State of California
AIR RESOURCES BOARD

Resolution 86-68

July 24, 1986

Agenda Item No.: 86-8-1

WHEREAS, Health and Safety Code Sections 39600 and 39601 authorize the Air Resources Board (the "Board") to adopt standards, rules and regulations necessary for the proper execution of the powers and duties granted to and imposed upon the Board by law;

WHEREAS, Health and Safety Code Section 43104 authorizes the Board to adopt test procedures for determining whether new motor vehicles and new motor vehicle engines are in compliance with vehicular emission standards adopted by the Board, and provides that the Board shall base its test procedures on federal test procedures or on driving patterns typical in the urban areas of California;

WHEREAS, the Board's present passenger car, light-duty truck, and medium-duty vehicle exhaust emission test procedures, and associated certification requirements, are set forth in the "California Exhaust Emission Standards and Test Procedures for 1981 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as last amended October 2, 1985, incorporated by reference in Section 1960.1, Title 13, California Administrative Code;

WHEREAS, the Board's present test procedures are largely based on Environmental Protection Agency (EPA) federal certification test procedures contained in Title 40, Code of Federal Regulations, Part 86, Subparts A and B, as the federal procedures existed April 15, 1978 with reference to gasoline-powered vehicles and October 13, 1981 with reference to diesel-powered vehicles;

WHEREAS, the EPA has since April 15, 1978 promulgated various changes to the federal certification procedures;

WHEREAS, the staff has proposed amendments to the Board's exhaust emission test procedures for passenger cars, light-duty trucks, and medium-duty vehicles, and associated certification requirements, which generally update the test procedures and requirements applicable to the 1988 and later model years to incorporate the federal test procedures reflecting recent amendments adopted by EPA while establishing separate California requirements where necessary and appropriate;

WHEREAS, the amendments proposed by staff would separate the existing exhaust emission standards and test procedures for 1984 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles into one set for the 1984 through 1987 model years and another set for the 1988 and subsequent model years, and would update references to weight specifications in Title 13, California Administrative Code, Sections 1960.1 and 1960.1.5;

WHEREAS, on April 25, 1986 the Board approved amendments to Title 13, California Administrative Code, Sections 1960.1 and Sections 1960.1.5 and to the incorporated test procedures, and those amendments are not yet in effect;

WHEREAS, the California Environmental Quality Act and Board regulations require that an action not be adopted as proposed where it will have significant adverse environmental impacts and alternatives or feasible mitigation measures to the proposed action are available which would substantially reduce or avoid such impacts;

WHEREAS, a public hearing and other administrative proceedings have been held in accordance with the provisions of Chapter 3.5 (commencing with Section 11340), Part 1, Division 3, Title 2 of the Government Code; and

WHEREAS, the Board finds that:

The amendments set forth in Attachments A through D more closely parallel the most recent federal test procedures and will reduce the certification costs and administrative burdens of vehicle manufacturers;

The amendments set forth in Attachments A through D will make necessary and appropriate improvements to the passenger car, light-duty truck, and medium-duty vehicle test procedures and associated certification requirements; and

Attachment E shows portions of the amendments contained in Attachments A through D in conjunction with the amendments approved April 25, 1986, and includes changes to the amendments approved April 25, 1986 which are appropriate and necessary to ensure the internal consistency of the Board's regulations; and

The attached amendments will not result in any significant adverse environmental impacts.

NOW, THEREFORE, BE IT RESOLVED that the Board approves the amendments to Title 13, California Administrative Code, Sections 1960.1 and 1960.1.5, set forth in Attachments A and B hereto.

BE IT FURTHER RESOLVED that the Board approves the amendments to the "California Exhaust Emission Standards and Test Procedures for 1981 through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" set forth in Attachment C hereto.

BE IT FURTHER RESOLVED that the Board approves the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" set forth in Attachment D hereto.

BE IT FURTHER RESOLVED that the Board approves the amendments set forth in Attachment E hereto.

BE IT FURTHER RESOLVED that the Board directs the Executive Officer to adopt the amendments set forth in Attachments A, B, C, and D, with the modifications in Attachment E if prior to adoption the Office of Administrative Law has approved the amendments approved by the Board April 25, 1986, after making them available to the public for a period of 15 days, provided that the Executive Officer shall consider such written comments as may be submitted during this period, shall make such modifications as may be appropriate in light of the comments received, and shall present the amendments to the Board for further consideration if he determines that this is warranted.

BE IT FURTHER RESOLVED that the Board hereby determines that the amendments approved herein will not cause the California emission standards, in the aggregate, to be less protective of public health and welfare than applicable federal standards, will not cause the California requirements to be inconsistent with Section 202(a) of the Clean Air Act, and raise no new issues affecting previous waiver determinations of the Administrator of the EPA pursuant to Section 209(b) of the Clean Air Act.

BE IT FURTHER RESOLVED that the Executive Officer shall forward the amended regulations to the EPA with a request for confirmation that the amendments are within the scope of an existing waiver pursuant to Section 209(b)(1) of the Clean Air Act.

I hereby certify that the above is a true and correct copy of Resolution 86-68, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Public Hearing to Consider Amendments to Regulations Regarding Certification Test Procedures Applicable to Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles

Agenda Item No.: 86-8-1

Public Hearing Date: July 24, 1986

Response Date: May 4, 1987

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant environmental issues pertaining to this item. The staff report identified no adverse environmental effects.

Response: N/A

Certified: Harold Halmes
Board Secretary

Date: May 27, 1987

State of California

MEMORANDUM

To : Gordon Van Vleck
Secretary
Resources Agency

Date : January 13, 1988

Subject : Filing of Notice of Decisions of the Air Resources Board

Cary Allison
Board Secretary
From : **Air Resources Board**

Pursuant to Title 17, Section 60007 (b), and in compliance with Air Resources Board certification under Section 21080.5 of the Public Resources Code, the Air Resources Board hereby forwards for posting the attached notice of decisions and response to environmental comments raised during the comment period.

ATTACHMENTS
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ATTACHMENT A

PROPOSED

Amend Title 13, California Administrative Code, Section 1960.1, subsections (d) and (h), to read as follows:

1960.1 Exhaust Emission Standards and Test Procedures--1981 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.

(d)(1) The exhaust emissions from new 1984 ~~and subsequent~~ through 1987 model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed:

1984 THROUGH 1987 EXHAUST EMISSIONS STANDARDS(6)
(grams per mile)

Vehicle Type(1)	Equivalent Inertia Weight (lbs.) (2)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons (3)	Carbon Monoxide	Oxides of Nitrogen (4)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(5)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (5)	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.0
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)	4000-5999	100,000	0.50 (0.50)	9.0	1.5
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(3) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(4) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(5) This set of standards for 1984 through 1987 ~~1988 and later~~ model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section ~~1960.15.~~ 1960.1.5.

(6) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: 0.4 g/mi for the 1985 model year, and 0.2 g/mi for the 1986 ~~through 1988~~ and 1987 model years~~, and 0.08 g/mi for the 1989 and subsequent model years~~. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(2) The exhaust emissions from new 1988 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed:

1988 AND SUBSEQUENT EXHAUST EMISSIONS STANDARDS(5)
(grams per mile)

Vehicle Type(1)	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(2)	Carbon Monoxide	Oxides of Nitrogen (3)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(4)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (4)	0-3750	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3750	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3750	100,000	0.46	10.6	1.0
LDT,MDV	3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)	3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(3) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(4) This set of standards is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section 1950.1.5.

(5) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to a particulate exhaust emission standard of 0.2 g/mi for the 1988 model year, and 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(h) The test procedures for determining compliance with these standards are set forth in "California Exhaust Emission Standards and Test Procedures for 1981 ~~and Subsequent~~ through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", adopted by the state board on November 23, 1976, as last amended ~~October 2, 1985~~ _____, and in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," adopted by the state board on _____, 1986.

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

ATTACHMENT B

PROPOSED

Amend Title 13, California Administrative Code, Section 1960.1.5, subsections (a) and (b), to read as follows:*

1960.1.5 Optional NOx Standards for 1983 and Later Model Passenger Cars and Light-Duty Trucks and Medium-Duty Vehicles less than 4000 lbs. Equivalent Inertia Weight (EIW) or 3751 lbs. Loaded Vehicle Weight (LVW).

(a) Notwithstanding any other provision of this chapter, a vehicle manufacturer may choose to certify 1983 and later model vehicles to optional NOx standards as follows:

Passenger cars - 0.7 gm/mile - 1983 and Subsequent Model Years. LDT, MDV 0-3999 pounds EIW - 1.0 gm/mile - 1983 ~~and Subsequent~~ through 1987 Model Years. LDT, MDV 0-3750 lbs. LVW - 1.0 gm/mile - 1988 and Subsequent Model Years.

(b) Testing of vehicles certified under this section shall be conducted in accordance with the California Exhaust Emission Test Procedures applicable to either 1981 through 1987 or 1988 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles certified to the primary California Standards for 50,000 miles.

NOTE: Authority cited: Sections 39600, ~~and~~ 39601, 43013, and 43101, Health and Safety Code. Reference: Sections 39002, 39003, 43000(e), 43013, 43100, 43101, 43101.5, 43104, and 43106 Health and Safety Code.

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* Sections 1960.1.5 (c) and (d) would remain in effect and are not changed by the above proposal.

ATTACHMENT C

PROPOSED

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 1981-~~AND-SUBSEQUENT~~ THROUGH 1987 MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES

Adopted:	November 23, 1976
Adopted:	December 14, 1976
Amended:	May 26, 1977
Amended:	June 8, 1977
Amended:	June 22, 1977
Amended:	September 20, 1977
Amended:	January 15, 1978
Amended:	March 1, 1978
Amended:	April 10, 1978
Amended:	May 24, 1978
Amended:	February 9, 1979
Amended:	May 22, 1979
Amended:	March 5, 1980
Amended:	March 26, 1980
Amended:	August 27, 1980
Amended:	August 28, 1980
Amended:	December 2, 1980
Amended:	May 20, 1981
Amended:	October 27, 1981
Amended:	November 19, 1981
Amended:	July 1, 1982
Amended:	August 26, 1982
Amended:	March 9, 1983
Amended:	January 5, 1984
Amended:	October 2, 1985
Amended:	1986

Note: These procedures are printed in a style to indicate the proposed changes. Text proposed to be added is underlined and strikeout indicates text proposed to be deleted. Headings which are underlined are not new. Additions to headings are shown by double underlines.

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 1981-~~AND SUBSEQUENT~~ THROUGH 1987 MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES

The provisions of Subparts A and B, Part 86, Title 40, Code of Federal Regulations, as they existed on April 15, 1978, are hereby adopted as the California Exhaust Emission Standards and Test Procedures for 1981 ~~and Subsequent~~ through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, with the following exceptions and additions. The test procedures applicable to the particulate exhaust emission standards for diesel-powered vehicles are contained in 40 CFR Part 86, Subpart B, as they existed on October 13, 1981.

1. Applicability

   a. These test procedures are applicable to 1981 ~~and subsequent~~ through 1987 model passenger cars, light-duty trucks, and medium-duty vehicles, except motorcycles. References to "light-duty trucks" in 40 CFR 86 shall apply both to "light-duty trucks" and "medium-duty vehicles" in these procedures.

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

   c. Regulations concerning EPA hearings, EPA inspections, specific language on the Certificate of Conformity, evaporative emissions, high-altitude vehicles and testing, and heavy-duty engines and vehicles shall not be applicable to these procedures, except where specifically noted.

   d. Any reference to gasoline-powered vehicles shall also apply to vehicles powered by gaseous fuels.

2. Definitions

   a. "Administrator" means the Executive Officer of the Air Resources Board.

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

   c. "Certification" means certification as defined in Section 39018 of the Health and Safety Code.

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

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

f. "Heavy-duty vehicle" means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6000 pounds, except passenger cars.

g. "Light-duty truck" means any motor vehicle, rated at 6000 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.

h. "Medium-duty vehicle" means any heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8500 pounds or less.

i. "Gaseous fuels" means liquefied petroleum gas, compressed natural gas, or liquefied natural gas fuels for use in motor vehicles.

j. "Trap oxidizer system" means an emission control system which consists of a trap to collect particulate matter and a mechanism to oxidize the accumulated particulate.

k. "Regeneration" means the process of oxidizing accumulated particulate matter. It may occur continually or periodically.

l. "Periodically regenerating trap oxidizer system" means a trap oxidizer system that utilizes an automated regeneration mode during normal driving conditions for cleaning the trap which can be easily detected.

m. "Continually regenerating trap oxidizer system" means a trap oxidizer system that does not utilize an automated regeneration mode during normal driving conditions for cleaning the trap.

n. "Non-regeneration emission test" means a complete emission test which does not include a regeneration.

o. "Regeneration emission test" means a complete emission test which includes a regeneration.

p. "Regeneration interval" means the interval from the start of a regeneration to the start of the next regeneration.

3. Test Procedures

a. In order to demonstrate compliance with a non-methane hydrocarbon emission standard, hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures."

b. Durability data submitted pursuant to subparagraph 86.078-23(f) may be from vehicles previously certified by EPA or ARB.

c. The requirements in subparagraph 86.078-28(a)(4)(i)(B) (durability vehicles must meet emission standards) refer, for each pollutant, to the highest of either the federal or California emission standards.

d. In paragraph 86.079-21 (Application for Certification), amend subparagraph (b)(5) to read:

(5) A statement of maintenance and procedures consistent with the restrictions imposed under subparagraph 86.078-25(a)(1), necessary to assure that the vehicles (or engines) covered by a certificate of conformity in operation in normal use conform to the regulations, and a description of the program for training of personnel for such maintenance, and the equipment required.

e. In paragraph 86.078-25 (Maintenance):

1. Amend subparagraph (a)(1) to read as follows:

(1) Scheduled maintenance on the engine, emission control system, and fuel system of durability vehicles shall, unless otherwise provided pursuant to paragraph (a)(5)(iii), be restricted as set forth in the following provisions.

(i) (A) for gasoline-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated:

(1) Drive belts on engine accessories (tension adjustment only); (30,000 miles).

(2) Valve lash (15,000 miles).

(3) Spark plugs (30,000 miles).

(4) Air filter (30,000 miles).

(5) Exhaust gas sensor (30,000 miles): Provided that~~,~~ ~~for 1987 and prior model years,~~ an audible and/or visible signal approved by the Executive Officer alerts the vehicle operator to the need for sensor maintenance at the mileage point.~~; and provided that, for 1988 and subsequent model year vehicles:~~

~~(a) the manufacturer shall equip the vehicle with a maintenance indicator consisting of a light or flag, which shall be preset to activate automatically by illuminating in the case of a light or by covering the odometer in the case of a flag the first time the minimum maintenance interval established during certification testing is reached and which shall remain activated until reset. After resetting, the maintenance indicator shall activate automatically when the minimum maintenance interval, when added to the vehicle mileage at the time of resetting, is~~

again-reached-and-shall-again-remain-activated-until reset.--When-the-maintenance-indicator-consists-of-a light,-it-shall-also-activate-automatically-in-the engine-run-key-position-before-engine-cranking-to indicate-that-it-is-functioning.--The-maintenance indicator-shall-be-located-on-the-instrument-panel and-shall,-when-activated,-display-the-words-"oxygen sensor"-or-may-display-such-other-words-determined by-the-Executive-Officer-to-be-likely-to-cause-the vehicle-owner-to-seek-oxygen-sensor-replacement. The-maintenance-indicator-shall-be-separate-from-the malfunction-indicator-light-required-by-Section 1968,-Title-13,-California-Administrative-Code;

(b)-the-manufacturer-shall-provide-free-replacement of-the-oxygen-sensor,-including-both-parts-and labor,-and-shall-reset-the-maintenance-indicator without-any-charge,-the-first-time-the-maintenance interval-established-during-certification-testing-is reached-for-vehicles-certified-with-scheduled-sensor maintenance-before-50,000-miles.--If-the-oxygen sensor-is-replaced-pursuant-to-the-warranty provisions-of-Section-2037,-Title-13,-California Administrative-Code,-before-the-first-maintenance interval-is-reached,-the-manufacturer-shall-also replace-the-oxygen-sensor-and-reset-the-maintenance indicator-at-the-mileage-point-determined-by-adding the-maintenance-interval-to-the-vehicle's-mileage-at the-time-of-the-warranty-replacement.--If-the calculated-mileage-point-for-a-second-oxygen-sensor replacement-would-exceed-50,000-miles,-no-free second-replacement-shall-be-required;

(c)--The-maintenance-indicator-shall-be-resettable. The-maintenance-instructions-required-by-paragraph 3.f.-of-these-procedures-shall-provide-instructions for-the-resetting-of-the-maintenance-indicator,-and shall-specify-that-the-maintenance-indicator-shall be-reset-each-time-the-oxygen-sensor-is-replaced;-and

(d)-Notwithstanding-the-provisions-of-Section 2037(c),-Title-13,-California-Administrative-Code, the-oxygen-sensor,-including-any-replacement required-pursuant-to-this-section,-shall-be warranted-for-the-useful-life-of-the-vehicle-or engine.--If-such-oxygen-sensor-fails-during-the useful-life-period,-it-shall-be-replaced-by-the manufacturer-in-accordance-with-Section-2037(d), Title-13,-California-Administrative-Code.

(6) Choke (cleaning or lubrication only); (30,000 miles).

(7) In addition, adjustment of the engine idle speed (curb idle and fast idle), valve lash, and engine bolt torque may be performed once during the first 5000 miles of scheduled driving, provided the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use.

(B) for diesel-powered vehicles, maintenance shall be restricted to the following items at intervals no more frequent than every 12,500 miles of scheduled driving, provided that no maintenance may be performed after 45,000 miles of scheduled driving:

(1) Adjust low idle speed.

(2) Adjust valve lash if required.

(3) Adjust injector timing.

(4) Adjust governor.

(5) Clean and service injector tips.

(6) Adjust drive belt tension on engine accessories.

(7) Check engine bolt torque and tighten as required.

(ii) Change of engine and transmission oil, change or service of oil filter and, for diesel-powered vehicles only, change or service of fuel filter and air filter, will be allowed at the mileage intervals specified in the manufacturer's maintenance instructions.

(iii) Maintenance shall be conducted in a manner consistent with service instructions and specifications provided by the manufacturer for use by customer service personnel.

(2) Delete subparagraph (a)(3) (Service of exhaust gas recirculation system).

(3) Delete subparagraph (a)(4) (Service of catalytic converter).

f. In paragraph 86.078-38 (Maintenance instructions):

1. Amend subparagraph (a) to read:

(a) The manufacturer shall furnish or cause to be furnished to the purchaser of each new motor vehicle (or motor vehicle engine) subject to the standards prescribed in paragraphs 86.078-8 through 86.078-11 as applicable, written instructions

for the maintenance and use of the vehicle (or engine) by the purchaser as may be reasonable and necessary to assure the proper functioning of emission control systems in normal use. Such instructions shall be consistent with and not require maintenance in excess of the restrictions imposed under subparagraph 86.078-25(a)(1), except that the instructions may, subject to approval by the Administrator, require additional maintenance for vehicles operated under extreme conditions. In addition, subject to approval by the Administrator, the instructions may require insoections necessary to insure safe operation of the vehicle in use. In addition to any maintenance which may be required pursuant to the preceding paragraph, the instructions may also recommend such inspections, maintenance, and repair as may be reasonable and necessary for the proper functioning of the vehicle and its emission control systems. If the instructions recommend maintenance in addition to that which may be required pursuant to the preceding paragraph, they shall distinguish clearly between required and recommended maintenance.

2. Amend subparagraph (c)(1) to read:

   (1) Such instructions shall specify the performance of all scheduled maintenance performed by the manufacturer under subparagraph 86.078-25(a)(1).

   If the instructions specify recommended maintenance as well as required maintenance, they shall distinguish clearly between the two.

3. Amend subparagraph (d) by adding a new subparagraph (3) to read:

   (3) Such instructions shall specify the performance of all scheduled maintenance performed by the manufacturer under subparagraph 86.078-25(a)(1).

   If the instructions specify recommended maintenance as well as required maintenance, they shall distinguish clearly between the two.

g. Amend subparagraph 86.078-39(a) (Submission of maintenance instructions) to read:

   (a) The manufacturer shall provide to the Administrator, no later than the time of the submission required by paragraph 86.078-23, a copy of the maintenance instructions which the manufacturer proposes to supply to the ultimate purchaser in accordance with subparagraph 86.078-38(a). The Administrator will review such instructions to determine whether they are consistent with federal requirements, and to determine whether the instructions for required maintenance are consistent with the restrictions imposed under subparagraph 86.078-25(a)(1). The Administrator will notify the manufacturer of his or her determinations.

h. Amend subparagraph 86.113-78 by adding a new subparagraph (c) to read:

(c) (1) Gaseous fuels representative of commercial gaseous fuels which will be generally available through retail outlets in California or liquid petroleum gas having the ASTM D1835 or NGPA HD-5 specification shall be used in service accumulation.

(2) Liquid petroleum gas having the ASTM D1835 or NGPA HD-5 specification shall be used for exhaust and evaporative emission testing.

(3) Natural gas representative of commercial natural gas which will be generally available through retail outlets in California shall be used for exhaust emission testing.

(4) Written approval from the Administrator of the fuel specifications must be provided prior to the start of the testing.

i. Amend paragraphs 86.079-26 (Mileage and service accumulation; emission measurements) and 86.079-28 (Compliance with emission standards) to require that emission tests performed on emission-data vehicles and durability-data vehicles be non-regeneration emission tests for diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems. For any diesel passenger cars, light-duty trucks, and medium-duty vehicles equipped with continually regenerating trap oxidizer systems, manufacturers may use the provisions applicable to periodically regenerating trap oxidizer systems as an option. If such an optionis elected, all references in these Procedures to vehicles equipped with periodically regenerating trap oxidizer systems shall be applicable to the vehicles equipped with continually regenerating trap oxidizer systems.

j. Amend subparagraph 86.079-26 (a)(4)(ii) (Mileage and service accumulation; emission measurements) to read:

(ii) Diesel. Each Diesel durability-data vehicle shall be driven, with all emission control systems installed and operating, for 50,000 miles or such lesser distance as the Administrator may agree to as meeting the objectives of this procedure. Complete emission tests (see §§ 86.106 through 86.145) shall be made at the following mileage points: 0; 5,000; 10,000; 15,000; 20,000; 25,000; 30,000; 35,000; 40,000; 45,000; and 50,000.* For diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with

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* Where applicable, the option to the above test plan set forth in the Manufacturers Advisory Correspondence #82-01A, dated April 6, 1982, may be used.

periodically regenerating trap oxidizer systems at least four regeneration emission tests (see §§ 86.106 through 86.145) shall be made. With the advance approval of the Administrator, the manufacturer may install (1) a manual override switch capable of preventing (i.e., delaying until the switch is turned off) the start of the regeneration process and (2) a light which indicates when the system would initiate regeneration if it had no override switch. Upon activation of the override switch, the vehicle will be operated on a dynamometer to precondition it for the regeneration emission test in accordance with paragraph 3.1. The Urban Dynamometer Driving Schedule (UDDS) which is in progress at the time when the light comes on shall be completed and the vehicle shall proceed to the prescribed soak period followed by testing. With the advance approval of the Administrator, the manual override switch will be turned off at some predetermined point in the testing sequence permitting the regeneration process to proceed without further manual interaction. The mileage intervals between test points shall be approximately equal. The first regeneration emission test shall be made at the 5,000 mile point, and the last shall be made at the 50,000 mile point. The regeneration emission tests must provide a deterioration factor confidence level equal to or better than the confidence level achieved by performing regeneration emission tests at the following mileage points: 5,000; 20,000; 35,000; and 50,000. The procedure for making this determination is as follows:

Select exhaust system mileage test points for proposed (prop) schedule.

Calculate the sums of the squares corrected to the mean of the system mileages at the proposed test points:

$$\Sigma (N_i'^2)_{prop} = [\Sigma (X_i^2) - \cancel{(\text{--}X)_i^2}\ \underline{(\Sigma X_i)^2}/N^i]_{prop}$$

Where:

X = Individual mileages which vehicle will be tested.

N = Total number of regeneration emission tests.

(Subscript and superscript "i" refers to proposed test schedule).

The exhaust system mileage tests points at 5,000, 20,000, 35,000, and 50,000 miles will be designated as the standard (std) test schedule.

Calculate the sums of squares corrected to the mean of the standard test schedule.

$$\Sigma (N_j'^2)_{std} = [\Sigma (X_j^2) - (\Sigma X_j)^2/N^j]_{std}$$

Where:

X = Individual mileages at which the vehicle will be tested.

N = Total number of regeneration emission tests. (Subscript and superscript "j" refers to standard test schedule)

Refer to Table I and determine t_i at $(N^i-2)_{prop}$ degrees of freedom and t_j at $(N^j-2)_{std}$.

$$\text{If } \sqrt{\Sigma (N_i')^2_{prop}} \geq \frac{t^i_{prop}}{t^j_{std}} X \sqrt{\frac{\Sigma (N_i')^2_{prop}}{\Sigma (N_j')^2_{std}}}$$

the proposed plan is acceptable.

Table I

Degrees of freedom N-2	t 0.050
1	6.314
2	2.920
3	2.353
4	2.132
5	2.015
6	1.943
7	1.895
8	1.860
9	1.833
10	1.812
11	1.796
12	1.782
13	1.771
14	1.761
15	1.753

k. In paragraph 86.079-28 (Compliance with emission standards):

1. Amend subparagraph (a)(4)(i) to read:

(i) Separate emission deterioration factors shall be determined from the exhaust emission results of the durability-data vehicle(s) for each engine-system combination. A separate factor shall be established for exhaust HC, exhaust CO, exhaust NOx, and exhaust particulate (diesel vehicles only) for each engine-system combination. A separate evaporative emission deterioration factor shall be determined for each evaporative emission family-evaporative

emission control system combination from the testing conducted by the manufacturer (gasoline-fueled vehicles only). Separate emission correction factors (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only) shall be determined from the exhaust emission results of the durability-data vehicle(s) for each engine-system combination. A separate factor shall be established for exhaust HC, exhaust CO, exhaust NOx, and exhaust particulate for each engine-system combination.

2. Add subparagraph (a)(4)(i)(D) to read:

(D) The regeneration exhaust emission data (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only) from the tests required under § 86.079-26(a)(4) shall be used to determine the regeneration exhaust emissions interpolated to the 50,000-mile point. The regeneration exhaust emission results shall be plotted as a function of the mileage on the system, rounded to the nearest mile, and the best fit straight lines, fitted by the method of least squares, shall be drawn through all these data points. The interpolated 50,000-mile point of this line shall be used to calculate the multiplicative exhaust emission correction factor for each engine-system combination as follows:

$$\text{Factor} = 1 + \frac{R-1}{4505} n$$

where, R = the ratio of the regeneration exhaust emissions interpolated to 50,000 miles to the non-regeneration exhaust emissions interpolated to 50,000 miles.

n = the number of complete regenerations which occur during the durability test.

These interpolated values shall be carried out to a minimum of four places to the right of the decimal point before dividing one by the other to determine the correction factor. The results shall be rounded to three places to the right of the decimal point in accordance with ASTM E 29-67. For applicability to gaseous emission standards under the 100,000 option, R will be determined based upon projected 100,000 mile emissions.

3. Amend subparagraph (a)(4)(ii)(A) to read:

(A) The official exhaust emission test results for each emission-data vehicle at the 4,000 mile test point shall be multiplied by the appropriate deterioration factor, and correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically

regenerating trap oxidizer systems only): Provided: that if a deterioration factor as computed in paragraph (a)(4)(i)(B) of this section or a correction factor as computed in paragraph (a)(4)(i)(D) of this section is less than one, that deterioration factor or correction factor shall be one for the purposes of this paragraph.

l. In paragraph 86.132.78 (Vehicle preconditioning):

1. Amend subparagraph (a)(2) to read:

(2) Within one hour of being fueled the vehicle shall be placed, either by being driven or pushed, on a dynamometer and operated through one Urban Dynamometer Driving Schedule (UDDS) test procedure, see § 86.115 and Appendix I. The UDDS performed prior to a non-regeneration emission test shall not contain a regeneration (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). A gasoline fueled test vehicle may not be used to set dynamometer horsepower.

2. Amend subparagraph (a)(3) to read:

(3) For those unusual circumstances where additional preconditioning is desired by the manufacturer, such preconditioning may be allowed with the advance approval of the Administrator. The Administrator may also choose to conduct or require the conduct of additional preconditioning to insure that the evaporative emission control system is stabilized in the case of gasoline engines, or to insure that the exhaust system is stabilized in the case of diesel engines. The additional preconditioning shall consist of an initial one hour minimum soak and, one, two, or three driving cycles of the UDDS (or more in the case of a diesel-powered vehicle equipped with a periodically regenerating trap oxidizer system, which is being preconditioned for a regeneration emission test), as described in paragraph (a)(2) of this section, each followed by a soak of at least one hour with engine off, engine compartment cover closed and cooling fan off. The vehicle may be driven off the dynamometer following each UDDS for the soak period.

m. The manufacturer shall record in the durability-data vehicle log book, the number of regenerations which occur during the 50,000 mile durability test of each diesel-powered passenger car, light-duty truck and medium-duty vehicle equipped with a periodically regenerating trap oxidizer system. The manufacturer shall include, for each regeneration: the date and time of the start of regeneration, the duration of the regeneration, and the accumulated mileage at the start and the end of regeneration. The number of regenerations will be used in the calculation of the correction factor in 40 CFR Part 86, Section 28.

n. Amend subparagraph § 86.144-78(a) (Calculations: exhaust emissions) to read:

The final reported test results shall be computed by the use of the following formula:

(a) For light-duty vehicles and light-duty trucks:

$$Ywm = 0.43\ ((Yct + Ys)/(Dct + Ds)) + 0.57\ ((Yht + Ys)/(Dht + Ds))$$

For purposes of adjusting emissions for regeneration:

$$Re = ((Yr1 - Yct) + (Yr2 - Ys) + (Yr3 - Yht))/(Dct + Ds + Dht)$$

$$Yr = Ywm^{*} + Re$$

Where:

Ywm = Weighted mass emissions of each pollutant, i.e., HC, CO, NOx or CO_2, in grams per vehicle mile.

Yct = Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Yht = Mass emissions as calculated from the "transient" phase of the hot start test in grams per test phase.

Ys = Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

Dct = The measured driving distance from the "transient" phase of the cold start test, in miles.

Dht = The measured distance from the "transient" phase of the hot start test, in miles.

Ds = The measured driving distance from the "stabilized" phase of the cold start test, in miles.

Yr = Regeneration emission test.

Re = Mass emissions of each pollutant attributable to regeneration in grams per mile.

Yr1 = Mass emissions, during a regeneration emission test, as calculated from the "transient" phase of the cold start test, in grams per test phase.

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* Ywm is derived using the emission data from a test with no regeneration.

Yr2 = Mass emissions, during a regeneration emission test, as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

Yr3 = Mass emissions, during a regeneration emission test, as calculated from the "transient" phase of the hot start test in grams per test phase.

o. Amend subparagraph § 86.145-82(a) (Calculations: Particulate emissions) to read:

(a) The final reported test results for the mass particulate (Mp) in grams/mile shall be computed as follows.

$$Mp = 0.43(Mp1 + Mp2)/(Dct + Ds) + 0.57\ (Mp3 + Mp2/(Dht + Ds)$$

For purposes of adjusting emissions for regeneration:

$$Re = ((Mpr1 - Mp1) + (Mpr2 - Mp2) + (Mpr3 - Mp3))/(Dct+Ds+Dht)$$

$$Mpr = Mp^{*} + Re$$

Where:

(1) Mp1 = Mass of particulate determined from the "transient" phase of the cold start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(2) Mp2 = Mass of particulate determined from the "stabilized" phase of the cold start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(3) Mp3 = Mass of particulate determined from the "transient" phase of the hot start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(4) Dct = The measured driving distance from the "transient" phase of the cold start test, in miles.

(5) Ds = The measured driving distance from the "stabilized" phase of the cold start test, in miles.

(6) Dht = The measured driving distance from the "transient" phase of the hot start test, in miles.

(7) Mpr = Regeneration emission test

(8) Re = Mass of particulate attributable to regeneration in grams/mile.

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* Mp is derived using the emission data from a test with no regeneration.

(9) Mpr1 = Mass of particulate determined, during a regeneration emission test, from the "transient" phase of the cold start test, in grams per test phase. (See § 86.110-82(c)(1) for determination.)

(10) Mpr2 = Mass of particulate determined, during a regeneration emission test, from "stabilized" phase of the cold start test, in grams per test phase. (See § 86.110-82(c)(1) for determination.)

(11) Mpr3 = Mass of particulate determined, during a regeneration emission test, from the "transient" phase of the hot start test, in grams per test phase. (See § 86.110-82(c)(1) for determination.)

4. Standards

The following standards represent the maximum projected exhaust emissions for the useful life of the vehicle.

(a) The exhaust emissions from new 1981 model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed (1):

1981 EXHAUST EMISSIONS STANDARDS
(grams per mile)

Vehicle Type(2)	Equivalent Inertia Weight (lbs.) (3)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(4)	Carbon Monoxide	Oxides of Nitrogen (5)
PC	All	50,000	(0.41)	3.4	1.0
PC(6)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (7)	3.4	1.5
PC (Option 2)	All	100,000	0.46 (7)	4.0	1.5
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41) (7)	9.0	1.5
LDT,MDV (Option 2)	0-3999	100,000	0.46 (7)	10.6	1.5
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.5
LDT,MDV (Option 1)	4000-5999	100,000	0.50 (0.50) (7)	9.0	2.0
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	2.0
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60) (7)	9.0	2.3

(1) Subsection (a) shall remain in effect until December 31, 1991, and as of that date is repealed unless a later regulation deletes or extends that date. Notwithstanding the repeal or expiration of this procedure on December 31, 1991, the provisions of the regulation as they existed prior to such repeal or expiration shall continue to be operative and effective for those events occurring prior to the repeal or expiration.

(2) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(3) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(4) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(5) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded to the nearest 0.1 gm/mi before being compared.

(6) The second set of 50,000 mile passenger car standards is optional. A manufacturer must select either the primary or optional sets of 50,000 mile standards for its full product line for both 1981 and 1982 model years.

(7) For vehicles from evaporative emission families with projected 50,000 mile evaporative emissions values below 1.0 g/test, an adjustment to the hydrocarbon exhaust emission standards may be granted by the Executive Officer. The adjusted standard will be calculated using the following formula:

$$HC_{ex} = .75\ [.185 - (Di + 3.3\ Hs) : 29.4] + HC_o$$

Where:

HC_{ex}	=	adjusted exhaust hydrocarbon standard
HC_o	=	unadjusted exhaust hydrocarbon standard
Di	=	diurnal evaporative emissions
Hs	=	hot soak evaporative emissions

(b) The exhaust emissions from new 1982 model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed (1):

1982 EXHAUST EMISSIONS STANDARDS
(grams per mile)

Vehicle Type(2)	Equivalent Inertia Weight (lbs.) (3)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(4)	Carbon Monoxide	Oxides of Nitrogen (5)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(6)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.5
PC (Option 2)	All	100,000	0.46	8.3	1.5
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41)	9.0	1.5
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.5
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.5
LDT,MDV (Option 1)	4000-5999	100,000	0.50 (0.50)	9.0	2.0
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	2.0
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60)	9.0	2.3

(1) Subsection (b) shall remain in effect until December 31, 1992, and as of that date is repealed unless a later regulation deletes or extends that date. Notwithstanding the repeal or expiration of this procedure on December 31, 1992, the provisions of the regulation as they existed prior to such repeal or expiration shall continue to be operative and effective for those events occurring prior to the repeal or expiration.

(2) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(3) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(4) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(5) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded to the nearest 0.1 gm/mi before being compared.

(6) The second set of 50,000 mile passenger car standards is optional. A manufacturer must select either the primary or optional sets of 50,000 mile standards for its full product line for both 1981 and 1982 model years.

(c) The exhaust emissions from new 1983 model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed (1):

1983 EXHAUST EMISSIONS STANDARDS(7)
(grams per mile)

Vehicle Type(2)	Equivalent Inertia Weight (lbs.) (3)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(4)	Carbon Monoxide	Oxides of Nitrogen (5)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(6)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.5
PC (Option 2)	All	100,000	0.46	8.3	1.5
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (6)	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41)	9.0	1.5
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.5
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV	4000-5999	100,000	0.50 (0.50)	9.0	2.0
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) Subsection (c) shall remain in effect until December 31, 1993, and as of that date, is repealed unless a later regulation deletes or extends that date. Notwithstanding the repeal or expiration of this regulation on December 31, 1993, the provisions of the regulation as they existed prior to such repeal or expiration shall continue to be operative and effective for those events occurring prior to the repeal or expiration.

(2) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(3) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(4) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(5) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR FPart 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded to the nearest 0.1 gm/mi before being compared.

(6) This set of standards for 1983 and later model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section 1960.15.

(7) For gaseous-fueled vehicles the calculation procedures provided in the appendix shall be used for determining emissions and fuel economy.

(d) The exhaust emissions from new 1984 through 1987 ~~and subsequent~~ model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed:

1984 ~~AND SUBSEQUENT~~ THROUGH 1987 EXHAUST EMISSIONS STANDARDS(6)(7)

(grams per mile)

Vehicle Type(1)	Equivalent Inertia Weight (lbs.) (2)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(3)	Carbon Monoxide	Oxides of Nitrogen (4)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(5)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (5)	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.0
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)	4000-5999	100,000	0.50 (0.50)	9.0	1.5
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(3) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(4) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded to the nearest 0.1 gm/mi before being compared.

(5) This set of standards for 1984 and later model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section 1960.15.

(6) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: 0.4 g/mi for the 1985 model year, and 0.2 g/mi for the 1986 ~~through 1988~~ and 1987 model years~~, and 0.08 g/mi for the 1989 and subsequent model years.~~ The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(7) For gaseous-fueled vehicles the calculation procedures provided in the appendix shall be used for determining emissions and fuel economy.

(e) The exhaust emissions from new 1981 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles certified to special standards authorized by Sections 1960.2, 1960.3, and 1960.4, Subchapter 1, Chapter 3, Title 13, California Administrative Code, subject to registration and sold and registered in this state, shall not exceed (1):

SPECIAL EXHAUST EMISSIONS STANDARDS(10)
(grams per mile)

Year	Vehicle Type(2)	Equivalent Inertia Weight (lbs.) (3)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(4)	Carbon Monoxide	Oxides of Nitrogen (5)
1981	PC(6)	All	50,000	0.39 (0.41)	7.0	1.5
	LDT,MDV(7)	0-3999	50,000	0.39 (0.41)	9.0	1.5
1982(8)	PC	All	50,000	0.39 (0.41)	7.0	1.0
1983(8)(11)	PC	All	50,000	0.39 (0.41)	7.0	0.7 (9)
	LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	1.0
1984(8)(11)	PC	All	50,000	0.39 (0.41)	7.0	0.7
	LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.7 (9)
1985(8)(11)	LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.7

(1) Subsection (e) shall remain in effect until December 31, 1990, and as of that date is repealed unless a later regulation deletes or extends that date. Notwithstanding the repeal or expiration of this procedure on December 31, 1990, the provisions of the regulation as they existed prior to such repeal or expiration shall continue to be operative and effective for those events occurring prior to the repeal or expiration.

(2) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(3) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(4) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(5) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subparagraph B) shall be no greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded to the nearest 0.1 gm/mi before being compared.

(6) For vehicles certified to special standards authorized by Section 1960.2, Article 2, Subchapter 1, Chapter 3, Title 13, California Administrative Code.

(7) For vehicles certified to special standards authorized by Section 1960.3, Article 2, Subchapter 1, Chapter 3, Title 13, California Administrative Code.

(8) For vehicles certified to special standards authorized by Section 1960.4, Article 2, Subchapter 1, Chapter 3, Title 13, California Administrative Code. Special standards revert to "1983 and subsequent" standards for 1985 and subsequent passenger cars and 1986 and subsequent LDTs and MDVs.

(9) The Executive Officer may grant limited relief from the 1983 passenger car and 1984 LDT and MDV special NOx standard to a manufacturer who exceeds the standard because of unforeseen technical problems.

(10) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: 0.4 g/mi for the 1985 model year, 0.2 g/mi for the 1986 through 1988 model years, and 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(11) For gaseous-fueled vehicles the calculation procedures provided in the appendix shall be used for determining emissions and fuel economy.

5. Additional Requirement

a. A statement must be supplied that the production vehicles shall be in all material respects the same as those for which certification is granted.

b. For model years 1981 through 1984, *If* if a gasoline-fueled vehicle manufacturer requires the use of unleaded fuel, a statement will be required that the engine and transmission combinations for which certification is requested are designed to operate satisfactorily on a gasoline having a research octane number not greater than 91. This requirement shall not apply to gaseous-fueled vehicles.

c. Labeling required pursuant to paragraph 86.079-35 and Section 1965, Chapter 3, Title 13 of the California Administrative Code shall conform with the requirements specified in the "California Motor Vehicle Tune-Up Label Specifications".

d. For gasoline-powered vehicles, evidence shall be supplied 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 emissions standard at barometric pressures equivalent to those expected at altitudes ranging from sea level to 6000 feet elevation.

e. The mechanism for adjusting the idle air/fuel mixture, if any, shall be designed so that either:

(i) The mixture adjustment mechanism is not visible, even with the air cleaner removed, and special tools and/or procedures are required to make adjustments; or

(ii) In the alternative, the Executive Officer may, upon reasonable notice to the manufacturer, require that a certification test of a vehicle be conducted with the idle air/fuel mixture at any setting which the Executive Officer finds corresponds to settings likely to be encountered in actual use. The Executive Officer, in making this finding, shall consider the difficulty of making adjustments, damage to the carburetor in the event of any effort to make an improper adjustment, and the need to replace parts following the adjustment.

The manufacturer shall submit for approval by the Executive Officer his or her proposed method for compliance with this requirement in his or her preliminary application for certification.

f. 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 paragraph 86.078-28, and then rounded and compared with the standard as set forth in paragraph 4 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 paragraph 4, 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.

g. The manufacturer shall submit to the Executive Officer a statement that those vehicles for which certification is requested have driveability and performance characteristics which satisfy that manufacturer's customary driveability and performance requirements for vehicles sold in the United States. This statement shall be based on driveability data and other evidence showing compliance with the manufacturer's performance criteria. This statement shall be supplied with the manufacturer's final application for certification, and with all running changes for which emission testing is required.

If the Executive Officer has evidence to show that in-use vehicles demonstrate poor performance that could result in wide-spread tampering with the emission control systems, he or she may request all driveability data and other evidence used by the manufacturer to justify the performance statement.

h. Certification, if granted, is effective only for the vehicle/engine family 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.

~~i. For all vehicles subject to the provisions of Section 1968, Title 13, California Administrative Code, the manufacturer shall submit with its application for certification a description of the malfunction and diagnostic system to be installed on the vehicles. The vehicles shall not be certified unless the Executive Officer finds that the malfunction and diagnostic system complies with the requirements of Section 1968, Title 13, California Administrative Code.~~

6. Optional 100,000 Mile Certification Procedure

The alternate emission standards shown in paragraph (4) preceding shall apply to any engine family which meets all of the following additional requirements:

a. Each exhaust emission durability data vehicle shall be driven, with all emission control systems installed and operating, for 100,000 miles or such lesser distance as the Executive Officer may agree to as meeting the objectives of this procedure. Emission tests performed on emission-data vehicles and durability-data vehicles (for determination of the deterioration factors) shall be non-regeneration emission tests for diesel-powered passenger cars, light-duty trucks and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems. Compliance with the emission standards shall be established as follows:

(i) The linear regression line for all pollutants shall be established by use of all required data from tests of the durability vehicle at every 5000 mile interval from 5000 to 100,000 miles. The requirements in subparagraph 86.078-28(a)(4)(i)(B) (durability vehicles must meet emissions standards) refer, for each pollutant, to the highest of either the federal 50,000 miles or California 100,000 mile emission standards.

(ii) Compliance with the hydrocarbon and carbon monoxide standards shall be determined as follows:

(a) For Option 1:

(A) the interpolated 4000 and 50,000 mile points on the linear regression line in (i) shall not exceed the appropriate hydrocarbon and carbon monoxide standards, except as in (B) below.

(B) the linear regression line in (i) may exceed the standard provided that no data point exceeds the standard.

(C) The hydrocarbon and carbon monoxide data from the 4000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 50,000 mile point by the interpolated 4000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate hydrocarbon and carbon monoxide standards.

(b) For Option 2:

(A) The interpolated 4000 and 100,000 mile points on the linear regression line in (i) shall not exceed the appropriate hydrocarbon and carbon monoxide standards, except as in (B) below.

(B) The linear regression line in (i) may exceed the standard provided that no data point exceeds the standard.

(C) The hydrocarbon and carbon monoxide data from the 4000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 100,000 mile point by the interpolated 4000 mile point, and the appropriate exhaust emission correction factor

(diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate 100,000 mile hydrocarbon and carbon monoxide standards.

(iii) Compliance with the oxides of nitrogen standard for Options 1 and 2 shall be determined as follows:

(a) the interpolated 4000 and 100,000 mile points on the linear regression line in (i) shall not exceed the appropriate 100,000 mile oxides of nitrogen standard, except as in (b) below.

(b) the linear regression line in (i) may exceed the standard provided that no data point exceeds the standard.

(c) the oxides of nitrogen data from the 4000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 100,000 mile point by the interpolated 4000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate 100,000 mile oxides of nitrogen standard.

(iv) Compliance with the particulate standard for options 1 and 2 shall be determined as follows:

(a) the interpolated 4000 and 50,000 mile points on the linear regression line in (i) shall not exceed the appropriate particulate standard, except as in (b) below.

(b) the linear regression line in (i) may exceed the standard provided that no data point exceeds the standard.

(c) the particulate data from the 4000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 50,000 mile point by the interpolated 4000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate particulate standard.

All references in these test procedures to "useful life", 5 years, and 50,000 miles shall mean "total life", 10 years, and 100,000 miles, respectively, except in subparagraph (ii).

b. Only the following scheduled maintenance shall be allowed under subparagraph 86.078-25(a)(1)(i).

25(a)(1)(i)(A) Option 1. For 1981 ~~and later~~ through 1987 model gasoline or diesel-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated.

(1) Drive belt tension on engine accessories (30,000 miles).
(2) Valve lash (15,000 miles).
(3) Spark plugs (30,000 miles).
(4) Air filter (30,000 miles).
(5) Exhaust gas sensor (30,000 miles): Provided that~~,-for-1987 and-prior-model-years,~~ an audible and/or visible signal approved by the Executive Officer alerts the vehicle operator to the need for sensor maintenance. ~~at-the-mileage-point;-and provided-that-for-1988-and-subsequent-model-year-vehicles;~~

~~(a)-the-manufacturer-shall-equip-the-vehicle-with-a maintenance-indicator-consisting-of-a-light-or-flag,-which shall-be-preset-to-activate-automatically-by-illuminating-in the-case-of-a-light-or-by-covering-the-odometer-in-the-case-of a-flag-the-first-time-the-minimum-maintenance-interval established-during-certification-testing-is-reached-and-which shall-remain-activated-until-reset.--After-resetting,-the maintenance-indicator-shall-activate-automatically-when-the minimum-maintenance-interval,-when-added-to-the-vehicle mileage-at-the-time-of-resetting,-is-again-reached-and-shall again-remain-activated-until-reset.--When-the-maintenance indicator-consists-of-a-light,-it-shall-also-activate automatically-in-the-engine-run-key-position-before-engine cranking-to-indicate-that-it-is-functioning.--The-maintenance indicator-shall-be-located-on-the-instrument-panel-and-shall, when-activated,-display-the-words-"oxygen-sensor"-or-may display-such-other-words-determined-by-the-Executive-Officer to-be-likely-to-cause-the-vehicle-owner-to-seek-oxygen-sensor replacement.--The-maintenance-indicator-shall-be-separate-from the-malfunction-indicator-light-required-by-Section-1968, Title-13,-California-Administrative-Code;~~

~~(b)-the-manufacturer-shall-provide-free-replacement-of-the oxygen-sensor,-including-both-parts-and-labor,-and-shall-reset the-maintenance-indicator-without-any-charge,-the-first-time the-maintenance-interval-established-during-certification testing-is-reached-for-vehicles-certified-with-scheduled sensor-maintenance-before-50,000-miles.--If-the-oxygen-sensor is-replaced-pursuant-to-the-warranty-provisions-of-Section 2037,-Title-13,-California-Administrative-Code,-before-the~~

~~first-maintenance-interval-is-reached,-the-manufacturer-shall also-replace-the-oxygen-sensor-and-reset-the-maintenance indicator-at-the-mileage-point-determined-by-adding-the maintenance-interval-to-the-vehicle's-mileage-at-the-time-of the-warranty-replacement.--If-the-calculated-mileage-point-for a-second-oxygen-sensor-replacement-would-exceed-50,000-miles, no-free-second-replacement-shall-be-required;~~

~~(c)--The-maintenance-indicator-shall-be-resettable.--The maintenance-instructions-required-by-paragraph-3.f.-of-these procedures-shall-provide-instructions-for-the-resetting-of-the maintenance-indicator,-and-shall-specify-that-the-maintenance indicator-shall-be-reset-each-time-the-oxygen-sensor-is replaced;-and~~

~~(d)-Notwithstanding-the-provisions-of-Section-2037(c),-Title 13,-California-Administrative-Code,-the-oxygen-sensor, including-any-replacement-required-pursuant-to-this-section, shall-be-warranted-for-the-useful-life-of-the-vehicle-or engine.--If-such-oxygen-sensor-fails-during-the-useful-life period,-it-shall-be-replaced-by-the-manufacturer-in-accordance with-Section-2037(d),-Title-13,-California-Administrative-Code.~~

(6) Choke, cleaning or lubrication only (30,000 miles).
(7) Idle speed (30,000 miles).
(8) Fuel Filter (30,000 miles).
(9) Injection timing (30,000 miles).

25(a)(1)(i)(B) Option 2. For 1981 ~~and later~~ through 1987 model gasoline or diesel-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated:

(1) Drive belt tension on engine accessories (30,000 miles).
(2) Valve lash (15,000 miles).
(3) Spark plugs (30,000 miles).
(4) Air filter (30,000 miles).
(5) Fuel filter (30,000 miles).
(6) Idle speed (30,000 miles).
(7) Injection timing (30,000 miles).

c. In addition, adjustment of the engine idle speed (curb idle and fast idle), valve lash, and engine bolt torque may be performed once during the first 5000 miles of scheduled driving, provided the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use.

d. The manufacturer agrees to apply to vehicles certified under this paragraph the provision of Section 43204 of the California Health and Safety Code for a period of ten years or 100,000 miles, whichever first occurs.

APPENDIX

Calculation procedures based on the Federal CVS-1975 Test Procedure. The reported test results shall be computed by use of the following formulas:

CO_{conc} = Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO_2 extraction, in ppm.

CO_{dm} = Carbon monoxide concentration of the dilution air sample as measured, in ppm.

CO_d = Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

CO_e = Carbon monoxide concentrations of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm. The calculation assumes the carbon to hydrogen ratio of the fuel to be 1:3.802 for natural gas and 1:2.658 for LPG.

CO_{em} = Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

CO_{mass} = Carbon monoxide emissions, in grams per test phase.

$CO_{2_{conc}}$ = Carbon dioxide concentration of the dilute exhaust sample corrected for background and water vapor, in percent.

CO_{2_e} = Carbon dioxide concentration of the dilute exhaust sample, in percent.

$CO_{2_{mass}}$ = Carbon dioxide emissions, in grams per test phase.

$Density_{CO}$ = Density of carbon monoxide is 32.97 g/ft^3 at 68°F and 760 mm. Hg pressure.

Density CO_2 = Density of Carbon Dioxide is 51.85 g/ft^3 68°F and 760 mm. Hg pressure.

$Density_{HC}$ = Density of hydrocarbons is 18.64 g/ft^3 for natural gas and 17.28 g/ft^3 for LPG assuming an average carbon to hydrogen ratio of 1:3.802 for natural gas and 1:2.658 for LPG, at 68°F and 760 mm Hg pressure.

$Density_{NO_2}$	=	Density of oxides of nitrogen is 54.16 g/ft^3 assuming they are in the form of nitrogen dioxide, at 68°F and 760 mm Hg pressure.
DF	=	Dilution Factor
H	=	Absolute humidity in grains of water per pound of dry air.
HC_{conc}	=	Hydrocarbon concentration for the dilute exhaust sample corrected for background, in ppm carbon equivalent, i.e., equivalent propane X 3.
HC_d	=	Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.
HC_e	=	Hydrocarbon concentration of the dilute exhaust sample, in ppm carbon equivalent.
HC_{mass}	=	Hydrocarbon emissions, in grams per test phase.
K_H	=	Humidity correction factor
N	=	Number of revolutions of the positive displacement pump during the test phase while samples are being collected.
NOx_{conc}	=	Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in ppm.
NO_d	=	Oxides of nitrogen concentration of the dilute air as measured, in ppm.
NOx_e	=	Oxides of nitrogen concentration of the dilute exhaust sample as measured, in ppm.
NOx_{mass}	=	Oxides of nitrogen emissions, in grams per test phase.
P_B	=	Barometric pressure, in mm. Hg.
P_d	=	Saturated vapor pressure, in mm. Hg at ambient dry bulb temp.
P_i	=	Pressure depression below atmospheric measured at the inlet to the positive displacement pump.

T_p = Average temperature of dilute exhaust entering positive displacement pump during test while samples are being collected, in degrees Rankine.

R_a = Relative humidity of the ambient air, in percent.

V_{mix} = Total dilute exhaust volume in cubic feet per test phase corrected to standard conditions (528°R and 760 mm. Hg)

Vo = Volume of gas pumped by the positive displacement pump, in cubic feet per revolution. This volume is dependent on the pressure differential across the positive displacement pump.

Y_{ct} = Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Y_{ht} = Mass emissions as calculated from the "transient" phase of the hot start test, in grams per test phase.

Y_s = Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams test phase.

Y_{wm} = Weighted mass emissions of each pollutant, i.e., HC, CO, or NOx, in grams per vehicle mile.

For passenger cars, light duty trucks, and medium duty vehicles:

(a) The mass emissions of each pollutant in grams per mile is

$$Y_{wm} = (0.43Y_{ct} + 0.57\ Y_{ht} + Y_s)/7.5$$

(b) The mass of each pollutant for each phase of both the cold start test and the hot start test is determined from the following:

(1) Hydrocarbon mass:

$$HC_{mass} = V_{mix} \times Density_{HC} \times (HC_{conc}/1{,}000{,}000)$$

(2) Oxides of nitrogen mass:

$$NOx_{mass} = V_{mix} \times Density_{NO_2} \times K_H \times (NOx_{conc}/1{,}000{,}000)$$

K_H = humidity correction factor

(3) Carbon monoxide mass:

$$CO_{mass} = V_{mix} \times Density_{CO} \times (CO_{conc}/1{,}000{,}000)$$

(4) Carbon dioxide mass:

$$CO_{2_{mass}} = V_{mix} \times \text{Density}_{CO_2} \times (CO_{2_{conc}}/100)$$

$$V_{mix} = \frac{V_o \times N \times (P_b - P_i) \times 528}{(760)\ (T_p)}$$

$$HC_{conc} = HC_e - HC_d\ (1-1/DF)$$

$$NOx_{conc} = NOx_e - NOx_d\ (1-1/DF)$$

$$CO_{conc} = CO_e - CO_d\ (1-1/DF)$$

$$CO_e = (1-0.02901\ CO_{2_e} - 0.000323\ R_a)\ CO_{em} \text{ for natural gas}$$

$$CO_e = (1-0.02328\ CO_{2_e} - 0.000323\ R_a)\ CO_{em} \text{ for LPG}$$

$$CO_d = (1-0.000323\ R_a)\ CO_{dm}$$

$$KH = \frac{1}{1-0.0047(H-75)}$$

$$H = \frac{(43.478R_a)\ (Pd)}{P_B - \frac{P_d \times R_a}{100}}$$

$$DF = \frac{9.77}{CO_{2_e} + (HC_e + CO_e) \times 10^{-4}} \quad \text{for natural gas}$$

$$DF = \frac{11.7}{CO_{2_e} + (HC_e + CO_e) \times 10^{-4}} \quad \text{for LPG}$$

Fuel Economy Calculations for Gaseous Fuels
Based on the Cold Start CVS-1975
Federal Test Procedure

Assume the fuel meets HD-5 specifications (95% C_3H_8, 5% nC_4H_{10}, by volume)

1. Physical constants of Propane and Normal Butane

Component	Mol. Wt.	Sp. Gr.	Liquid Density lb/gal @ 60°F				Liquid Density of HD-5 lb/gal at 60°F
C_3H_8	44.094	0.508	4.235	x	(0.95)	=	4.0233
nC_4H_{10}	58.12	0.584	4.868	x	(0.05)	=	.2434
							4.2667

2. Density of the HD-5 fuel

(0.95 X 4.235) + (0.05 X 4.868) = 4.267 lb/gal @ 60°F

3. Molecular Weights

Specie	Mol. Wt.
C	12.01115
H	1.00797
O	15.9994
CO	28.01055
CO_2	44.00995
*$CH_{2.658}$	14.6903

*Average ratio of Hydrogen to carbon atoms in HD-5 fuel.

C_3H_8 $\frac{8}{3}$ = 2.666 x 0.95 (% propane) = 2.533

nC_4H_{10} $\frac{10}{4}$ = 2.5 x 0.05 (% Butane) = .125

2.658

4. Weight of Carbon in:

CO = wt. of CO x (12.01115/28.01055) = wt CO x (0.429)

CO_2 = wt of CO_2 x (12.01115/44.00995) = wt CO_2 x (0.273)

$CH_{2.658}$ = wt. of $CH_{2.658}$ x (12.01115/14.6903) = wt $CH_{2.658}$ x (0.818)

5. <u>Wt. of Carbon per gallon of LPG</u>

wt. of carbon = 4.2667 lbs/gal x 453.59 gms/lb x 0.818 = 1583 grams C/gal HD-5

6. <u>Fuel economy:</u>

$$\frac{\text{grams C/gal}}{\text{grams C in exhaust/mi}} = \text{miles/gal.}$$

$$\text{LPG} = \frac{1583 \text{ gms C/gal}}{(0.818(HC) + (0.429)(CO) + (0.273)\ (CO_2)}$$

HC = CVS HC in grams/mile
CO = CVS CO in grams/mile
CO_2 = CVS CO_2 in grams/mile

$$\text{For gasoline} = \frac{2423}{(0.866)\ HC + (0.429)\ CO + (0.273)\ CO_2}$$

$$\text{For Natural Gas} = \frac{1535}{(0.759)\ HC + (0.429)\ CO + (0.273)\ CO_2}$$

ATTACHMENT D

Proposed

State of California
AIR RESOURCES BOARD

CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 1988 AND SUBSEQUENT MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES

Adopted: _____

NOTE: This is a new document proposed for adoption. However, many of the provisions in the document are based on the "California Exhaust Emission Standards and Test Procedures for 1981 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as last amended October 2, 1985. The document also incorporates by reference various sections of the Code of Federal Regulations, some with modifications.

To enhance public understanding, the document is printed in a style that generally indicates changes from the previous California 1981 and subsequent model year test procedures, or terms which vary from the federal provisions. In most instances, changes from the previous California test procedures are shown by underline to indicate added language and strikeout to indicate deleted language. Only significant changes from the previous California test procedures are shown -- organizational, numbering, and editorial changes are not specifically designated. The table of contents is new, but it is not underlined.

In numerous instances, this document states that incorporated provisions of the Code of Federal Regulations are to be varied in some way. Where the directions introducing the variation (e.g., "amend paragraph 86.085-1 to read ...") are not entirely underlined, the variation is displayed in an underline and strikeout form showing changes from the reference to the federal regulation in the previous California test procedure. Where the directions introducing the variation are entirely underlined, the variation is displayed in an underline and strikeout form showing changes to the most recent incorporated federal language.

The numbering convention employed in this document, in order or priority, is: 1.a.1.i.A. Any references within specific sections in the Code of Federal Regulations are denoted in order of priority as: (a)(1)(i)(A) - the same numbering system employed in the Code of Federal Regulations.

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CALIFORNIA EXHAUST EMISSION
STANDARDS AND TEST PROCEDURES
FOR 1988 AND SUBSEQUENT
MODEL PASSENGER CARS, LIGHT-DUTY TRUCKS
AND MEDIUM-DUTY VEHICLES

The provisions of Subparts A and B, Part 86, Title 40, Code of Federal Regulations, ~~as they existed on April 15, 1978,~~ as set forth in Appendix I, to the extent they pertain to Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles, are hereby adopted as the California Exhaust Emission Standards and Test Procedures for ~~1981~~ 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, with the following exceptions and additions. ~~The test procedures applicable to the particulate exhaust emission standards for diesel-powered vehicles are contained in 40 CFR Part 86, Subpart B, as they existed on October 13, 1981.~~

1. Applicability

   a. These test procedures are applicable to 1988 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, except motorcycles. References to "light-duty trucks" in 40 CFR 86 shall apply both to "light-duty trucks" and "medium-duty vehicles" in these procedures.

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

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

   d. Any reference to gasoline-powered vehicles shall also apply to vehicles powered by gaseous fuels.

2. Definitions

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

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

   c. "Certification" means certification as defined in Section 39018 of the Health and Safety Code.

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

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

f. "Heavy-duty vehicle" means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6000 pounds, except passenger cars.

g. "Light-duty truck" means any motor vehicle, rated at 6000 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.

h. "Medium-duty vehicle" means any heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8500 pounds or less.

i. "Gaseous fuels" means liquefied petroleum gas, compressed natural gas, or liquefied natural gas fuels for use in motor vehicles.

j. "Trap oxidizer system" means an emission control system which consists of a trap to collect particulate matter and a mechanism to oxidize the accumulated particulate.

k. "Regeneration" means the process of oxidizing accumulated particulate matter. It may occur continually or periodically.

l. "Periodically regenerating trap oxidizer system" means a trap oxidizer system that utilizes, during normal driving conditions for cleaning the trap, an automated regeneration mode which can be easily detected.

m. "Continually regenerating trap oxidizer system" means a trap oxidizer system that does not utilize an automated regeneration mode during normal driving conditions for cleaning the trap.

n. "Non-regeneration emission test" means a complete emission test which does not include a regeneration.

o. "Regeneration emission test" means a complete emission test which includes a regeneration.

p. "Regeneration interval" means the interval from the start of a regeneration to the start of the next regeneration.

q. "Useful Life" means a period of use of either: 5 years or 50,000 miles, whichever first occurs, or if denoted by the emission standards to which a given vehicle is certifying, 10 years or 100,000 miles, whichever first occurs.

3. Standards

The following standards represent the maximum projected exhaust emissions for the useful life of the vehicle.

a. The exhaust emissions from new ~~1984~~ 1988 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, subject to registration and sold and registered in this state, shall not exceed:

~~1984~~ 1988 AND SUBSEQUENT MODEL YEAR EXHAUST EMISSIONS STANDARDS(5)(6)~~(7)~~
(grams per mile)

Vehicle Type(1)	~~Equivalent Inertia Weight (2)~~	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons~~(3)~~(2)	Carbon Monoxide	Oxides of Nitrogen ~~(4)~~(3)
PC		All	50,000	0.39 (0.41)	7.0	0.4
PC~~(5)~~(4)		All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)		All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)		All	100,000	0.46	8.3	1.0
LDT,MDV		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV ~~(5)~~(4)		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)		0-~~3999~~ 3750	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)		0-~~3999~~ 3750	100,000	0.46	10.6	1.0
LDT,MDV		~~4000-5999~~ 3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)		~~4000-5999~~ 3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751	~~6000~~ & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751	~~6000~~ & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

~~(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).~~

~~(3)~~(2) Hydrocarbon standards in parentheses apply to total hydrocarbons. In order to demonstrate compliance with a non-methane hydrocarbon emission standard, hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures".

~~(4)~~(3) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

~~(5)~~(4) This set of standards ~~for 1984 and later model vehicles~~ is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section ~~1960.15~~ 1960.1.5 of Title 13, California Administrative Code.

~~(6)~~(5) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: ~~0.4 g/mi for the 1985 model year,~~ 0.2 g/mi for the ~~1986 through~~ 1988 model years, and 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

~~(7)~~(6) For gaseous-fueled vehicles the calculation procedures provided in ~~the~~ Appendix V shall be used for determining emissions and fuel economy.

4. Initial Requirements

a. Application for Certification

In paragraph ~~86.079-21~~ 86.088-21:

1. Amend subparagraph (b)(1)(i) to read:

(i) Identification and description of the vehicles (or engines) covered by the application and a description (including a list and part numbers of all major emission control system parts and fuel system components) of their engine (vehicles only), emission control system and fuel system components, including if applicable, the turbocharger and intercooler. This shall include a detailed description of each auxiliary emission control device (AECD) to be installed in or on any certification test vehicle (or certification test engine).

2. Amend subparagraph (b)(2) to read:

(2) Projected California ~~U.S.~~ sales data sufficient to enable the ~~Administrator~~ Executive Officer to select a test fleet representative of the vehicles (or engines) for which certification is requested. ~~The sales data shall also include the altitude of intended sale for light-duty trucks.~~

3. Amend subparagraph (b)~~(5)~~(4)(iii)(C)(1) and (C)(2) to read:

(1) A statement of maintenance and procedures consistent with the restrictions imposed under subparagraph ~~86.078-25(a)(1)~~ 86.085-25(a)(1), necessary to assure that the vehicles (or engines) covered by a certificate of conformity in operation in normal use conform to the regulations, and a description of the program for training of personnel for such maintenance, and the equipment required.

(2) A statement that the vehicles sold comply with the California high-altitude emission requirements as specified in Section 11.b. (High Altitude Requirements) in these procedures.

b. Test Vehicles and Test Engines; Assigned Deterioration Factors (DFs)

In paragraph 86.085-24:

1. Delete subparagraph (b) (Emission-data vehicle selection provisions)

REPLACE WITH:

(b) Emission-data vehicles shall be selected according to the provisions of Appendix II. Selection shall be based on highest sales volume and will require only two emission-data vehicles for certification testing per engine family. (For fifty-state families the reference in the federal procedures to configuration or sales shall mean California configurations and sales rather than total family configurations and sales.)

The Executive Officer will accept data from vehicles tested for EPA certification provided that they are the same configuration selected according to California's procedures. Also, Federal vehicles may be reconfigured to California versions and tested to show compliance with California emission standards. The Executive Officer will also allow the manufacturer to reconfigure California vehicles.

2. Delete subparagraph (e)(1) (Reduced number of test vehicles)

REPLACE WITH:

(1) Any manufacturer whose projected California annual sales for the model year in which certification is sought is less than a combined total of 3,000 passenger cars, light-duty trucks, medium-duty vehicles may request a reduction in the number of test vehicles determined in accordance with the foregoing provisions of this paragraph. The Executive Officer may agree to such lesser numbers as he or she determines would meet the objectives of this procedure.

3. Delete subparagraph (e)(2) (Assigned deterioration factors)

REPLACE WITH:

(2)(i) Any manufacturer may request to certify engine families using assigned DF's for a combined total of 3,000 projected annual California sales of passenger cars, light-duty trucks, medium-duty vehicles per manufacturer regardless of total sales.

(2)(ii) Assigned DF's shall be used only where specific mileage accumulation data do not exist (i.e., if a vehicle manufacturer uses an engine/system combination where DF's derived from exhaust emission testing exist, then the assigned factors cannot be used).

Assigned DF's shall be used in lieu of data from durability vehicle(s) only when a manufacturer demonstrates that it has control over design specifications, can provide development

data, has in-house testing capabilities including accelerated aging of components/systems, and has evaluation criteria to ensure emission control system (ECS) durability for the vehicle's useful life. The applying manufacturer must demonstrate engine durability and that the emission control system(s) developed or adapted for the particular engine will be durable and comply with the applicable emission standards for the engine's or vehicle's useful life. In evaluating any information provided, all relevant test data and design factors shall be considered, including but not limited to: vehicle application, engine design, catalyst loading and volume, space velocity in the catalyst, engine exhaust gas concentrations and catalyst temperatures for various operating modes, and the durability of any emission control system components which may have been used in other vehicle applications. The assigned DF's shall be applied only to entire families.

If emission control parts from other certified vehicles are utilized, then parameter comparisons of the above data must also be provided including part numbers where applicable. Emission control durability may include special in-house specifications.

(2)(iii) The criteria for evaluating assigned DF's for evaporative families are the same as those for exhaust families. However, in determining evaporative family DF's the "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Liquefied Petroleum Gas- or Gasoline-Powered Motor Vehicles" require that an evaporative family DF be determined by averaging DF's obtained from durability vehicle testing and from bench testing. Therefore, if a manufacturer meets the criteria as specified above in (e)(2)(i) and (e)(2)(ii), the Executive Officer may grant assigned DF's for either (or both) the durability vehicle DF or the bench DF.

Assigned DF's for bench test requirements do not depend upon the 3,000 maximum sales limit. The assigned bench DF is applicable only to evaporative emission control systems which are similar to those used by the manufacturer for 1980 or later model-year vehicles and where an evaporative vehicle DF was determined. In evaluating a request for an assigned bench DF, all relevant information shall be considered, including but not limited to: fuel tank capacity, fuel tank temperatures, carburetor bowl "capacity", underhood temperatures, canister capacity and location, and any other comparisons to the certified application.

4. Amend subparagraph ~~86.078-23(f)~~ 86.085-24(f) and (h)(1)(v) by adding the following additional requirement which reads:

The durability or emission data submitted may be from vehicles previously certified by EPA or ARB.

5. Maintenance Requirements

a. Maintenance*

Delete paragraph 86.088-25.

Delete paragraph 86.087-25.

In paragraph ~~86.078-25~~ 86.085-25:

1. Amend the title and first sentence of subparagraph (a) to read:

(a) Light-duty vehicles. Paragraph (a) of this section applies to passenger cars, light-duty trucks, and medium-duty vehicles.

~~1~~2. Amend subparagraph (a)(1) to read:

(1) Scheduled maintenance on the engine, emission control system, and fuel system of durability vehicles shall, unless otherwise provided pursuant to paragraph (a)(5)(iii), be restricted as set forth in the following provisions. If a manufacturer must revise the maintenance schedule, prior approval by the Executive Officer is required. Unscheduled maintenance must not render a durability vehicle nonrepresentative of the production vehicles. The unscheduled maintenance must not be likely to be required in the normal use of the vehicle. Unauthorized or unjustifiable unscheduled maintenance may be cause for disqualification of a durability vehicle.

Manufacturers must submit durability maintenance logs to the Executive Officer. The maintenance logs shall include the mileage where maintenance occurred, the nature of the maintenance, and the name and part numbers of all fuel system and emission control parts involved with the maintenance.

(i)(A) For gasoline-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated:

(1) Drive belts on engine accessories (tension adjustment only); (30,000 miles).

(2) Valve lash (15,000 miles).

(3) Spark plugs (30,000 miles).

(4) Air filter (30,000 miles).

* These requirements are for vehicles certified to the 50,000 mile standard. Requirements for the vehicles certified to the optional 100,000 mile standards are found in section 10 (Optional 100,000 Mile Certification Procedure) of these procedures.

(5) Exhaust gas sensor (30,000 miles)~~:~~, Provided that~~,-for-1987-and-prior-model-years,-an audible-and/or-visible-signal-approved-by-the Executive-Officer-alerts-the-vehicle-operator to-the-need-for-sensor-maintenance-different-at the-mileage-point;-and-provided-that,-for-1988 and-subsequent-model-year-vehicles~~:

(a) the manufacturer shall equip the vehicle with a maintenance indicator consisting of a light or flag, which shall be preset to activate automatically by illuminating in the case of a light or by covering the odometer in the case of a flag the first time the minimum maintenance interval established during certification testing is reached and which shall remain activated until reset. After resetting, the maintenance indicator shall activate automatically when the minimum maintenance interval, when added to the vehicle mileage at the time of resetting, is again reached and shall again remain activated until reset. When the maintenance indicator consists of a light, it shall also activate automatically in the engine-run key position before engine cranking to indicate that it is functioning. The maintenance indicator shall be located on the instrument panel and shall, when activated, display the words "oxygen sensor" or may display such other words determined by the Executive Officer to be likely to cause the vehicle owner to seek oxygen sensor replacement. The maintenance indicator shall be separate from the malfunction indicator light required by Section 1968, Title 13, California Administrative Code;

(b) the manufacturer shall provide free replacement of the oxygen sensor, including both parts and labor, and shall reset the maintenance indicator without any charge, the first time the maintenance interval established during certification testing is reached for vehicles certified with scheduled sensor maintenance before 50,000 miles. If the oxygen sensor is replaced pursuant to the warranty provisions of Section 2037, Title 13, California Administrative Code, before the first maintenance interval is reached, the manufacturer shall also replace the oxygen sensor and reset the maintenance indicator at the mileage point determined by adding the

maintenance interval to the vehicle's mileage at the time of the warranty replacement. If the calculated mileage point for a second oxygen sensor replacement would exceed 50,000 miles, no free second replacement shall be required;

(c) The maintenance indicator shall be resettable. The maintenance instructions required by section 5.b. of these procedures shall provide instructions for the resetting of the maintenance indicator, and shall specify that the maintenance indicator shall be reset each time the oxygen sensor is replaced; and

(d) Notwithstanding the provisions of Section 2037(c), Title 13, California Administrative Code; the oxygen sensor, including any replacement required pursuant to this section, shall be warranted for the useful life of the vehicle or engine. If such oxygen sensor fails during the useful life period, it shall be replaced by the manufacturer in accordance with Section 2037(d), Title 13, California Administrative Code.

(6) Choke (cleaning or lubrication only); (30,000 miles).

(7) In addition, adjustment of the engine idle speed (curb idle and fast idle), valve lash, and engine bolt torque may be performed once during the first 5,000 miles of scheduled driving, provided the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use.

(i)(B) For diesel-powered vehicles, maintenance shall be restricted to the following items at intervals no more frequently than every 12,500 miles of scheduled driving, provided that no maintenance may be performed after 45,000 miles of scheduled driving:

(1) Adjust low idle speed.

(2) Adjust valve lash if required.

(3) Adjust injector timing.

(4) Adjust governor.

(5) Clean and service injector tips.

(6) Adjust drive belt tension on engine accessories.

(7) Check engine bolt torque and tighten as required.

(ii) Change of engine and transmission oil, change or service of oil filter and, for diesel-powered vehicles only, change or service of fuel filter and air filter, will be allowed at the mileage intervals specified in the manufacturer's maintenance instructions.

(iii)Maintenance shall be conducted in a manner consistent with service instructions and specifications provided by the manufacturer for use by customer service personnel.

~~2~~/3. Delete subparagraph (a)(3) (Service of exhaust gas recirculation system).

~~3~~/4. Delete subparagraph (a)(4) (Service of catalytic converter).

~~4~~/5. Amend subparagraph (a)(5), by adding a new subparagraph ~~(iii)~~ (iv)to read:

~~(iii)~~(iv)When a part has to be replaced while conducting unscheduled maintenance, a similarly aged part shall be used for those parts that affect emissions, unless it is impractical and unnecessary to age a part and prior approval has been obtained from the Executive Officer for use of the part without aging. In either case, an engineering report on the nature of the problem with the probable cause and corrective action shall be supplied to the Executive Officer.

6. Delete subparagraph (b) (Maintenance of light-duty trucks and heavy-duty engines)

b. Maintenance Instructions

Delete paragraph 86.087-38.

In paragraph ~~86.078-38~~ 86.085-38:

1. Amend subparagraph (a) to read:

(a) The manufacturer shall furnish or cause to be furnished to the purchaser of each new motor vehicle ~~(or motor vehicle engine)~~ subject to the standards prescribed in ~~paragraphs 86.078-8 through 86.078-11~~ Section 3 of these procedures ~~as applicable~~, written instructions for the maintenance and use of the vehicle ~~(or engine)~~ by the purchaser as may be reasonable and necessary to assure the proper functioning of emission control systems in normal use. Such instructions shall be consistent with and not require maintenance in excess of the restrictions imposed under subparagraph ~~86.078-25(a)(1)~~

86.085-25(a)(1) as amended above, except that the instructions may, subject to approval by the ~~Administrator~~ Executive Officer, require additional maintenance for vehicles operated under extreme conditions. In addition, subject to approval by the ~~Administrator~~ Executive Officer, the instructions may require inspections necessary to insure safe operation of the vehicle in use.

In addition to any maintenance which may be required pursuant to the preceding paragraph, the instructions may also recommend such inspections, maintenance, and repair as may be reasonable and necessary for the proper functioning of the vehicle and its emission control systems. If the instructions recommend maintenance in addition to that which may be required pursuant to the preceding paragraph, they shall distinguish clearly between required and recommended maintenance.

2. Amend both subparagraphs (c)(1) and (d)(1) to read:

(1) Such instructions shall specify the performance of all scheduled maintenance performed by the manufacturer under subparagraph ~~86.078-25(a)(1)~~ 86.085-25(a)(1). ~~If the instructions specify recommended maintenance as well as required maintenance, they shall distinguish clearly between the two.~~

~~3. Amend subparagraph (d) by adding a new subparagraph (3) to read:~~

~~(3) Such instructions shall specify the performance of all scheduled maintenance performed by the manufacturer under subparagraph 86.078-25(a)(1). If the instructions specify recommended maintenance as well as required maintenance, they shall distinguish clearly between the two.~~

c. Submission of Maintenance Instructions

Amend subparagraph ~~86.078-39(a)~~ 86.079-39(a) to read:

(a) The manufacturer shall provide to the ~~Administrator~~ Executive Officer, no later than the time of the submission required by paragraph ~~86.078-23~~ 86.088-23, a copy of the maintenance instructions which the manufacturer proposes to supply to the ultimate purchaser in accordance with subparagraph ~~86.078-38(a)~~ 86.085-38(a). The ~~Administrator~~ Executive Officer will review such instructions to determine whether they are consistent with ~~federal~~ California

requirements, and to determine whether the instructions for required maintenance are consistent with the restrictions imposed under subparagraph ~~86.078-25(a)(1)~~ 86.085-25(a)(1). The ~~Administrator~~ Executive Officer will notify the manufacturer of his or her determinations.

6. Demonstrating Compliance

a. Mileage and Service Accumulation; Emission Measurements

In paragraph ~~86.079-26~~ 86.084-26:

1 Amend (a)(3)(i) and (a)(3)(ii) by adding the following additional requirement which reads:

The Executive Officer will accept the manufacturer's determination of the mileage at which the engine-system combination is stabilized for emission data testing if (prior to testing) a manufacturer determines that the interval chosen yields emissions performance which is stable and representative of design intent. Sufficient mileage should be accumulated to reduce the possible effects of any emissions variability that is the result of insufficient vehicle operation. Of primary importance in making this determination is the behavior of the catalyst, EGR valve, trap oxidizer or any other part of the ECS which may have non-linear aging characteristics. In the alternative, the manufacturer may elect to accumulate 4,000 mile +/- 250 mile on each test vehicle within an engine family without making a determination.

2. Amend (a)(4)(i) and (a)(4)(ii) by adding the following new subparagraph (A), (B), (C), and (D) to read:

(A) For gasoline- and diesel-powered vehicles:

(1) Passenger cars, light-duty trucks and medium-duty vehicles selected by the Executive Officer or elected by the manufacturer under §86.085-24(c)(1) shall be driven, with all emission control systems installed and operating, for 50,000 miles or such lesser distance as the Executive Officer may agree to as meeting the objective of this procedure.

(2) Prior to initiation of mileage accumulation in a durability-data vehicle, manufacturers must establish the mileage test interval for durability-data vehicle testing of the engine family. Once testing has begun on a durability-data vehicle, the durability test interval for that family may not be changed. At a minimum, multiple tests must be performed at 5,000 and 50,000 miles as long as they meet the requirement of Appendix III. The Executive Officer will accept durability test interval schedules determined by the manufacturer.

The testing must provide a DF confidence level equal to or better than the confidence level using the former fixed mileage test and scheduled maintenance intervals. The procedure for making this determination is also given in Appendix III. The mileage intervals between test points must be approximately of equal length. The +/- 250 mile test point tolerance and the requirement that tests be conducted before and after scheduled maintenance is still mandatory. Emission control systems for gasoline engines which have step function changes designed into the control system must use the 5,000 mile test interval schedule.

(3) Testing before and after scheduled (or unscheduled) maintenance points must be conducted, and these data are to be included in the deterioration factor calculation*. The number of tests before and after scheduled maintenance and the mileage intervals between test points should be approximately equal. Durability test interval schedules with multiple testing at test points within 10,000 miles of or at the 50,000 mile test point must be submitted for approval. Multiple testing at maintenance mileage tests points within 10,000 miles of the 50,000 mile test points may be approved if it can be demonstrated by previously generated data that the emission effects of the maintenance are insignificant.

(4) For engine families which are to be certified to the 100,000 mile emission standards, each exhaust emission durability-data vehicle shall be driven, with all emission control systems installed and operating, for 100,000 miles or such lesser distance as the Executive Officer may agree to as meeting the objective of this procedure. Durability tests will be at every 5,000 miles, from 5,000 to 100,000 miles, however, the above procedures may be used to determine test intervals for the first 50,000 miles of testing.

(B) ~~(ii) Diesel.--Each Diesel durability-data vehicle shall be driven with all emission control systems installed and operating, for 50,000 miles or such lesser distance as the Administrator may agree to as meeting the objectives of this procedure.--Complete emission tests (see §§ 86.106 through 86.145) shall be made at the following mileage~~

* Testing before unscheduled maintenance may be omitted with the prior consent of the Executive Officer when testing would be dangerous to a vehicle or an operator.

~~points:--0;-5,000;-10,000;-15,000;20,000;-25,000;-30,000;35,000;-40,000;-45,000;-and-50,000.*--For-diesel-powered passenger-cars,-light-duty-trucks,-and-medium-duty vehicles~~ For diesel-powered vehicles equipped with periodically regenerating trap oxidizer systems, at least four regeneration emission tests (see §86.106 through §86.145) shall be made.* With the advance approval of the Executive Officer, the manufacturer may install (1) a manual override switch capable of preventing (i.e., delaying until the switch is turned off) the start of the regeneration process and (2) a light which indicates when the system would initiate regeneration if it had no override switch. Upon activation of the override switch, the vehicle will be operated on a dynamometer to precondition it for the regeneration emission test in accordance with section ~~(3.1)~~ 86.132.82 and section 9.b. of these procedures. The Urban Dynamometer Driving Schedule (UDDS) which is in progress at the time when the light comes on shall be completed and the vehicle shall proceed to the prescribed soak period followed by testing. With the advance approval of the Executive Officer, the manual override switch will be turned off at some predetermined point in the testing sequence permitting the regeneration process to proceed without further manual interaction. The mileage intervals between test points shall be approximately equal. The first regeneration emission test shall be made at the 5,000 mile point. The regeneration emission tests must provide a deterioration factor confidence level equal to or better than the confidence level achieved by performing regeneration emission tests at the following mileage point: 5,000; 20,000; 35,000; and 50,000. The procedure for making this determination is shown in Appendix IV.

(C) For gasoline-powered vehicles, the "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Gasoline Powered Motor Vehicles" specify evaporative durability testing at 5,000, 10,000, 20,000, 30,000, 40,000 and 50,000 mile test points. A manufacturer may conduct evaporative testing at test points used for exhaust emission durability testing provided that the same deterioration confidence level for the evaporative emission DF determination is retained (see Appendix III).

~~*-Where-applicable,-the-option-to-the-above-test-plan-set-forth-in-the Manufacturers-Advisory-Correspondence-#82-01A,-dated-April-6,-1982,-may-be used.~~

* Included in Appendix V are the pollutant mass emission calculation procedures for vehicles equipped with periodicaly regenerating trap oxidizer systems.

(D) The Executive Officer may determine under §86.085-24(f) that no testing is required.

3. Amend subparagraph (a)(5)(i) by adding the following requirement which reads:

In addition, the emission tests performed on emission-data vehicles and durability-data vehicles shall be non-regeneration emission tests for diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems. For any diesel passenger cars, light-duty trucks, and medium-duty vehicles equipped with continually regenerating trap oxidizer systems, manufacturers may use the provisions applicable to periodically regenerating trap oxidizer systems as an option.

If such an option is elected, all references in these procedures to vehicles equipped with periodically regenerating trap oxidizer systems shall be applicable to the vehicles equipped with continually regenerating trap oxidizer systems.

4. Amend subparagraph (a)(8) to read:

(8) Once a manufacturer submits the information required in paragraphs (a)(7) of this section for a durability-data vehicle, the manufacturer shall continue to run the vehicle to 50,000 miles if the family is certified to 50,000 mile emission standards or to 100,000 miles if it is certified to the 100,000 mile emission standards (or to a lesser distance which the Executive Officer may have previously agreed to), and the data from the vehicle will be used in the calculations under §86.084-28. Discontinuation of a durability-data vehicle shall be allowed only with the consent of the ~~Administrator~~ Executive Officer.

b. Compliance with Emission Standards

In paragraph ~~86.079-28~~ 86.088-28:

1. Amend subparagraph (a)(1) to read:

(1) Paragraph (a) of this section applies to light-duty vehicles (passenger cars, light-duty trucks and medium-duty vehicles).

2. Amend subparagraph (a)(3) to read:

(3) Since it is expected that emission control efficiency will change with mileage accumulation on a vehicle, the emission level of a vehicle which has accumulated 50,000 miles will be used as the basis for determining compliance with the 50,000 mile emission standards ~~(or family particulate emission limit, as appropriate)~~.

3. Delete subparagraph (b) (Compliance provisions for light-duty trucks).

4. Amend subparagraph (a)(4)(i) to read:

(i) Separate emission deterioration factors shall be determined from the exhaust emission results of the durability-data vehicle(s) for each engine-system combination. A separate factor shall be established for exhaust HC, exhaust CO, exhaust NOx, and exhaust particulate (diesel vehicles only) for each engine-system combination. A separate evaporative emission deterioration factor shall be determined for each evaporative emission family-evaporative emission control system combination from the testing conducted by the manufacturer (gasoline-fueled vehicles only). Separate emission correction factors (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only) shall be determined from the exhaust emission results of the durability-data vehicle(s) for each engine-system combination. A separate factor shall be established for exhaust HC, exhaust CO, exhaust NOx, and exhaust particulate for each engine-system combination.

5. Delete subparagraph (a)(4)(i)(A)(4) (Outlier test point procedure)

REPLACE WITH:

(4) The manufacturer must use the outlier identification procedure to test for irregular data from a durability-data set. All durability test data must be reported. If any data point is identified as a statistical outlier, the Executive Officer will determine whether the outlier was a result of an emission control system anomaly, test procedure error or of unknown and non-recurring circumstance. The outlier is not automatically rejected under California regulations. If the procedure identifies a data point as an outlier, and an analysis by the Executive Officer shows that the outlier was caused by some irregularity of the instrumentation, only that data point will be eliminated, not all of the data (i.e., other pollutants) at that test point. Where the manufacturer choses to apply both the outlier procedure and averaging (as allowed under 86.084-26(b)(6)(i)) to the same data set, the outlier procedure shall be completed prior to applying the averaging procedure. The durability data should be submitted with the final application unless a data anomaly occurs and a staff decision is needed.

6. Amend subparagraph ~~86.079-28(a)(4)(i)(B)~~ 86.088-28(a)(4)(i)(B) (durability vehicles must meet emissions standards) by adding the additional requirement which reads:

The requirements above, refer, for each pollutant, to the highest of either the federal or California emissions

standards. The emission data will be acceptable for use in the calculation of the deterioration factor only if the interpolated 4,000-mile and 50,000-mile points on this line are within the highest of either the California or federal low-altitude emission standards.

As an exception, the Executive Officer will review the data on a case-by-case basis and may approve its use in those instances where the best fit straight line crosses an applicable standard but no data point exceeds the standard or when the best fit straight line crosses the applicable standard at the 4,000-mile point but the 5,000-mile actual test point and the 50,000 mile interpolated points are both below the standards.

7. Add subparagraph (a)(4)(i)(D) to read:

(D) The regeneration exhaust emission data (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only) from the tests required under ~~§86.079-26(a)(4)~~ §86.084-26(a)(4) shall be used to determine the regeneration exhaust emissions interpolated to the 50,000-mile point. The regeneration exhaust emission results shall be plotted as a function of the mileage on the system, rounded to the nearest mile, and the best fit straight lines, fitted by the method of least squares, shall be drawn through all these data points. The interpolated 50,000-mile point of this line shall be used to calculate the multiplicative exhaust emission correction factor for each engine-system combination as follows:

$$\text{Factor} = 1 + \frac{R-1}{4505} n$$

where, R = the ratio of the regeneration exhaust emissions interpolated to 50,000 miles to the non-regeneration exhaust emissions interpolated to 50,000 miles.

n = the number of complete regenerations which occur during the durability test.

These interpolated values shall be carried out to a minimum of four places to the right of the decimal point before dividing one by the other to determine the correction factor. The results shall be rounded to three places to the right of the decimal point in accordance with ASTM E 29-67. For applicability to gaseous emission standards under the 100,000 mile option, R will be determined based upon projected 100,000 mile emissions.

8. Amend subparagraph (a)(4)(ii)(A) to read:

(A) The official exhaust emission test results for each

emission-data vehicle at the 4,000 mile test point shall be multiplied by the appropriate deterioration factor, and correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only): Provided: that if a deterioration factor as computed in paragraph (a)(4)(i)(B) of this section or a correction factor as computed in paragraph (a)(4)(i)(D) of this section is less than one, that deterioration factor or correction factor shall be one for the purposes of this paragraph.

7. Small-Volume Manufacturer's Certification Procedures

a. In paragraph 86.084-14:

1. Amend subparagraph (b)(1) to read:

(1) The optional small-volume manufacturers certification procedures apply to light-duty vehicles (passenger cars, light-duty trucks, and medium-duty vehicles), ~~light-duty trucks, and heavy-duty engines~~ produced by manufacturers with ~~U.S.~~ California sales (for the model year in which certification is sought) of fewer than ~~10,000~~ 3,000 units (PC ~~LDV~~, LDT and MDV ~~HDE~~ combined).

2. Amend subparagraph (c)(4) to read:

(4) A small-volume manufacturer shall include in its records all of the information that ~~EPA~~ ARB requires on ~~§ 86.084-21~~ § 86.088-21. This information will be considered part of the manufacturer's application for certification and must be submitted to the Executive Officer. ~~However, the manufacturer is not required to submit the information to the Administrator unless the Administrator requests it.~~

3. Delete subparagraph (c)(7)(i)(A) (Worst-case selection of emission-data vehicles).

8. Alternative Procedures for Notification of Additions and Changes

a. Amend subparagraph 86.082-34(a) by adding the following additional requirements which read:

A manufacturer must notify the Executive Officer within 10 working days of making an addition of a vehicle to a certified engine family or a change in a vehicle previously covered by certification.

The manufacturer shall also submit, upon request of the Executive Officer, the following items:

(1) service bulletin.
(2) driveability statement.
(3) test log.
(4) maintenance log.

All running changes and field fixes which do not adversely affect the system durability are deemed approved unless disapproved by the Executive Officer within 30 days of the receipt of the running change or field fix request. A change not specifically identified in the manufacturer's application must also be reported to the Executive Officer if the change may adversely affect engine or emission control system durability. Examples of such changes include any change that could affect durability, thermal characteristics, deposit formation, or exhaust product composition, i.e., combustion chamber design, cylinder head material, camshaft profile, computer modifications, turbocharger, intercooler, wastegate characteristics, and transmission or torque converter specifications. Note that this section does not affect the California "blanket" approval provisions.

The manufacturer is required to update and submit to the Executive Officer the "supplemental data sheet" for all running changes and field fixes implemented with the change notification. The manufacturer shall submit, on a monthly basis, by engine family, a list of running changes/field fixes giving the document number, date submitted and a brief description of the change.

9. Test Requirements

a. Fuel Specification

Amend ~~subparagraph 86.113-78~~ 86.113-87 by adding a new subparagraph ~~(c)~~(d) to read:

(1) Gaseous fuels representative of commercial gaseous fuels which will be generally available through retail outlets in California or liquid petroleum gas having the ASTM D1835 or NGPA HD-5 specification shall be used in service accumulation.

(2) Liquid petroleum gas having the ASTM D1835 or NGPA HD-5 specification shall be used for exhaust and evaporative emission testing.

(3) Natural gas representative of commercial natural gas which will be generally available through retail outlets in California shall be used for exhaust emission testing.

(4) Written approval from the Administrator of the fuel specifications must be provided prior to the start of the testing.

b. Vehicle preconditioning

In paragraph ~~86.132-78~~ 86.132-82:

1. Amend subparagraph (a)(2) to read:

(2) Within one hour of being fueled the vehicle shall be placed, either by being driven or pushed, on a dynamometer and

placed, either by being driven or pushed, on a dynamometer and operated through one Urban Dynamometer Driving Schedule (UDDS) test procedure, see §86.115 and Appendix I of the federal procedures.

The UDDS performed prior to a non-regeneration emission test shall not contain a regeneration (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). A gasoline fueled test vehicle may not be used to set dynamometer horsepower.

2. Amend subparagraph (a)(3) to read:

(3) For those unusual circumstances where additional preconditioning is desired by the manufacturer, such preconditioning may be allowed with the advance approval of the ~~Administrator~~ Executive Officer. The ~~Administrator~~ Executive Officer may also choose to conduct or require the conduct of additional preconditioning to insure that the evaporative emission control system is stabilized in the case of gasoline engines, or to insure that the exhaust system is stabilized in the case of diesel engines. The additional preconditioning shall consist of an initial one hour minimum soak and, one, two, or three driving cycles of the UDDS (or more in the case of a diesel-powered vehicle equipped with a periodically regenerating trap oxidizer system, which is being preconditioned for a regeneration emission test), as described in paragraph (a)(2) of this section, each followed by a soak of at least one hour with engine off, engine compartment cover closed and cooling fan off. The vehicle may be driven off the dynamometer following each UDDS for the soak period.

c. Regeneration Recording Requirements

Amend paragraph 86.142-82 by adding the following subparagraph (r) which reads:

(r) The manufacturer shall record in the durability-data vehicle log book, the number of regenerations which occur during the 50,000 mile durability test of each diesel-powered passenger car, light-duty truck and medium-duty vehicle equipped with a periodically regenerating trap oxidizer system. The manufacturer shall include, for each regeneration: the date and time of the start of regeneration, the duration of the regeneration, and the accumulated mileage at the start and the end of regeneration. The number of regenerations will be used in the calculation of the correction factor in 40 CFR Part 86, Section 28.

10. Optional 100,000 Mile Certification Procedure

The following provisions and alternate emission standards shown in ~~paragraph~~ section (3) of these procedures shall apply to any engine

family ~~which meets all of the following additional requirements~~ certified to the 100,000 mile certification standards*.

a. General Guidelines for Implementation

1. Designation

The manufacturer shall designate in the preliminary application for certification those engine families that will be certified to the 100,000 mile procedures. In order to allow the manufacturer as much flexibility as possible, the manufacturer may at any time designate additional engine families or remove any designated engine family. Families originally intended for 50,000 mile certification may be designated as 100,000 mile families after the start of durability testing and vice versa. The Executive Officer must be notified within ten working days of any such changes. Manufacturers are cautioned that any engine family certified to the 100,000 mile certification procedure must comply with the allowable maintenance provisions of section 10.b in these procedures during the engine mileage accumulation.

2. Mileage Accumulation

All durability vehicles must be run to at least 50,000 miles. For established emission control systems, early termination of mileage accumulation may be requested by the manufacturer if sufficient evidence as described below is provided to satisfy the Executive Officer that further testing is unnecessary.

Testing beyond 50,000 miles must be conducted in accordance with the certification test procedures applicable prior to 50,000 miles. Exhaust emissions tests shall be performed at every 5,000 mile interval starting with the 55,000 mile point and ending with the 100,000 mile point, and before and after all scheduled maintenance.

The Executive Officer may, upon request by the manufacturer, waive any exhaust emission testing beyond 50,000 miles, if he or she finds that (1) the extrapolated 100,000 mile points and interpolated 4,000 mile points on the least squares lines comply with the line crossing provisions of section 10.b. of the procedures, and (2) the system and engine designs, on the basis of previous engineering experience, would not be expected to exceed the applicable standards after 100,000 miles. For example, a diesel vehicle that shows a flat deterioration curve (D.F. = 1.0) for the first 50,000 miles

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* The additional criteria outlined in Section 6.a. (Mileage and Service Accumulation: Emission Measurements) shall be used to determine the durability-data testing schedule and the emission-data 4,000 mile test point.

and which is not equipped with any add-on emission control system (such as EGR) may be eligible for such a waiver. The Executive Officer will evaluate each request on a case-by-case basis. The manufacturer must submit its request to the Executive Officer to stop testing within ten working days after the last emission test.

If a durability vehicle accumulates less than 100,000 miles, the manufacturer shall submit evidence that the engine is capable of meeting the applicable emission standards for 100,000 miles. Such evidence shall include engineering data on piston rings, piston, valves, cylinder head, fuel system, ignition system, etc., as applicable.

Any decision to stop mileage accumulation before 100,000 miles does not relieve the manufacturer from its warranty and recall obligations.

For the last 50,000 miles, the Executive Officer may, upon the request of the manufacturer, allow driving schedules different from the standard AMA driving cycle for accelerated mileage accumulation and a reduced test frequency. The evaluation of alternate test programs will be based on the type of emission control system involved and the characteristic of the cumulative emission control system deterioration.

3. Scheduled Maintenance

A vehicle manufacturer who initially intends to certify a vehicle to the 50,000 mile procedure may not change to the 100,000 mile option after mileage accumulation unless the manufacturer starts initial mileage accumulation using, for each maintenance item, the most stringent maintenance schedule of either the 100,000 mile option or the 50,000 mile certification requirements.

4. Unscheduled Maintenance

The Executive Officer will follow the provisions of section 5.a of these procedures, in evaluating any manufacturer's request for unscheduled maintenance. Manufacturers shall obtain the Executive Officer's approval before performing any unscheduled emission control component/system maintenance. In all cases, the degree of system degradation must not be improved by any inspection or repairs. Emission tests must be performed before and after all unscheduled maintenance and be used in the DF calculation*.

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* Testing before unscheduled maintenance may be omitted with the prior consent of the Executive Officer when testing would be dangerous to a vehicle or an operator.

5. Evaporative Compliance Criteria

If a manufacturer conducts evaporative emission testing (gasoline-powered vehicles only) in conjunction with exhaust durability testing, the vehicle manufacturer is required to show compliance with the evaporative emission standard for 50,000 miles. If the manufacturer wishes to conduct testing beyond 50,000 miles, all data must be submitted to the Executive Officer. The Executive Officer will not use any evaporative emission data beyond 50,000 miles for determining compliance with the applicable evaporative emission standard. However, the manufacturer must warrant the evaporative emission control system for 10 years or 100,000 miles.

b. Specific Guidelines for Compliance

Each exhaust emission durability data vehicle shall be driven, with all emission control systems installed and operating, for 100,000 miles or such lesser distance as the Executive Officer may agree to as meeting the objectives of this procedure. Emission tests performed on emission-data vehicles and durability-data vehicles (for determination of the deterioration factors) shall be non-regeneration emission tests for diesel-powered passenger cars, light-duty trucks and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems. Compliance with the emission standards shall be established as follows:

1. The linear regression line for all pollutants shall be established by use of all required data from tests of the durability vehicle at every 5,000 mile interval from 5,000 to 100,000 miles. The requirements in subparagraph ~~86.078-28(a)(4)(i)(B)~~ 86.088-28(a)(4)(i)(B) (durability vehicles must meet emissions standards) refer, for each pollutant, to the highest of either the federal 50,000 mile or California 100,000 mile emission standards.

2. Compliance with the hydrocarbon and carbon monoxide standards shall be determined as follows:

   i. For Option 1:

      A. The interpolated 4,000 and 50,000 mile points on the linear regression line in section b.1. shall not exceed the appropriate hydrocarbon and carbon monoxide standards, except as in B. below.

      B. The linear regression line in section b.1. may exceed the standard provided that no data point exceeds the standard.

C. The hydrocarbon and carbon monoxide data from the 4,000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 50,000 mile point by the interpolated 4,000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate hydrocarbon and carbon monoxide standards.

ii. For Option 2:

A. The interpolated 4,000 and 100,000 mile points on the linear regression line in section b.1. shall not exceed the appropriate hydrocarbon and carbon monoxide standards, except as in B below.

B. The linear regression line in section b.1. may exceed the standard provided that no data point exceeds the standard.

C. The hydrocarbon and carbon monoxide data from the 4,000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 100,000 mile point by the interpolated 4,000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate 100,000 mile hydrocarbon and carbon monoxide standards.

3. Compliance with the oxides of nitrogen standard for Options 1 and 2 shall be determined as follows:

i. the interpolated 4,000 and 100,000 mile points on the linear regression line in section b.1. shall not exceed the appropriate 100,000 mile oxides of nitrogen standard, except as in ii. below.

ii. the linear regression line in section b.1. may exceed the standard provided that no data point exceeds the standard.

iii. the oxides of nitrogen data from the 4,000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 100,000 mile point by the interpolated 4,000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with

periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate 100,000 mile oxides of nitrogen standard.

4. Compliance with the particulate standard for options 1 and 2 shall be determined as follows:

   i. the interpolated 4,000 and 50,000 mile points on the linear regression line in section b.1. shall not exceed the appropriate particulate standard, except as in ii. below.

   ii. the linear regression line in section b.1. may exceed the standard provided that no data point exceeds the standard.

   iii. the particulate data from the 4,000 mile test point of the emission data vehicle shall be multiplied by the deterioration factor computed by dividing the interpolated 50,000 mile point by the interpolated 4,000 mile point, and the appropriate exhaust emission correction factor (diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles equipped with periodically regenerating trap oxidizer systems only). These values shall not exceed the appropriate particulate standard.

5. All references in these test procedures to "useful life", 5 years, and 50,000 miles shall mean "total life", 10 years, and 100,000 miles, respectively, except in section 10.b.2.

c. Maintenance

Only the following scheduled maintenance shall be allowed under subparagraph ~~86.078-25(a)(1)(i)~~ 86.085-25 (a)(1)(i).

1. 25(a)(1)(i) Option 1. For ~~1981~~ 1988 and later model gasoline or diesel-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated.

   (1) Drive belt tension on engine accessories (30,000 miles).
   (2) Valve lash (15,000 miles).
   (3) Spark plugs (30,000 miles).
   (4) Air filter (30,000 miles).
   (5) Exhaust gas sensor (30,000 miles): Provided that~~,-for 1987-and-prior-model-years,-an-audible-and/or-visible signal-approved-by-the-Executive-Officer-alerts-the vehicle-operator-to-the-need-for-sensor-maintenance-at the-mileage-point;-and-provided-that-for-1988-and subsequent-model-year-vehicles;~~:

(a) the manufacturer shall equip the vehicle with a maintenance indicator consisting of a light or flag, which shall be preset to activate automatically by illuminating in the case of a light or by covering the odometer in the case of a flag the first time the minimum maintenance interval established during certification testing is reached and which shall remain activated until reset. After resetting, the maintenance indicator shall activate automatically when the minimum maintenance interval, when added to the vehicle mileage at the time of resetting, is again reached and shall again remain activated until reset. When the maintenance indicator consists of a light, it shall also activate automatically in the engine-run key position before engine cranking to indicate that it is functioning. The maintenance indicator shall be located on the instrument panel and shall, when activated, display the words "oxygen sensor" or may display such other words determined by the Executive Officer to be likely to cause the vehicle owner to seek oxygen sensor replacement. The maintenance indicator shall be separate from the malfunction indicator light required by Section 1968, Title 13, California Administrative Code;

(b) the manufacturer shall provide free replacement of the oxygen sensor, including both parts and labor, and shall reset the maintenance indicator without any charge, the first time the maintenance interval established during certification testing is reached for vehicles certified with scheduled sensor maintenance before 50,000 miles. If the oxygen sensor is replaced pursuant to the warranty provisions of Section 2037, Title 13, California Administrative Code, before the first maintenance interval is reached, the manufacturer shall also replace the oxygen sensor and reset the maintenance indicator at the mileage point determined by adding the maintenance interval to the vehicle's mileage at the time of the warranty replacement. If the calculated mileage point for a second oxygen sensor replacement would exceed 50,000 miles, no free second replacement shall be required;

(c) the maintenance indicator shall be resettable. The maintenance instructions required by paragraph 5.b. of these procedures shall provide instructions for the resetting of the maintenance indicator, and shall specify that the maintenance indicator shall be reset each time the oxygen sensor is replaced; and

(d) notwithstanding the provisions of Section 2037(c), Title 13, California Administrative Code, the oxygen sensor, including any replacement required pursuant to this section, shall be warranted for the useful life of the vehicle or engine. If such oxygen sensor fails during the useful life period, it shall be replaced by the manufacturer in accordance with Section 2037(d) Title 13, California Administrative Code.

(6) Choke, cleaning or lubrication only (30,000 miles).
(7) Idle speed (30,000 miles).
(8) Fuel Filter (30,000 miles).
(9) Injection timing (30,000 miles).

Option 2. For ~~1981~~ 1988 and later model gasoline or diesel-fueled vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intervals no more frequent than indicated:

(1) Drive belt tension on engine accessories (30,000 miles).
(2) Valve lash (15,000 miles).
(3) Spark plugs (30,000 miles).
(4) Air filter (30,000 miles).
(5) Fuel filter (30,000 miles).
(6) Idle speed (30,000 miles).
(7) Injection timing (30,000 miles).

2. In addition, adjustment of the engine idle speed (curb idle and fast idle), valve lash, and engine bolt torque may be performed once during the first 5000 miles of scheduled driving, provided the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use.

d. The manufacturer shall agree to apply to vehicles certified under this paragraph the provision of Section 43204 of the California Health and Safety Code for a period of ten years or 100,000 miles, whichever first occurs.

11. Additional Requirements

a. In order to qualify for the alternative durability program, in addition to the requirements of paragraph 86.085-13, the algorithm requirements of Appendix III shall be met and only the first 50,000 miles (or 100,000 miles, as applicable) of data or its equivalent shall be used.

b. For gasoline-powered vehicles, 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 6000 feet elevations.

A vehicle will be deemed in compliance with the above requirement if the manufacturer demonstrates that the tailpipe air/fuel ratio (TAFR) is, at elevations up to 6000 feet, stoichiometric or leaner in each of several driving modes. However, if a vehicle operates in a given driving mode at sea level with a TAFR richer than stoichiometric, then for that particular driving mode the manufacturer is only required to show that the TAFR is, at elevations up to 6000 feet, no richer than the TAFR at sea level. The driving modes selected for testing shall be representative of the full range of normal driving conditions, and shall include the following three steady-state modes: idle, 30 mph road load cruise, 50 mph road load cruise. Assuming the use of dry air and indolene fuel (hydrogen to carbon atom ratio of 1.85), a TAFR of 14.6 shall be considered a stoichiometric ratio. The vehicle manufacturer may correct this value for different fuels and/or humidity, subject to approval by the Executive Officer.

For fuel injected vehicles, compliance may be demonstrated upon a showing by the manufacturer that the fuel injection system distributes fuel based on air mass 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 which meet all the applicable California low altitude emission standards when tested at the EPA test elevation are deemed to be in compliance.

Exemptions to the high altitude provisions as allowed by the federal government in §86.087-8 and §86.088-9 shall not be approved.

c. 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 paragraph ~~86.078-28~~ 86.088-28, and then rounded and compared with the standard as set forth in section 3 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 3, 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.

~~d. If a gasoline-fueled vehicle manufacturer requires the use of unleaded fuel, a statement will be required that the engine and transmission combinations for which certification is requested are designed to operate satisfactorily on a gasoline having a research octane number not greater than 91. This requirement shall not apply to gaseous-fueled vehicles.~~

d. Labeling required pursuant to paragraph ~~86.079-35~~ 86.088-35 and Section 1965, Chapter 3, Title 13 of the California Administrative Code shall conform with the requirements specified in the "California Motor Vehicle Tune-Up Label Specifications".

e. The manufacturer shall submit to the Executive Officer a statement that those vehicles for which certification is requested have driveability and performance characteristics which satisfy that manufacturer's customary driveability and performance requirements for vehicles sold in the United States. This statement shall be based on driveability data and other evidence showing compliance with the manufacturer's performance criteria. This statement shall be supplied with the manufacturer's final application for certification, and with all running changes for which emission testing is required.

If the Executive Officer has evidence to show that in-use vehicles demonstrate poor performance that could result in wide-spread tampering with the emission control systems, he or she may request all driveability data and other evidence used by the manufacturer to justify the performance statement.

f. For all vehicles subject to the provisions of Section 1968, Title 13, California Administrative Code, the manufacturer shall submit with its application for certification a description of the malfunction and diagnostic system to be installed on the vehicles. (The vehicles shall not be certified unless the Executive Officer finds that the malfunction and diagnostic system complies with the requirements of Section 1968).

g. Certification, if granted, is effective only for the vehicle/engine family 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.

h. A statement must be supplied that the production vehicles shall be in all material respects the same as those for which certification is granted.

~~e. The mechanism for adjusting the idle air/fuel mixture, if any, shall be designed so that either:~~

~~(i) The mixture adjustment mechanism is not visible, even with the air cleaner removed, and special tools and/or procedures are required to make adjustments; or~~

~~(ii) In the alternative, the Executive Officer may, upon reasonable notice to the manufacturer, require that a certification test of a vehicle be conducted with the idle air/fuel mixture at any setting which the Executive Officer finds corresponds to settings likely to be encountered in actual use. The Executive Officer, in making this finding, shall consider the difficulty of making adjustments, damage to the carburetor in the event of any effort to make an improper adjustment, and the need to replace parts following the adjustment.~~

~~The manufacturer shall submit for approval by the Executive Officer his or her proposed method for compliance with this requirement in his or her preliminary application for certification.~~

APPENDIX I

List of Sections of Subparts A and B, Part 86, Title 40, Code of Federal Regulations, Incorporated by Reference

This Appendix sets forth the sections of Subparts A and B, Part 86, Title 40, Code of Federal Regulations, as adopted or amended by the U.S. Environmental Protection Agency (EPA) on the date listed for each section, which are incorporated by reference in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles."

All of the incorporated federal provisions were in effect as of ~~August 30, 1985~~ July 7, 1986. Seven additional sections adopted by EPA prior to ~~August 30, 1985~~ July 7, 1986 and applicable to 1991 and subsequent model vehicles are not included: Sections 86.91-2, 86.91-21, 86.91-23, 86.91-28, 86.91-29, 86.91-30, and 86.91-35. However, the terms of these sections as they pertain to passenger cars, light-duty trucks, and medium-duty vehicles are identical to the corresponding incorporated federal sections applicable commencing with 1988 model year vehicles: Sections 86.88-2, 86.88-21, 86.88-23, 86.88-28, 86.88-29, 86.88-30, and 86.88-35.

Subpart A - General Provisions for Emission Regulations for 1977 and Later Model Year New Light-Duty Vehicles, 1977 and Later Model Year New Light-Duty Trucks.

§86.085-1	General applicability. ~~March 15, 1985~~ July 7, 1986.
§86.082-2	Definition. November 2, 1982.
§86.084-2	Definition. December 10, 1984.
§86.085-2	Definition. November 16, 1983.
§86.088-2	Definition. March 15, 1985.
§86.078-3	Abbreviations. January 21, 1980.
§86.084-4	Section numbering; construction. September 25, 1980.
§86.084-5	General standards; increase in emissions,; unsafe conditions. November 3, 1982.
§86.078-7	Maintenance of records; submitted information; right of entry. November 2, 1982.
§86.087-8	Emission standards for 1987 light duty vehicles. January 24, 1984.
§86.088-9	Emission standards for 1987 model light-duty trucks. ~~March 15, 1985~~ July 7, 1986.
§86.080-12	Alternative certification procedures. April 17, 1980.
§86.085-13	Alternative durability program. May 19, 1983.
§86.084-14	Small-volume manufacturers certification procedures. January 31, 1985.
§86.085-20	Incomplete vehicles. January 12, 1983.
§86.088-21	Application for certification. March 15, 1985.
§86.085-22	Approval of application for certification; test fleet selection, etc., ~~August 30, 1985~~ July 7, 1986.
§86.088-23	Required data. July 19, 1985.
§86.085-24	Test vehicles and engines. January 31, 1985.
§86.085-25	Maintenance. ~~November 16, 1983~~ July 7, 1986.

§86.087-25 Maintenance. ~~March 15, 1985~~ July 7, 1986.
§86.088-25 Maintenance. ~~March 15, 1985~~ July 7, 1986.
§86.084-26 Mileage and service accumulation; emission measurements. ~~October 19, 1983~~ July 7, 1986.
§86.085-27 Special test procedures. January 12, 1983.
§86.088-28 Compliance with emission standards. ~~March 15, 1985~~ July 7, 1986.
§86.088-29 Testing by the Administrator. March 15, 1985.
§86.088-30 Certification. January 24, 1984.
§86.079-31 Separate certification. September 8, 1984.
§86.079-32 Addition of a vehicle or engine after certification. September 8, 1977.
§86.079-33 Changes to a vehicles or engine covered by certification. September 8, 1977.
§86.082-34 Alternative procedures for notification of addition and changes. November 2, 1982.
§86.088-35 Labeling. ~~March 15, 1985~~ December 31, 1985.
§86.079-36 Submission of vehicle identification numbers. November 14, 1978.
§86.085-37 Production vehicles and engines. January 12, 1983.
§86.085-38 Maintenance instructions. ~~November 16, 1983~~ July 7, 1986.
§86.087-38 Maintenance instructions. March 15, 1985.
§86.079-39 Submission of maintenance instructions. September 8, 1977.
§86.084-40 Automatic expiration of reporting and record keeping requirements. September 25, 1980.

Subpart B-Emission Regulations for 1977 and later Model Year New Light-Duty Vehicles and New Light-Duty Trucks Test Procedures.

§86.101 General applicability. June 28, 1977.
§86.102 Definitions. March 5, 1980.
§86.103 Abbreviations. March 5, 1980.
§86.104 Section numbering, construction. June 28, 1977.
§86.105 Introduction; structure of subpart. March 5, 1980.
§86.106-82 Equipment required; overview. March 5, 1980.
§86.107-78 Sampling and analytical system, evaporative emissions. June 28, 1977.
§86.108-79 Dynamometer. September 12, 1977.
§86.109-82 Exhaust gas sampling system; gasoline-fueled vehicles. March 5, 1980.
§86.110-82 Exhaust gas sampling system; diesel vehicles. October 13, 1981.
§86.111-82 Exhaust gas analytical system. March 5, 1980.
§86.112-82 Weighing chamber (or room) and microgram balance specifications. March 5, 1980.
~~§86.113-82 Fuel specification. December 10, 1984.~~
§86.113-87 Fuel Specification. July 7, 1986.
§86.114-79 Analytical gases. November 14, 1978.
§86.115-78 EPA urban dynamometer driving schedules. June 28, 1977.
§86.116-82 Calibrations, frequency and overview. March 5, 1980.
§86.117-78 Evaporative emission enclosure calibrations. June 28, 1977.
§86.118-78 Dynamometer calibration. June 28, 1977.
§86.119-78 CVS calibration. June 28, 1977.
§86.120-82 Gas meter or flow instrumentation calibration, particulate measurement. March 5, 1980.

§86.121-82 Hydrocarbon analyzer calibration. March 5, 1980.
§86.122-78 Carbon monoxide analyzer calibration. June 28, 1977.
§86.123-78 Oxides of nitrogen analyzer calibration. September 12, 1977.
§86.124-78 Carbon dioxide analyzer calibration. June 28, 1977.
§86.126-78 Calibration of other equipment. June 28, 1977.
§86.127-82 Test procedures; overview. March 5, 1980.
§86.128-79 Transmission. November 14, 1978.
§86.129-80 Road load power test weight and inertia weight class determination. November 14, 1978.
§86.130-78 Test sequence; general requirements. November 14, 1978.
§86.131-78 Vehicle preparation. June 28, 1977.
§86.132-82 Vehicle preconditioning. March 5, 1980.
§86.133-78 Diurnal breathing loss test. November 16, 1983.
§86.134-78 Running loss test. December 10, 1984.
§86.135-82 Dynamometer procedure. December 10, 1984.
§86.136-82 Engine starting and restarting. March 5, 1980.
§86.137-82 Dynamometer test run, gaseous and particulate emissions. March 5, 1980.
§86.138-78 Hot soak test. June 28, 1977.
§86.139-82 Diesel particulate filter handling and weighing. March 5, 1980.
§86.140-82 Exhaust sample analysis. March 5, 1980.
§86.142-82 Records required. March 5, 1980.
§86.143-78 Calculations; evaporative emissions. March 15, 1985.
§86.144-78 Calculations; exhaust emissions. December 10, 1984.
§86.145-82 Calculations; particulate emissions. October 13, 1981.

APPENDIX II

Exhaust Emission-Data Vehicle Selection Criteria For Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles

I. Selection of Exhaust Emission-Data Vehicles (see flow diagram on page II-4)

A. Item 1 of the attached emission-data vehicle selection worksheet (page II-5) shall be prepared with the highest projected sales engine displacement-system combination first and the remainder in order of decreasing projected sales volume.

B. For engine families with a single engine displacement-exhaust emission control system combination representing 70 percent or more of the projected sales.

1. The first vehicle selection will be determined as follows:

a. The engine displacement-exhaust emission control system combination shall be the one with the highest projected sales. (Item 1, on worksheet.)

b. Using the data entered in Item 2 of the worksheet and the formula shown below, the equivalent test weight of the vehicle is determined from the calculated sales weighted equivalent test weight for that engine displacement-exhaust emission control system combination.

Sales Weighted Test Weight

Determine the sales weighted test weight as follows:

T_i = Test weight of i'th class

S_i = Sales volume of i'th class

N = Number of test weight classes

SWTW = Sales Weighted Test Weight

$$SWTW = \frac{\sum_{i=1}^{N} S_i T_i}{\sum_{i=1}^{N} S_i}$$

Select the equivalent test weight that includes the calculated SWTW. If the SWTW is exactly between two equivalent test weights, select the higher equivalent test weight. Similarly, if there are no vehicles with the desired displacement-exhaust emission control system combination in the same equivalent test weight that includes the calculated SWTW, the next higher equivalent test weight that contains such a vehicle will be specified.

c. The transmission will be the class with the highest sales for the engine displacement-exhaust emission control system combination (Item 3, worksheet). If the highest sales transmission class is not available in the equivalent test weight determined in (b), above, the next higher equivalent test weight with the highest sales transmission class will be selected. If manual transmissions are the highest selling class, the transmission configuration with the highest sales should generally be selected (Item 4, worksheet. If the manufacturer wishes to test a vehicle with an M-4 transmission both as an M-4 vehicle and an M-3 vehicle, use of the vehicle with an M-4 transmission will be allowed provided the first three gear ratios are identical in both transmissions. Similarly, use of an M-5 will be allowed to represent both an M-5 vehicle and an M-4 vehicle, providing the first four gear ratios are identical in both transmissions.

d. The highest selling engine code within the engine displacement-exhaust emission control system-equivalent test weight-transmission class combination will be specified (Item 5, worksheet).

e. The highest selling body style within the engine displacement-exhaust emission control system-equivalent test weight-transmission class-engine code combination will be specified (Item 6, worksheet.)

f. The N/V ratio will be the standard ratio (standard tire and axle ratio combination) for the vehicle selected (Item 7, worksheet).

g. Standard or optional equipment that can reasonably be expected to influence emissions (Item 8, worksheet) and is expected to be installed on more than 33 percent of the vehicles in the car line within the engine-system combination shall be specified (and the full estimated weight of those items should be included in the curb weight computation) unless an item is not available on the particular vehicle specified. Other standard or optional equipment expected to be installed on more than 33 percent of the vehicles in the car line within the engine-system combination shall have their full estimated weight included in the curb weight computation and be included in the specified vehicle's weight. Overdrive units are considered transmission configurations and not items of optional equipment. The weight of an overdrive unit should be included in the curb weight computation of vehicles with such units. (In other words, the weight of overdrive units should not be disregarded when car line sales of such items are 33 percent or less.)

2. The second vehicle will be determined as follows:

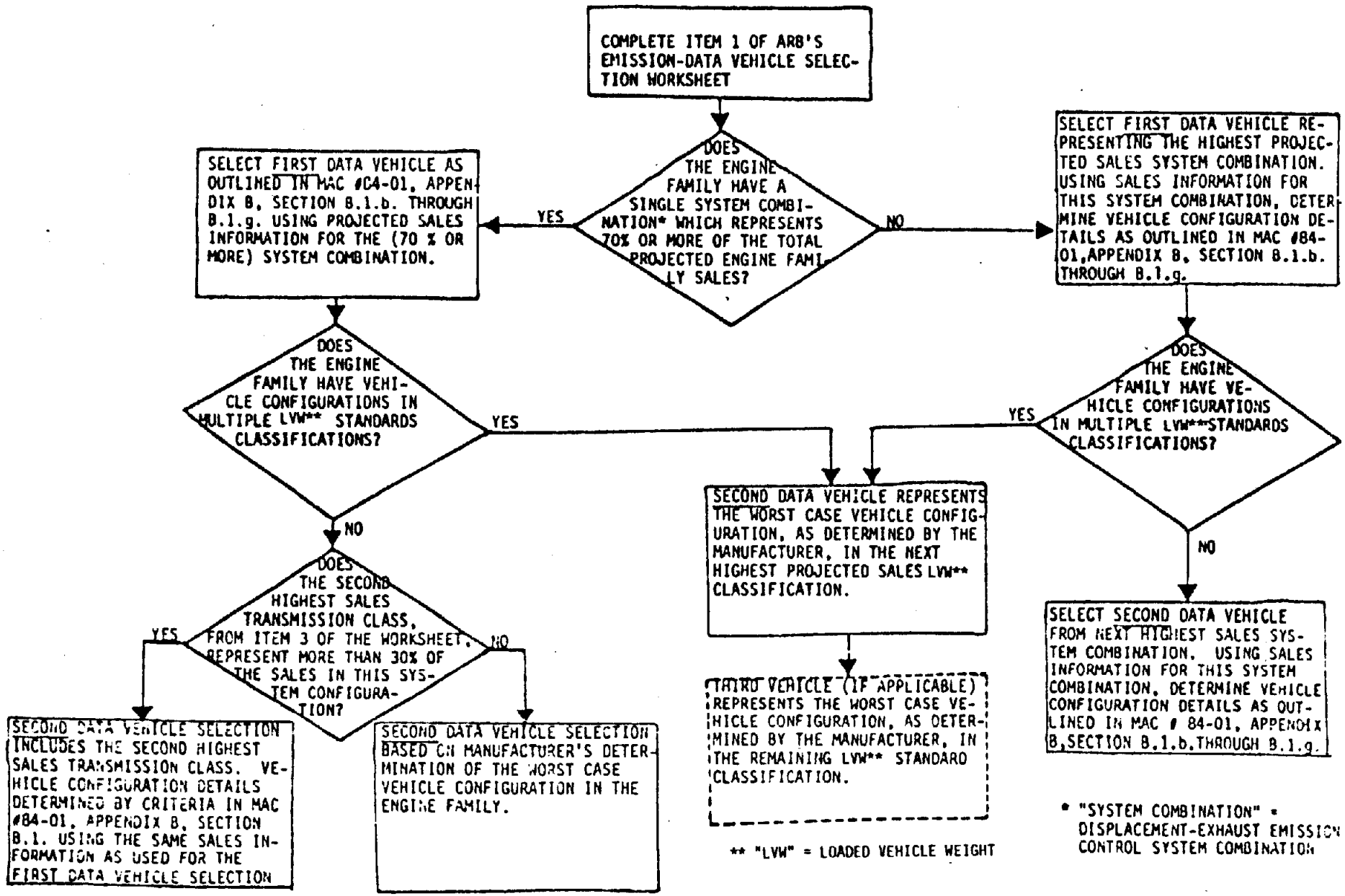
a. The transmission class, from Item 3 of worksheet, with the second highest sales will be specified if this transmission class has projected sales of more than 30 percent of the engine displacement-exhaust emission control system combination. The equivalent test weight, engine code, body style, N/V ratio, and optional equipment specified for the second vehicle are determined by criteria in Section 1.

b. If the second transmission class does not meet the criteria of 2.a. above, the second vehicle will be the worst case vehicle selected from the family.

c. For engine families with multiple displacement-emission control system combinations, the first vehicle selection will be highest sales combination, and the second vehicle selection will be second highest sales combination. Other vehicle configuration details will be as in Section B.1.b. through B.1.g.

d. An exception to the two maximum emission-data vehicles may occur for engine families with vehicles in multiple standard classifications, i.e., loaded vehicle weight classifications for light-duty trucks and/or medium-duty vehicles. The first vehicle selection will be determined as above in B.1. in the highest sales loaded vehicle weight classification, and the subsequent vehicle selection(s) will be a worst case vehicle(s) in the other loaded vehicle weight classification(s).

FLOW DIAGRAM FOR SELECTING ARB
PC, LDT AND MDV EXHAUST EMISSION-DATA VEHICLES



Emission-Data Vehicle Selection Worksheet

Manufacturer_____ Date_____

Engine Family_____

1.

	Engine Displacement	Emission Control System	Unit	Percent	Cummulative%
a)	_____	_____	_____	_____	_____
b)	_____	_____	_____	_____	_____
c)	_____	_____	_____	_____	_____
d)	_____	_____	_____	_____	_____

2. Sales Weighted Test Weight

Total projected sales_____

	Test Weight - lb.	Sales Volume
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____

Calculated SWTW_____lbs. Equivalent Test Weight_____lbs.

3. Transmission Selection

	Class	Sales Volumes	Percentage Sales	High Sales
a)	_____	_____	_____	_____
b)	_____	_____	_____	_____

4. Transmission Configuration

	Configuration	Sales Volumes	High Sales
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____

5. Engine Code (within 1, 2, 3, and 4 above)	Sales Volumes	High Sales
a)		
b)		
c)		
d)		

6. Body Style (within 1, 2, 3, 4, and 5 above)	Sales Volumes	High Sales
a)		
b)		
c)		
d)		
e)		
f)		

7. STD Axle _____ STD N/V _____

8. Options over 33 percent

9. Second and Subsequent Selections Vehicles

a) High Sales Engine Displacement-Exhaust Emission Control System _____

b) Second-Highest Selling Transmission Class _____

Designated Second and Subsequent Selections Vehicles

Disp.	Eng. Code	Evap. Code	Model	Trans.	ETW	Axle	N/V

APPENDIX III

Determination of Acceptable Durability Test Schedule*

A manufacturer may determine mileage test intervals for durability-data vehicles subject to the conditions specified in 40 CFR 86.082-26. The following procedure shall be used to determine if the schedule is acceptable to the Executive Officer.

1. Select exhaust system mileage test points and maintenance mileage test points for proposed (prop) schedule.

2. Calculate the sums of the squares corrected to the mean of the system mileages at the proposed test points:

$$A_{prop} = [\Sigma(X_p^2) - (\Sigma X_p)^2/N_p]_{prop}$$

Where:

X = Individual mileages at which the vehicle will be tested.

N = Total number of tests (including before and after maintenance tests).

(Subscript "p" refers to proposed test schedule).

3. Determine exhaust system mileage test points and maintenance mileage test points based on testing at 5, 10, 15, 20, 25, 30, 35, 40, 45, and 50 thousand miles and maintenance mileage test points selected for the proposed schedule in Section 1. This schedule will be designated as the standard (std) test schedule.

4. Calculate the sums of squares corrected to the mean of the standard test schedule.

$$B_{std} = [\Sigma(X_s^2) - (\Sigma X_s)^2/N_s]_{std}$$

Where:

X = Individual mileages at which the vehicle will be tested.

N = Total number of tests (including before and after maintenance).

---

*For diesel-powered vehicles equipped with periodically regenerating trap oxidizer systems (or those with continuously regenerating trap oxidizer systems elected to be certified to the provisions of diesel-powered vehicles with periodically regenerating trap oxidizer systems), additional test schedule requirements for regeneration tests must be met as outlined in subparagraphs 6.a.2. and 6.b.3. in these procedures.

APPENDIX IV

Procedure for Determining An Acceptable Exhaust Regeneration Durability-Data Test Schedule for Diesel-Powered Vehicles, Equipped with Periodically Regenerating Traps Oxidizer Systems.

1. Select exhaust system mileage test points for proposed (prop) schedule.

2. Calculate the sums of the squares corrected to the mean of the system mileages at the proposed test points:

$$\cancel{\Sigma(N_i'^2)_{prop} = [\Sigma(X_i^2) - (\Sigma X_i)^2/N_i]_{prop}}$$

$$A_{prop} = [\Sigma(X_p^2) - (\Sigma X_p)^2/N_p]_{prop}$$

Where:

X = Individual mileages at which the vehicle will be tested.

N = Total number of regeneration emission tests.

(Subscript ~~and superscript "i"~~ "p" refers to proposed test schedule).

3. The exhaust system mileage tests points at 5,000, 20,000, 35,000, and 50,000 miles will be designated as the standard (std) test schedule.

4. Calculate the sums of square corrected to the mean of the standard tests schedule.

$$\cancel{\Sigma(N_j'^2)_{std} = [\Sigma(X_j^2) - (\Sigma X_j)^2/N_j]_{std}}$$

$$B_{std} = [\Sigma(X_s^2) - (\Sigma X_s)^2/N_s]_{std}$$

Where:

X = Individual mileages at which the vehicle will be tested.

N = Total number of regeneration emission tests.

(Subscript ~~and superscript "j"~~ "s" refers to standard test schedule)

5. Refer to Table I and determine ~~t_i~~ t_p at ~~(N^i-2)~~ (N_p-2) prop degrees of freedom and ~~t^j~~ t_s at ~~(N^j-2)~~ (N_s-2) std degrees of freedom.

$$\cancel{\text{If}} \quad \cancel{\sqrt{\Sigma(N_i'-)^2_{prop}}} \cancel{\geq} \cancel{\frac{t^i_{prop}}{t^j_{std}} \times \sqrt{\Sigma(N_j^i-)^2_{std}}}$$

$$\underline{\text{If}} \quad \sqrt{A_{prop}} \geq \frac{t_p}{t_s} \times \sqrt{B_{std}}$$

the proposed plan is acceptable.

Table I

Degrees of Freedom N-2	t ~~0.050~~
1	6.314
2	2.920
3	2.353
4	2.132
5	2.015
6	1.943
7	1.895
8	1.860
9	1.833
10	1.812
11	1.796
12	1.782
13	1.771
14	1.761
15	1.753

APPENDIX V

Pollutant Mass Emissions Calculation Procedure for Vehicles Equipped with Periodically Regenerating Trap Oxidizer Systems

These calculation procedures are based on the Federal CVS-1975 Test Procedure.

The reported test results shall be computed by use of the following formulas:

CO_{conc} = Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO_2 extraction, in ppm.

CO_{dm} = Carbon monoxide concentration of the dilution air sample as measured, in ppm.

CO_d = Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

CO_e = Carbon monoxide concentrations of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm. The calculation assumes the carbon to hydrogen ratio of the fuel to be 1:3.802 for natural gas and 1:2.658 for LPG.

CO_{em} = Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

CO_{mass} = Carbon monoxide emissions, in grams per test phase.

$CO_{2_{conc}}$ = Carbon dioxide concentration of the dilute exhaust sample corrected for background and water vapor, in percent.

CO_{2_e} = Carbon dioxide concentration of the dilute exhaust sample, in percent.

$CO_{2_{mass}}$ = Carbon dioxide emissions, in grams per test phase.

$Density_{CO}$ = Density of carbon monoxide is 32.97 g/ft^3 at 68°F and 760 mm. Hg pressure.

Density CO2 = Density of carbon dioxide is ~~51.85~~ 51.81 g/ft3 68° and 760 mm. Hg pressure.

$Density_{HC}$ = Density of hydrocarbons is 18.64 g/ft^3 for natural gas and 17.28 g/ft^3 for LPG assuming an average carbon to hydrogen ratio of 1:3.802 for natural gas and 1:2.658 for LPG, at 68°F and 760 mm Hg pressure.

$Density_{NO_2}$	=	Density of oxides of nitrogen is 54.16 g/ft^3 assuming they are in the form of nitrogen dioxide, at 68°F and 760 mm Hg pressure.
DF	=	Dilution Factor
H	=	Absolute humidity in grains of water per pound of dry air.
HC_{conc}	=	Hydrocarbon concentration for the dilute exhaust sample corrected for background, in ppm carbon equivalent, i.e., equivalent propane X 3.
HC_d	=	Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.
HC_e	=	Hydrocarbon concentration of the dilute exhaust sample, in ppm carbon equivalent.
HC_{mass}	=	Hydrocarbon emissions, in grams per test phase.
K_H	=	Humidity correction factor
N	=	Number of revolutions of the positive displacement pump during the test phase while samples are being collected.
NOx_{conc}	=	Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in ppm.
NO_d	=	Oxides of nitrogen concentration of the dilute air as measured, in ppm.
NOx_e	=	Oxides of nitrogen concentration of the dilute exhaust sample as measured, in ppm.
NOx_{mass}	=	Oxides of nitrogen emissions, in grams per test phase.
P_B	=	Barometric pressure, in mm. Hg.
P_d	=	Saturated vapor pressure, in mm. Hg at ambient dry bulb temp.
P_i	=	Pressure depression below atmospheric measured at the inlet to the positive displacement pump.

T_p = Average temperature of dilute exhaust entering positive displacement pump during test while samples are being collected, in degrees Rankine.

R_a = Relative humidity of the ambient air, in percent.

V_{mix} = Total dilute exhaust volume in cubic feet per test phase corrected to standard conditions (528°R and 760 mm. Hg)

Vo = Volume of gas pumped by the positive displacement pump, in cubic feet per revolution. This volume is dependent on the pressure differential across the positive displacement pump.

Y_{ct} = Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Y_{ht} = Mass emissions as calculated from the "transient" phase of the hot start test, in grams per test phase.

Y_s = Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams test phase.

Y_{wm} = Weighted mass emissions of each pollutant, i.e., HC, CO, or NOx, in grams per vehicle mile.

D_{ct} = The measured driving distance from the "transient" phase of the cold start test, in miles.

D_{ht} = The measured distance from the "transient" phase of the hot start test, in miles.

D_s = The measured driving distance from the "stabilized" phase of the cold start test, in miles.

For passenger cars, light duty trucks, and medium duty vehicles:

(a) The mass emissions of each pollutant in grams per mile is

~~Ywm--=--(0.43Yct-+-0.57-Yht-+-Ys)/7.5--------~~

$$Y_{wm} = 0.43\ ((Y_{ct} + Y_s)/(D_{ct} + D_s)) + 0.57\ ((Y_{ht} + Y_s)/(D_h + D_s))$$

(b) The mass of each pollutant for each phase of both the cold start test and the hot start test is determined from the following:

(1) Hydrocarbon mass:

$$HC_{mass} = V_{mix} \times Density_{HC} \times (HC_{conc}/1{,}000{,}000)$$

(2) Oxides of nitrogen mass:

$$NOx_{mass} = V_{mix} \times Density_{NO_2} \times K_H \times (NOx_{conc}/1{,}000{,}000)$$

K_H = humidity correction factor

(3) Carbon monoxide mass:

$$CO_{mass} = V_{mix} \times Density_{CO} \times (CO_{conc}/1{,}000{,}000)$$

(4) Carbon dioxide mass:

$$CO_{2_{mass}} = V_{mix} \times Density_{CO_2} \times (CO_{2_{conc}}/100)$$

$$V_{mix} = \frac{V_o \times N \times (P_b - P_i) \times 528}{(760)\ (T_p)}$$

$$HC_{conc} = HC_e - HC_d\ (1-1/DF)$$

$$NOx_{conc} = NOx_e - NOx_d\ (1-1/DF)$$

$$CO_{conc} = CO_e - CO_d\ (1-1/DF)$$

$$CO_e = (1-0.02901\ CO_{2_e} - 0.000323\ R_a)\ CO_{em} \text{ for natural gas}$$

$$CO_e = (1-0.02328\ CO_{2_e} - 0.000323\ R_a)\ CO_{em} \text{ for LPG}$$

$$CO_d = (1-0.000323\ R_a)\ CO_{dm}$$

$$KH = \frac{1}{1-0.0047(H-75)}$$

$$H = \frac{(43.478R_a)\ (Pd)}{P_B - \frac{P_d \times R_a}{100}}$$

$$DF = \frac{9.77}{CO_{2_e} + (HC_e + CO_e) \times 10^{-4}} \quad \text{for natural gas}$$

$$DF = \frac{11.7}{CO_{2_e} + (HC_e + CO_e) \times 10^{-4}} \quad \text{for LPG}$$

Pollutant Mass Emissions Calculation Procedure for Vehicles Equipped with Periodically Regenerating Trap Oxidizer Systems

Exhaust Emissions

Amend subparagraph § 86.144-78(a) in Part 86, Title 40, Code of Federal Regulations (CFR) to read:

The final reported test results shall be computed by the use of the following formula:

(a) For light-duty vehicles and light-duty trucks:

$$Ywm = 0.43\ ((Yct + Ys)/(Dct + Ds)) + 0.57\ ((Yht + Ys)/(Dht + Ds))$$

For purposes of adjusting emissions for regeneration:

$$Re = ((Yr1 - Yct) + (Yr2 - Ys) + (Yr3 - Yht))/(Dct + Ds + Dht)$$

$$Yr = Ywm^{*} + Re$$

Where:

Ywm = Weighted mass emissions of each pollutant, i.e., HC, CO, NOx or CO_2, in grams per vehicle mile.

Yct = Mass emissions as calculated from the "transient" phase of the cold start test, in grams per test phase.

Yht = Mass emissions as calculated from the "transient" phase of the hot start test in grams per test phase.

Ys = Mass emissions as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

Dct = The measured driving distance from the "transient" phase of the cold start test, in miles.

Dht = The measured distance from the "transient" phase of the hot start test, in miles.

Ds = The measured driving distance from the "stabilized" phase of the cold start test, in miles.

Yr = Regeneration emission test.

Re = Mass emissions of each pollutant attributable to regeneration in grams per mile.

---

* Ywm is derived using the emission data from a test with no regeneration.

Yr1 = Mass emissions, during a regeneration emission test, as calculated from the "transient" phase of the cold start test, in grams per test phase.

Yr2 = Mass emissions, during a regeneration emission test, as calculated from the "stabilized" phase of the cold start test, in grams per test phase.

Yr3 = Mass emissions, during a regeneration emission test, as calculated from the "transient" phase of the hot start test in grams per test phase.

Particulate Emissions

Amend subparagraph §86.145-82(a) in Part 86, Title 40, Code of Federal Regulations (CFR) to read:

(a) The final reported test results for the mass particulate (Mp) in grams/mile shall be computed as follows.

For purposes of adjusting emissions for regeneration:

$$Mp = 0.43(Mp1 + Mp2)/(Dct + Ds) + 0.57\ (Mp3 + Mp2/(Dht + Ds)$$

$$Re = ((Mpr1 - Mp1) + (Mpr2 - Mp2) + (Mpr3 - Mp3))/(Dct+Ds+Dht)$$

$$Mpr = Mp^{*} + Re$$

Where:

(1) Mp1 = Mass of particulate determined from the "transient" phase of the cold start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(2) Mp2 = Mass of particulate determined from the "stabilized" phase of the cold start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(3) Mp3 = Mass of particulate determined from the "transient" phase of the hot start test, in grams per test phase. (See §86.110-82(c)(1) for determination.)

(4) Dct = The measured driving distance from the "transient" phase of the cold start test, in miles.

(5) Ds = The measured driving distance from the "stabilized" phase of the cold start test, in miles.

---

* Mp is derived using the emission data from a test with no regeneration.

(6) Dht = The measured driving distance from the "transient" phase of the hot start test, in miles.

(7) Mpr = Regeneration emission test

(8) Re = Mass of particulate attributable to regeneration in grams/mile.

(9) Mpr1 = Mass of particulate determined, during a regeneration emission test, from the "transient" phase of the cold start test, in grams per test phase.
(See § 86.110-82(c)(1) for determination.)

(10) Mpr2 = Mass of particulate determined, during a regeneration emission test, from "stabilized" phase of the cold start test, in grams per test phase.
(See § 86.110-82(c)(1) for determination.)

(11) Mpr3 = Mass of particulate determined, during a regeneration emission test, from the "transient" phase of the hot start test, in grams per test phase.
(See § 86.110-82(c)(1) for determination.)

Fuel Economy Calculations for Gaseous Fuels
Based on the Cold Start CVS-1975
Federal Test Procedure

Assume the fuel meets HD-5 specifications (95% C_3H_8, 5% nC_4H_{10}, by volume)

1. Physical constants of Propane and Normal Butane

Component	Mol. Wt.	Sp. Gr.	Liquid Density lb/gal @ 60°F				Liquid Density of HD-5 lb/gal at 60°F
C_3H_8	44.094	0.508	4.235	x	(0.95)	=	4.0233
nC_4H_{10}	58.12	0.584	4.868	x	(0.05)	=	.2434
							4.2667

2. Density of the HD-5 fuel

(0.95 X 4.235) + (0.05 X 4.868) = 4.267 lb/gal @ 60°F

3. Molecular Weights

Specie	Mol. Wt.
C	12.01115
H	1.00797
O	15.9994
CO	28.01055
CO_2	44.00995
*$CH_{2.658}$	14.6903

*Average ratio of Hydrogen to carbon atoms in HD-5 fuel.

C_3H_8 $\frac{8}{3}$ = 2.666 x 0.95 (% propane) = 2.533

nC_4H_{10} $\frac{10}{4}$ = 2.5 x 0.05 (% Butane) = .125

2.658

4. Weight of Carbon in:

CO = wt. of CO x (12.01115/28.01055) = wt CO x (0.429)

CO_2 = wt of CO_2 x (12.01115/44.00995) = wt CO_2 x (0.273)

$CH_{2.658}$ = wt. of $CH_{2.658}$ x (12.01115/14.6903) = wt $CH_{2.658}$ x (0.818)

5. <u>Wt. of Carbon per gallon of LPG</u>

wt. of carbon = 4.2667 lbs/gal x 453.59 gms/lb x 0.818 = 1583 grams C/gal HD-5

6. <u>Fuel economy:</u>

$$\frac{\text{grams C/gal}}{\text{grams C in exhaust/mi}} = \text{miles/gal.}$$

$$\text{LPG} = \frac{1583 \text{ gms C/gal}}{(0.818(HC) + (0.429)(CO) + (0.273)(CO_2)}$$

HC = CVS HC in grams/mile
CO = CVS CO in grams/mile
CO_2 = CVS CO_2 in grams/mile

$$\text{For gasoline} = \frac{\cancel{2423}\ \underline{2421}}{(0.866)\ HC + (0.429)\ CO + (0.273)\ CO_2}$$

$$\text{For Natural Gas} = \frac{1535}{(0.759)\ HC + (0.429)\ CO + (0.273)\ CO_2}$$

APPENDIX VI

Blanket Approval of Running Changes and Field Fixes

Running changes and field fixes meeting the following definitions shall be granted automatic or "blanket" approval by the Executive Officer, provided that notification of changes listed in paragraph 1. below are received by the ARB at least five working days before implementation, and notification of changes listed in 2. through 13. below are received by the ARB within two working days after implementation. Such automatic approvals shall be effective when they are approved by EPA.

For passenger cars, light-duty trucks and medium-duty vehicles:

1. The addition of new models to an engine family where the new models differ from previously certified models only in model name and curb weight (same inertia weight class), and where the exhaust, evaporative and fill pipe emission control system specifications do not change.

2. Changes in axle ratio, tire size or tire type, providing that changes to the N/V ratio and/or load horsepower are within 5% of the originally certified values. This includes re-classification of base and optional axle ratios or tires.

3. The deletion of models or vehicle configurations.

4. Changes in fuel tank capacity of less than 10 percent of the originally certified capacity, providing there is no other modification of the evaporative emission control system.

5. Changes to the fuel filler system leaded fuel nozzle restrictor, where EPA preemption is involved.

6. Advance certification of models in the next higher inertia weight class, for use if needed later.

7. Changes in tailpipe length of less than ten inches.

8. The following changes involving spark plugs:

   a. The addition of resistor-type spark plugs if nonresistor spark plugs are standard, or vice-versa, providing the secondary circuit resistance changes less than 5 percent.

   b. The addition of alternate heat ranges within one range of the originally certified spark plugs.

   c. The change of spark plug gap within 15 percent of originally certified spark plug gap.

9. Changes to component part numbers when there are no changes in the materials used or to the performance specifications (e.g., distributor advance curves, carburetor flow curves, fuel pump supply pressure, etc.). These changes may be the result of parts consolidation, changes in supplier, addition/deletion of peripheral items such as brackets, and minor dimensional changes where the durability and performance are not affected.

10. Changes in the crankcase emission control system where EPA preemption is involved, excluding revisions that could have an interaction effect on exhaust emissions (e.g., PCV purge flow changes).

11. Changes submitted under the alternate or concurrent notification procedure in 40 CFR 86 which would otherwise qualify for automatic or "blanket" status.

12. Changes in the physical location of a vacuum hose connection with no change in the relationship between vacuum, speed, load or any other vacuum-related parameter, provided that the changes do not render the vacuum hose routing diagram unrepresentative.

13. Changes in exhaust system cross sectional area, if this area equals or exceeds the minimum area in the system.

ATTACHMENT E

This attachment contains the amendments proposed for adoption July 24, 1986 shown in conjunction with the amendments related to the 0.4 gram per mile (g/mi) oxides of nitrogen (NOx) standard which were approved by the Board April 25, 1986. The 0.4 g/mi NOx amendments are being distributed for a supplemental 15-day public availability period prior to adoption.

In this attachment, the regulations and test procedures as they are being amended by the 0.4 g/mi NOx action are treated as the existing provisions. Additions proposed for consideration at the July 24, 1986 public hearing are shown by underline, and deletions are shown by strikeout. This attachment is made up of four parts: E/A, E/B, E/C, and E/D. The parts correspond to the proposed amendments contained in Attachments A, B, C, and D, respectively. In parts E/C and E/D, only the portions of the test procedures affected by the 0.4 g/mi NOx amendments are shown; the remainder of the test procedures would be as proposed in Attachments C and D.

Part E/A, containing amendments to Title 13, California Administrative Code, Section 1960.1, shows appropriate amendments to Section 1960.1(e), which will be added by the 0.4 g/mi NOx action. The amendments to subsection (e) simply reflect amendments proposed to subsection (d), and would have no additional substantive effect. Part E/B, showing the amendments to Title 13, California Administrative Code, Section 1960.1.5, shows modifications to portions of Section 1960.1.5(a) which are being added in the 0.4 g/mi NOx action. New amendments are shown relating to a necessary changeover from references to Equivalent Inertia Weight (EIW) to references to Loaded Vehicle Weight (LVW), and associated changes to weight ranges shown in the regulation. These changes are nonsubstantive -- the EIW and LVW weight ranges have an identical effect.

ATTACHMENT E/A

PROPOSED

Amend Title 13, California Administrative Code, Section 1960.1, subsections (d), (e) and (h), to read as follows:

1960.1 Exhaust Emission Standards and Test Procedures--1981 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.

(d)(1) The exhaust emissions from new 1984 through 1987 ~~1988~~ model passenger cars, light-duty trucks, and medium-duty vehicles ~~and new 1984 through 1990 model passenger cars, light-duty trucks and medium-duty vehicles produced by a small-volume manufacturer~~, subject to registration and sold and registered in this state, shall not exceed:

1984 THROUGH 1987 ~~1988~~ EXHAUST EMISSIONS STANDARDS(6)
(grams per mile)

Vehicle Type(1)	Equivalent Inertia Weight (lbs.) (2)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(3)	Carbon Monoxide	Oxides of Nitrogen (4)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(5)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3999	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (5)	0-3999	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.0
LDT,MDV	4000-5999	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)	4000-5999	100,000	0.50 (0.50)	9.0	1.5
MDV	6000 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(3) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(4) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(5) This set of standards for 1984 through 1987 ~~1988~~ model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section ~~1960.15.~~ 1960.1.5.

(6) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: 0.4 g/mi for the 1985 model year, and 0.2 g/mi for the 1986 ~~through 1988~~ and 1987 model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(2) The exhaust emissions from new 1988 model passenger cars, light-duty trucks, and medium-duty vehicles and new 1988 through 1990 model passenger cars, light-duty trucks and medium-duty vehicles produced by a small volume manufacturer, subject to registration and sold and registered in this state, shall not exceed:

1988 EXHAUST EMISSIONS STANDARDS(5)
(grams per mile)

Vehicle Type(1)	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons(2)	Carbon Monoxide	Oxides of Nitrogen (3)
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC(4)	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV (4)	0-3750	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3750	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3750	100,000	0.46	10.6	1.0
LDT,MDV	3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)	3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751 & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751 & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(3) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(4) This set of standards is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section 1950.1.5.

(5) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to a particulate exhaust emission standard of 0.2 g/mi for the 1988 model year. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(e) The exhaust emissions from new 1989 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, except those produced by a small volume manufacturer, and new 1991 and subsequent model passenger cars, light-duty trucks and medium-duty vehicles produced by a small volume manufacturer, subject to registration and sold and registered in this state, shall not exceed:

1989 AND SUBSEQUENT MODEL-YEAR EXHAUST EMISSIONS STANDARDS~~(6)~~(5)
(grams per mile)

Vehicle Type(1)	~~Equivalent Inertia Weight~~	Loaded Vehicle Weight (lbs.) ~~(2)~~	Durability Vehicle Basis (mi)	Non-Methane Hydro-carbons~~(3)~~(2)	Carbon Monoxide	Oxides of Nitrogen (3)(4)~~(5)~~
PC		All	50,000	0.39 (0.41)	7.0	0.4
PC~~(7)~~(6)		All	50,000	0.39 (0.41)	7.0	0.7
Diesel PC (Option 2)		All	100,000	0.46	8.3	1.0
LDT,MDV		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV ~~(7)~~(6)		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.7~~(8)~~(7)
Diesel LDT, MDV (Option 2)		0-~~3999~~ 3750	100,000	0.46	10.6	1.0
LDT,MDV		~~4000-5999~~ 3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)		~~4000-5999~~ 3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751	~~6000~~ & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751	~~6000~~ & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

~~(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).~~

(2)~~(3)~~Hydrocarbon standards in parentheses apply to total hydrocarbons.

(3)~~(4)~~The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(4)~~(5)~~The standard for in-use compliance for passenger cars, light-duty trucks and medium-duty vehicles certifying to the 0.4 g/mi NOx standard shall be 0.55 g/mi NOx for 50,000 miles. If the in-use compliance level is above 0.4 g/mi NOx but does not exceed 0.55 g/mi NOx, and based on a review of information derived from a statistically valid and representative sample of vehicles, the Executive Officer determines that a substantial percentage of any class or category of such vehicles exhibits, prior to 50,000 miles or 5 years, whichever occurs first, an identifiable, systematic defect in a component listed in Section 1960.1.5(c)(2) which causes a significant increase in emissions above those exhibited by vehicles free of such defects and of the same class or category and having the same period of use and mileage, then the Executive Officer may invoke the enforcement authority under Sections 2112 and 2113, Title 13, California Administrative Code, to require remedial action by the vehicle manufacturer. Such remedial action shall be limited to owner notification and repair or replacement of the defective component. As used in this section, the term "defect" shall not include failures which are the result of abuse, neglect, or improper maintenance. This provision is applicable for the 1989 through 1993 model years only. For small volume manufacturers, this provision is applicable for the 1991 through 1995 model years only.

(5)~~(6)~~Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to a particulate exhaust emission standard of 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(6)~~(7)~~This set of standards is optional. A manufacturer may choose to certify to these standards pursuant to the conditions set forth in Section 1960.1.5.

(7)~~(8)~~Pursuant to Section 1960.1.5 (a)(1)(B), the optional standard for 1989 model year light-duty trucks and medium-duty vehicles only is 1.0 g/mi NOx.

(h) The test procedures for determining compliance with these standards are set forth in "California Exhaust Emission Standards and Test Procedures for 1981 ~~and Subsequent~~ through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", adopted by the state board on November 23, 1976, as last amended ~~October 2, 1985~~ _____, and in "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles", adopted by the state board on _____, 1986.

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

ATTACHMENT E/B

PROPOSED

Amend Title 13, California Administrative Code, Section 1960.1.5, subsections (a) and (b), to read as follows:*

1960.1.5 Optional NOx Standards for 1983 and Later Model Passenger Cars and Light-Duty Trucks and Medium-Duty Vehicles less than 4000 lbs. Equivalent Inertia Weight (EIW) or 3751 lbs. Loaded Vehicle Weight (LVW).

(a)(1) Notwithstanding any other provision of this chapter, a vehicle manufacturer may certify 1983 and later model vehicles to optional NOx standards as follows:

(A) Passenger cars - 0.7 gm/mile - 1983 through 1988 model years. LDT, MDV 0-3999 pounds EIW - 1.0 gm/mile - 1983 through ~~1988~~ 1987 model years. LDT, MDV 0-3750 lbs. LVW - 1.0 gm/mile - 1988 model year.

(B) For the 1989 model year, each manufacturer may certify no more than 50 percent of its projected California model-year sales of passenger cars, light-duty trucks (~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW), and medium-duty vehicles (~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW) to the optional NOx standard as follows:

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* Sections 1960.1.5(c) and (d) would remain in effect and would not be changed by the above proposal.

Passenger cars - 0.7 gm/mi

LDT, MDV ~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW - 1.0 gm/mi

(C) 1989 through 1993 model year passenger cars weighing more than ~~5000-pounds-EIW~~ 5250 lbs. LVW may be certified to the 0.7 gm/mile NOx standard.

(D) For the 1990 through 1993 model years, a vehicle manufacturer may certify passenger cars, light-duty trucks (~~0-3999-lbs.-EIW~~ 0-3750 lbs. LVW), and medium-duty vehicles (~~0-3999-lbs.-EIW~~ 0-3750 lbs. LVW) to the optional 0.7 gm/mi NOx standard subject to the following limitations:

For each model year, the total number of passenger cars (~~0-5000-pounds-EIW~~ 0-5250 lbs. LVW) each manufacturer may certify at 0.7 gm/mi NOx shall be limited to a maximum of 10 percent of the total previous California model-year sales of these vehicles.

For each model year, the total number of light-duty trucks (~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW) and medium-duty vehicles (~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW) each manufacturer may certify at 0.7 gm/mi NOx shall be limited to a maximum of 15 percent of the combined total previous California model-year sales of these vehicles.

For manufacturers certifying for the first time in California, "previous California model-year sales" shall mean projected California model-year sales.

(2) Notwithstanding any other provisions of this chapter, a small volume manufacturer may certify 1989 and later model vehicles to optional NOx standards as follows:

(A) Passenger cars - 0.7 gm/mile - 1989 and 1990 model years. LDT, MDV ~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW - 1.0 gm/mile - 1989 and 1990 model years.

(B) For the 1991 model year, each small volume manufacturer may certify no more than 50 percent of its projected California model-year sales of passenger cars, light-duty trucks (~~0-3999 pounds-EIW~~ 3750 lbs. LVW), and medium-duty vehicles (~~0-3999-pounds EIW~~ 3750 lbs. LVW) to the optional NOx standards as follows:

Passenger cars - 0.7 gm/mile

LDT, MDV ~~0-3999-pounds-EIW~~ 0-3750 lbs. LVW - 1.0 gm/mile

(C) For the 1992 through 1995 model years, each small volume manufacturer may certify passenger cars, light-duty trucks (~~0-3999 lbs.-EIW~~ 03750 lbs. LVW), and medium-duty vehicles (~~0-3999-lbs.-EIW~~ 3750 lbs. LVW) to the optional 0.7 gm/mi NOx standard subject to the following limitations:

For each model year, the total number of passenger cars (~~0-5000-pounds-EIW~~ 0-5250 lbs. LVW) each manufacturer may certify at 0.7 gm/mi NOx shall be limited to a maximum of 10 percent of the total previous California model-year sales of these vehicles.

For each model year, the total number of light-duty trucks (~~0-3999-pounds-EIW~~ 3750 lbs. LVW) and medium-duty vehicles (~~0-3999-pounds-EIW~~ 3750 lbs. LVW) each manufacturer may certify at 0.7 gm/mi NOx shall be limited to a maximum of 15 percent of the combined total previous California model-year sales of these vehicles.

For manufacturers certifying for the first time in California, "previous California model-year sales" shall mean projected California model-year sales.

(b) Testing of vehicles certified under this section shall be conducted in accordance with the California Exhaust Emission Test Procedures applicable to either 1981 through 1987 or 1988 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles certified to the primary California Standards for 50,000 miles.

NOTE: Authority cited: Sections 39600, 39601, 43013, and 43101, Health and Safety Code Reference: Sections 39002, 39003, 43000(e), 43013, 43100, 43101, 43101.5, 43104, and 43106 Health and Safety Code.

ATTACHMENT E/C

Amend California Exhaust Emission Standards and Test Procedures for 1981 ~~and Subsequent~~ Through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, paragraph 4, subsections (d) and (e), to read as follows:

4.(d) The exhaust emissions from new 1984 through ~~1988~~ 1987 model passenger cars, light-duty trucks, and medium-duty vehicles ~~and new 1984 through 1990 model passenger cars, light duty trucks and medium duty vehicles produced by a small volume manufacturer~~, subject to registration and sold and registered in this state, shall not exceed:

1984 THROUGH ~~1988~~ 1987 EXHAUST EMISSION STANDARDS (6)(7)
(grams per mile)

Vehicle Type(1)	Equivalent Inertia Weight (lbs.)(2)	Durability Vehicle Basis (mi)	Non-Methane Hydro-carbons(3)	Carbon Monoxide	Oxides of Nitrogen (4)
PC	All	50,000	0.39(0.41)	7.0	0.4
PC (5)	All	50,000	0.39(0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39(0.41)	7.0	1.0
PC (Option 2)	All	100,000	0.46	8.3	1.0
LDT,MDV	0-3999	50,000	0.39(0.41)	9.0	0.4
LDT,MDV (5)	0-3999	50,000	0.39(0.41)	9.0	1.0
LDT,MDV (Option 1)	0-3999	100,000	0.39(0.41)	9.0	1.0
LDT,MDV (Option 2)	0-3999	100,000	0.46	10.6	1.0
LDT,MDV	4000-5999	50,000	0.50(0.50)	9.0	1.0
LDT,MDV (Option 1)	4000-5999	100,000	0.50(0.50)	9.0	1.5
MDV	6000 & larger	50,000	0.60(0.60)	9.0	1.5
MDV (Option 1)	6000 & larger	100,000	0.60(0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).

(3) Hydrocarbon standards in parentheses apply to total hydrocarbons.

(4) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

(5) This set of standards for 1984 through ~~1988~~ 1987 model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section 1960.15.

(6) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: 0.4 g/mi for the 1985 model year and 0.2 g/mi for the 1986 ~~through~~ and ~~1988~~ 1987 model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

(7) For gaseous-fueled vehicles the calculation procedures provided in the appendix shall be used for determining emissions and fuel economy.

~~(e)--The-exhaust-emissions-from-new-1989-and-subsequent-model-passenger-cars,-light-duty-trucks,-and-medium-duty-vehicles,-except-those-produced-by-a small-volume-manufacturer,-and-new-1991-and-subsequent-model-passenger cars,-light-duty-trucks-and-medium-duty-vehicles-produced-by-a-small volume-manufacturer,-subject-to-registration-and-sold-and-registered-in this-state,-shall-not-exceed:~~

~~1989-AND-SUBSEQUENT-MODEL-YEAR-EXHAUST-EMISSION-STANDARDS-(6)(7)~~

~~(grams-per-mile)~~

~~Vehicle Type(1)~~	~~Equivalent Inertia Weight (lbs.)(2)~~	~~Durability Vehicle Basis (mi)~~	~~Non-Methane Hydro-carbons(3)~~	~~Carbon Monoxide~~	~~Oxides-of Nitrogen (4)-(5)~~
~~PC~~	~~All~~	~~50,000~~	~~0.39(0.41)~~	~~7.0~~	~~0.4~~
~~PC(8)~~	~~All~~	~~50,000~~	~~0.39(0.41)~~	~~7.0~~	~~0.7~~
~~Diesel-PC-(Option-2)~~	~~All~~	~~100,000~~	~~0.46~~	~~8.3~~	~~1.0~~
~~LDT,MDV~~	~~0-3999~~	~~50,000~~	~~0.39(0.41)~~	~~9.0~~	~~0.4~~
~~LDT,MDV(8)~~	~~0-3999~~	~~50,000~~	~~0.39(0.41)~~	~~9.0~~	~~0.7(9)~~
~~Diesel-LDT,MDV(Option-2)~~	~~0-3999~~	~~100,000~~	~~0.46~~	~~10.6~~	~~1.0~~
~~LDT,MDV~~	~~4000-5999~~	~~50,000~~	~~0.50(0.50)~~	~~9.0~~	~~1.0~~
~~LDT,MDV(Option-1)~~	~~4000-5999~~	~~100,000~~	~~0.50(0.50)~~	~~9.0~~	~~1.5~~
~~MDV~~	~~6000-&-larger~~	~~50,000~~	~~0.60(0.60)~~	~~9.0~~	~~1.5~~
~~MDV-(Option-1)~~	~~6000-&-larger~~	~~100,000~~	~~0.60(0.60)~~	~~9.0~~	~~2.0~~

(1) "PC"-means-passenger-cars.
"LDT"-means-light-duty-trucks.
"MDV"-means-medium-duty-vehicles.

(2) Equivalent-inertia-weights-are-determined-under-subparagraph-40-CFR-86.129-79(a).

(3) Hydrocarbon-standards-in-parentheses-apply-to-total-hydrocarbons.

(4) The-maximum-projected-emissions-of-oxides-of-nitrogen-measured-on-the federal-Highway-Fuel-Economy-Test-(HWFET;-40-CFR-Part-600,-Subpart-B) shall-be-not-greater-than-1.33-times-the-applicable-passenger-car standards-and-2.00-times-the-applicable-light-duty-truck-and medium-duty-vehicle-standards-shown-in-the-table.--Both-the-projected emissions-and-the-HWFET-standard-shall-be-rounded-to-the-nearest-0.1 before-gm/mi-being-compared.

(5) The-standard-for-in-use-compliance-for-passenger-cars,-light-duty trucks-and-medium-duty-vehicles-certifying-to-the-0.4-g/mi-NOx-standard shall-be-0.55-g/mi-NOx-for-50,000-miles.--If-the-in-use-compliance-level is-above-0.4-g/mi-NOx-but-does-not-exceed-0.55-g/mi-NOx,-and-based-on-a review-of-information-derived-from-a-statistically-valid-and representative-sample-of-vehicles,-the-Executive-Officer-determines that-a-substantial-percentage-of-any-class-or-category-of-such-vehicles exhibits,-prior-to-50,000-miles-or-5-years,-whichever-occurs-first, an-identifiable,-systematic-defect-in-a-component-listed-in Section-1960.1.5(c)(2)-which-causes-a-significant-increase-in-emissions above-those-exhibited-by-vehicles-free-of-such-defects-and-of-the-same class-or-category-and-having-the-same-period-of-use-and-mileage,-then the-Executive-Officer-may-invoke-the-enforcement-authority-under Sections-2112-and-2113,-Title-13,-California-Administrative-Code,-to require-remedial-action-by-the-vehicle-manufacturer.--Such-remedial-action shall-be-limited-to-owner-notification-and-repair-or-replacement-of-the defective-component.--As-used-in-this-section,-the-term-"defect"-shall-not include-failures-which-are-the-result-of-abuse,-neglect,-or-improper maintenance.--This-provision-is-applicable-for-the-1989-through-1993 model-years-only.--For-small-volume-manufacturers,-this-provision-is to-the-applicable-1991-through-1995-model-years-only.

(6) Diesel-powered-passenger-cars,-light-duty-trucks,-and-medium-duty vehicles-are-subject-to-a-particulate-exhaust-emission-standard-of 0.08-g/mi-for-the-1989-and-subsequent-model-years.--The-particulate compliance-shall-be-determined-on-a-50,000-mile-durability-vehicle-basis.

(7) For-gaseous-fueled-vehicles-the-calculation-procedures-provided-in the-appendix-shall-be-used-for-determining-emissions-and-fuel-economy.

(8) This-set-of-standards-is-optional.--A-manufacturer-may-choose-to certify-to-these-standards-pursuant-to-the-conditions-set-forth-in Section-1960.1.5.

(9) Pursuant-to-Section-1960.1.5(a)(1),-the-optional-standard-for-1989 model-year-light-duty-trucks-and-medium-duty-vehicles-only-is-1.0-gm/mi NOx.

ATTACHMENT E/D

Adopt California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, Sections 3 and 10.c., as follows:

3. Standards

The following standards represent the maximum projected exhaust emissions for the useful life of the vehicle.

a. The exhaust emissions from new ~~1984-through~~ 1988 model passenger cars, light-duty trucks, and medium-duty vehicles ~~and new 1984 through 1990 model passenger cars, light-duty trucks and medium-duty vehicles produced by a small volume manufacturer~~, subject to registration and sold and registered in this state, shall not exceed:

~~1984-THROUGH~~ 1988 EXHAUST EMISSIONS STANDARDS(5)(6)~~(7)~~
(grams per mile)

Vehicle Type(1)	~~Equivalent Inertia Weight (2)~~	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons~~(3)~~(2)	Carbon Monoxide	Oxides of Nitrogen ~~(4)~~(3)
PC		All	50,000	0.39 (0.41)	7.0	0.4
PC~~(5)~~(4)		All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)		All	100,000	0.39 (0.41)	7.0	1.0
PC (Option 2)		All	100,000	0.46	8.3	1.0
LDT,MDV		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV ~~(5)~~(4)		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 1)		0-~~3999~~ 3750	100,000	0.39 (0.41)	9.0	1.0
LDT,MDV (Option 2)		0-~~3999~~ 3750	100,000	0.46	10.6	1.0
LDT,MDV		~~4000-5999~~ 3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)		~~4000-5999~~ 3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751	~~6000~~ & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751	~~6000~~ & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

~~(2) Equivalent inertia weights are determined under subparagraph 40 CFR 86.129-79(a).~~

~~(3)~~(2) Hydrocarbon standards in parentheses apply to total hydrocarbons. In order to demonstrate compliance with a non-methane hydrocarbon emission standard, hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures".

~~(4)~~(3) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable passenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

~~(5)~~(4) This set of standards for ~~1984~~ 1988 and later model vehicles is optional. A manufacturer may choose to certify to these optional standards pursuant to the conditions set forth in Section ~~1960.15~~ 1960.1.5 of Title 13, California Administrative Code.

~~(6)~~(5) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to the following particulate exhaust emission standards: ~~0.4 g/mi for the 1985 model year,~~ 0.2 g/mi for the ~~1986 through~~ 1988 model years, and 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

~~(7)~~(6) For gaseous-fueled vehicles the calculation procedures provided in ~~the~~ Appendix V shall be used for determining emissions and fuel economy.

b. The exhaust emissions from new 1989 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, and new 1991 and subsequent model passenger cars, light-duty trucks and medium-duty vehicles produced by a small volume manufacturer subject to registration and sold and registered in this state, shall not exceed:

1989 AND SUBSEQUENT MODEL YEAR EXHAUST EMISSIONS STANDARDS(5)(6)~~(7)~~
(grams per mile)

Vehicle Type(1)	~~Equivalent Inertia Weight~~	Loaded Vehicle Weight (lbs.)~~(2)~~	Durability Vehicle Basis (mi)	Non-Methane Hydro-carbons ~~(3)~~(2)	Carbon Monoxide	Oxides of Nitrogen (3)(4)~~(5)~~
PC		All	50,000	0.39 (0.41)	7.0	0.4
PC~~(8)~~(7)		All	50,000	0.39 (0.41)	7.0	0.7
Diesel PC (Option 2)		All	100,000	0.46	8.3	1.0
LDT,MDV		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.4
LDT,MDV ~~(8)~~(7)		0-~~3999~~ 3750	50,000	0.39 (0.41)	9.0	0.7~~(8)~~(7)
Diesel LDT, MDV (Option 2)		0-~~3999~~ 3750	100,000	0.46	10.6	1.0
LDT,MDV		~~4000-5999~~ 3751-5750	50,000	0.50 (0.50)	9.0	1.0
LDT,MDV (Option 1)		~~4000-5999~~ 3751-5750	100,000	0.50 (0.50)	9.0	1.5
MDV	5751	~~6000~~ & larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751	~~6000~~ & larger	100,000	0.60 (0.60)	9.0	2.0

(1) "PC" means passenger cars.
"LDT" means light-duty trucks.
"MDV" means medium-duty vehicles.

~~(2)~~ ~~Equivalent-inertia-weights-are-determined-under-subparagraph-40-CFR 86.129-79(a).~~

~~(3)~~ (2) Hydrocarbon standards in parentheses apply to total hydrocarbons. In order to demonstrate compliance with a non-methane hydrocarbon emission standard, hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures".

~~(4)~~ (3) The maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600, Subpart B) shall be not greater than 1.33 times the applicable assenger car standards and 2.00 times the applicable light-duty trucks and medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 gm/mi before being compared.

~~(5)~~ (4) The standard for in-use compliance for passenger cars, light-duty trucks and medium-duty vehicles certifying to the 0.4 g/mi NOx standard shall be 0.55 g/mi NOx for 50,000 miles. If the in-use compliance level is above 0.4 g/mi NOx but does not exceed 0.55 g/mi NOx, and based on a review of information derived from a statistically valid and representative sample of vehicles, the Executive Officer determines that a substantial percentage of any

class or category of such vehicles exhibits, prior to 50,000 miles or 5 years, whichever occurs first, an identifiable, systematic defect in a component listed in Section 1960.1.5(c)(2) of Title 13, California Administrative Code which causes a significant increase in emissions above those exhibited by vehicles free of such defects and of the same class or category and having the same period of use and mileage, then the Executive Officer may invoke the enforcement authority under Sections 2112 and 2113, Title 13, California Administrative Code, to require remedial action by the vehicle manufacturer. Such remedial action shall be limited to owner notification and repair or replacement of the defective component. As used in this section, the term "defect" shall not include failures which are the result of abuse, neglect, or improper maintenance. This provision is applicable for the 1989 through 1993 model years only. For small volume manufacturers, this provision is applicable for the 1991 through 1995 model years only.

~~(6)~~ (5) Diesel-powered passenger cars, light-duty trucks, and medium-duty vehicles are subject to a particulate exhaust emission standard of 0.08 g/mi for the 1989 and subsequent model years. The particulate compliance shall be determined on a 50,000 mile durability vehicle basis.

~~(7)~~ (6) For gaseous-fueled vehicles the calculation procedures provided in ~~the~~ Appendix V shall be used for determining emissions and fuel economy.

~~(8)~~ (7) This set of standards is optional. A manufacturer may choose to certify to these standards pursuant to the conditions set forth in Section 1960.1.5 of Title 13, California Administrative Code.

~~(9)~~ (8) Pursuant to Section 1960.1.5(a)(1)(B), Title 13, California Administrative Code, the optional standard for 1989 model year light-duty trucks and medium-duty vehicles only is 1.0 g/mi NOx.

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10. Optional 100,000 Mile Certification Procedure

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c. Maintenance

Only the following scheduled maintenance shall be allowed under subparagraph ~~86.078-25(a)(1)(i)~~ 86.085-25 (a)(1)(i).

1. 25(a)(1)(i) Option 1. For ~~1981~~ 1988 model gasoline or diesel-powered vehicles, and 1989 and later model gasoline or diesel-~~fueled~~ powered light-duty trucks and medium-duty vehicles 3751 L.V.W. and greater, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the follwing items at intervals no more frequent than indicated.

   (1) Drive belt tension on engine accessories (30,000 miles).
   (2) Valve lash (15,000 miles).
   (3) Spark plugs (30,000 miles).
   (4) Air filter (30,000 miles).

(5) Exhaust gas sensor (30,000 miles): Provided that~~,-for 1987-and-prior-model-years,-an-audible-and/or-visible signal-approved-by-the-Executive-Officer-alerts-the vehicle-operator-to-the-need-for-sensor-maintenance-at the-mileage-point;-and-provided-that-for-1988-and subsequent-model-year-vehicles;~~:

(a) the manufacturer shall equip the vehicle with a maintenance indicator consisting of a light or flag, which shall be preset to activate automatically by illuminating in the case of a light or by covering the odometer in the case of a flag the first time the minimum maintenance interval established during certification testing is reached and which shall remain activated until reset. After resetting, the maintenance indicator shall activate automatically when the minimum maintenance interval, when added to the vehicle mileage at the time of resetting, is again reached and shall again remain activated until reset. When the maintenance indicator consists of a light, it shall also activate automatically in the engine-run key position before engine cranking to indicate that it is functioning. The maintenance indicator shall be located on the instrument panel and shall, when activated, display the words "oxygen sensor" or may display such other words determined by the Executive Officer to be likely to cause the vehicle owner to seek oxygen sensor replacement. The maintenance indicator shall be separate from the malfunction indicator light required by Section 1968, Title 13, California Administrative Code;

(b) the manufacturer shall provide free replacement of the oxygen sensor, including both parts and labor, and shall reset the maintenance indicator without any charge, the first time the maintenance interval established during certification testing is reached for vehicles certified with scheduled sensor maintenance before 50,000 miles. If the oxygen sensor is replaced pursuant to the warranty provisions of Section 2037, Title 13, California Administrative Code, before the first maintenance interval is reached, the manufacturer shall also replace the oxygen sensor and reset the maintenance indicator at the mileage point determined by adding the maintenance interval to the vehicle's mileage at the time of the warranty replacement. If the calculated mileage point for a second oxygen sensor replacement would exceed 50,000 miles, no free second replacement shall be required;

(c) the maintenance indicator shall be resettable. The maintenance instructions required by paragraph 5.b. of these procedures shall provide instructions for the resetting of the maintenance indicator, and shall specify that the maintenance indicator shall be reset each time the oxygen sensor is replaced; and

(d) notwithstanding the provisions of Section 2037(c), Title 13, California Administrative Code, the oxygen sensor, including any replacement required pursuant to this section, shall be warranted for the useful life of the vehicle or engine. If such oxygen sensor fails during the useful life period, it shall be replaced by the manufacturer in accordance with Section 2037(d) Title 13, California Administrative Code.

(6) Choke, cleaning or lubrication only (30,000 miles).
(7) Idle speed (30,000 miles).
(8) Fuel Filter (30,000 miles).
(9) Injection timing (30,000 miles).

Option 2. For ~~1981~~ 1988 ~~and later~~ model gasoline powered vehicles or 1988 and later diesel-~~fueled~~ powered vehicles, maintenance shall be restricted to the inspection, replacement, cleaning, adjustment, and/or service of the following items at intevals no more frequent than indicated:

(1) Drive belt tension on engine accessories (30,000 miles).
(2) Valve lash (15,000 miles).
(3) Spark plugs (30,000 miles).
(4) Air filter (30,000 miles).
(5) Fuel filter (30,000 miles).
(6) Idle speed (30,000 miles).
(7) Injection timing (30,000 miles).

2. In addition, adjustment of the engine idle speed (curb idle and fast idle), valve lash, and engine bolt torque may be performed once during the first 5000 miles of scheduled driving, provided the manufacturer makes a satisfactory showing that the maintenance will be performed on vehicles in use.

d. The manufacturer shall agree to apply to vehicles certified under this paragraph the provision of Section 43204 of the California Health and Safety Code for a period of ten years or 100,000 miles, whichever first occurs.