(c) as adopted February 10, 2000. A California vehicle model is to be treated as equivalent to a federal vehicle model if all of the following characteristics are identical:

- (a) Vehicle make and model;
- (b) Cylinder block configuration (e.g., L-6, V-8);
- (c) Displacement;
- (d) Combustion cycle; and
- (e) Transmission class.

The comparative stringency of the standards for the federal exhaust emissions bin and for the California vehicle emissions category shall be based on a comparison of the sum of the 100,000, 120,000, or 150,000 mile standards for NMOG and NOx.

1.4.1 If a federally-certified vehicle model is certified in California in accordance with subparagraph 1.4, the model shall be subject to the federal requirements for exhaust emissions, SFTP emissions, cold CO emissions and highway NOx. The vehicle model shall be subject to all other California requirements including evaporative emissions, OBD II, and emissions warranty.

1.4.2 Prior to certification of a 2004 or subsequent model-year vehicle, a manufacturer must submit information sufficient to enable the Executive Officer to determine whether there is a federally-certified vehicle model for that model year that is equivalent to the California vehicle model based on the criteria listed in subparagraph 1.4.

1.4.3 If the Executive Officer determines that there is a federally-certified vehicle model for that model year that is equivalent to the California vehicle model, the following information shall be submitted with the Part I or Part II Application for Certification as set forth below:

(a) Part I Application for Certification: (i) Evidence of federal certification including, but not limited to, federal certification exhaust emission levels and compliance with federal SFTP, cold CO and highway NOx emission levels; and (ii) evidence of compliance with California evaporative emission requirements and California OBD II requirements.

(b) Part II Application for Certification: evidence of a warranty on emission-related parts in accordance with sections 2035 et seq., title 13 CCR as they apply to vehicles certified under the primary California standard.

1.4.4 For purposes of meeting the California NMOG fleet average phase-in requirements or for determining vehicle equivalent credits, the applicable California NMOG value for passenger cars and light-duty trucks or vehicle equivalent credits for medium-duty vehicles shall be determined as follows:

(a) The sum of the federal full useful life (100,000, 120,000 or 150,000) NMOG and NOx value shall be compared with the next less stringent California full useful life NMOG plus NOx value to determine which emission category (e.g., LEV, ULEV or SULEV) is to be used for the fleet average value or vehicle equivalent credit calculation.

(b) For passenger cars and light-duty trucks, once the equivalent California emission category is determined (e.g., whether the vehicle is considered a

LEV, ULEV or SULEV), the applicable NMOG value to be used in the fleet average calculation is set forth in the table in section E.2.1.2 of these test procedures for passenger cars and light-duty trucks. For example, if the full useful life (120,000 miles) NMOG plus NOx standard to which the federal vehicle is certified is 0.110 grams per mile, that vehicle would be considered a LEV II ULEV for fleet average purposes because the combined LEV full useful life NMOG plus NOx value is 0.125 and is the next less stringent emission category. The applicable emission standard to be used in the fleet average calculation would therefore be 0.040 grams per mile.

1.4.5 The vehicle shall be subject to the federal in-use requirements and the emission standard applicable for in-use compliance purposes shall be the federal standard to which the vehicle was federally-certified.

1.4.6 The tune label shall meet the federal requirements applicable to such a vehicle with an additional sentence which reads: "This vehicle conforms to federal regulations and is certified for sale in California." The value used in the smog index label shall be the California emission category to which the vehicle was deemed certified for fleet average NMOG purposes.

**2. §86.1842 Addition of a vehicle after certification; and changes to a vehicle covered by certification. [No change.]**

**3. §86.1843 General information requirements**

3.1 §86.1843-01 [No change.]

3.2 **Alternative Fuel Information.** For TLEVs, LEVs, ULEVs, and SULEVs not certified exclusively on gasoline or diesel, the manufacturer shall submit projected California sales and fuel economy data nineteen months prior to January 1 of the model year for which the vehicles are certified.

3.3 **Credit Reporting.** In order to verify the status of a manufacturer's compliance with the fleet average or phase-in requirements for a given model year, and in order to confirm the accrual of credits or debits, each manufacturer shall submit an annual report to the Executive Officer which sets forth the production data used to establish compliance, by no later than March 1 of the calendar year following the close of the model year.

3.4 **SFTP.** Prior to 2003 model year, a manufacturer that introduces MDVs certified to the SFTP requirements set forth in E1.2.2 must submit the implementation information required for vehicles produced in subsequent model years.

**4. §86.1844 Information Requirements: Application for Certification and Submittal of Information Upon Request**

4.1 §86.1844-01. Amend as follows:

4.1.1 Delete §86.1844-01(d)(9).

4.1.2 Add the following requirements to §86.1844-01(e):

(a) The information required in sections 2037, 2038 and 2039, title 13, CCR.

(b) The NMOG/NMHC and/or formaldehyde to NMHC ratios established according to Section I.1.4 of these test procedures

4.2 **OBD Requirements.** For 2001 and subsequent model-year passenger cars, light-duty trucks and medium-duty vehicles, information shall be submitted in the application for certification according to the requirements of section 1968.1, title 13, CCR.

4.3 **HEVs.** For HEVs, the information required in the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(d), title 13, CCR, must be supplied with the Part I application for certification.

**I. In-Use Compliance Requirements and Procedures**

1. §86.1845 Manufacturer in-use verification testing requirements

1.1 §86.1845-01. Amend as follows:

1.1.1 **Table S01-5 California Small Volume Manufacturers and Small Volume Test Groups**

California only test group annual sales <sup>(1)</sup>	1-1,500	1,501-4,500
High Mileage	voluntary	2

<sup>(1)</sup> Total annual production of groups eligible for testing under small volume sampling plan is capped at a maximum of 4,500 California-only production volume per model year, per large volume manufacturer. All other remaining large or intermediate volume manufacturer small volume test groups shall meet the requirements in Table S01-06 below.

1.1.2 **Table S01-6 - California Large Volume Manufacturers**

California only test group - annual sales	4,500-15,000	15,001-25,000	>25,000
High Mileage	4	5	6

1.1.3. **High Mileage Testing.** Amend subparagraph (c)(2) of 40 CFR §86.1845-01 to read: All test vehicles must have a minimum odometer mileage of 50,000 miles. At least one vehicle of each test group certified to the emission standards in Section E.1.1.1 must have a minimum age and odometer mileage of 75,000 for light-duty vehicles and 90,000 miles for medium-duty vehicles. At least one vehicle of each test group certified to the emission standards in Section E.1.1.2 must have a minimum age and odometer mileage of 90,000 miles. See §86.1838-01(c)(2) for small volume manufacturer mileage requirements.

1.1.4 **High Altitude Testing.** Amend subparagraph (c)(5)(i) of 40 CFR §86.1845-01 to read: Each test vehicle shall be tested in accordance with the Federal Test Procedure and the US06 portion of the Supplemental Federal Test Procedure (if applicable) as described in subpart B of this part, when such test vehicle is tested for compliance with the applicable exhaust emission standards under this subpart. High altitude testing shall not apply.

## 1.2 §86.1845-04. Amend as follows:

1.2.1 **Table S04-5 California Small Volume Manufacturers and Small Volume Test Groups**

California only test group annual sales <sup>(1)</sup>	1-1,500	1,501-4,500
Low Mileage	voluntary	0
High Mileage	voluntary	2

<sup>(1)</sup> Total annual production of groups eligible for testing under small volume sampling plan is capped at a maximum of 4,500 California-only production volume per model year, per large volume manufacturer. All other remaining large or intermediate volume manufacturer small volume test groups shall meet the requirements in Table S04-06 below.

1.2.2 **Table S04-6 - California Large Volume Manufacturers**

California only test groups - annual sales	4,500-15,000	15,001-25,000	>25,000
Low Mileage	2	3	4
High Mileage	4	5	6

1.2.3 **High Mileage Testing.** Amend subparagraph (c)(2) of 40 CFR §86.1845-04 to read as follows: All test vehicles must have a minimum odometer mileage of 50,000 miles. At least one vehicle of each test group certified to the emission standards in Part I, Section E.1.1.1 of these procedures must have a minimum age and odometer mileage of 75,000 for light-duty vehicles and 90,000 miles for medium-duty vehicles. At least one vehicle of each test group certified to the emission standards in Part I, Section E.1.1.2 of these test procedures must have a minimum age and odometer mileage of 90,000 miles. See §86.1838-01(c)(2) for small volume manufacturer mileage requirements.

1.3 **SFTP.** The manufacturer in-use verification testing requirements shall not apply to vehicles certified to the SFTP standards set forth in Section E.1.2.2 of these test procedures.

1.4 **Test Ratios.** (a) As an alternative to measuring the NMOG content, the Executive Officer may approve, upon submission of supporting data by a manufacturer, the use of NMOG to NMHC ratios. To request the use of NMOG to NMHC ratios, a manufacturer shall establish during certification testing the ratio of measured NMOG exhaust emissions to measured NMHC exhaust emissions for each emission data vehicle for the applicable test group. The results shall be submitted to the Executive Officer in the Part II application for certification. A manufacturer may conduct in-use testing on the test group by measuring NMHC exhaust

emissions rather than NMOG exhaust emissions. After approval by the Executive Officer, the measured NMHC exhaust emissions shall be multiplied by the NMOG to NMHC ratio submitted in the application for certification for the test group to determine the equivalent NMOG exhaust emission values for the test vehicle. The equivalent NMOG exhaust emission value shall be used in place of the measured NMOG exhaust emission value in determining the reactivity adjusted exhaust NMOG results. The equivalent reactivity adjusted NMOG exhaust emission values shall be compared to the NMOG exhaust emission standard applicable to the vehicle emission category (TLEV, LEV, ULEV or SULEV) in which the test group was certified.

(b) For fuel-flexible vehicles certified to NMOG standards, the manufacturer may request from the Executive Officer the use of a methanol (M85) or ethanol (E85) NMOG exhaust emission to gasoline NMHC exhaust emission ratio which shall be established during certification testing for each emission data vehicle for the applicable test group. The results shall be submitted to the Executive Officer in the Part II application for certification. After approval by the Executive Officer, the measured gasoline NMHC exhaust emissions shall be multiplied by the M85 or E85 NMOG to gasoline NMHC ratio submitted in the application for certification for the test group to determine the equivalent NMOG exhaust emission values for the test vehicle. The equivalent NMOG exhaust emission value shall be used in place of the measured NMOG exhaust emission value in determining the reactivity adjusted exhaust NMOG results. The equivalent reactivity adjusted NMOG exhaust emission values shall be compared to the NMOG exhaust emission standard applicable to the vehicle emission category (TLEV, LEV, ULEV, or SULEV) in which the test group was certified.

(c) As an alternative to measuring the HCHO content, the Executive Officer may approve, upon submission of supporting data by a manufacturer, the use of HCHO to NMHC ratios. To request the use of HCHO to NMHC ratios, the manufacturer shall establish during certification testing the ratio of measured HCHO exhaust emissions to measured NMHC exhaust emissions for each emission data vehicle for the applicable test group. The results shall be submitted to the Executive Officer in the Part II application for certification. Following approval of the application for certification, the manufacturer may conduct in-use testing on the test group by measuring NMHC exhaust emissions rather than HCHO exhaust emissions. The measured NMHC exhaust emissions shall be multiplied by the HCHO to NMHC ratio submitted in the application for certification for the test group to determine the equivalent HCHO exhaust emission values for the test vehicle. The equivalent HCHO exhaust emission values shall be compared to the HCHO exhaust emission standard applicable to the test group.

**2. §86.1846 Manufacturer in-use confirmatory testing requirements.**

2.1 §86.1846-01 [No Change.]

2.2 **SFTP.** The manufacturer in-use compliance testing requirements shall not apply to vehicles certified to the SFTP standards set forth in Section E.1.2.2 of these test procedures.

3. **§86.1847 Manufacturer in-use verification and in-use confirmatory testing; submittal of information and maintenance of records.**

3.1 §86.1847-01 Amend as follows:

3.1.1 Amend subparagraph (a)(3) of 40 CFR §86.1847-01 to add: Procurement documentation. A description of the procurement area, a record of the source(s) of any list(s) of vehicles used as a basis for procurement, and a complete record of the number of vehicles rejected after positive vehicle owner response, reason(s) for manufacturer rejection of each rejected vehicles and the method used for random selection of positive owner response vehicles. A complete record of the number of vehicle owners/lessees in which attempt to contact was made and the number of vehicle owners/lessees actually contacted, the number of owners/lessees not contacted and the reasons and number of each for failure to contact, and the number of owners contacted who declined to participate.

3.1.2 Amend subparagraph (b)(1) of 40 CFR §86.1847-01 to read: A complete printout of each and every emission test performed, including, but not limited to, all test results, the date of each test, the full useful life emission standards to which the test group is certified, and the phase mass values for fuel economy, carbon dioxide and each pollutant measured by the Federal Test Procedure and Supplemental Test Procedure as prescribed by subpart B of this part.

3.1.3 Amend subparagraph (f)(1) of 40 CFR §86.1847-01 to read: A complete printout of each and every emission test performed, including, but not limited to, all test results, the date of each test, the full useful life emission standards to which the test group is certified, and the phase mass values for fuel economy, carbon dioxide and each pollutant measured by the Federal Test Procedure and Supplemental Test Procedure as prescribed by subpart B of this part.

Appendices I, II, and III to §86.1845-01 [No change.]

**J. Procedural Requirements**

1. §86.1848 Certification. [No change.]
2. §86.1849 Right of entry. [No change.]
3. §86.1850 Denial, Suspension or Revocation of Certificate of Conformity. [No change.]
4. §86.1851 Application of good engineering judgment to manufacturers' decisions. [No change.]
5. §86.1852 Waivers for good in-use emission performance. [No change.]
6. §86.1853 Certification hearings. [No change.]

**PART II**  
**CALIFORNIA EXHAUST AND PARTICULATE EMISSION TEST PROCEDURES**  
**FOR PASSENGER CARS, LIGHT-DUTY TRUCKS**  
**AND MEDIUM-DUTY VEHICLES**

This part describes the equipment required and the procedures necessary to perform gaseous and particulate exhaust emission tests (40 CFR Part 86, Subpart B); cold temperature test procedures (40 CFR Part 86, Subpart C); the California 50°F test procedure; the development of reactivity adjustment factors; and the supplemental federal test procedure (40 CFR Part 86, Subpart B) on passenger cars, light-duty trucks and medium-duty vehicles.

**A. 40 CFR Part 86, Subpart B - Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles and New Light-Duty Trucks; Test Procedures.**

**100.1 General applicability.**

86.101 General applicability. ~~June 28, 1977~~ October 6, 2000

86.102 Definitions. March 5, 1980.

86.103 Abbreviations. March 5, 1980.

86.104 Section numbering, construction. ~~April 11, 1989~~ September 21, 1994.

86.105 Introduction; structure of subpart. ~~April 11, 1989~~ September 21, 1994.

**100.2 Equipment and Facility Requirements.**

86.106-00 Equipment required; overview. October 22, 1996.

86.107-98 Sampling and analytical system, evaporative emissions. August 23, 1995.

86.108-00 Dynamometer. October 22, 1996.

86.109-94 Exhaust gas sampling system; Otto-cycle vehicles not requiring particulate emission measurements. June 30, 1995.

86.110-94 Exhaust gas sampling system; diesel-cycle vehicles, and Otto-cycle vehicles requiring particulate emissions measurements. June 30, 1995.

86.111-94 Exhaust gas analytical-system. September 30, 1994.

86.112-91 Weighing chamber (or room) and microgram balance specifications. June 5, 1991.

**100.3 Certification Fuel Specifications.**

86.113-94 Fuel Specifications. June 30, 1995.

86.113-04 Fuel Specifications. February 10, 2000.

**100.3.1 California Certification Gasoline Specification.** Add the following subparagraph which reads: Gasoline having the specifications listed below may be used in exhaust and evaporative emission testing as an option to the specifications referred to in 86.113-94(a)(1). If a manufacturer elects to utilize this option, both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed below, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below.

California Certification Gasoline Specifications		
Fuel Property <sup>(a)</sup>	Limit	Test Method <sup>(b)</sup>
Octane (R+M)/2	91 (min)	D 2699-88, D 2700-88
Sensitivity	7.5 (min)	D 2699-88, D 2700-88
Lead	0-0.01g/gal (max); no lead added	§2253.4(c), title 13 CCR
Distillation Range:		§2263, title 13 CCR <sup>(c)</sup>
10% point	130-150 °F	
50% point <sup>(d)</sup>	200-210 °F	
90% point <sup>(e)</sup>	290-300 °F	
EP, maximum	390 °F	
Residue	2.0 vol. % (max)	
Sulfur	30-40 ppm by wt.	§2263, title 13 CCR
Phosphorous	0.005 g/gal (max)	§2253.4(c), title 13 CCR
RVP	6.7-7.0 psi	§2263, title 13 CCR
Olefins	4.0-6.0 vol. %	§2263, title 13 CCR
Total Aromatic Hydrocarbons	22-25 vol. %	§2263, title 13 CCR
Benzene	0.8-1.0 vol. % <sup>(f)</sup>	§2263, title 13 CCR
Multi-substituted Alkyl Aromatic Hydrocarbons	12-14 vol. % <sup>(g)</sup>	
MTBE	10.8-11.2 vol. %	§2263, title 13 CCR
Additives	Sufficient to meet requirements of §2257, title 13 CCR	
Copper Corrosion	No. 1	D 130-88
Gum, washed	3.0 mg/100 mL (max)	D 381-86
Oxidation Stability	1000 minutes (min)	D 525-88
Specific Gravity	Report <sup>(h)</sup>	
Heat of Combustion	Report <sup>(h)</sup>	
Carbon	Report wt. % <sup>(h)</sup>	
Hydrogen	Report wt. % <sup>(h)</sup>	

<sup>(a)</sup> The gasoline must be blended from typical refinery feedstocks.

<sup>(b)</sup> ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.

(c) Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.

(d) The range for interlaboratory testing is 195-215° F.

(e) The range for interlaboratory testing is 285-305° F.

(f) The range for interlaboratory testing is 0.7-1.1 percent by volume.

(g) "Detailed Hydrocarbon Analysis of Petroleum Hydrocarbon Distillates, Reformates, and Gasoline by Single Column High Efficiency (Capillary) Column Gas Chromatography," by Neil Johansen, 1992, Boulder, CO.

(h) The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

### 100.3.2 Certification Diesel Fuel Specifications

Amend subparagraphs §86.113-94(b)(2) and (b)(3) as follows:

(2) Except as noted below, petroleum fuel for diesel vehicles meeting the specifications referenced in 40 CFR §86.113-94(b)(2), or substantially equivalent specifications approved by the Executive Officer, shall be used in exhaust emission testing. The grade of petroleum fuel recommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel, shall be used. The petroleum fuel used in exhaust emission testing may meet the specifications listed below, or substantially equivalent specifications approved by the Executive Officer, as an option to the specifications in 40 CFR §86.113-94(b)(2). Where a manufacturer elects pursuant to this subparagraph to conduct exhaust emission testing using the specifications of 86.113-94(b)(2), or the specifications listed below, the Executive Officer shall conduct exhaust emission testing with the diesel fuel meeting the specifications elected by the manufacturer.

California Certification Diesel Fuel Specifications		
Fuel Property	Limit	Test Method <sup>(a)</sup>
Natural Cetane Number	47-55	D 613-86
Distillation Range		§2282(g)(3), title 13, CCR
IBP	340-420 °F	
10% point	400-490 °F	
50% point	470-560 °F	
90% point	550-610 °F	
EP	580-660 °F	
API Gravity	33-39°	D 287-82
Total Sulfur	0.01-0.05 wt. %	§2282(g)(3), title 13, CCR
Nitrogen Content	100-500 ppmw	§2282(g)(3), title 13, CCR
Total Aromatic Hydrocarbons	8-12 vol. %	§2282(g)(3), title 13, CCR
Polycyclic Aromatic Hydrocarbons	1.4 wt. % (max)	§2282(g)(3), title 13, CCR
Flashpoint	130 °F (max)	D 93-80
Viscosity @ 40°F	2.0-4.1 centistokes	D 445-83

(a) ASTM specifications unless otherwise noted. A reference to a subsection of §2282, title 13, CCR, means the test method identified in that subsection for the particular property. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results of the specified method.

(3) Diesel fuel representative of commercial diesel fuel which will be generally available through retail outlets shall be used in service accumulation.

### 100.3.3 Alcohol Fuels

Amend §86.113-94(c) as follows:

Delete subparagraphs (c)(1) and (c)(2); replace with:

(c)(1) **Emission test fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust and evaporative emission testing shall meet the specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol) as modified by the following:

Specification	Limit
<b>M-100 Fuel Methanol</b>	
Methanol	98.0 ± 0.5 vol. percent
Ethanol	1.0 ± 0.1 vol. percent max.
Petroleum fuel meeting the specifications of section 100.3.1.	1.0 ± 0.1 vol. percent
<b>E-100 Fuel Ethanol</b>	
Ethanol	98.0 ± 0.5 vol. percent
Methanol	1.0 ± 0.1 vol. percent max.
Petroleum fuel meeting the specifications of section 100.3.1.	1.0 ± 0.1 vol. percent

(c)(2) **Mileage accumulation fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for service accumulation shall meet the applicable specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol).

(c)(3) Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

**100.3.4 Mixtures of Petroleum and Alcohol Fuels for Flexible Fuel Vehicles**

Amend §86.113-94(d) as follows:

Delete subparagraphs (d)(1) and (d)(2); replace with:

**(d)(1) Exhaust emission test fuel for emission-data and durability-data vehicles.**

For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) as modified by the following:

Specification	Limit
<b>M-85 Fuel Methanol</b>	
Petroleum fuel meeting the specifications of section 100.3.1.	13-16 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.
<b>E-85 Fuel Ethanol</b>	
Petroleum fuel meeting the specifications of section 100.3.1.	15-21 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.

**(d)(2) Mileage accumulation fuel.** For flexible fuel Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles that use Otto-cycle or diesel alcohol engines, petroleum fuel shall meet the applicable specifications in Part II, Sections A.100.3.1 or 100.3.2 and methanol or ethanol fuel shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specification for E-85 Fuel Ethanol). Mileage accumulation procedures shall be subject to the requirements set forth in 40 CFR §86.1831-01(a) and (b) and are subject to the prior approval of the Executive Officer. A manufacturer shall consider expected customer fuel usage as well as emissions deterioration when developing its durability demonstration.

**(d)(3) Evaporative emission test fuel for emission-data and durability-data vehicles.**

For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, a blend of methanol or ethanol fuel used for evaporative emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) and gasoline meeting the specifications of Part II section A.100.3.1 of these test procedures such that the final blend is composed of either 35 volume percent methanol ( $\pm 1.0$  volume percent of total blend) for methanol-fueled vehicles or 10 volume percent ethanol ( $\pm 1.0$  volume percent of total blend) for ethanol-fueled vehicles. Alternative alcohol-gasoline blends may be used in place of M35 or E10 if demonstrated to result in equivalent or higher evaporative emissions, subject to prior approval of the Executive Officer.

**(d)(4) Additive requirements.** Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such

approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

### 100.3.5 Natural Gas Fuels

Amend §86.113-94(e) as follows:

Delete subparagraphs (e)(1), (e)(2) and (e)(3); replace with:

(e)(1) **Exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas) as modified by the following:

Specification	Limit
<b>Compressed Natural Gas Certification Test Fuel</b>	
Methane	90.0 ± 1.0 mole percent
Ethane	4.0 ± 0.5 mole percent
C <sub>3</sub> and higher hydrocarbon content	2.0 ± 0.3 mole percent
Oxygen	0.5 mole percent maximum
Inert gases (CO <sub>2</sub> + N <sub>2</sub> )	3.5 ± 0.5 vol. percent

(e)(2) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for service accumulation shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas).

### 100.3.6 Liquefied Petroleum Gas Fuels

Amend §86.113-94(f) as follows:

Delete subparagraphs (f)(1) and (f)(2); replace with:

(f)(1) **Evaporative and exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas) as modified by the following:

Specification	Limit
<b>Liquefied Petroleum Gas Certification Test Fuel</b>	
Propane	93.5 ± 1.0 volume percent
Propene	3.8 ± 0.5 volume percent
Butane and heavier components	1.9 ± 0.3 volume percent

(f)(2) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for service accumulation shall meet the

specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas).

### 100.3.7 Identification of New Clean Fuels to be Used in Certification Testing

Any person may petition the state board to establish by regulation certification testing specifications for a new clean fuel for which specifications for a new clean fuel are not specifically set forth in paragraph 86.113-94 as amended herein. Prior to adopting such specifications, the state board shall consider the relative cost-effectiveness of use of the fuel in reducing emissions compared to the use of other fuels. Whenever the state board adopts specifications for a new clean fuel for certification testing, it shall also establish by regulation specifications for the fuel as it is sold commercially to the public.

(a) If the proposed new clean fuel may be used to fuel existing motor vehicles, the state board shall not establish certification specifications for the fuel unless the petitioner has demonstrated that:

(1) Use of the new clean fuel in such existing motor vehicles would not increase emissions of NMOG (on a reactivity-adjusted basis), NO<sub>x</sub>, CO, and the potential risk associated with toxic air contaminants, as determined pursuant to the procedures set forth in "California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels," as adopted September 17, 1993. In the case of fuel-flexible vehicles or dual-fuel vehicles which were not certified on the new clean fuel but are capable of being operated on it, emissions during operation with the new clean fuel shall not increase compared to emissions during vehicle operation on gasoline.

(2) Use of the new clean fuel in such existing motor vehicles would not result in increased deterioration of the vehicle and would not void the warranties of any such vehicles.

(b) Whenever the state board designates a new clean fuel pursuant to this section, the state board shall also establish by regulation required specifications for the new clean fuel sold commercially in California.

86.114-94 Analytical gases. June 30, 1995.

86.115-00 EPA urban dynamometer driving schedules. October 22, 1996.

### 100.4 Calibration methods and frequency.

86.116-94 Calibrations, frequency and overview. ~~April 11, 1989~~ June 30, 1995.

86.117-96 Evaporative emission enclosure calibrations. August 23, 1995.

86.118-00 Dynamometer calibrations. October 22, 1996.

86.119-90 CVS calibration. ~~June 30, 1995~~ May 4, 1998.

86.120-94 Gas meter or flow instrumentation calibration, particulate, methanol and formaldehyde measurement. June 30, 1995.

86.121-90 Hydrocarbon analyzer calibration. June 30, 1995.

- 86.122-78 Carbon monoxide analyzer calibration. June 28, 1977.  
 86.123-78 Oxides of nitrogen analyzer calibration. June 30, 1995.  
 86.124-78 Carbon dioxide analyzer calibration. June 28, 1977.  
 86.125-94 Methane analyzer calibration. June 5, 1991.  
 86.126-90 Calibration of other equipment. April 11, 1989.

### 100.5 Test Procedures and Data Requirements.

- 86.127-00 Test procedures; overview. ~~October 22, 1996~~ May 4, 1999.  
 86.128-00 Transmissions. October 22, 1996.  
 86.129-00 Road load power, test weight, inertia weight class determination, and fuel temperature profile. ~~October 22, 1996~~. October 6, 2000.

#### 100.5.1 California Road Load Power, Test Weight and Inertia Weight Class Determination.

100.5.1.1 Amend §86.129-00(a) to add the following specifications for medium-duty vehicles:

ROAD LOAD POWER @ 50 mph FOR MEDIUM-DUTY VEHICLES		
ADJUSTED LOADED VEHICLE WEIGHT (lbs.)	EQUIVALENT TEST WEIGHT (lbs.)	INERTIA WEIGHT CLASS (lbs.)
10001 to 10250	10000	10000
10251 to 10750	10500	10500
10751 to 11250	11000	11000
11251 to 11750	11500	11500
11751 to 12250	12000	12000
12251 to 12750	12500	12500
12751 to 13250	13000	13000
13251 to 13750	13500	13500
13751 to 14000	14000	14000

100.5.1.2 Amend §86.129-00(b) to add the following specifications for medium-duty vehicles: **Power absorption unit adjustment- medium-duty vehicles.**

(1) The power absorption unit shall be adjusted to reproduce road load power at 50 miles per hour true speed. The dynamometer power absorption shall take into account the dynamometer friction, as discussed in paragraph 86.118-78.

(2) The dynamometer road load setting is determined from the loaded test weight, the reference frontal area, vehicle protuberances, and an aerodynamic drag coefficient as determined appropriate by the Executive Officer. The vehicle manufacturer shall submit the procedure by which the aerodynamic drag coefficient was determined in the test vehicle information section in

the certification application. The dynamometer road load setting shall be determined by the following equation.

- (i) For medium-duty vehicles to be tested on twin or single large roll dynamometers:

$$H_p = (0.00182)V((0.015)(W)+(0.0375)(C_d)(A)(V^2)/(32.2\text{ft/s}^2))+P$$

where:

$H_p$  = the dynamometer power absorber setting at 50 mph (horsepower).

0.00182 = conversion factor to horsepower.

$V$  = velocity in feet/sec.

0.015 = coefficient of rolling resistance.

$W$  = loaded vehicle weight in pounds.

0.0375 = air density in lbm/cubic ft.

$C_d$  = aerodynamic drag coefficient.

$A$  = reference frontal area in square ft.

32.2 ft/s<sup>2</sup> = gravitational acceleration

$P$  = protuberance power (horsepower)

- (ii) The protuberance power,  $P$  shall be determined per subparagraph

86.129-80(c)(2)(i).

- (iii) The dynamometer power absorber setting for medium-duty vehicles shall be rounded to the nearest 0.1 horsepower.

(3) The road load power calculated above shall be used or the vehicle manufacturer may determine the road load power by an alternate procedure requested by the manufacturer and approved in advance by the Executive Officer.

(4) Where it is expected that more than 33 percent of a vehicle line within an engine-system combination will be equipped with air conditioning, per §86.1828-01, the road load power as determined in paragraph (2) or (3) of this section shall be increased by 10 percent up to a maximum increment of 1.4 horsepower, for testing all test vehicles of that vehicle line within that engine-system combination if those vehicles are intended to be offered with air conditioning in production. This power increment shall be added to the indicated dynamometer power absorption setting prior to rounding off this value.

86.130-00 Test sequence; general requirements. October 22, 1996.

**100.5.2 California test sequence; general requirements**

100.5.2.1 Delete subparagraph (a) of §86.130-00 and replace with:

For purposes of determining conformity with 50°F test requirements, the procedures set forth in Part II, Section C. For all hybrid electric vehicles and all 2001 and subsequent model-year vehicles certifying to running loss and useful life evaporative emission standards, the test sequence specified in "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Motor Vehicles" as incorporated by reference in section 1976, title 13, CCR shall apply.

100.5.2.2 Add the following:

A manufacturer has the option of simulating air conditioning operation during testing at other ambient test conditions provided it can demonstrate that the vehicle tailpipe exhaust emissions are representative of the emissions that would result from the SC03 cycle test procedure and the ambient conditions of paragraph 86.161-00. The Executive Officer has approved two optional air conditioning test simulation procedures, AC1 and AC2, for the 2001 to 2003 model years only. If a manufacturer desires to conduct an alternative SC03 test simulation other than AC1 and AC2, or the AC1 and AC2 simulations for the 2004 and subsequent model years, the simulation test procedure must be approved in advance by the Executive Officer (see paragraphs 86.162-00 and 86.162-03).

86.131-00 Vehicle preparation. October 22, 1996.

86.132-00 Vehicle preconditioning. October 22, 1996

### 100.5.3 California Vehicle Preconditioning Requirements

100.5.3.1 Add the following subparagraph: For all hybrid electric vehicles and all 2000 and subsequent model-year vehicles subject to running loss and useful life evaporative emission standards, the preconditioning sequence for the Federal Test Procedure specified in "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Motor Vehicles" as incorporated by reference in section 1976, title 13, CCR shall apply. In addition, the preconditioning sequence for the SFTP described in subparagraphs (n) and (o) of paragraph 86.132-00 shall apply.

86.133-96 Diurnal breathing loss test. August 23, 1995.

86.134-96 Running loss test. August 23, 1995.

86.135-00 Dynamometer procedure. October 22, 1996.

86.136-90 Engine starting and restarting. September 21, 1994.

86.137-96 Dynamometer test run, gaseous and particulate emissions. March 24, 1993.

86.138-96 Hot soak test. August 23, 1995.

86.139-90 Diesel particulate filter handling and weighing. April 11, 1989.

86.140-94 Exhaust sample analysis. June 30, 1995.

86.142-90 Records required. June 30, 1995.

86.143-96 Calculations; evaporative emissions. August 23, 1995.

86.144-94 Calculations; exhaust emissions. ~~July 5, 1991~~ September 5, 1997.

### 100.5.4 Calculations; exhaust emissions

100.5.4.1 The exhaust emission calculations for California are set forth in the "California Non-Methane Organic Gas Test Procedures," as adopted July 21, 1991 and last amended August 5, 1999, which is incorporated by reference herein.

100.5.4.2 Add the following calculation:

Organic material non-methane hydrocarbon equivalent mass for ethanol vehicles:

$$\text{OMNMHCE}_{\text{mass}} = \text{NMHC}_{\text{mass}} + (13.8756/32.042) \times (\text{CH}_3\text{OH})_{\text{mass}} + \\ (13.8756/23.035) \times (\text{CH}_3\text{CH}_2\text{OH})_{\text{mass}} + (13.8756/30.0262) \times (\text{HCHO})_{\text{mass}} + \\ (13.8756/22.027) \times (\text{CH}_3\text{CHO})_{\text{mass}}$$

86.145-82 Calculations; particulate emissions. November 2, 1982.

~~86.146-96 to 85.157-98 [n/a; (ORVR)]~~

- 86.158-00 Supplemental Federal Test Procedures; overview. October 22, 1996.
- 86.159-00 Exhaust emission test procedures for US06 emissions. October 22, 1996.
- 86.160-00 Exhaust emission test procedure for SC03 emissions. October 22, 1996.
- 86.161-00 Air conditioning environmental test facility ambient requirements. October 22, 1996.
- 86.162-00 Approval of alternative air conditioning test simulations and descriptions of AC1 and AC2. October 22, 1996.
- 86.162-03 Approval of alternative air conditioning test simulations. October 22, 1996.
- 86.163-00 Spot check correlation procedures for vehicles tested using a simulation of the environmental test cell for air conditioning emission testing. October 22, 1996.
- 86.164-00 Supplemental federal test procedure calculations. October 22, 1996.

**B. Subpart C - Emission Regulations for 1994 and Later Model Year Gasoline-Fueled New Light-Duty Vehicles and New Light-Duty Trucks; Cold Temperature Test Procedures**

86.201-94 General applicability. July 17, 1992.

**200.1 California applicability.**

Amend subparagraph 86.201-94(a) as follows: This subpart describes procedures for determining the cold temperature carbon monoxide (CO) emissions from 2000 and later model year new passenger cars, light-duty trucks, and medium-duty vehicles (excluding natural gas, diesel-fueled, and zero-emission vehicles).

86.202-94 Definitions. July 17, 1992.

86.203-94 Abbreviations. July 17, 1992.

86.204-94 Section number construction. July 17, 1992.

86.205-94 Introduction; structure of subpart. July 17, 1992.

86.206-94 Equipment required; overview. July 17, 1992.

**200.2 California Equipment Required; Overview**

Amend §86.206-94, as follows:

This subpart contains procedures for exhaust emission tests on passenger cars, light-duty trucks, and medium-duty vehicles (excluding natural gas, diesel-fueled, and zero-emission vehicles.) Equipment required and specifications are as follows:

(a)(1) **Exhaust emission tests.** Exhaust from vehicles (excluding natural gas, diesel-fueled, and zero-emission vehicles) is tested for gaseous emissions using the Constant Volume Sampler (CVS) concept (§86.209). Equipment necessary and specifications appear in 40 CFR Part 86, §§86.208 through 86.214.

(a)(2) **Fuel, analytical gas, and driving schedule specifications.** Fuel specifications for exhaust emission testing for gasoline-fueled vehicles are specified in 40 CFR Part 86, §86.213. As an option, a manufacturer may utilize the fuel specified in §86.213 with the sulfur content limited to 30-40 ppm by weight. Fuel specifications for exhaust emission testing for alcohol-fueled vehicles and liquefied petroleum gas vehicles are specified in Part II, Section A.100.3 of these test procedures. Analytical gases are specified in 40 CFR Part 86, §86.214. The EPA Urban Dynamometer Driving Schedule (UDDS) for use in emission tests is specified in 40 CFR Part 86, §86.215 and appendix I to this part.

86.208-94 Dynamometer. July 17, 1992.

86.209-94 Exhaust gas sampling system; gasoline-fueled vehicles. July 17, 1992.

86.211-94 Exhaust gas analytical system. July 17, 1992.

86.213-904 Fuel specifications. ~~July 17, 1992~~ February 10, 2000.

86.214-94 Analytical gases. July 17, 1992.

86.215-94 EPA urban dynamometer driving schedule. July 17, 1992.

86.216-94 Calibrations, frequency and overview. July 17, 1992.

86.218-94 Dynamometer calibration. July 17, 1992.

86.219-94 CVS calibration. July 17, 1992.

- 86.221-94 Hydrocarbon analyzer calibration. July 17, 1992.
- 86.222-94 Carbon monoxide analyzer calibration. July 17, 1992.
- 86.223-94 Oxides of nitrogen analyzer calibration. July 17, 1992.
- 86.224-94 Carbon dioxide analyzer calibration. July 17, 1992.
- 86.226-94 Calibration of other equipment. July 17, 1992.
- 86.227-94 Test procedures; overview. July 17, 1992.
- 86.228-94 Transmissions. July 17, 1992.
- 86.229-94 Road load force, test weight, and inertia weight class determination. July 17, 1992.
- 86.230-94 Test Sequence; general requirements. July 17, 1992.
- 86.231-94 Vehicle Preparation. July 17, 1992.
- 86.232-94 Vehicle Preconditioning. July 17, 1992.
- 86.235-94 Dynamometer procedure. July 17, 1992.
- 86.236-94 Engine starting and restarting. July 17, 1992.
- 86.237-94 Dynamometer test run, gaseous emissions. July 17, 1992.
- 86.240-94 Exhaust sample analysis. July 17, 1992.
- 86.242-94 Records required. July 17, 1992.
- 86.244-94 Calculations; exhaust emissions. July 17, 1992.
- 86.246-94 Intermediate temperature testing. July 17, 1992.

Appendix I to Part 86 -- Urban Dynamometer Schedules. ~~October 22, 1996~~ April 29, 1998.

**C. 50°F Emission Test Procedure.**

The NMOG, CO, NO<sub>x</sub> and formaldehyde emissions from all light- and medium-duty TLEVs, LEVs, ULEVs and SULEVs shall be measured according to the Federal Test Procedure as set forth in Subpart B, 40 CFR Part 86 at a nominal temperature of 50°F with the following modifications:

**(1) Test Procedure.**

(a) The test vehicles shall not be subject to a diurnal heat build prior to the cold start exhaust test or evaporative emission testing.

(b) Following a 12 to 36 hour cold soak at a nominal temperature of 50°F, the nominal preconditioning, soak, and test temperatures shall be maintained within 3°F of the nominal temperature on an average basis and within 5°F of the nominal temperature on a continuous basis. The temperature shall be sampled at least once every 15 seconds during the preconditioning and test periods and at least once each 5 minutes during the soak period. A continuous strip chart recording of the temperature with these minimum time resolutions is an acceptable alternative to employing a data acquisition system.

(c) The test site temperature shall be measured at the inlet of the vehicle cooling fan used for testing.

(d) The test vehicle may be fueled before the preconditioning procedure in a fueling area maintained within a temperature range of 68 to 86°F. The requirement to saturate the evaporative control canister(s) shall not apply.

(e) If a soak area remote from the test site is used, the vehicle may pass through an area maintained within a temperature range of 68 to 86° F during a time interval not to exceed 10 minutes. In such cases, the vehicle shall be restabilized to 50°F by soaking the vehicle in the nominal 50°F test area for six times as long as the exposure time to the higher temperature area, prior to starting the emission test.

(f) The vehicle shall be approximately level during all phases of the test sequence to prevent abnormal fuel distribution.

**D. Procedure for Determining Specific Reactivity.**

The following procedure shall be used by the Executive Officer to establish reactivity adjustment factors for exhaust emissions of non-methane organic gases (NMOG) for the purpose of certifying a vehicle of specific emission category and fuel for sale in California.

**1. Procedure for Determining Specific Reactivity.**

(a) A representative speciated NMOG exhaust emission profile for light- and medium-duty low-emission vehicles shall be established according to the following conditions:

i. Speciated NMOG profiles shall be obtained from a statistically valid number of vehicles in each vehicle emission category and fuel type. The maximum incremental reactivities to be used are provided in the "California Non-Methane Organic Gas Test Procedures," incorporated by reference in Part II, section A.100.5.4 of these test procedures.

ii. The speciated NMOG profiles shall identify and quantify, in units of grams per mile or milligrams per mile, all compounds above the specified laboratory limit of detection as measured in accordance with the procedures specified in the "California Non-Methane Organic Gas Test Procedures."

(b) The "grams ozone per mile" value of each organic compound identified in the speciated profile shall be determined by multiplying the "grams per mile NMOG" emission value of each compound by the applicable maximum incremental reactivity value as specified in the "California Non-Methane Organic Gas Test Procedures."

(c) The "total grams ozone per mile" of NMOG exhaust emissions from each vehicle emission category and fuel type shall be the sum of all the organic compounds values calculated in step (b).

(d) The specific reactivity of each vehicle emission category and fuel type shall be determined by dividing the "total grams ozone per mile" value calculated in step (c) by the "total grams per mile of NMOG emissions."

**2. Procedure for Determining Reactivity Adjustment Factors.**

(a) The baseline specific reactivity of vehicle emission categories operating on conventional gasoline shall be determined by the Executive Officer in accordance with the procedure outlined in subparagraph 1., above.

i. Gasoline meeting the specifications listed below shall be used to determine the baseline specific reactivity low-emission vehicles operating on conventional gasoline:

Specifications for Conventional Gasoline	
Fuel Property	Limit
Sulfur	300 ± 50 ppm by weight
Benzene	1.6 ± 0.3 volume percent
Reid vapor pressure	8.7 ± 0.3 psi
Distillation, D-86, °F	
10%	115-135
50%, maximum	240
90%,	323-333
EP, maximum	420
Hydrocarbons	
Total Aromatics	32 ± 3.0 volume percent
Multi-substituted alkyl aromatics	21 ± 3.0 volume percent
Olefins	12 ± 3.0 volume percent
Saturates	Remainder

(The test methods used for each fuel property shall be the same as the test method for the identical fuel property listed in Part II, Section A.100.3 of these test procedures.)

(b) The generic specific reactivity of vehicle emission categories operating on clean fuels shall also be determined by the Executive Officer according to the procedure outlined in subparagraph 1. above.

(c) The candidate vehicle/fuel "reactivity adjustment factor" shall be determined by dividing the specific reactivity of a candidate fuel and vehicle by the baseline specific reactivity of vehicles in the same vehicle emission category using the procedure outline in subparagraph 1. above.

(d) For a candidate vehicle/fuel system operating on natural gas, a "methane reactivity adjustment factor" shall be calculated by dividing the maximum incremental reactivity value for methane given in the California Non-Methane Organic Gas Test Procedures by the specific reactivity for the vehicle in the same emission control technology category operated on conventional gasoline as listed in subparagraph (a)i. above or established by the Executive Officer pursuant to paragraph 4 and 5 below. The current methane reactivity adjustment factors are listed in Part I.E.4 of these test procedures.

**3. Procedures for Establishing Test Group Specific Reactivity Adjustment Factors.** A manufacturer may request the use of a unique specific reactivity for a specific

vehicle test group category and fuel. The Executive Officer shall approve such a request provided the criteria outlined below are met.

(a) The manufacturer submits speciated NMOG exhaust emission profiles to the Executive Officer obtained from emission testing a minimum of four different vehicles representative of vehicles that will be certified in the test group. The test vehicles shall include the official emission-data vehicle(s) for the engine family, and the mileage accumulation of each vehicle shall be at or greater than 4000 miles. One speciated profile shall be submitted for each test vehicle. Emission levels of each constituent NMOG shall be measured according to the "California Non-Methane Organic Gas Test Procedures." For the emission-data vehicle(s), the speciated profile(s) shall be obtained from the same test used to obtain the official exhaust emission test results for the emission-data vehicle at the 4,000 mile test point. The manufacturer shall calculate specific reactivity for each speciated NMOG exhaust emission profile in accordance with the procedures specified in paragraph 2. above. By using these specific reactivity values, the manufacturer shall calculate a "reactivity adjustment factor" for each test vehicle in accordance with the procedure specified in paragraph 3. above. A "reactivity adjustment factor" for the test group shall be calculated by taking the arithmetic mean of the "reactivity adjustment factor" obtained for each test vehicle. The 95 percent upper confidence bound (95% UCB) shall be calculated according to the equation:

$$95\% \text{ UCB} = \text{RAF} + 1.96 \times \left[ \frac{\sum_{I=1}^n (\text{RAF}_i - \text{RAF}_m)^2}{(n-1)} \right]^{1/2}$$

where:

$\text{RAF}_m$  = mean "reactivity adjustment factor" calculated for the test group

$\text{RAF}_i$  = "reactivity adjustment factor" calculated for the i'th test vehicle

$n$  = number of test vehicles

The 95 percent upper confidence bound of the "reactivity adjustment factor" for the test group shall be less than or equal to 115 percent of the test group "reactivity adjustment factor."

(b) The manufacturer submits an "ozone deterioration factor" for the test group. To determine the "ozone deterioration factor," the manufacturer shall perform two tests at each mileage interval for one or more durability vehicle(s) tested in accordance with the procedures and conditions for calculating mass deterioration factors specified in Part I, Section F.3 (40 CFR §86.1819) of these test procedures. The Executive Officer shall approve the use of other mileage intervals and procedures if the manufacturer can demonstrate that equivalently representative "ozone deterioration factors" are obtained. One speciated profile shall be submitted for each test. Emission levels of each constituent NMOG shall be measured according to the "California Non-Methane Organic Gas Test Procedures." A mean gram per mile NMOG mass value and a mean specific reactivity value shall be calculated by taking the arithmetic mean of each measurement from the speciated profiles. These results shall be multiplied together to obtain a mean "total grams ozone per mile" value at each mileage interval. A mean "ozone deterioration factor" shall be calculated in accordance with the procedures in Part I Section F.3 (40 CFR §86.1819) of these test procedures except that the mean total "grams ozone per mile" value determined at each mileage interval shall be used in place of measured mass emissions. If the

"ozone deterioration factor" is determined to be less than 1.00, the "ozone deterioration factor" shall be assigned a value of 1.00. The "ozone deterioration factor" shall be multiplied by the product of the official exhaust NMOG mass emission results at the 4,000 mile test point and the mean "reactivity adjustment factor" for the test group to obtain the NMOG certification levels used to determine compliance with the NMOG emission standards.

(c) The speciated profiles, mean "reactivity adjustment factor" for the test group, and "ozone deterioration factor" are provided to the Executive Officer with the certification application for the engine family.

(d) The maximum incremental reactivities to be used are provided in the "California Non-Methane Organic Gas Test Procedures." Any manufacturer which intends to use the table shall submit to the Executive Officer a list which provides the specific organic gases measured by the manufacturer and the maximum incremental reactivity value assigned to each organic gas prior to or with the submittal of a request for the use of a reactivity adjustment factor unique to a specific test group. The Executive Officer may deny such requests if he or she determines that the maximum incremental reactivity value assignments are made incorrectly.

(e) Methanol and LPG Requirements. For a candidate vehicle/fuel system powered by methanol or liquefied petroleum gas, the reactivity adjustment factor determined by the manufacturer shall be multiplied by 1.1. The resulting value shall constitute the "reactivity adjustment factor" for the methanol or liquefied petroleum gas-powered vehicle/fuel system.

**4. Procedure for Establishing A New Reactivity Adjustment Factor.** The Executive Officer may establish by executive order new reactivity adjustment factor pursuant to the procedures set forth above. The Executive Officer shall notify manufacturers in writing of a new reactivity adjustment factor within 30 days of their establishment.

**5. Procedure for Revising Reactivity Adjustment Factors.** The Executive Officer may revise any reactivity adjustment factor listed in Part I.E.5 of these test procedures or established by the Executive Officer pursuant to the above criteria if he or she determines that the revised reactivity adjustment factor is more representative of the ozone-forming potential of vehicle NMOG emissions based on the best available scientific knowledge and sound engineering judgment. The Executive Officer shall notify manufacturers in writing of any such reactivity adjustment factor at least 3 years prior to January 1 of the calendar year which has the same numerical designation as the model year for which the revised reactivity adjustment factor first becomes effective. However, a manufacturer may use the revised reactivity adjustment factor in certifying any new test group whose certification application is submitted following such notification, if it so chooses. A manufacturer may also continue to use the original reactivity adjustment factor for any existing test group previously certified with that reactivity adjustment factor until a new durability-data vehicle is tested for that test group.



State of California  
AIR RESOURCES BOARD

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES  
FOR 2004 AND SUBSEQUENT MODEL  
HEAVY-DUTY OTTO-CYCLE ENGINES**

Adopted: [INSERT DATE OF ADOPTION]

Note: These are proposed new test procedures that have been updated with a new format and a 2004 and subsequent model-year applicability date. The proposed test procedures also include amendments to the California exhaust emission standards in Part I Section 10.B. Under the staff's proposal, the preexisting "California Exhaust Emission Standards and Test Procedures for 1987 and Subsequent Model Heavy-Duty Otto-Cycle Engines" would be amended to be applicable through the 2003 model year only. In order to facilitate a comparison of the new test procedures from the preexisting test procedures, this document shows changes to the previous text in underline to indicate additions and ~~strikeout~~ to indicate deletions.

NOTE: This document is incorporated by reference in section 1956(d), title 13 California Code of Regulations (“CCR”) and also incorporates by reference various sections of Title 40, Part 86 of the Code of Federal Regulations, with some modifications. It contains the majority of the requirements necessary for certification of heavy-duty Otto-cycle engines for sale in California, in addition to containing the exhaust emissions standards and test procedures for these Otto-cycle engines.<sup>1</sup> The section numbering conventions for this document are set forth in subparagraph 4 on page 4. Reference is also made in this document to other California-specific requirements which are necessary to complete an application for certification. These other documents are designed to be used in conjunction with this document. They include:

1. “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (incorporated by reference in section 1976, title 13, CCR).
2. “California Motor Vehicle Emission Control and Smog Index Label Specifications” (incorporated by reference in section 1965, title 13, CCR).
3. “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (incorporated by reference in section 1978(b), title 13, CCR).
4. Warranty requirements (sections 2035, et seq, title 13, CCR).
5. OBDII (section 1968.1, title 13, CCR).

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<sup>1</sup> The requirements for Otto-cycle engines used in complete vehicles are contained in the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated by reference in §1961(d), title 13, CCR.

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**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST  
PROCEDURES FOR 2004 AND SUBSEQUENT MODEL  
HEAVY-DUTY OTTO-CYCLE ENGINES**

The following provisions of Subparts A, E, N, and P, Part 86, Title 40, Code of Federal Regulations ("CFR"), as adopted or amended by the U.S. Environmental Protection Agency on the date set forth next to the 40 CFR Part 86 section listed below, and only to the extent they pertain to the testing and compliance of exhaust emissions from heavy-duty Otto-cycle engines, are adopted and incorporated herein by this reference as the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," with the following exceptions and additions.

**Part 1. GENERAL PROVISIONS FOR CERTIFICATION AND IN-USE  
VERIFICATION OF EMISSIONS**

**Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, Light-Duty Trucks and Heavy-Duty Engines, and for 1985 and Later Model Year New Gasoline-Fueled, Natural Gas-Fueled, Liquefied Petroleum Gas-Fueled and Methanol-Fueled Heavy Duty Vehicles**

**1. General Applicability. [§86.xxx-1]**

**A. Federal provisions.**

1. ~~§86.001-1 May 4, 1999.~~ October 6, 2000

1.1 Subparagraph (a). [No change.]

1.2 Delete subparagraph (b) and replace with the following: A manufacturer must certify any complete heavy-duty vehicle of 14,000 pounds gross vehicle weight rating or less in accordance with the medium-duty vehicle provisions contained in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles," incorporated herein by reference. Heavy-duty engine or vehicle provisions of subpart A do not apply to such a vehicle.

1.3 Subparagraph (c). [n/a (ADP for LDVs)]

1.4 Subparagraph (d). [n/a. (NLEVs)]

1.5 Amend subparagraph (e) as follows: *Small volume manufacturers.* Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR §86.092-14.

1.6 Subparagraph (f). [n/a; exhaust opacity refers to diesel engines.]

2. §86.005-1 October 6, 2000

2.1 Subparagraph (a). [No change.]

2.2 Delete subparagraph (b) and replace with the following: A manufacturer must certify any complete heavy-duty vehicle of 14,000 pounds gross vehicle weight rating or less in accordance with the medium-duty vehicle provisions contained in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles," incorporated by reference in §1961(d), title 13, CCR. Heavy-duty engine or vehicle provisions of subpart A do not apply to such a vehicle.

2.3 Subparagraph (c). [No change.]

2.4 Subparagraph (d). [Reserved.]

2.5 Amend subparagraph (e) as follows: *Small volume manufacturers.* Special certification procedures are available for any manufacturer whose projected or actual combined California sales of passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines in its product line are fewer than 4,500 units based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For manufacturer certifying for the first time in California, model-year production shall be based on projected California sales. The small volume manufacturer's heavy-duty engine certification procedures are described in 40 CFR §86.092-14.

2.6 Subparagraph (f). [n/a; exhaust opacity refers to diesel engines.]

## **B. California provisions.**

1. These regulations are applicable to all heavy-duty Otto-cycle methanol-fueled, ethanol-fueled, natural-gas-fueled and liquefied-petroleum-gas-fueled dedicated, dual-fuel and multi-fuel engines (and vehicles) except those engines derived from existing diesel engines. For any engine which is not a distinctly Otto-cycle engine nor derived from such, the Executive Officer shall determine whether the engine shall be subject to these regulations or alternatively to the heavy-duty diesel engine regulations, in consideration of the relative similarity of the engine's torque-speed characteristics and vehicle applications with those of Otto-cycle and diesel engines. Reference to dual fuel vehicles or engines shall also mean bi-fuel vehicles or engines.

2. References in the federal regulations to light-duty vehicles and light-duty trucks do not apply.

3. Any reference to vehicle sales throughout the United States shall mean vehicles and engines sales in California. Any reference to small volume manufacturer shall mean a California small-volume manufacturer as defined in section I.1.A.1.5, above.

4. Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, evaporative emissions, high-altitude vehicles and testing, particulate and oxides of nitrogen averaging and test group standards applicable in such averaging, alternative useful life, selective enforcement audit, and Certification Short Test shall not be applicable to these procedures, except where specifically noted. The regulations pertaining to evaporative emissions are contained in

"California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as incorporated in §1976, title 13, CCR.

5. Non-methane hydrocarbon emissions shall be measured in accordance with the "California Non-methane Hydrocarbon Test Procedures" as last amended July 12, 1991, which is incorporated herein by reference.

2. **Definitions.** [§86.xxx-2]

**A. Federal provisions.** All of the definitions in previous CFR sections continue to apply, except as otherwise noted below. Definitions specific to other requirements such as evaporative emissions are contained in those separate documents.

1. §86.004-2. ~~October 21, 1997~~ October 6, 2000

**B. California provisions.**

"**Administrator**" means the Executive Officer of the Air Resources Board.

"**Certificate of Conformity**" means "Executive Order" certifying vehicles for sale in California.

"**Certification**" means certification as defined in Section 39018 of the Health and Safety Code.

"**EPA Enforcement Officer**" means the Executive Officer or his delegate.

"**Medium-duty vehicle**" means any 1992 through 2006 model-year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in section 1960.1(h)(2) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; any 1995 through 2003 model-year heavy-duty vehicle certified to the standards in section 1960.1(h)(1) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and any 2000 and subsequent model heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in section 1961(a)(1) or 1962 having a manufacturer's gross vehicle weight rating between 8,500 and 14,000 pounds.

**Warranty** means the warranty provisions set forth in title 13, California Code of Regulations §2036].

3. **Abbreviations** [§86.xxx-3]

**A. Federal provisions.** §86.000-3 October 22, 1996. All federal abbreviations apply, except as otherwise noted below. Abbreviations specific to other requirements are contained in those separate documents.

**B. California provisions.**

CCR means California Code of Regulations

LEV means low-emission vehicle

ULEV means ultra-low-emission vehicle

SULEV means super-ultra-low-emission vehicle

MDV means medium-duty vehicle

**4. Section numbering; construction.** [§86.084-4] September 21, 1994. [No change.]

The section numbering convention employed in these test procedures, in order of priority, is I.1.A.1.1. in order to distinguish California procedures and requirements from those of the U.S. EPA. References in these test procedures to specific sections of the Code of Federal Regulations maintain the same numbering system employed in the Code of Federal Regulations. California-only requirements are set forth in a separate subsection. In the beginning of each section the generic notation §86.xxx-1 is used when there is more than one applicable section to indicate the section being discussed without regard to model year. The years of applicability (denoted generically by "xxx") are added as applicable in the pertinent subsections.

In cases where the entire CFR section is incorporated by reference with no modifications, the notation "[No change.]" is used. In cases where the federal requirements are modified by California requirements, the notation "Amend (or delete) subparagraph ( ) as follows:" is used. If the federal requirement is not applicable, the notation "[n/a]" is used. In cases where there are California only requirements, the additional California requirements are noted in a separate subsection with the numbering convention set forth above.

If a CFR section for a specific model year is set forth in this document, and that CFR section references previous CFR sections, then all previously referenced CFR sections are deemed incorporated into this document unless otherwise noted.

5. **General Standards; increase in emissions; unsafe conditions.** [§86.090-5] November 12, 1996 [No change.]
6. **Hearings on certification.** [§86.078-6] [n/a]
7. **Maintenance of records; submittal of information; right of entry.** [§86.000-7] October 22, 1996 [No change.]
8. **Emission standards for light-duty vehicles** [§86.xxx-8] [n/a]
9. **Emission standards for light-duty trucks** [§86.xxx-9] [n/a]
10. **Emission standards for Otto-cycle heavy-duty engines and vehicles** [§86.xxx-10]
  - A. **Federal provisions.**
    1. §86.098-10 October 21, 1997. Amend as follows:
      - 1.1 Amend subparagraph (a) as follows:
        - 1.1.1 Delete subparagraph (a)(1) and replace with emission standards set forth in Section I.10.B below.]
        - 1.1.2 Subparagraph (a)(2). [No change.]
        - 1.1.3 Subparagraph (a)(3). [No change.]
      - 1.2 Subparagraph (b) [n/a] [See evap TPs]
      - 1.3 Subparagraph (c) [No change.]
      - 1.4 Subparagraph (d) [No change.]
    2. §86.099-10 August 23, 1995 [n/a; See evap TPs]

3. §86.005-10 October 6, 2000 Amend as follows:
  - 3.1 Amend subparagraph (a) as follows:
    - 3.1.1 Delete subparagraph (a)(1). [See emission standards in I.10.B below]
    - 3.1.2 Subparagraph (a)(2). [No change.]
    - 3.1.3 Subparagraph (a)(3). [No change.]
    - 3.1.4 Subparagraph (a)(4). [No change.]
  - 3.2 Subparagraph (b) [n/a] [See evap TPs]
  - 3.3 Subparagraph (c) [No change.]
  - 3.4 Subparagraph (d) [No change.]
  - 3.5 Subparagraph (e) [No change.]
  - 3.6 Subparagraph (f) [No change.]
4. §86.008-10 October 6, 2000
  - 4.1 Amend subparagraph (a) as follows:
    - 4.1.1 Delete subparagraph (a)(1). [See emission standards in I.10.B below]
    - 4.1.2 Subparagraph (a)(2). [No change.]
    - 4.1.3 Subparagraph (a)(3). [No change.]
    - 4.1.4 Subparagraph (a)(4). [No change.]
  - 4.2 Subparagraph (b) [n/a] [See evap TPs]
  - 4.3 Subparagraph (c) [No change.]
  - 4.4 Subparagraph (d) [No change.]
  - 4.5 Subparagraph (e) [No change.]
  - 4.6 Subparagraph (f) [No change.]

**B. California provisions.**  
**California Emission Standards for 2004 and Subsequent Model**  
**Heavy-Duty Otto-Cycle Engines<sup>A</sup>**  
(in g/bhp-hr)

Model Year	Emission Category	NMHC + NO <sub>x</sub>	CO	HCHO
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Medium-Duty Vehicles 8,501 to 14,000 pounds GVW<sup>B</sup></b>				
2004 and subsequent	ULEV	2.4 or 2.5 with 0.5 NMHC cap <sup>C</sup>	14.4	0.05
2004 and subsequent	SULEV	2.0	7.2	0.025
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW</b>				
2004 and subsequent	n/a	2.4 or 2.5 with 0.5 NMHC cap <sup>C</sup>	37.1	0.05 <sup>D</sup>
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Incomplete Medium-Duty Vehicles 8,500 - 14,000 pounds GVW</b>				
	LEV	1.0 <sup>C</sup>	37.1	0.05
2005 and subsequent	ULEV	1.0 <sup>C</sup>	14.4	0.05
	SULEV	0.5	7.2	0.025
<b>Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW</b>				
2005 and subsequent	n/a	1.0 <sup>C</sup>	37.1	0.05 <sup>D</sup>

<sup>A</sup> These standards apply to petroleum-fueled, alcohol-fueled, liquefied petroleum gas-fueled and natural gas-fueled Otto-cycle engines. Alcohol-fueled engines have the option of certifying to the organic material hydrocarbon equivalent ("OMHCE") or organic material non-methane hydrocarbon equivalent ("OMNMHCE") standard.

<sup>B</sup> A manufacturer of engines used in incomplete medium-duty vehicles may choose to comply with these standards as an alternative to the primary emission standards and test procedures for complete vehicles specified in section 1961, title 13, CCR. A manufacturer that chooses to comply with these optional heavy-duty engine standards and test procedures shall specify, in the Part I application for certification, an in-use compliance test procedure, as provided in section 2139(c), title 13 CCR.

<sup>C</sup> A manufacturer may request to certify to the Option 1 or Option 2 federal NMHC + NO<sub>x</sub> standards as set forth in 40 CFR §86.005-10(f). However, for engines used in medium-duty vehicles 8,500 - 14,000 lbs. GVW, the formaldehyde and carbon monoxide standards must meet the levels specified above.

<sup>D</sup> This standard only applies to methanol-fueled Otto-cycle engines.

11. **Emission standards for heavy-duty diesel engines and vehicles.** [§86.xxx-11] [n/a]
12. **Alternative certification procedures.** [§86.080-12] April 17, 1980 [No change.]
13. **Alternative durability program.** [§86.xxx-13] [n/a]

14. **Small-volume manufacturers certification procedures.** [§86.xxx-14]  
**A. Federal provisions.** [Note: A small volume manufacturer shall mean a California small volume manufacturer as defined in Section I.1.A., above. Any reference to 10,000 units shall mean 4,500 units in California based on a three year running average as defined in I.1.A., above.]
1. §86.094-14 January 3, 1996. Amend as follows:
    - 1.1 Subparagraphs (a) through (c)(3) [No change.]
    - 1.2 Amend subparagraph (c)(4) as follows: Small volume manufacturers shall include in their records all of the information that EPA requires in §86.094-21. This information will be considered part of the manufacturer's application for certification. [The last sentence is deleted.]
    - 1.3 Subparagraphs (c)(5) through (c)(7)(i)(B) [No change.]
    - 1.4 Amend subparagraph (c)(7)(i)(C)(1) as follows: Manufacturers with aggregated sales of less than 301 motor vehicles and motor vehicle engines per year may use assigned deterioration factors that the Administrator determines and prescribes based on design specifications or sufficient control over design specifications, development data, in-house testing procedures, and in-use experience. [The remainder of the paragraph is the same.]
    - 1.5 Subparagraph (c)(7)(i)(C)(2) through (c)(13)(i) [No change.]
    - 1.6 Add the following test to subparagraph (c)(13)(ii): All running changes that do not adversely affect emissions or the emission control system durability shall be deemed approved unless disapproved by the Executive Officer within 30 days of the implementation of the running change.
  2. §86.096-14 March 24, 1993 [n/a; pertains to evaporative requirements.]
  3. §86.098-14 April 6, 1994 [No change.]
15. **NOx and particulate averaging, trading, and banking for heavy-duty engines.** [§86.xxx-15] [n/a]
16. **Prohibition of defeat devices.** [§86.004-16] October 6, 2000 [No change.]
17. **Emission control diagnostic system for light-duty vehicles and trucks.** [§86.099-17; §86.005-17] Delete; replace with: All heavy-duty Otto-cycle engines up to 14,000 pounds GVW must have an on-board diagnostic system as required in section 1968.1, title 13 CCR.
18. [Reserved.]
19. [Reserved.]
20. **Incomplete vehicles, classification.** [§86.085-20] January 12, 1983. [No change.]
21. **Application for certification** [§86.xxx-21]
- A. Federal provisions**
1. §86.004-21 October 21, 1997 October 6, 2000 [No change.]
  2. §86.007-21 October 6, 2000 [No change - diesel only.]
- B. California provisions**
1. ~~For 1992 and subsequent model-year low-emission and ultra-low-emission vehicles and engines not powered exclusively by gasoline, projected California sales data and fuel economy estimates two years prior to certification, and projected California sales data for all vehicles and engines, regardless of operating fuel or vehicle emission~~

category, sufficient to enable the Executive Officer to select a test fleet representative of the vehicles (or engines) for which certification is requested at the time of certification. For California vehicles not certified exclusively on gasoline or diesel fuel, the manufacturer shall submit projected California sales and fuel economy data nineteen months prior to January 1 of the model year for which the engines are certified.

22. **Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certifications and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges.** [§86.xxx-22]
- A. **Federal provisions**
1. §86.001-22 April 6, 1994. [No change.]
23. **Required data.** [§86.xxx-23]
- A. **Federal provisions**
1. §86.001-23 October 21, 1997 [No change.]
- B. **California provisions**
1. Such The data derived from testing to determine the exhaust emission deterioration factors shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.
24. **Test vehicles and engines.** [§86.001-24] October 22, 1996 [No change.]
25. **Maintenance.** [§86.004-25] October 21, 1997.
26. **Mileage and service accumulation; emission measurements** [§86.004-26] October 6, 2000
27. **Special test procedures.** [§86.090-27] April 11, 1989. [No change.]
28. **Compliance with emission standards.** [§86.xxx-28]
- A. **Federal provisions**
1. §86.004-28 October 6, 2000.  
~~(c)(4)(iii)(A)(i) For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...~~  
~~(2) For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...~~
- B. **California provisions**
1. All dedicated methanol-fueled and fuel-flexible vehicles and engines shall comply with the requirements which are applicable to heavy-duty gasoline-fueled Otto-cycle vehicles and engines, except where otherwise noted. In particular, for fuel-flexible vehicles and engines, a manufacturer's proposed durability demonstration program, as required in sections 86.091-21(b)(4)(iii)(A) and 86.091-23(b)(1)(ii), shall provide for the assessment of the durability of the engine in operation with methanol and

gasoline, as well as intermediate mixtures of both fuels. A manufacturer's proposed mileage and service accumulation, as required in section 86.090-24(c), shall be conducted on methanol.

2. ~~The provisions of section 86.091-28(c), "Compliance with emissions standards," shall be used to determine the compliance requirements with the emission standards.~~ For fuel-flexible vehicles and engines, the noted deterioration factors shall be determined from testing conducted with gasoline fuel. However, as an assurance that fuel-flexible vehicles and engines will comply with applicable exhaust emission standards throughout their useful lives when operated on methanol fuel, the manufacturer shall demonstrate that exhaust emissions tests conducted with methanol fuel at the beginning, middle, and end of the durability service accumulation schedule do not exceed the applicable exhaust emission standards. For certification to be granted, the vehicle or engine may not exceed applicable certification exhaust emission standards.

3. For dual-fuel or multi-fuel gaseous engines and vehicles, the noted deterioration factors shall be determined separately for operation on each type of fuel or combination of fuels that the engine is designed to use. For certification to be granted, the provisions of 86.091-28(c) must be met separately for emissions using each type and combination of fuels.

29. **Testing by the Administrator.** [§86.091-29] March 24, 1993 [No change.]
30. **Certification.** §86.004-30 October 6, 2000 [No change.]
31. **Separate certification.** [§86.079-31] September 8, 1977. [No change.]
32. **Addition of a vehicle or engine after certification.** §86.079-32 September 8, 1977. [No change.]
33. **Changes to a vehicle or engine covered by certification.** §86.079-33 September 8, 1977. [No change.]
34. **Alternative procedure for notification of additions and changes.** §86.082-34 November 2, 1982. [No change.]
35. **Labeling.** [§86.xxx-35] Delete. Labels shall comply with the requirements set forth in the "California Motor Vehicle Emission Control and Smog Index Label Specifications," incorporated by reference in §1965, title 13, CCR.
36. **Submission of vehicle identification numbers.** [§86.079-36] [n/a]
37. **Production vehicles and engines.** [§86.085-37] June 6, 1997 [No change.]
38. **Maintenance instructions.** [§86.xxx-38]
  1. §86.004-38 October 21, 1997.
    - 1.1 Subparagraphs (a) through (f). [No change.]
    - 1.2 Amend subparagraph (g)(1) as follows:
      - (g) Emission control diagnostic service information:
        - (1) Manufacturers shall furnish or cause to be furnished to any person engaged in the repairing or servicing of motor vehicles or motor vehicle engines, or the Administrator upon request, any and all information needed to make use of the on-board diagnostic system and such other information, including instructions for making emission-related diagnosis and repairs, including, but not limited to, service manuals, technical service bulletins, recall service information, data stream information, bi-directional control information, and training information, unless such information is

protected by section 208(c) of the Act or California Government Code Section 6250, as a trade secret. No such information may be withheld under section 208(c) of the Act or California Government Code Section 6250, if that information is provided (directly or indirectly) by the manufacturer to franchised dealers or other persons engaged in the repair, diagnosing, or servicing of motor vehicles or motor vehicle engines.

1.3 Subparagraph (h). [No change.]

39. **Submission of maintenance instructions.** [§86.079-39] September 8, 1977 [No change.]

40. **Heavy-duty engine rebuilding practices.** [§86.xxx-40]

1. §86.004-40. October 21, 1997.

1.1 Amend the introductory paragraph as follows: The provisions of this section are applicable to engines subject to the standards prescribed §86.004-10 or §86.004-11 and are applicable to the process of engine rebuilding (or rebuilding a portion of an engine or engine system). The process of engine rebuilding generally includes disassembly, replacement of multiple parts due to wear, and reassembly, and also may include the removal of the engine from the vehicle and other acts associated with rebuilding an engine. Any deviation from the provisions contained in this section is a prohibited act under section 203(a)(3) of the Clean Air Act (42 U.S.C. 7522(a)(3)) or of the California Vehicle Code § 27156, et seq.

1.2 Subparagraphs (a) through (e). [No change.]

## Part II - OTHER REQUIREMENTS; TEST PROCEDURES

### Subpart N, Emission Regulations for New Otto-cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures

- ~~86.1301-84 Scope; applicability. November 16, 1983.~~  
~~86.1301-88 Scope; applicability. March 15, 1985.~~  
~~86.1301-90 Scope; applicability. April 11, 1989.~~  
~~86.1302-84 Definitions. November 16, 1983.~~  
~~86.1303-84 Abbreviations. November 16, 1983.~~  
~~86.1304-84 Section numbering; construction. November 16, 1983.~~  
~~86.1304-90 Section numbering; construction. April 11, 1989 October 6, 2000.~~  
~~86.1305-84 Introduction; structure of subpart. November 16, 1983.~~  
~~86.1305-90 Introduction; structure of subpart. April 11, 1989.~~  
~~86.1305-2004 Introduction; structure of subpart. October 6, 2000.~~  
~~86.1306-84 Equipment required and specification; overview. November 16, 1983.~~  
~~86.1306-88 Equipment required and specification; overview. March 15, 1985.~~  
~~86.1306-90 Equipment required and specification; overview. April 11, 1989.~~  
~~86.1306-96 Equipment required and specification; overview. September 21, 1994.~~  
~~86.1308-84 Dynamometer and engine equipment specifications. ~~December 10, 1984~~ 16, 1987.~~  
~~86.1309-84 Exhaust gas sampling system; gasoline-fueled engines. November 16, 1983.~~  
~~86.1309-90 Exhaust gas sampling system; gasoline-fueled and methanol-fueled Otto-cycle engines. April 11, 1989 June 30, 1995.~~

Amend subparagraph (a)(3) as follows: For methanol-fueled engines, the sample lines for the methanol and formaldehyde samples are heated to  $235^{\circ} \pm 15^{\circ}\text{F}$  ( $113^{\circ} \pm 8^{\circ}\text{C}$ ).

- ~~86.1311-84 Exhaust gas analytical system; CVS bag sample. November 16, 1983.~~  
~~86.1311-88 Exhaust gas analytical system; CVS bag sample. August 29, 1986.~~  
~~86.1311-94 Exhaust gas analytical system; CVS bag sample. October 21, 1997.~~  
~~86.1313-94 Fuel specifications September 5, 1997~~  
~~86.1313-98 Fuel specifications. September 5, 1997 [n/a diesel fuel specifications]~~

Amend the federal fuel specifications as follows:

- California Certification Gasoline Specification.** Add the following subparagraph which reads: Gasoline having the specifications listed below may be used in exhaust and evaporative emission testing as an option to the specifications referred to in 86.1313-94(a)(1). If a manufacturer elects to utilize this option, both exhaust and evaporative emission testing shall be conducted by the manufacturer with gasoline having the specifications listed

below, and the Executive Officer shall conduct exhaust and evaporative emission testing with gasoline having the specifications listed below.

California Certification Gasoline Specifications		
Fuel Property <sup>(a)</sup>	Limit	Test Method <sup>(b)</sup>
Octane (R+M)/2	91 (min)	D 2699-88, D 2700-88
Sensitivity	7.5 (min)	D 2699-88, D 2700-88
Lead	0-0.01g/gal (max); no lead added	§2253.4(c), title 13 CCR
Distillation Range:		§2263, title 13 CCR <sup>(c)</sup>
10% point	130-150 °F	
50% point <sup>(d)</sup>	200-210 °F	
90% point <sup>(e)</sup>	290-300 °F	
EP, maximum	390 °F	
Residue	2.0 vol. % (max)	
Sulfur	30-40 ppm by wt.	§2263, title 13 CCR
Phosphorous	0.005 g/gal (max)	§2253.4(c), title 13 CCR
RVP	6.7-7.0 psi	§2263, title 13 CCR
Olefins	4.0-6.0 vol. %	§2263, title 13 CCR
Total Aromatic Hydrocarbons	22-25 vol. %	§2263, title 13 CCR
Benzene	0.8-1.0 vol. % <sup>(f)</sup>	§2263, title 13 CCR
Multi-substituted Alkyl Aromatic Hydrocarbons	12-14 vol. % <sup>(g)</sup>	
MTBE	10.8-11.2 vol. %	§2263, title 13 CCR
Additives	Sufficient to meet requirements of §2257, title 13 CCR	
Copper Corrosion	No. 1	D 130-88
Gum, washed	3.0 mg/100 mL (max)	D 381-86
Oxidation Stability	1000 minutes (min)	D 525-88
Specific Gravity	Report <sup>(h)</sup>	
Heat of Combustion	Report <sup>(h)</sup>	
Carbon	Report wt. % <sup>(h)</sup>	
Hydrogen	Report wt. % <sup>(h)</sup>	

- (a) The gasoline must be blended from typical refinery feedstocks.
- (b) ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.
- (c) Although §2263, title 13, CCR refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.
- (d) The range for interlaboratory testing is 195-215° F.
- (e) The range for interlaboratory testing is 285-305° F.
- (f) The range for interlaboratory testing is 0.7-1.1 percent by volume.
- (g) "Detailed Hydrocarbon Analysis of Petroleum Hydrocarbon Distillates, Reformates, and Gasoline by Single Column High Efficiency (Capillary) Column Gas Chromatography," by Neil Johansen, 1992, Boulder, CO.
- (h) The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

## 2. Alcohol Fuel Specifications

Amend §86.1313-94(c) as follows: Delete subparagraphs (c)(1) and (c)(2); replace with:

(c)(1) **Emission test fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust and evaporative emission testing shall meet the specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol) as modified by the following:

Specification	Limit
<b>M-100 Fuel Methanol</b>	
Methanol	98.0 ± 0.5 vol. percent
Ethanol	1.0 ± 0.1 vol. percent
Petroleum fuel meeting the specifications of section 100.3.1.	1.0 ± 0.1 vol. percent
<b>E-100 Fuel Ethanol</b>	
Ethanol	98.0 ± 0.5 vol. percent
Methanol	1.0 ± 0.1 vol. percent
Petroleum fuel meeting the specifications of section 100.3.1.	1.0 ± 0.1 vol. percent

(c)(2) **Mileage accumulation fuel.** For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for service accumulation shall meet the applicable specifications set forth in section 2292.1, title 13, CCR, (Specifications for M-100 Fuel Methanol) or section 2292.3 (Specification for E-100 Fuel Ethanol).

(c)(3) Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a

manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

**3. Mixtures of Petroleum and Alcohol Fuels for Flexible Fuel Vehicles**

Amend §86.1313-94(d) as follows: Delete subparagraphs (d)(1) and (d)(2); replace with:

**(d)(1) Exhaust emission test fuel for emission-data and durability-data vehicles.**

For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, methanol or ethanol fuel used for exhaust emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) as modified by the following:

Specification	Limit
<b>M-85 Fuel Methanol</b>	
Petroleum fuel meeting the specifications of section 100.3.1.	13-16 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.
<b>E-85 Fuel Ethanol</b>	
Petroleum fuel meeting the specifications of section 100.3.1.	15-21 vol. percent
Reid vapor pressure	8.0-8.5 psi, using common blending components from the gasoline stream.

**(d)(2) Mileage accumulation fuel.** For flexible fuel Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles that use Otto-cycle or diesel alcohol engines, petroleum fuel shall meet the applicable specifications in Part II, subparagraph 1 and methanol or ethanol fuel shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specification for E-85 Fuel Ethanol). Mileage accumulation procedures shall be subject to the requirements set forth in 40 CFR §86.001-26 and §86.1831-01(a) and (b) and are subject to the prior approval of the Executive Officer. A manufacturer shall consider expected customer fuel usage as well as emissions deterioration when developing its durability demonstration.

**(d)(3) Evaporative emission test fuel for emission-data and durability-data vehicles.**

For Otto-cycle or diesel alcohol vehicles and hybrid electric vehicles which use Otto-cycle or diesel alcohol engines, a blend of methanol or ethanol fuel used for evaporative emission testing shall meet the applicable specifications set forth in section 2292.2, title 13, CCR, (Specifications for M-85 Fuel Methanol) or section 2292.4 (Specifications for E-85 Fuel Ethanol) and gasoline meeting the specifications of Part II subparagraph 1 of these test procedures such that the final blend is composed of either 35 volume percent methanol ( $\pm 1.0$  volume percent of total blend) for methanol-fueled vehicles or 10 volume percent ethanol ( $\pm 1.0$  volume percent of total blend) for ethanol-fueled vehicles. Alternative alcohol-gasoline blends may be used in place of M35 or

E10 if demonstrated to result in equivalent or higher evaporative emissions, subject to prior approval of the Executive Officer.

(d)(4) **Additive requirements.** Fuel additives and ignition improvers intended for use in alcohol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

#### 4. Natural Gas Fuel Specifications

Add the following subparagraphs:

(a) **Exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas) as modified by the following:

Specification	Limit
<b>Compressed Natural Gas Certification Test Fuel</b>	
Methane	90.0 ± 1.0 mole percent
Ethane	4.0 ± 0.5 mole percent
C <sub>3</sub> and higher hydrocarbon content	2.0 ± 0.3 mole percent
Oxygen	0.5 mole percent maximum
Inert gases (CO <sub>2</sub> + N <sub>2</sub> )	3.5 ± 0.5 vol. percent

(b) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use natural gas, fuel used for service accumulation shall meet the specifications listed in section 2292.5, title 13, CCR, (Specifications for Compressed Natural Gas).

#### 5. Liquefied Petroleum Gas Fuel Specifications

Add the following subparagraphs:

(a) **Evaporative and exhaust emission test fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for exhaust and evaporative emission testing shall meet the specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas) as modified by the following:

Specification	Limit
<b>Liquefied Petroleum Gas Certification Test Fuel</b>	
Propane	93.5 ± 1.0 volume percent
Propene	3.8 ± 0.5 volume percent
Butane and heavier components	1.9 ± 0.3 volume percent

(b) **Mileage accumulation fuel.** For dedicated, dual-fueled or hybrid electric vehicles which use liquefied petroleum gas, fuel used for service accumulation shall meet the specifications listed in section 2292.6, title 13, CCR, (Specifications for Liquefied Petroleum Gas).

## 6. Identification of New Clean Fuels to be Used in Certification Testing

Any person may petition the state board to establish by regulation certification testing specifications for a new clean fuel for which specifications for a new clean fuel are not specifically set forth in paragraph 86.1313-94 as amended herein. Prior to adopting such specifications, the state board shall consider the relative cost-effectiveness of use of the fuel in reducing emissions compared to the use of other fuels. Whenever the state board adopts specifications for a new clean fuel for certification testing, it shall also establish by regulation specifications for the fuel as it is sold commercially to the public.

(a) If the proposed new clean fuel may be used to fuel existing motor vehicles, the state board shall not establish certification specifications for the fuel unless the petitioner has demonstrated that:

(1) Use of the new clean fuel in such existing motor vehicles would not increase emissions of NMOG (on a reactivity-adjusted basis), NOx, CO, and the potential risk associated with toxic air contaminants, as determined pursuant to the procedures set forth in "California Test Procedures for Evaluating Substitute Fuels and New Clean Fuels," as adopted September 17, 1993. In the case of fuel-flexible vehicles or dual-fuel vehicles which were not certified on the new clean fuel but are capable of being operated on it, emissions during operation with the new clean fuel shall not increase compared to emissions during vehicle operation on gasoline.

(2) Use of the new clean fuel in such existing motor vehicles would not result in increased deterioration of the vehicle and would not void the warranties of any such vehicles.

(b) Whenever the state board designates a new clean fuel pursuant to this section, the state board shall also establish by regulation required specifications for the new clean fuel sold commercially in California.

~~86.1314-84 Analytical gases. December 10, 1984.~~

~~86.1314-94 Analytical gases. June 30, 1995.~~

~~86.1316-84 Calibration, frequency and overview. December 10, 1984.~~

~~86.1316-90 Calibration, frequency and overview. April 11, 1989.~~

~~86.1316-94 Calibration, frequency and overview. September 5, 1997.~~

~~86.1318-84 Engine dynamometer system calibrations. November 16, 1983.~~

~~86.1319-84 CVS calibration. December 10, 1984.~~

~~86.1319-90 CVS calibration. April 11, 1989. May 4, 1998.~~

~~86.1320-88 Gas meter or flow instrumentation calibration, particulate measurement. December 16, 1987.~~

- 86.1320-90 Gas meter or flow instrumentation calibration; particulate, methanol, and formaldehyde measurement. April 11, 1989.
- ~~86.1321-84 Hydrocarbon analyzer calibration. December 10, 1984.~~
- ~~86.1321-90 Hydrocarbon analyzer calibration. April 11, 1989.~~
- 86.1321-94 Hydrocarbon analyzer calibration. September 5, 1997.
- ~~86.1322-84 Carbon monoxide analyzer calibration. November 16, 1983. September 5, 1997~~
- ~~86.1323-84 Oxides of nitrogen analyzer calibration. December 10, 1984. September 5, 1997~~
- ~~86.1324-84 Carbon dioxide analyzer calibration. November 16, 1983. September 5, 1997~~
- 86.1325-94 Methane analyzer calibration. September 5, 1997.
- ~~86.1326-84 Calibration of other equipment. November 16, 1983.~~
- ~~86.1326-90 Calibration of other equipment. April 11, 1989.~~
- ~~86.1327-84 Engine dynamometer test procedures; overview. December 10, 1984.~~
- ~~86.1327-88 Engine dynamometer test procedures; overview. March 15, 1985.~~
- ~~86.1327-90 Engine dynamometer test procedure; overview. April 11, 1989.~~
- ~~\*\*\*\*\*~~
- ~~\_\_\_\_\_ (a)...sample collection impingers (or capsules) for formaldehyde (HCHO). A bag or continuous sample of the dilution air...~~
- ~~\*\*\*\*\*~~
- 86.1327-98 Engine dynamometer test procedures; overview. September 5, 1997.
- ~~86.1330-84 Test sequence, general requirements. November 16, 1983.~~
- ~~86.1330-90 Test sequence, general requirements. April 11, 1989. September 5, 1997.~~
- ~~86.1332-84 Engine mapping procedures. December 10, 1984.~~
- ~~86.1332-90 Engine mapping procedures. April 11, 1989. September 21, 1994.~~
- ~~86.1333-84 Transient test cycle generation. November 16, 1983.~~
- ~~86.1333-90 Transient test cycle generation. April 11, 1989. May 4, 1998.~~
- ~~86.1334-84 Pre-test engine and dynamometer preparation. December 10, 1984. September 5, 1997.~~
- ~~86.1335-84 Optional forced cool-down procedure. December 10, 1984.~~
- ~~86.1335-90 Optional forced cool-down procedure. April 11, 1989. September 5, 1997.~~
- ~~86.1336-84 Engine starting and restarting. March 15, 1985. September 21, 1994.~~
- ~~86.1337-84 Engine dynamometer test run. November 16, 1983.~~
- ~~86.1337-88 Engine dynamometer test run. March 15, 1985.~~
- ~~86.1337-90 Engine dynamometer test run. April 11, 1989.~~
- ~~86.1337-96 Engine dynamometer test run. September 5, 1997.~~
- ~~86.1338-84 Emission measurement accuracy. November 16, 1983. September 5, 1997.~~
- ~~86.1340-84 Exhaust sample analysis. December 10, 1984.~~
- ~~86.1340-90 Exhaust sample analysis. April 11, 1989.~~
- 86.1340-94 Exhaust sample analysis. June 30, 1995.
- ~~86.1341-84 Test cycle validation criteria. March 15, 1985.~~
- ~~86.1341-90 Test cycle validation criteria. April 11, 1989.~~
- 86.1341-98 Test cycle validation criteria. September 5, 1997.
- ~~86.1342-84 Calculations; exhaust emissions. March 15, 1985.~~
- ~~86.1342-90 Calculations; exhaust emissions. April 11, 1989.~~
- 86.1342-94 Calculations; exhaust emissions. September 21, 1994, 1997.

Amend subparagraph (d) Meaning of symbols as follows:

(1)(ii) ~~... (101.3 kPa) pressure, or, i~~ If gaseous fuels are being used, 18.64 g/ft<sup>3</sup> for natural gas and 17.28 g/ft<sup>3</sup> for liquefied petroleum gas, assuming an average carbon to hydrogen ratio of 1:3.803 for natural gas and 1:2.656 for liquefied petroleum gas, at 68° F and 760 mm Hg pressure. The Executive Officer may approve other density values deemed appropriate by a manufacturer when gaseous fuels are being used.

\* \* \* \* \*

~~(3)(v)(A)  $CO_e = (1 - 0.01925CO_{2e} - 0.000323R)CO_{em}$  for gasoline and petroleum diesel fuel, with hydrogen to carbon ratio of 1.85:1.~~

(3)(v)(B)  $CO_e = [1 - (0.01 + 0.005HCR)CO_{2e} - 0.000323R]CO_{em}$  for methanol fuel, where HCR is hydrogen to carbon ratio as measured for the fuel used. For natural gas and liquefied petroleum gas, HCR is assumed to be 2.656 and 3.802 respectively.

\* \* \* \* \*

~~(8)(i)  $K_H$  = Humidity correction factor.~~

~~(ii) For gasoline fueled, gaseous fuel, and methanol fueled diesel engines:  $K_H = 1/[1 - 0.0047(H - 75)]$  (or for SI units, ...~~

\* \* \* \* \*

~~86.1344-84 Required information. December 10, 1984.~~

~~86.1344-88 Required information. March 15, 1985.~~

~~86.1344-90 Required information. April 11, 1989.~~

~~86.1344-94 Required information. October 21, 1997.~~

**Subpart P - Emission Regulations for New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Heavy-Duty Engines and New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Light-Duty Trucks; Idle Test Procedures**

- 86.1501-84 ~~Scope, applicability. December 10, 1984.~~  
 86.1501-90 ~~Scope, applicability. April 11, 1989.~~  
 86.1501-94 ~~Scope, applicability. October 6, 2000.~~  
 86.1502-84 ~~Definitions. November 16, 1983. May 4, 1999.~~  
 86.1503-84 ~~Abbreviations. November 16, 1983. May 4, 1999.~~  
 86.1504-84 ~~Section numbering; construction. November 16, 1983.~~  
 86.1504-90 ~~Section numbering; construction. April 11, 1989.~~  
 86.1504-94 ~~Section numbering; construction. June 30, 1995.~~  
 86.1505-84 ~~Introduction; structure of subpart. November 16, 1983.~~  
 86.1505-90 ~~Introduction; structure of subpart. April 11, 1989.~~  
 86.1505-94 ~~Introduction; structure of subpart. June 30, 1995.~~  
 86.1506-84 ~~Equipment required and specifications; overview. November 16, 1983.~~  
 86.1506-90 ~~Equipment required and specifications; overview. April 11, 1989.~~  
 86.1506-94 ~~Equipment required and specifications; overview. September 21, 1994.~~  
 86.1509-84 ~~Exhaust gas sampling system. November 16, 1983. June 30, 1995.~~  
 86.1511-84 ~~Exhaust gas analysis system. November 16, 1983. June 30, 1995.~~  
 86.1513-84 ~~Fuel specifications. November 16, 1983.~~  
 86.1513-87 ~~Fuel specifications. July 7, 1986.~~  
 86.1513-90 ~~Fuel specifications. January 8, 1988.~~  
 86.1513-94 ~~Fuel specifications. September 21, 1994.~~  
 86.1514-84 ~~Analytical gases. November 16, 1983. June 30, 1995.~~  
 86.1516-84 ~~Calibration; frequency and overview. November 16, 1983.~~  
 86.1519-84 ~~CVS calibration. November 16, 1983.~~  
 86.1522-84 ~~Carbon monoxide analyzer calibration. November 16, 1983.~~  
 86.1524-84 ~~Carbon dioxide analyzer calibration. November 16, 1983.~~  
 86.1526-84 ~~Calibration of other equipment. November 16, 1983.~~  
 86.1527-84 ~~Idle test procedure; overview. November 16, 1983.~~  
 86.1530-84 ~~Test sequence; general requirements. November 16, 1983.~~  
 86.1537-84 ~~Idle test run. November 16, 1983. June 30, 1995.~~  
 86.1540-84 ~~Idle exhaust sample analysis. November 16, 1983.~~  
 86.1542-84 ~~Information required. December 10, 1984.~~  
 86.1544-84 ~~Calculation; idle exhaust emissions. March 15, 1985. July 7, 1986.~~

**Appendix I- Urban Dynamometer Schedules.**

(f)(1) EPA Engine Dynamometer Schedule for Heavy-Duty Gasoline-Fueled Engines.  
~~December 10, 1984.~~ April 29, 1998.

**Appendix XII - Tables for Production Compliance Auditing of Heavy-Duty Engines and Heavy-Duty Vehicles.**

State of California  
AIR RESOURCES BOARD

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES  
FOR 1987 THROUGH 2003 AND SUBSEQUENT MODEL  
HEAVY-DUTY OTTO-CYCLE ENGINES AND VEHICLES**

Adopted: April 25, 1986  
 Amended: June 2, 1988  
 Amended: January 22, 1990  
 Amended: May 15, 1990  
 Amended: December 26, 1990  
 Amended: July 12, 1991  
 Amended: October 23, 1992  
 Amended: May 28, 1993  
 Amended: September 24, 1994  
 Amended: June 29, 1995  
 Amended: June 24, 1996  
 Amended: February 26, 1999  
 Amended: [INSERT DATE OF ADOPTION]

NOTE: This document incorporates by reference various sections of the Code of Federal Regulations, some with modifications. California provisions which replace specific federal provisions are denoted by the words "DELETE" for the federal language and "REPLACE WITH" for the new California language. The symbols "\* \* \* \* \*" and "..." mean that the remainder of the federal text for a specific section, which is not shown in these procedures, has been included by reference, with only the printed text changed. Federal regulations which are not listed are not part of the procedures.

The proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions compared to the test procedures as amended February 26, 1999.

**CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST  
PROCEDURES FOR 1987 THROUGH 2003 AND SUBSEQUENT MODEL  
HEAVY-DUTY OTTO-CYCLE ENGINES AND VEHICLES**

The following provisions of Subparts A, L, N, and P, Part 86, Title 40, Code of Federal Regulations, as adopted or amended by the U.S. Environmental Protection Agency on the date listed, and only to the extent they pertain to the testing and compliance of exhaust emissions from heavy-duty Otto-cycle gasoline engines and vehicles, are adopted and incorporated herein by this reference as the California Exhaust Emission Standards and Test Procedures for 1987 through 2003 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles, except as altered or replaced by the provisions set forth below.

The federal regulations contained in the subparts identified above which pertain to evaporative emissions and oxides of nitrogen emission averaging shall not be applicable to these procedures. Regulations pertaining to evaporative emissions are contained in "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Motor Vehicles," as incorporated in Title 13, California Code of Regulations, Section 1976.

The federal regulations contained in the subparts identified above which pertain to nonconformance penalty shall be applicable for the 1988 model year. The Executive Officer shall not implement a nonconformance fee schedule until it is established that payment of nonconformance fees in California may substitute, on the basis of each heavy-duty engine or vehicle certified for sale in California, for payment of nonconformance fees to the federal government.

Starting with For the 1990 through 2003 model years, these regulations shall be applicable to all heavy-duty Otto-cycle natural-gas-fueled and liquefied-petroleum-gas-fueled engines (and vehicles) except those engines derived from existing Diesel engines. For any engine which is not a distinctly Otto-cycle engine nor derived from such, the Executive Officer shall determine whether the engine shall be subject to these regulations or alternatively to the heavy-duty Diesel engine regulations, in consideration of the relative similarity of the engine's torque-speed characteristics and vehicle applications with those of Otto-cycle and Diesel engines.

The regulations concerning the certification of methanol-fueled vehicles and engines including dedicated methanol and fuel-flexible vehicles and engines are not applicable in California until the 1993 through 2003 and subsequent model years. Regulations concerning the certification of incomplete medium-duty Otto-cycle low-emission vehicles and engines, and ultra-low-emission vehicles and engines and super-ultra-low-emission vehicles and engines operating on any fuel are applicable for the 1992 through 2003 and subsequent model years.

**Subpart A, General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Engines, and for 1985 and Later Model Year Gasoline-Fueled and Methanol-Fueled Heavy-Duty Vehicles.**

86.085-1 General Applicability. ~~March 15, 1985~~ July 7, 1986.

\* \* \* \* \*

(b) ...GVWR or less to the medium-duty vehicle...

\* \* \* \* \*

(e) ...projected combined California sales of passenger cars, light-duty trucks, medium-duty vehicles and heavy-duty engines in its product line are fewer than 3,000 units for the model...

\* \* \* \* \*

86.090-1 General Applicability. April 11, 1989.

(a) ... heavy-duty engines. ~~Starting with~~ For the 1990 through 2003 model years, the provisions of this subpart are also applicable to all Otto-cycle dedicated gaseous-fuel, dual-fuel and multi-fuel engines (or vehicles) except those engines derived from existing Diesel engines. Any reference to Otto-cycle heavy-duty engines and vehicles shall also apply to gaseous-fuel engines and vehicles, except where specifically noted. ~~Starting with~~ For the 1992 through 2003 model years, the provisions of this subpart are also applicable to all Otto-cycle low-emission vehicles and engines, and ultra-low-emission vehicles and engines and super-ultra-low-emission vehicles and engines operating on any fuel.

\* \* \* \* \*

(b) ...may request to certify any pre-1996 model-year heavy-duty vehicle of 10,000 pounds Gross Vehicle Weight Rating or less to the medium-duty vehicle...

\* \* \* \* \*

(e) ...projected combined California sales of passenger cars, light-duty trucks, medium-duty vehicles and heavy-duty engines in its product line are fewer than 3,000 units for the model...

\* \* \* \* \*

(g) Prior to the 2004 model year, a manufacturer may certify to the standards and test procedures set forth in section 10.B of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines."

86.085-2 Definitions. ~~November 16, 1983~~ December 16, 1987.

"Administrator" DELETE; REPLACE WITH:

"Administrator" means the Executive Officer of the Air Resources Board.

\* \* \* \* \*

"Certificate of Conformity" DELETE; REPLACE WITH:

"Certificate of Conformity" means "Executive Order" certifying vehicles for sale in California.

"Certification" DELETE; REPLACE WITH:

"Certification" means certification as defined in Section 39018 of the Health and Safety Code.

\* \* \* \* \*

"EPA Enforcement Officer" DELETE; REPLACE WITH:

"EPA Enforcement Officer" means the Executive Officer or his delegate.

\* \* \* \* \*

"Heavy-Duty Engine" DELETE; REPLACE WITH:

"Heavy-duty engine" means an engine which is used to propel a heavy-duty vehicle.

"Heavy-Duty Vehicle" DELETE; REPLACE WITH:

"Heavy-duty vehicle" means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6,000 pounds, except passenger cars.

\* \* \* \* \*

"Medium-duty vehicle" means any pre-1995 model-year heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8,500 pounds or less; any 1992 through 2006 and subsequent model-year heavy-duty low-emission vehicle, or ultra-low-emission vehicle, super-ultra-low-emission vehicle or zero-emission vehicle certified to the standards in title 13 CCR section 1960.1(h)(2) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; or any 1995 through 2003 or subsequent model-year heavy-duty vehicle certified to the standards in title 13 CCR section 1960.1(h)(1) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and any 2000 and subsequent model-year heavy-duty low-emission vehicle, ultra-low-emission

vehicle, super-ultra-low-emission vehicle or zero-emission vehicle certified to the standards in title 13 CCR section 1961(a)(1) or 1962 having a manufacturer's gross vehicle weight rating between 8,500 and 14,000 pounds.

\* \* \* \* \*

86.088-2 Definitions. ~~March 15, 1985.~~

86.090-2 Definitions. ~~April 11, 1989~~ June 6, 1997.

\* \* \* \* \*

"Dedicated Methanol Vehicle" means any methanol-fueled motor vehicle that is engineered and designed to be operated solely on methanol.

"Dedicated Methanol Engine" means any methanol-fueled heavy-duty engine that is engineered and designed to be operated solely on methanol.

"Flexible-Fuel Vehicle (or Engine)" or "Fuel-Flexible Vehicle (or Engine)" means ...

\* \* \* \* \*

86.091-2 Definitions. ~~March 15, 1985~~ July 26, 1990.

\* \* \* \* \*

"Gaseous Fuels" means compressed natural gas or liquefied petroleum gas fuel for use in motor vehicles and engines.

"Dedicated Gaseous-Fuel Engine" means any gaseous-fuel engine that is engineered and designed to be operated solely on a gaseous fuel.

"Dual-Fuel Engine" means any gaseous-fuel engine that is engineered and designed to be operated on either a gaseous fuel or petroleum fuel.

"Multi-Fuel Engine" means any gaseous-fuel engine that is engineered and designed to be operated with a gaseous fuel simultaneously with a petroleum fuel.

\* \* \* \* \*

86.098-2 Definitions. ~~April 6, 1994~~ September 21, 1994.

The definitions of §86.096-2 continue to apply to 1996 and later model year vehicles.

DELETE.

The definitions listed in this section apply beginning with for the 1998 through 2003 model years.

\* \* \* \* \*

“Dispensed fuel temperature”	DELETE
“Evaporative/refueling emission control system”	DELETE
“Evaporative/refueling emission family”	DELETE
“Integrated refueling emission control system”	DELETE
“Non-integrated refueling emission control system”	DELETE
“Refueling emissions”	DELETE
“Refueling emission canister(s)”	DELETE
“Resting losses”	DELETE
“Useful life” means:	
(1) DELETE	
(2) DELETE	
(3) For an Otto-cycle heavy-duty engine family:	
(i) DELETE	
(ii) For the oxides of nitrogen standard, a period of use of 10 years or 110,000 miles whichever first occurs.	
(iii) DELETE	
(4) DELETE	

~~86.004-2 Definitions. October 21, 1997.~~

~~The definitions of §86.098-2 continue to apply to 1998 and later model year vehicles. The definitions listed in this section apply beginning with the 2004 model year.~~

~~\* \* \* \* \*~~

~~“Useful life” means:~~

- ~~(1) — DELETE~~
- ~~(2) — DELETE~~
- ~~(3) — For an Otto-cycle HDE family:~~
  - ~~(i) — For hydrocarbon and carbon monoxide standards, a period of use of 10 years or 110,000 miles, whichever first occurs.~~
  - ~~(ii) — For the oxides of nitrogen standard, a period of use of 10 years or 110,000 miles, whichever first occurs.~~
  - ~~(iii) — For the portion of evaporative emission control systems subject to the evaporative emission test requirements of §86.1230-96, a period of use of 10 years or 110,000 miles, whichever first occurs.~~
- ~~(4) — DELETE~~
- ~~(5) — As an option for HDE families, an alternative useful life period may be assigned by the Administrator under the provisions of §86.094-21(f).~~

~~Warranty period [DELETE, for guidance see California Code of Regulations Title 13 §2036].~~

86.078-3 Abbreviations. January 21, 1980.

86.090-3 Abbreviations. ~~April 11, 1989~~ June 30, 1995.

86.098-3 Abbreviations. October 21, 1997.

(a) The abbreviations in §86.090-3 continue to apply. The abbreviations in this section apply ~~beginning with~~ for the 1998 ~~through 2003~~ model years.

(b) The abbreviations of this section apply to this subpart, and also to subparts B, E, F, G, K, M, N, and P of this part, and have the following meanings:

T<sub>D</sub> -- DELETE

ABT--Averaging, banking, and trading

CCR -- California Code of Regulations

HDE--Heavy-duty engine

86.000-3 Abbreviations. October 22, 1996

86.084-4 Section numbering; construction. September 25, 1980 September 21, 1994.

86.084-5 General Standards; increase in emissions; unsafe conditions. November 2, 1982.

86.090-5 General Standards; increase in emissions; unsafe conditions. April 11, 1989

November 12, 1996.

86.078-7 Maintenance of records; submittal of information; right of entry.

November 2, 1982.

86.091-7 Maintenance of records; submittal of information; right of entry.

July 26, 1990.

86.000-7 Maintenance of records; submittal of information; right of entry.

October 22, 1996.

86.087-10 Emission standards for 1987 and later model year gasoline-fueled heavy-duty engines and vehicles. November 16, 1983.

86.088-10 Emission standards for 1988 and 1989 model year gasoline-fueled heavy-duty engines and vehicles. March 15, 1985.

86.090-10 Emission standards for 1990 and later model year Otto-cycle heavy-duty engines and vehicles. April 11, 1989.

86.091-10 Emission standards for 1991 and later model year Otto-cycle heavy-duty engines and vehicles. April 11, 1989.

\* \* \* \* \*

(a)(2) Manufacturers may choose to certify incomplete medium-duty vehicles from 8501-14,000 pounds, gross vehicle weight to the emission standards and test procedures specified below as an alternative to the primary standards and test procedures specified in Section 1960.1, Title 13, California Code of Regulations. Manufacturers certifying medium-duty vehicles to these optional heavy-duty standards and test procedures shall

specify, in the application for certification, an in-use compliance test procedure, as provided in Section 2139(c), Title 13, California Code of Regulations. Exhaust emissions from new 1995 ~~through 2003~~ and later model year incomplete medium-duty vehicles certifying to the optional heavy-duty engine test procedures shall not exceed the following:

- (i) Carbon Monoxide. 14.4 grams per brake horsepower-hour, as measured under transient operating conditions.
  - (ii) Non-methane Hydrocarbon and Oxides of Nitrogen. 3.9 grams per brake horsepower-hour total, as measured under transient operating conditions.
- (3) Manufacturers may choose to certify incomplete medium-duty low-emission, and ultra-low-emission ~~and super-ultra-low-emission~~ vehicles from 8501-14,000 pounds, gross vehicle weight to the emission standards and test procedures specified below as an alternative to the primary standards and test procedures specified in Section 1960.1, Title 13, California Code of Regulations. Manufacturers certifying medium-duty low-emission, and ultra-low-emission ~~and super-ultra-low-emission~~ vehicles to these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in Section 2139(c), Title 13, California Code of Regulations. Exhaust emissions from new 1992 ~~through 2003~~ and later model year incomplete medium-duty low-emission (LEV), and ultra-low-emission (ULEV), ~~and super-ultra-low-emission (SULEV)~~ vehicles certifying to the optional heavy-duty engine test procedures shall not exceed the following:
- (i) Carbon Monoxide. 14.4 grams per brake horsepower-hour for LEVs and ULEVs ~~and 7.2 grams per brake horsepower-hour for SULEVs~~, as measured under transient operating conditions.
  - (ii) Non-methane Hydrocarbon and Oxides of Nitrogen. 3.5 grams per brake horsepower-hour total for LEVs through the 2001 model year; 3.0 grams per brake horsepower-hour for LEVs ~~through for the 2002-2003 model years; and 2.5 grams per brake horsepower-hour total for ULEVs through the 2003 model year; and 2.0 grams per brake horsepower-hour total for SULEVs for the 1992-2003 model years~~, as measured under transient operating conditions.
  - (iii) Formaldehyde Emissions. 0.050 grams per brake horsepower-hour for LEVs and ULEVs ~~and 0.025 grams per brake horsepower-hour for SULEVs~~, as measured under transient operating conditions.
- (4) The standards set forth in paragraphs (a)(1), (a)(2), and (a)(3)...
- (5) A manufacturer...

\* \* \* \* \*

86.098-10 Emission Standards for 1998 and Later Model Year Otto-Cycle Heavy-Duty Engines and Vehicles. DELETE; REPLACE WITH:

86.098-10 Emission Standards for 1998 ~~through 2003~~ and Later Model Year Otto-Cycle Heavy-Duty Engines and Vehicles and Optional Standards for 1995 Through 1997 Model Year Otto-Cycle Heavy-Duty Engines. ~~September 21, 1994~~ October 21, 1997.

Section 86.098-10 includes text that specifies requirements that differ from §86.096-10. Where a paragraph in §86.086-10 is identical and applicable to §86.096-10, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see §86.096-10.” DELETE

- (a)(1) Exhaust emissions from new 1998 through 2003 and later model year Otto-cycle heavy-duty engines shall not exceed:
- (i) DELETE
  - (ii) *For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas*, and intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 pounds.
    - (A) DELETE
    - (B) DELETE
    - (C) *Oxides of nitrogen*
      - (1) (4.0) grams per brake horsepower-hour (1.49 grams per megajoule), as measured under transient operating conditions.
      - (2) DELETE
      - (3) DELETE
      - (4) A manufacturer may elect to certify to an optional oxides of nitrogen standard between 0.5 grams per brake horsepower-hour and 1.5 grams per brake horsepower-hour, inclusive, at 0.5 grams per brake horsepower-hour increments, as measured under transient operating conditions.
  - (iii) DELETE
  - (iv) *For methanol-fueled Otto-cycle heavy-duty engines* intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs.
    - (A) DELETE
    - (B) DELETE
    - (C) *Oxides of nitrogen.*
      - (1) 4.0 grams per brake horsepower-hour (1.49 grams per megajoule), as measured under transient operating conditions.
      - (2) DELETE; REPLACE WITH:
      - (2) A manufacturer may elect to certify to an optional oxides of nitrogen standard between 0.5 grams per brake horsepower-hour and 1.5 grams per brake horsepower-hour, inclusive, at 0.5 grams per brake horsepower-hour increments, as measured under transient operating conditions.
  - (v) DELETE
  - (vi) *For natural gas-fueled Otto-cycle engines* intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 pounds.
    - (A) DELETE
    - (B) DELETE
    - (C) DELETE; REPLACE WITH: *Oxides of nitrogen.*

(1) 4.0 grams per brake horsepower-hour (1.49 grams per megajoule, as measured under transient operating conditions.

(2) DELETE

(3) A manufacturer may elect to certify to an optional oxides of nitrogen standard between 0.5 grams per brake horsepower-hour and 1.5 grams per brake horsepower-hour, inclusive, at 0.5 grams per brake horsepower-hour increments, as measured under transient operating conditions.

(2) The standards set forth in paragraph (a)(1) of this section refer to the exhaust emitted over the operating schedule set forth in paragraph (f)(1) of Appendix I to this part, and measured and calculated in accordance with the procedures set forth in subpart N or P of this part.

(3) DELETE

\* \* \* \* \*

(c) DELETE

(d) DELETE

(e) A manufacturer may elect to certify 1995 through 1997 model year Otto-cycle engines for use in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 pounds, to an optional oxides of nitrogen standard between 0.5 grams per brake horsepower-hour and 2.5 grams per brake horsepower-hour, inclusive, at 0.5 grams per brake horsepower-hour increments, as measured under transient operating conditions.

~~ADD SUBPARAGRAPH (f) WHICH READS:~~

~~(f)(1) Exhaust emissions from new 2004 and later model year Otto-cycle heavy-duty engines shall not exceed:~~

~~(i) For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas and intended for use only in vehicles with a Gross Vehicle Weight Rating greater than 14,000 pounds:~~

~~(A) Carbon Monoxide. 37.1 grams per brake horsepower-hour, as measured under transient operating conditions.~~

~~(B) Non-Methane Hydrocarbons + Oxides of Nitrogen:~~

~~(1) 2.5 grams per brake horsepower-hour total for ULEVs, as measured under transient operating conditions, including a cap of 0.5 grams per brake horsepower-hour for Non-Methane Hydrocarbons; or~~

~~(2) 2.4 grams per brake horsepower-hour total for ULEVs as measured under transient operating conditions.~~

~~(2) Manufacturers may choose to certify incomplete medium-duty vehicles from 8501-14,000 pounds, gross vehicle weight, to the emission standards and test procedures specified above in section (f)(1) as an alternative to the primary standards and test procedures specified in Section 1960.1, Title 13, California Code of Regulations.~~

Manufacturers certifying medium-duty vehicles to these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in Section 2139(c), Title 13, California Code of Regulations. Exhaust emission from new 2004 and later model year incomplete medium-duty vehicles certifying to the optional heavy-duty engine test procedures shall not exceed the standards set forth in §86.098-10 subparagraph (f)(1).

86.080-12 Alternative certification procedures. April 17, 1980.

~~86.084-14 Small-volume manufacturers certification procedures. January 31, 1985.~~

~~\* \* \* \* \*~~

~~(b)(1) ... produced by manufacturers with California sales (for the model year in which certification is sought) of fewer than 3,000 units (PC, LDT, MDV, and HDE combined).~~

~~\* \* \* \* \*~~

~~(c)(4) DELETE, REPLACE WITH:~~

~~(c)(4) The manufacturer shall include in its records all of the information that EPA requires in §86.084-21 of this subpart. This information will be considered part of the manufacturer's application for certification.~~

~~\* \* \* \* \*~~

~~(c)(7)(i)(C) ... determines and prescribes based on design specifications or sufficient control over design specifications, development data, in-house testing procedures, and in-use experience. However, ...~~

~~\* \* \* \* \*~~

~~(c)(11)(ii)(D)(1) ... We project the total California sales of vehicles (engines) subject to this subpart to be fewer than 3,000 units.~~

~~\* \* \* \* \*~~

~~(c)(13)(ii) ... affect vehicle emissions. All running changes which do not adversely affect emissions or the emissions control system durability are deemed approved unless disapproved by the Executive Officer within 30 days of the implementation of the running change. This ...~~

~~\* \* \* \* \*~~

86.090-14 Small-volume manufacturers certification procedures. April 11, 1989.

\* \* \* \* \*

(b)(1) ...produced by manufacturers with California sales (for the model year in which certification is sought) of fewer than 3,000 units (PC, LDT, MDV, and HDE combined).

\* \* \* \* \*

(c)(4) DELETE; REPLACE WITH:

(c)(4) The manufacturer shall include in its records all of the information that EPA requires in §86.088-21 of this subpart. This information will be considered part of the manufacturer's application for certification.

\* \* \* \* \*

(c)(7)(i)(C) ...determines and prescribes based on design specifications or sufficient control over design specifications, development data, in-house testing procedures, and in-use experience. However,...

\* \* \* \* \*

(c)(11)(ii)(D)(I) ...We project the total California sales of vehicles (engines) subject to this subpart to be fewer than 3,000 units.

\* \* \* \* \*

(c)(13)(ii) ...affect vehicle emissions. All running changes which do not adversely affect emissions or the emissions control system durability are deemed approved unless disapproved by the Executive Officer within 30 days of the implementation of the running change. This...

86.098-14 Small volume manufacturers certification procedures. April 6, 1994.

86.000-16 Prohibition of defeat devices. October 6, 2000.

86.099-17 Emission control diagnostic systems for 1999 and later light-duty vehicles and light-duty trucks. December 22, 1998. DELETE; REPLACE WITH:

All heavy-duty Otto-cycle engines up to 14,000 pounds gross vehicle weight must have an on-board diagnostic system as required in section 1968.1, title 13 CCR.

86.085-20 Incomplete vehicles, classification. January 12, 1983.

86.087-21 Application for certification. November 16, 1983.

86.088-21 Application for certification. March 15, 1985.

86.090-21 Application for certification. April 11, 1989.

86.091-21 Application for certification. April 11, 1989 July 26, 1990.

\* \* \* \* \*

(b)(2) For 1992 through 2003 and subsequent model-year low-emission, and ultra-low-emission, and super-ultra-low-emission vehicles and engines not powered exclusively by gasoline, projected California sales data and fuel economy estimates two years prior to certification, and projected California sales data for all vehicles and engines, regardless of operating fuel or vehicle emission category, sufficient to enable the Executive Officer to select a test fleet representative of the vehicles (or engines) for which certification is requested at the time of certification.

\* \* \* \* \*

~~86.085-22 Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certification and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges. August 30, 1985.~~

~~DELETE any reference to Selective Enforcement Audit.~~

86.090-22 Approval of application for certification; test fleet selections; determinations of parameters subject to adjustment for certification and Selective Enforcement Audit, adequacy of limits, and physically adjustable ranges. April 11, 1989.

DELETE any references to Selective Enforcement Audit.

~~86.087-23 Required data. March 15, 1985.~~

~~\* \* \* \* \*~~

~~(b)(1)(ii) ... useful life of the engine. Such data shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.~~

~~\* \* \* \* \*~~

~~86.088-23 Required data. July 19, 1985.~~

~~\* \* \* \* \*~~

~~(b)(1)(ii) ... useful life of the engine. Such data shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.~~

~~\* \* \* \* \*~~

~~86.090-23 Required data. April 11, 1989.~~

~~\* \* \* \* \*~~

~~(b)(1)(ii) ... useful life of the engine. Such data shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.~~

~~\* \* \* \* \*~~

~~86.091-23 Required data. April 11, 1989 December 12, 1991.~~

~~\* \* \* \* \*~~

(b)(1)(ii) ... useful life of the engine. Such data shall be submitted to the Executive Officer for review. If the durability test method is accepted by EPA, it shall also be accepted by ARB, subject to the following condition. If, after certification for the first model year in which the method is used, the Executive Officer determines that a manufacturer's durability test procedures do not conform with good engineering practices, the Executive Officer may require changes to that manufacturer's durability test procedures for subsequent model years. The manufacturer's revised durability test procedures shall be submitted to the Executive Officer for review and approval.

\* \* \* \* \*

86.001-23 Required data. October 21, 1997.

~~86.085-24 Test vehicles and engines. December 10, 1984.~~

~~\* \* \* \* \*~~

~~(c)(1) (i) DELETE; REPLACE WITH:~~

~~(e)(1) (i) a combined total of 3000 California passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty engines;~~

~~(ii) DELETE~~

~~(iii) DELETE~~

~~(iv) DELETE~~

~~(v) DELETE~~

~~(vi) may request a reduction in the number of test vehicles (or engines) ...~~

~~(e)(2) ...total sales of fewer than 3,000...~~

~~\* \* \* \* \*~~

~~(f) ...submitted. Durability data submitted may be from engines previously certified by the EPA or the Air Resources Board.~~

~~\* \* \* \* \*~~

86.090-24 Test vehicles and engines. April 11, 1989 July 26, 1990.

\* \* \* \* \*

(e)(1) (i) DELETE; REPLACE WITH:

(e)(1) (i) A combined total of 3,000 California passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty engines,

(ii) DELETE

(iii) DELETE

(iv) DELETE

(v) DELETE

(vi) may request a reduction in the number of test vehicles (or engines)...

(e)(2) ...total sales of fewer than 3,000...

\* \* \* \* \*

(f) ...submitted. Durability data submitted may be from engines previously certified by the EPA or the Air Resources Board.

\* \* \* \* \*

~~86.001-24 Test vehicles and engines. October 22, 1996.~~  
~~86.087-25 Maintenance. March 15, 1985.~~  
~~86.088-25 Maintenance. March 15, 1985.~~  
~~86.090-25 Maintenance. April 11, 1989.~~  
~~86.084-26 Mileage and service accumulation; emission measurements. October 19, 1983.~~  
~~86.090-26 Mileage and service accumulation; emission measurements. April 11, 1989.~~  
~~86.085-27 Special test procedures. January 12, 1983.~~  
~~86.090-27 Special test procedures. April 11, 1989.~~  
~~86.087-28 Compliance with emission standards. March 15, 1985.~~  
~~86.088-28 Compliance with emission standards. March 15, 1985.~~  
~~86.090-28 Compliance with emission standards. April 11, 1989.~~

\* \* \* \* \*

~~(c)(4)(iii)(A) (1) ...For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...~~  
~~(2) ...For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...~~

\* \* \* \* \*

~~86.091-28 Compliance with emission standards. April 11, 1989~~ September 21, 1994.

\* \* \* \* \*

(c)(4)(iii)(A) (1) ...For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...  
 (2) ...For transient HC (OMHCE), formaldehyde (methanol-fueled engines and vehicles, low-emission vehicles and engines, and ultra-low-emission vehicles and engines and super-ultra-low-emission vehicles and engines), CO, and NOx, the official exhaust emission...

\* \* \* \* \*

~~86.087-29 Testing by the Administrator. January 24, 1984.~~  
~~86.088-29 Testing by the Administrator. March 15, 1985.~~  
~~86.090-29 Testing by the Administrator. April 11, 1989.~~  
~~86.091-29 Testing by the Administrator. April 11, 1989~~ March 24, 1993.

- 86.087-30 Certification. ~~August 30, 1985.~~  
 86.088-30 Certification. ~~March 15, 1985.~~  
 86.090-30 Certification. ~~April 11, 1989.~~  
 86.091-30 Certification. ~~April 11, 1989~~ July 26, 1990.  
 86.079-31 Separate certification. September 8, 1977.  
 86.079-32 Addition of a vehicle or engine after certification. September 8, 1977.  
 86.079-33 Changes to a vehicle or engine covered by certification. September 8, 1977.  
 86.082-34 Alternative procedure for notification of additions and changes. November 2, 1982.  
 86.087-35 Labeling. Labels shall comply with the requirements set forth in the "California Motor Vehicle Emission Control and Smog Index Label Specifications", as last amended June 24, 1996 incorporated by reference in section 1965, title 13, CCR.  
 86.085-37 Production vehicles and engines. ~~January 12, 1983~~ June 6, 1997.  
 86.087-38 Maintenance instructions. ~~March 15, 1985~~ July 7, 1986.  
 86.004-38 Maintenance instructions. ~~October 21, 1997.~~

\* \* \* \* \*

(g) — Emission control diagnostic service information:

(1) — ~~Manufacturers shall furnish or cause to be furnished to any person engaged in the repairing or servicing of motor vehicles or motor vehicle engines, or the Administrator upon request, any and all information needed to make use of the on-board diagnostic system and such other information, including instructions for making emission-related diagnosis and repairs, including, but not limited to, service manuals, technical service bulletins, recall service information, data stream information, bi-directional control information, and training information; unless such information is protected by section 208(c) of the Act or California Government Code Section 6250, as a trade secret. No such information may be withheld under section 208(c) of the Act or California Government Code Section 6250, if that information is provided (directly or indirectly) by the manufacturer to franchised dealers or other persons engaged in the repair, diagnosing, or servicing of motor vehicles or motor vehicle engines.~~

\* \* \* \* \*

86.084-40 Automatic expiration of reporting and recordkeeping requirements. September 25, 1980.

~~86.004-40 Heavy-duty engine rebuilding practices. October 21, 1997:~~

~~The provisions of this section are applicable to engines subject to the standards prescribed in §86.004-10 or §86.004-11 and are applicable to the process of engine rebuilding (or rebuilding a portion of an engine or engine system). The process of engine rebuilding generally includes disassembly, replacement of multiple parts due to wear, and reassembly, and also may include the removal of the engine from the vehicle and other acts associated with rebuilding an engine. Any deviation from the provisions contained in this section is a prohibited act under section 203(a)(3) of the Clean Air Act (42 U.S.C. 7522(a)(3)) or of the California Vehicle Code § 27156, et seq.~~

\* \* \* \* \*

**Subpart L - Nonconformance Penalties for Gasoline-Fueled and Diesel Heavy-Duty Engines and Heavy-Duty Vehicles, Including Light-Duty Trucks**

86.1101-87 Applicability. ~~August 30, 1985~~ October 6, 2000.

\* \* \* \* \*

...applicable for 1988 model...

\* \* \* \* \*

86.1102-87 Definitions. ~~August 30, 1985~~ November 5, 1990.

86.1103-87 Criteria for availability of nonconformance penalties. August 30, 1985.

86.1104-87 Determination of upper limits. ~~August 30, 1985~~ July 26, 1990.

86.1105-87 Emission standards for which nonconformance penalties are available. ~~December 31, 1985~~ February 3, 1996.

86.1106-87 Production compliance auditing. ~~August 30, 1985~~ December 28, 1993.

This section only applies to 50-state engines or vehicle configurations with engines available for sale in California.

\* \* \* \* \*

~~(b) A 50-state engine or vehicle configuration with engines available for sale in California fails a Selective Enforcement...~~

\* \* \* \* \*

~~(c) A 50-state engine or vehicle configuration with engines available for sale in California, for which an NCP has been previously...~~

\* \* \* \* \*

86.1107-87 Testing by the Administrator. August 30, 1985.

86.1108-87 Maintenance of records. August 30, 1985.

86.1109-87 Entry and access. August 30, 1985.

86.1110-87 Sample selection. August 30, 1985.

86.1111-87 Test procedures for PCA testing. ~~August 30, 1985~~ September 5, 1997.

86.1112-87 Determining the compliance level and reporting of test results. August 30, 1985.

86.1113-87 Calculation and payment of penalty. ~~December 31, 1985~~ October 2, 1996.

\* \* \* \* \*

(a)(3)(iv)...not affect the previous year's penalty. In calculating AAFi for the California heavy-duty engines, it shall be equal to the value of n as is used federally.

\* \* \* \* \*

(g)(1)(ii)...payable to: Air Pollution Control Fund, c/o Executive Officer, Air Resources Board, P.O. Box 2815, Sacramento, CA 95812.

\* \* \* \* \*

(g)(3)...date to: Chief, Mobile Source Division, Air Resources Board, 9528 Telstar Avenue, El Monte, CA 91731 and Director, Manufacturers Operations...

\* \* \* \* \*

(h)...PCA take place. The refund to manufacturers shall be made from the Air Pollution Control Fund. The amount refunded will be as follows...

\* \* \* \* \*

86.1114-87 Suspension and voiding of certificates of conformity. August 30, 1985.

**Subpart N, Emission Regulations for New Otto-cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures**

- ~~86.1301-84 Scope; applicability. November 16, 1983.~~  
~~86.1301-88 Scope; applicability. March 15, 1985.~~  
~~86.1301-90 Scope; applicability. April 11, 1989.~~  
~~86.1302-84 Definitions. November 16, 1983.~~  
~~86.1303-84 Abbreviations. November 16, 1983.~~  
~~86.1304-84 Section numbering; construction. November 16, 1983.~~  
~~86.1304-90 Section numbering; construction. April 11, 1989 October 6, 2000.~~  
~~86.1305-84 Introduction; structure of subpart. November 16, 1983.~~  
~~86.1305-90 Introduction; structure of subpart. April 11, 1989.~~  
~~86.1306-84 Equipment required and specification; overview. November 16, 1983.~~  
~~86.1306-88 Equipment required and specification; overview. March 15, 1985.~~  
~~86.1306-90 Equipment required and specification; overview. April 11, 1989 September 21, 1994.~~  
~~86.1306-96 Equipment required and specification; overview. September 21, 1994.~~  
~~86.1308-84 Dynamometer and engine equipment specifications. ~~December 10, 1984~~ December 16, 1987.~~  
~~86.1309-84 Exhaust gas sampling system; gasoline-fueled engines. November 16, 1983.~~  
~~86.1309-90 Exhaust gas sampling system; gasoline-fueled and methanol-fueled Otto-cycle engines. April 11, 1989 June 30, 1995.~~

\* \* \* \* \*

(a)(3)...For methanol-fueled engines, the sample lines for the methanol and formaldehyde samples are heated to  $235^{\circ} \pm 15^{\circ}\text{F}$  ( $113^{\circ} \pm 8^{\circ}\text{C}$ ).

\* \* \* \* \*

- ~~86.1311-84 Exhaust gas analytical system; CVS bag sample. November 16, 1983.~~  
~~86.1311-88 Exhaust gas analytical system; CVS bag sample. August 29, 1986.~~  
~~86.1311-90 Exhaust gas analytical system; CVS bag sample. April 11, 1989.~~  
~~86.1311-94 Exhaust gas analytical system; CVS bag sample. October 21, 1997.~~  
~~86.1313-84 Fuel specifications. December 10, 1984.~~  
~~86.1313-91  $\theta$  Fuel specifications. April 11, 1989 September 5, 1997.~~

\* \* \* \* \*

ADD SUBPARAGRAPH (a)(1) WHICH READS:

(a)(1)(i) For 1993-1994 model-year Otto-cycle LEVs and ULEVs, and for all 1995 through 2003 and subsequent model-year heavy-duty and medium-duty Otto-cycle vehicles and engines, gasoline having the specifications listed below may be used in

exhaust and evaporative emission testing as an option to the specifications referred to in paragraph (a).

Fuel Property a/	Limit	Test Method b/
Octane, (R+M)/2 (min)	91	D2699-88, D 2700-88
Sensitivity (min)	7.5	D 2699-88, D 2700-88
Lead, g/gal (max) (No lead added)	0-0.01	Title 13 CCR §2253.4(c)
Distillation Range, degrees F		Title 13 CCR §2263 c/
10 pct. point,	130-150	
50 pct. point,	200-210 d/	
90 pct. point,	290-300 e/	
EP, maximum	390	
Residue, vol% (max)	2.0	
Sulfur, ppm by wt.	30-40	Title 13 CCR §2263
Phosphorous, g/gal (max)	0.005	Title 13 CCR §2253.4(c)
RVP, psi	6.7-7.0	Title 13 CCR §2263
Olefins, vol %	4.0-6.0	Title 13 CCR §2263
Total Aromatic Hydrocarbons (vol%)	22-25	Title 13 CCR §2263
Benzene, vol %	0.8-1.0 f/	Title 13 CCR §2263
Multi-Substituted Alkyl		
Aromatic Hydrocarbons, vol %	12-14	g/
MTBE, vol %	10.8-11.2	Title 13 CCR §2263
Additives :	Sufficient to meet requirements of	Title 13, CCR §2257
Copper Corrosion	No. 1	D 130-88
Gum, Washed, mg/100 ml (max)	3.0	D 381-86
Oxidation Stability, minutes (min)	1000	D 525-88
Specific Gravity	Report h/	
Heat of Combustion	Report h/	
Carbon, wt%	Report h/	
Hydrogen, wt%	Report h/	

a/ The gasoline must be blended from typical refinery feedstocks.

b/ ASTM specification unless otherwise noted. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results with the specified method.

c/ Although Title 13 CCR § 2263 refers to the temperatures of the 50 and 90 percent points, this procedure can be extended to the 10 percent and end point temperatures, and to the determination of the residue content.

d/ The range for interlaboratory testing is 195-215°F.

e/ The range for interlaboratory testing is 285-305°F.

f/ The range for interlaboratory testing is 0.7-1.1 percent by volume.

- g/ "Detailed Hydrocarbon Analysis of Petroleum Hydrocarbon Distillates, Reformates, and Gasoline by Single Column High Efficiency (Capillary) Column Gas Chromatography," by Neil Johansen, 1992, Boulder, CO.
- h/ The fuel producer should report this fuel property to the fuel purchaser. Any generally accepted test method may be used and shall be identified in the report.

\* \* \* \* \*

(a)(3)(i) Methanol-Gasoline Fuel Specifications for 1993 Model-Year Engines. Methanol fuel used in service accumulation of methanol-fueled Otto-cycle engines shall be representative of commercially available methanol fuel. Methanol used in fuel for exhaust emission testing shall be chemical grade methanol. For fuel-flexible vehicles and engines, the gasoline used for blending fuel for use in service accumulation shall be representative of commercial regular unleaded gasoline which will be generally available through retail outlets. Gasoline used for blending fuel for use in emission testing shall conform with the unleaded gasoline specification noted in paragraph (a) above. The requirements set forth in subparagraph (a)(3)(ii) may be used as an option for 1993 model-year vehicles.

(a)(3)(ii) Methanol-Gasoline Fuel Specifications for 1994 through 2003 and Subsequent Model-Year Engines.

(a)(3)(ii)(A) Otto-cycle methanol-fuel vehicles

**Mileage-accumulation fuel:** For methanol-fueled Otto-cycle methanol engines, fuel which meets the specifications listed in Title 13, CCR, Section 2292.1 or 2292.2 as applicable.

**Emission-testing fuel:** For methanol-fueled Otto-cycle methanol engines, fuel which meets the specifications listed in Title 13, CCR, Section 2292.1 or 2292.2 as modified by the following:

The fuel specification for 2292.1 shall be modified to: a) require methanol content at  $98.0 \pm 0.5$  volume percent; b) require ethanol content at  $1.0 \pm 0.1$  volume percent; c) require certification gasoline as noted in paragraph 9(a) of the California Exhaust Emission Standards and Test Procedures for 1988-2000 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, at  $1.0 \pm 0.1$  volume percent.

The fuel specification for 2292.2 shall be modified to require certification gasoline as noted in paragraph 9(a) of the California Exhaust Emission Standards and Test Procedures for 1988-2000 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, as the hydrocarbon fraction. The vapor

pressure specification for the emission-testing fuel shall be adjusted to 8.0 - 8.5 psi, using common blending components from the gasoline stream.

(a)(3)(ii)(B) Fuel-flexible vehicles

**Mileage-accumulation fuel:** For both durability-data vehicles and emission-data vehicles, mileage accumulation shall be conducted with one fuel. For vehicles designed to operate on methanol, a fuel that meets the specifications listed in Title 13, CCR, Section 2292.2 shall be used.

**Emission-testing fuel:** For emission testing, fuel that meets the specifications listed in Title 13, CCR, Section 2292.2 with the following exception. The fuel specification for 2292.2 shall be modified to require certification gasoline as noted in paragraph 9(a) of the California Exhaust Emission Standards and Test Procedures for 1988-2000 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, as the hydrocarbon fraction. The vapor pressure specification for the emission-testing fuel shall be adjusted to 8.0 - 8.5 psi, using common blending components from the gasoline stream.

(a)(3)(iii) Fuel additives and ignition improvers intended for use in methanol test fuels shall be subject to the approval of the Executive Officer. In order for such approval to be granted, a manufacturer must demonstrate that emissions will not be adversely affected by the use of the fuel additive or ignition improver.

\* \* \* \* \*

ADD SUBPARAGRAPH (e) TO READ:

(e) **Natural Gas and Liquefied Petroleum Gas Test Fuel.**

(e)(1)(i) **Natural Gas Test Fuel.** Natural gas used in service accumulation for 1990 through 1993 model-year engines shall be representative of commercial natural gas which is generally available. Natural gas meeting the specifications below, or substantially equivalent specifications approved by the Executive Officer, shall be used in exhaust emission testing for 1990 through 1993 model-year engines. The specifications set forth in subparagraph (e)(1)(ii) may be used as an option for 1993 model-year vehicles.

### Natural Gas Emission Testing Fuel Specification

Specification	Value	Tolerance	Calculation Method
Wobbe Number	1350	± 0.5%	ASTM D. 1945 Using AGA Bulletin No. 36
Hydrocarbons (expressed as percent of total organic carbon present)			
Methane	88%	± 0.5%	ASTM D 1945
Ethane	8%	± 0.3%	ASTM D 1945
C <sub>3</sub> and higher HC	4%	± 0.2%	ASTM D 1945
C <sub>6</sub> and higher HC	0.5%	maximum	ASTM D 1945
Total unsaturated HC	0.5%	maximum	ASTM D 2650
Other Species (expressed as mole percent)			
Hydrogen	0.1%	maximum	ASTM D 2650
Carbon Monoxide	0.1%	maximum	ASTM D 2650

#### Other Requirements:

1. Free from liquids over the entire range of temperatures and pressures encountered in the engine and fuel system.
2. Free from solid particulate matter.

(e)(1)(ii) Natural gas used in service accumulation and in exhaust emission testing for 1994 through 2003 and subsequent model-year engines shall meet the specification as follows:

**Mileage accumulation fuel:** Natural gas meeting the specifications listed in Title 13, CCR, Section 2292.5 shall be used in service accumulation.

**Emission-testing fuel:** Natural gas meeting the following specifications listed in Title 13, CCR, Section 2292.5 as modified by the following: a) methane content at  $90.0 \pm 1.0$  mole percent; b) ethane content at  $4.0 \pm 0.5$  mole percent; c) C<sub>3</sub> and higher hydrocarbon content at  $2.0 \pm 0.3$  mole percent; d) oxygen content at 0.5 mole percent maximum; e) inert gas (sum of CO<sub>2</sub> and N<sub>2</sub>) content at  $3.5 \pm 0.5$  mole percent.

(e)(2)(i) **Liquefied Petroleum Gas Test Fuel.** Liquefied petroleum gas used in service accumulation for 1990 through 1993 model-year engines shall be representative of commercial liquefied petroleum gas which is generally available through retail outlets. Liquefied petroleum gas used in exhaust and evaporative emission testing for 1990 through 1993 model-year engines shall conform to NGPA HD-5 specification. The specifications set forth in subparagraph (e)(2)(ii) may be used as an option for 1993 model-year vehicles.

(e)(2)(ii) Liquefied petroleum gas fuel that will be used in service accumulation and in exhaust and evaporative emission testing for 1994 through 2003 and subsequent model-year engines shall meet the specifications as follows.

**Mileage accumulation fuel:** Liquefied petroleum gas meeting the specifications listed in Title 13, CCR, Section 2292.6 shall be used in service accumulation.

**Emission-testing fuel:** Liquefied petroleum gas meeting the specifications listed in Title 13, CCR, Section 2292.6 shall be used for exhaust and evaporative emission testing with the following exceptions: a) propane content limited to  $93.5 \pm 1.0$  volume percent; b) propene content limited to  $3.8 \pm 0.5$  volume percent; and c) butane and heavier components limited to  $1.9 \pm 0.3$  volume percent.

(e)(3) The specification range of the fuels to be used under paragraphs (e)(1) and (e)(2) of this section shall be reported in accordance with 86.090-21(b)(3).

86.1314-84 Analytical gases. December 10, 1984.

~~86.1314-94 Analytical gases. June 30, 1995.~~

~~86.1316-84 Calibration; frequency and overview. December 10, 1984.~~

86.1316-90 Calibration; frequency and overview. April 11, 1989 September 5, 1997.

~~86.1316-94 Calibration; frequency and overview. September 5, 1997.~~

86.1318-84 Engine dynamometer system calibrations. November 16, 1983.

~~86.1319-84 CVS calibration. December 10, 1984~~ May 4, 1998.

86.1319-90 CVS calibration. April 11, 1989 May 4, 1998.

~~86.1320-88 Gas meter or flow instrumentation calibration; particulate measurement. December 16, 1987.~~

86.1320-90 Gas meter or flow instrumentation calibration; particulate, methanol, and formaldehyde measurement. April 11, 1989.

~~86.1321-84 Hydrocarbon analyzer calibration. December 10, 1984.~~

86.1321-90 Hydrocarbon analyzer calibration. April 11, 1989 September 5, 1997.

~~86.1321-94 Hydrocarbon analyzer calibration. September 5, 1997.~~

86.1322-84 Carbon monoxide analyzer calibration. November 16, 1983 September 5, 1997.

~~86.1323-84 Oxides of nitrogen analyzer calibration. December 10, 1984~~ September 5, 1997.

~~86.1324-84 Carbon dioxide analyzer calibration. November 16, 1983~~ September 5, 1997.

~~86.1325-94 Methane analyzer calibration. September 5, 1997.~~

~~86.1326-84 Calibration of other equipment. November 16, 1983.~~

86.1326-90 Calibration of other equipment. April 11, 1989.

~~86.1327-84 Engine dynamometer test procedures; overview. December 10, 1984.~~

~~86.1327-88 Engine dynamometer test procedures; overview. March 15, 1985.~~

86.1327-90 Engine dynamometer test procedure; overview. April 11, 1989 September 5, 1997.

\* \* \* \* \*

(a)...sample collection impingers (or capsules) for formaldehyde (HCHO). A bag or continuous sample of the dilution air...

\* \* \* \* \*

- 86.1327-98 Engine dynamometer test procedure; overview. September 5, 1997.
- 86.1330-84 Test sequence, general requirements. ~~November 16, 1983~~ September 5, 1997.
- 86.1330-90 Test sequence, general requirements. ~~April 11, 1989~~ September 5, 1997.
- ~~86.1332-84 Engine mapping procedures. December 10, 1984.~~
- 86.1332-90 Engine mapping procedures. ~~April 11, 1989~~ September 21, 1994.
- ~~86.1333-84 Transient test cycle generation. November 16, 1983.~~
- 86.1333-90 Transient test cycle generation. ~~April 11, 1989~~ May 4, 1998.
- 86.1334-84 Pre-test engine and dynamometer preparation. ~~December 10, 1984~~ September 5, 1997.
- ~~86.1335-84 Optional forced cool-down procedure. December 10, 1984.~~
- 86.1335-90 Optional forced cool-down procedure. ~~April 11, 1989~~ September 5, 1997.
- 86.1336-84 Engine starting and restarting. ~~March 15, 1985~~ September 21, 1994.
- ~~86.1337-84 Engine dynamometer test run. November 16, 1983.~~
- ~~86.1337-88 Engine dynamometer test run. March 15, 1985.~~
- 86.1337-90 Engine dynamometer test run. ~~April 11, 1989~~ September 5, 1997.
- ~~86.1337-96 Engine dynamometer test run. September 5, 1997.~~
- 86.1338-84 Emission measurement accuracy. ~~November 16, 1983~~ September 5, 1997.
- ~~86.1340-84 Exhaust sample analysis. December 10, 1984.~~
- 86.1340-90 Exhaust sample analysis. ~~April 11, 1989~~ June 30, 1995.
- ~~86.1340-94 Exhaust sample analysis. June 30, 1995.~~
- ~~86.1341-84 Test cycle validation criteria. March 15, 1985.~~
- 86.1341-90 Test cycle validation criteria. ~~April 11, 1989~~ September 5, 1997.
- ~~86.1341-98 Test cycle validation criteria. September 5, 1997.~~
- ~~86.1342-84 Calculations; exhaust emissions. March 15, 1985.~~
- 86.1342-90 Calculations; exhaust emissions. ~~April 11, 1989~~ September 5, 1997.

\* \* \* \* \*

(d) Meaning of symbols:

\* \* \* \* \*

(1)(ii) . . . (101.3 kPa) pressure; or, if gaseous fuels are being used, 18.64 g/ft<sup>3</sup> for natural gas and 17.28 g/ft<sup>3</sup> for liquefied petroleum gas, assuming an average carbon to hydrogen ratio of 1:3.803 for natural gas and 1:2.656 for liquefied petroleum gas, at 68° F and 760 mm Hg pressure. The Executive Officer may approve other density values deemed appropriate by a manufacturer when gaseous fuels are being used.

\* \* \* \* \*

(3)(v)(A)  $CO_e = (1 - 0.01925CO_{2e} - 0.000323R)CO_{em}$  for gasoline and petroleum diesel fuel, with hydrogen to carbon ratio of 1.85:1.

(3)(v)(B)  $CO_e = [1 - (0.01 + 0.005HCR)CO_{2e} - 0.00323R]CO_{em}$  for methanol fuel, where HCR is hydrogen to carbon ratio as measured for the fuel used. For natural gas and liquefied petroleum gas, HCR is assumed to be 2.656 and 3.802 respectively.

\* \* \* \* \*

(8)(i)  $K_H$  = Humidity correction factor.

(ii) For gasoline-fueled, gaseous-fuel, and methanol-fueled diesel engines:  $K_H = 1/[1 - 0.0047(H-75)]$  (or for SI units, ...

\* \* \* \* \*

86.1342-94 Calculations; Exhaust Emissions. ~~September 21, 1994~~ September 5, 1997.

86.1344-84 Required information. ~~December 10, 1984.~~

86.1344-88 Required information. ~~March 15, 1985.~~

86.1344-90 Required information. April 11, 1989.

86.1344-94 Required information. October 21, 1997.

**Subpart P - Emission Regulations for New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Heavy-Duty Engines and New Gasoline-Fueled and Methanol-Fueled Otto-Cycle Light-Duty Trucks; Idle Test Procedures**

- 86.1501-84 ~~Scope, applicability. December 10, 1984.~~  
 86.1501-90 Scope, applicability. April 11, 1989.  
 86.1501-94 Scope, applicability. May 4, 1999.  
 86.1502-84 ~~Definitions. November 16, 1983~~ May 4, 1999.  
 86.1503-84 ~~Abbreviations. November 16, 1983~~ May 4, 1999.  
 86.1504-84 ~~Section numbering; construction. November 16, 1983.~~  
 86.1504-90 Section numbering; construction. April 11, 1989.  
 86.1504-94 Section numbering; construction. June 30, 1995.  
 86.1505-84 Introduction; structure of subpart. November 16, 1983.  
 86.1505-90 Introduction; structure of subpart. April 11, 1989.  
 86.1505-94 Introduction; structure of subpart. June 30, 1995.  
 86.1506-84 ~~Equipment required and specifications; overview. November 16, 1983.~~  
 86.1506-90 Equipment required and specifications; overview. April 11, 1989.  
 86.1506-94 Equipment required and specifications; overview. September 21, 1994.  
 86.1509-84 ~~Exhaust gas sampling system. November 16, 1983~~ June 30, 1995.  
 86.1511-84 ~~Exhaust gas analysis system. November 16, 1983~~ June 30, 1995.  
 86.1513-84 ~~Fuel specifications. November 16, 1983.~~  
 86.1513-87 ~~Fuel specifications. July 7, 1986.~~  
 86.1513-90 Fuel specifications. January 8, 1988.  
 86.1513-94 Fuel specifications. September 21, 1994.  
 86.1514-84 ~~Analytical gases. November 16, 1983~~ June 30, 1995.  
 86.1516-84 Calibration; frequency and overview. November 16, 1983.  
 86.1519-84 CVS calibration. November 16, 1983.  
 86.1522-84 Carbon monoxide analyzer calibration. November 16, 1983.  
 86.1524-84 Carbon dioxide analyzer calibration. November 16, 1983.  
 86.1526-84 Calibration of other equipment. November 16, 1983.  
 86.1527-84 Idle test procedure; overview. November 16, 1983.  
 86.1530-84 Test sequence; general requirements. November 16, 1983.  
 86.1537-84 ~~Idle test run. November 16, 1983~~ June 30, 1995.  
 86.1540-84 Idle exhaust sample analysis. November 16, 1983.  
 86.1542-84 Information required. December 10, 1984.  
 86.1544-84 ~~Calculation; idle exhaust emissions. March 15, 1985~~ July 7, 1986.

## Appendix I- Urban Dynamometer Schedules.

(f)(1) EPA Engine Dynamometer Schedule for Heavy-Duty Gasoline-Fueled Engines.  
December 10, 1984 ~~April 29, 1998.~~

## Appendix XII - Tables for Production Compliance Auditing of Heavy-Duty Engines and Heavy-Duty Vehicles.

### Additional Requirements

1. Any reference to vehicle or engine sales throughout the United States shall mean vehicle or engine sales in California.
2. Regulations concerning EPA hearings, EPA inspections, and specific language on the Certificate of Conformity, shall not be applicable to these procedures.
3. Any reference made to Selective Enforcement Auditing (SEA) shall not be applicable to these procedures except as explicitly stated in regards to nonconformance penalties.
4. In addition to the standards and provisions specified in CFR §86.091-10 (emission standards for 1991 ~~through 2003~~ and later model year Otto-cycle heavy-duty engines and vehicles), the following formaldehyde emission levels as measured under transient operating conditions shall not be exceeded for dedicated methanol and fuel-flexible vehicles and engines:

	(g/bhp-hr)
1993-1995	0.10
1996- <del>2003</del> and Subsequent	0.05

The following formaldehyde emission levels as measured under transient operating conditions shall not be exceeded for 1992 ~~through 2003~~ and subsequent low-emission vehicles, and ultra-low-emission vehicles ~~and super-ultra-low-emission vehicles~~ operating on any fuel.

	(g/bhp-hr)
1992- <del>2003</del> and Subsequent Low-Emission Vehicles	0.050
1992- <del>2003</del> and Subsequent Ultra-Low-Emission Vehicles	<u>0.050</u> 0.025
1992- <del>2003</del> Super-Ultra-Low-Emission Vehicles	<u>0.025</u>

5. All dedicated methanol-fueled and fuel-flexible vehicles and engines shall comply with the requirements which are applicable to heavy-duty gasoline-fueled Otto-cycle vehicles and engines, except where otherwise noted. In particular, for fuel-flexible vehicles and engines, a manufacturer's proposed durability

demonstration program, as required in sections 86.091-21(b)(4)(iii)(A) and 86.091-23(b)(1)(ii), shall provide for the assessment of the durability of the engine in operation with methanol and gasoline, as well as intermediate mixtures of both fuels. A manufacturer's proposed mileage and service accumulation, as required in section 86.090-24(c), shall be conducted on methanol.

The provisions of section 86.091-28(c), "Compliance with emissions standards," shall be used to determine the compliance requirements with the emission standards. For fuel-flexible vehicles and engines, the noted deterioration factors shall be determined from testing conducted with gasoline fuel. However, as an assurance that fuel-flexible vehicles and engines will comply with applicable exhaust emission standards throughout their useful lives when operated on methanol fuel, the manufacturer shall demonstrate that exhaust emissions tests conducted with methanol fuel at the beginning, middle, and end of the durability service accumulation schedule do not exceed the applicable exhaust emission standards. For certification to be granted, the vehicle or engine may not exceed applicable certification exhaust emission standards.

6. All dedicated gaseous-fuel, dual-fuel, and multi-fuel Otto-cycle engines (and vehicles), except engines derived from existing Diesel engines, shall comply with the requirements which are applicable to heavy-duty Otto-cycle engines, except where otherwise noted.
7. Non-methane hydrocarbon emissions shall be measured in accordance with the "California Non-methane Hydrocarbon Test Procedures" as last amended July 12, 1991, which is incorporated herein by reference.
8. For dual-fuel or multi-fuel gaseous engines and vehicles, the noted deterioration factors shall be determined separately for operation on each type of fuel or combination of fuels that the engine is designed to use. For certification to be granted, the provisions of 86.091-28(c) must be met separately for emissions using each type and combination of fuels.

