NOTICES OF FINAL RULEMAKING

The Administrative Procedure Act requires the publication of the final rules of the state's agencies. Final rules are those which have appeared in the *Register* first as proposed rules and have been through the formal rulemaking process including approval by the Governor's Regulatory Review Council or the Attorney General. The Secretary of State shall publish the notice along with the Preamble and the full text in the next available issue of the *Register* after the final rules have been submitted for filing and publication.

NOTICE OF FINAL RULEMAKING

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 2. DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR POLLUTION CONTROL

[R08-161]

PREAMBLE

1. Sections Affected — **Rulemaking Action**

Sections Affected	Rulemaking Action
Article 18	New Article
R18-2-1801	New Section
R18-2-1802	New Section
R18-2-1803	New Section
R18-2-1804	New Section
R18-2-1805	New Section
R18-2-1806	New Section
R18-2-1807	New Section
R18-2-1808	New Section
R18-2-1809	New Section
R18-2-1810	New Section
R18-2-1811	New Section
R18-2-1812	New Section
Appendix 13	New Appendix

2. The statutory authority for the rulemaking, including both the authorizing statute (general) and the statutes the rules are implementing (specific):

Authorizing Statutes: A.R.S. §§ 49-104(A)(1), (A)(10) and (B)(4), 49-425; 42 U.S.C. 7521(b), 7507; *Massachusetts* v. *EPA*, 127 S. Ct. 1438, 167 L. Ed. 2d 248 (April 2, 2007)

Implementing Statutes: A.R.S. §§ 49-447, 49-421(1), 28-955(D)

3. The effective date of the rules:

July 8, 2008

4. A list of all previous notices appearing in the *Register* addressing the rules:

Notice of Rulemaking Docket Opening: 13 A.A.R. 4331, December 7, 2007

Notice of Proposed Rulemaking: 14 A.A.R. 258, February 1, 2008

5. The name and address of agency personnel with whom persons may communicate regarding the rulemaking:

Name: Steven J. Burr

Address: Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

Telephone: (602) 771-4251 (This number may be reached in-state by dialing 1-800-234-5677 and requesting the seven digit number.)

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6. An explanation of the rules, including the agency's reasons for initiating the rules:

Summary. ADEQ is proposing to adopt a new Article 18 to implement the California Low Emission Vehicle program in Arizona, as permitted under the Clean Air Act sections 177 and 209.

Background. The 1970 Federal Clean Air Act (the "Act") established tailpipe emission standards for new motor vehicles to curb emissions of carbon monoxide (CO), volatile organic compounds (VOC) and oxides of nitrogen (NOx). These standards took effect for cars and light duty trucks in 1975. Section 209(a) of the Act preempted the states from adopting their own emission standards for new vehicles but granted California authority to enact stricter standards, if the state obtained a waiver of preemption from the Environmental Protection Agency (EPA).

The 1977 federal Clean Air Act amendments tightened the NOx standard for cars in two phases: 1977 through 1979 and 1981. EPA revised the federal standards for light-duty trucks in 1979 and 1988, and set rules for heavier trucks in 1988. Section 177 of the Act allows other states to adopt California's standards, rather than the federal ones, while prohibiting the states from adopting their own. A state may adopt California's standards if they are identical to California's, and the state adopts these standards at least two years before they become effective. Thus, in the United States there are two federally-sanctioned motor vehicle control programs: the federal program and the California program.

The 1990 Clean Air Act Amendments lowered the NOx emissions standards for vehicles starting in 1994. These standards are commonly referred to as the Tier 1 standards, and they resulted in a 40 percent reduction in tailpipe NOx emissions from the prior federal program (the federal motor vehicle control program).

In 1998, EPA, vehicle manufactures and the Northeastern and Mid-Atlantic states forged a voluntary agreement to introduce cleaner vehicles. This was called the NLEV program and was patterned after the California program in place at that time. The first NLEVs were available in Northeast and Mid-Atlantic states beginning with model year 1999 vehicles, and the rest of the country in model year 2001. Compared with the Tier 1 standards, the NLEV program reduced NOx emissions by 50 percent for cars, and 17 percent for light-duty trucks. In 1999, EPA promulgated the motor vehicle Tier 2 emission standards starting with model year 2004 vehicles. The Tier 2 program further reduced the NOx emission standards by between 77 and 86 percent in cars and between 92 and 95 percent in trucks, compared with the NLEV program. The Tier 2 program also gave a manufacturer the flexibility to average emission reductions across its fleet to meet the emission standards. Vehicles sold in any state that has not adopted the California program must meet the Tier 2 standards.

In 1991 the California Air Resources Board (CARB) adopted its Low Emission Vehicles (LEV) program, which applied to model year 1994 through 2003 passenger cars, light-duty trucks, and medium-duty vehicles. For each model year, a manufacturer could choose how many of each type of LEV to manufacture, provided that the manufacturer's entire fleet of vehicles met a specific fleet average non-methane organic gas (NMOG) emissions level. The program also required each manufacturer to include in its fleet of vehicles a certain percentage of Zero Emission Vehicles (ZEVs) starting in 1998.

In 1998, CARB amended the LEV program to tighten and extend the NMOG fleet average to heavier sport utility vehicles and light trucks, and to provide more flexibility in meeting the ZEV requirement by creating Partial Zero Emission Vehicle (PZEV) credits for passenger cars and light-duty trucks that achieve near zero emissions, and passenger cars and light-duty trucks using advanced technologies. Advanced technology PZEVs are known as ATPZEVs. To achieve compliance with the ZEV sales mandate, manufacturers could use credits earned from the sale of PZEVs or ATPZEVs.

On March 27, 2008, CARB adopted additional amendments to the ZEV requirement to recognize the current state of ZEV technology. Those amendments are expected to be finalized in approximately six months to one year. This rulemaking adopts the ZEV requirement currently in effect in California. ADEQ will initiate a new rulemaking to incorporate the March 27, 2008, changes when they become final.

In addition to these strict standards limiting criteria pollutants, growing public concern over observed increases in temperature and extreme weather events, and increasing scientific consensus on their cause, prompted the California Assembly to develop AB 1493. This legislation, signed into law on July 22, 2002, by Governor Gray Davis, directed CARB to develop regulations to achieve the maximum feasible reduction in GHGs from vehicles. These regulations, called the Pavley standards after the legislative sponsor, set a declining fleet-wide average for GHGs beginning with model year 2009 and established a flexible compliance scheme with credit banking and trading. The full Board approved the regulations on September 24, 2004, and applied to the U.S. EPA for a waiver in December 2005. A full discussion of greenhouse gases (GHGs) sources and impacts is included in section C of the summary of the economic, small business, and consumer impact.

In 2005, CARB added a greenhouse gas fleet average emission requirement similar to the NMOG requirement. EPA found that this new standard did not fall within the scope of California's original Clean Air Act section 209 waiver, thus requiring California to submit a separate waiver request specifically for this new greenhouse gas requirement. The EPA Administrator denied this waiver request in a December 19, 2007, letter to Governor Schwarzenegger and published the denial in the *Federal Register* on March 6, 2008 (73 Fed. Reg. 12156). California filed a petition for review against EPA on January 2, 2008, in the Ninth Circuit Court of Appeals to overturn this decision. Fifteen states, including Arizona, and five nonprofit organizations have filed motions to intervene in support of California's petition. It is also possible that Congress will amend the Clean Air Act to reverse EPA's decision.

Twelve other states have adopted the California program: Connecticut (Conn. Admin. Code § 22a-174-36a), Maine (06 Code of Maine Rules § 127), Maryland (Code of Md. Regs. § 26.11.34), Massachusetts (310 Code of Mass. Regs. 7.40), New York (6 NY Code, Rules & Regs., Part 218), New Jersey (NJ Admin. Code §§ 7:27-29), New Mexico (20

NM Admin. Code, Chapter 2, Part 88), Oregon (Or. Admin. Rules § 340-257), Pennsylvania (25 Penn. Code § 126.411, Subpart D), Rhode Island (RI Air Poll. Ctrl Reg. 37), Vermont (Vt Air Poll. Ctrl Regs., Subchapter XI) and Washington (Wash. Admin. Code § 173.423). Colorado, Florida, Montana and Utah also have announced their intention to adopt the California standards.

In response to growing concerns over the issue of greenhouse gases and their effect on climate change, Governor Napolitano established the Arizona Climate Change Advisory Group (CCAG) to develop recommendations for reducing greenhouse gas emissions in Arizona. The CCAG unanimously recommended adoption of the California standards in Arizona. In September 2006, in response to the CCAG's recommendations, the Governor signed Executive Order 2006-13. Among other actions, the Order directed ADEQ to adopt and implement the California Clean Car Program to reduce greenhouse gas emissions from passenger vehicles.

Section by Section explanation of proposed rules:

Article 18

R18-2-1801 This Section lists the definitions applicable to Article 18, and includes, in the root paragraph, definitions from A.R.S. § 49-401.01 and the applicable definitions from Title 13 of the California Code of Regulations (CCR), incorporated in R18-2-1803. Of particular note, this Section defines "an affected vehicle" as any passenger car, light duty truck or medium duty vehicle with 7,500 or fewer miles on its odometer.

R18-2-1802 This Section details the applicability of the rules of Article 18, from general requirements to more specific applicability of certain sections of the Article to particular entities. All persons, other than those excepted in subsection (D), require CARB certification in order to deliver for sale, offer for sale, sell, import, deliver, purchase, rent, lease, acquire, receive, or register an affected vehicle with a model year of 2012 or later.

R18-2-1803 This Section incorporates a new Appendix 13, discussed below, by reference.

R18-2-1804 This Section establishes the Non-methane Organic Gas (NMOG) fleet-wide average exhaust emission limit, a weighted average of the emissions for all of the passenger cars and light-duty trucks a manufacturer delivers for sale during the specified model year, beginning in model year 2012. Each manufacturer would be required to demonstrate that all of its passenger cars and light-duty trucks delivered for sale in Arizona for model year 2012 or later, meet an average emission standard for NMOG, as detailed in CCR, Title 13, section 1961, incorporated in R18-2-1803.

R18-2-1805 This Section establishes the Greenhouse Gas (GHG) fleet-wide average exhaust emission standards, similar to the NMOG fleet average requirements detailed in R18-2-1804. Each manufacturer would be required to demonstrate that all of its passenger cars and light-duty trucks delivered for sale in Arizona meet an average emission standard for GHG, as detailed in CCR, Title 13, section 1961.1, incorporated in R18-2-1803. In light of the EPA decision denying California's request for a section 209(b) waiver for the GHG standards and the possibility that the federal courts or Congress will reverse the decision, this section conditions adoption of the GHG standards on such a reversal.

R18-2-1806 This Section would require each manufacturer to comply with a ZEV sales requirement identical to California's. (See CCR, Title 13, section 1962, incorporated in R18-2-1803.) The ZEV sales requirement would be based on total vehicle sales in Arizona, and would commence with model year 2012 passenger cars and light-duty trucks produced and delivered for sale in Arizona on or after January 1, 2011. The ZEV sales requirement allows manufacturers to choose between two compliance paths. The conventional path requires the manufacturer to place in service (that is, to sell to an ultimate purchaser) in Arizona a certain number of ZEVs, which number is based upon the number of passenger vehicles and light-duty trucks that the manufacturer delivers for sale in the state. The second or "alternative compliance" path allows manufacturers to meet the entire ZEV mandate with a combination of ZEVs, ATPZEVs and PZEVs.

R18-2-1807 This Section would establish a ZEV Credit Bank, which would allow a manufacturer to earn and bank vehicle equivalent credits for any ZEV, ATPZEV or PZEV it delivers for sale in Arizona on or after model year 1999. The manufacturer may use its credits at a later date to comply with the ZEV sales requirement detailed in R18-2-1806. The proposed ZEV Credit Bank would allow a manufacturer to bank, acquire from another manufacturer, and use credits in the same manner as the California program.

R18-2-1808 This Section details manufacturers' reporting requirements in addition to those established in other sections of this Article.

R18-2-1809 This Section applies California's emissions warranty requirements for new Low Emission Vehicles, which are incorporated by reference in R18-2-1803. The warranty requirements would apply to all passenger cars and light-duty trucks for which the manufacturer is claiming early ZEV credits, and to all qualifying vehicles delivered for sale in Arizona for model year 2012 or later. This Section excludes the 15-year, 150,000-mile warranty requirement for PZEVs.

R18-2-1810	This Section would make any enforcement action resulting in a recall of any vehicles in California prima facie evidence of noncompliance for applicable vehicles registered in Arizona, and extend such recall campaigns to Arizona-registered vehicles, unless the manufacturer can demonstrate that the recall would not be applicable in Arizona.
R18-2-1811	This Section would allow the Department to inspect vehicles and records, and require documentation from appropriate parties to determine compliance and help facilitate enforcement of the rules of this Article.
R18-2-1812	This Section clarifies how the Department's civil enforcement authority under A.R.S. § 49-463 applies to violations of the Article.
Appendix 13	This new Appendix to 18 A.A.C. 2, consists of the applicable sections of the California Code of Regulations necessary to implement the rules of this Article.

7. A reference to any study relevant to the rule that the agency reviewed and either relied on or did not rely on in its evaluation of or justification for the rule, where the public may obtain or review each study, all data underlying each study, and any analysis of each study and other supporting material:

ADEQ relied upon all of the following studies:

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An F, Sauer A. 2004. *Comparison of Passenger Vehicle Fuel Economy and GHG Emission Standards Around the World*. Pew Center on Global Climate Change, Arlington.

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Arizona Department of Commerce. no date. Energy Dollar Flow Analysis for the State of Arizona (2003).

Arizona Department of Transportation (ADOT). 2008. Personal communication, March 10.

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Brook RD, Brook JR, Rajagopalan S. 2003. Air Pollution: The "Heart" of the Problem. *Cur Hypertens Rep*. 51(1): 32-39.

Brown D, Ridlington E. 2005. Cars and Global Warming: Policy Options to Reduce Arizona's Global Warming Pollution from Cars and Light Trucks. Arizona PIRG Foundation (October).

California Air Resources Board (CARB). 2008. Letter to Senator John Marty Minnesota Senate (March 12).

CARB. 2008. Technical Assessment: Comparison of Greenhouse Gas Reductions for the United States and Canada Under US CAFE Standards and CARB Greenhouse Gas Regulations (February 25).

CARB. 2005. Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons (August 4).

CARB. 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles (August 6).

CARB. 2004. Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions form Motor Vehicles (September 10).

CARB. 2004. Technical Support Document for Staff Proposal Regarding Reductions of Greenhouse Gas Emissions from Motor Vehicles: Economic Impacts of the Climate Change Regulations (August 6).

CARB. 2004. Fact Sheet: Climate Change Emission Control Regulations (December 10).

CARB. Executive Orders A-006-1467, A-006-1552, A-003-0347, A-009-0808, A-010-1429, A-006-1459, A-006-1451.

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Chen H. 2008. Calculation and Analysis of Emission Reduction Benefits of Adopting California LEVII Program in Arizona. Arizona Department of Environmental Quality, Air Quality Division (March).

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CNA Corporation 2007. National Security and the Threat of Climate Change.

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Garfin G, Lenart M. 2007. Effects on Southwest Water Resources. *Southwest Hydrology* (January/February).

Guhatahakurta S, Gober P. 2007. The Impact of Phoenix Urban Heat Island on Residential Water Use. *Journal of the American Planning Association* 73(3): 317-329 (September).

Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzil N, Lurmann F, Rappaport E, Margolis H, Bates D, Peters J. 2004. The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age, *The New England Journal of Medicine* 351 (11): 1057-1067.

Grineski SE. 2006. Social Vulnerability, Environmental Inequality, and Childhood Asthma in Phoenix, Arizona, A Report to the Community.

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Kinney PL, Lippmann M. 2000. Respiratory Effects of Seasonal Exposure to Ozone and Particles. *Arch. Environ. Health* 55(3): 210-216.

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Kutcher, C. 2007. Tackling Climate Change in the US: Potential Carbon Emissions Reductions from Energy Efficiency and Renewable Energy by 2030.

Lilienthal P, Brown H. 2007. Potential Carbon Emissions Reductions from Plug-in Hybrid Electric Vehicles by 2030. In Tackling Climate Change in the US, 70-77.

Lenart M, Garfin G, Colby B, Swetnam T, Morehouse BJ, Doster S, Hartmann H. 2007. Global Warming in the Southwest: Projections, Observations, and Impacts. Climate Assessment for the Southwest, University of Arizona.

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Maricopa County Air Quality Department. 2004. *2002* Periodic Emissions Inventory for Carbon Monoxide for the Maricopa County, Arizona, Nonattainment Area (June).

Maricopa County Air Quality Department. 2004. 2002 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County, Arizona, Nonattainment Area (June).

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Northeast States Center for Clean Air Future (NESCCAF). 2004. Reducing Greenhouse Gas Emissions from Light Duty Motor Vehicles (September).

Oak Ridge National Laboratory. 2004. Transportation Energy Data Book: Edition 24, 12-4.

Orszag P. 2007. Approaches to Reducing Carbon Dioxide Emissions. Congressional Budget Office Testimony (November 1).

Reuters. 2007. Climate Change Drying Up Western Rockies (December 12).

Ridlington E, Sargent R. 2007. The Clean Cars Program: How States Are Driving Cuts in Global Warming Pollution. U.S. PIRG Education Fund (May). Available at: www.uspirg.org.

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Sandford AJ, Silverman EK. 2002. Chronic Obstructive Pulmonary Disease1: Susceptibility factors for COPD the Genotype-environmental Interaction. *Thorax* 57: 736-741.

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Washington State Department of Ecology. 2005. Concise Explanatory Statement and Responsiveness Summary (November 28).

Washington State Department of Ecology. 2005. Cost, Benefit, and Least Burdensome Analysis for the Proposed Low emission Vehicles, Chapter 173-423 WAC (October).

Westerling AL, Hidalgo HG, Cayan DR, Swetnam TW. 2006. Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity. *Science* (313): 940-943.

8. A showing of good cause why the rules are necessary to promote a statewide interest if the rules will diminish a previous grant of authority of a political subdivision of this state:

Not applicable

9. The summary of the economic, small business, and consumer impact:

A. Rule Identification

This rule comprises new Article 18, sections R18-2-1801 through R18-2-1812, entitled "Clean Car Standards." The rule implements the California Low Emissions Vehicle (LEV II) program in Arizona, creating more stringent requirements for motor vehicle emissions than the federal Tier II standards promulgated by EPA in 1999 that currently apply to model year of 2004 or later vehicles sold in Arizona.

B. Executive Summary

ADEQ expects the Clean Car Standards to reduce emissions of non-methane organic gases (NMOG), carbon monoxide, nitrogen oxides (NO_X), and greenhouse gases (GHG) from light- and medium-duty passenger vehicles and light-duty trucks. These rules will apply to vehicles beginning with the 2012 model year.

Governor Janet Napolitano issued Executive Order 2006-13 in September 2006 to begin implementing the recommendations in Arizona's Climate Change Action Plan. The Climate Change Action Plan was produced by the Arizona Climate Change Advisory Group (CCAG). Appointed by the Governor, the CCAG comprised diverse group of 35 stakeholders from diverse backgrounds who brought broad perspective and expertise to the topic of climate change in Arizona. Members represented the following sectors: electric power generation, fossil fuel industry, manu-

facturing, mining, agriculture, forestry, construction and building, tourism and recreation, heath care, non-governmental organizations, Indian tribes, state and local government, and the general public. The CCAG developed 49 policy recommendations to reduce GHG emissions in Arizona.

The CCAG held its first meeting on July 14, 2005, followed by a year of intensive fact-finding and consensus building, facilitated by the Center for Climate Strategies (CCS). The CCAG held six public meetings during this period. Five sector-based technical work groups (TWGs) held a total of 40 public meetings. Members of the public were invited to speak and present information at all CCAG and TWG public meetings.

The Transportation and Land Use Technical Work Group (TLU TWG) met a total of eight times between Aug. 31, 2005 and May 3, 2006. The TLU TWG was the forum in which the CCAG developed and analyzed the State Clean Car Program policy option (TLU 1). A representative of the Automobile Industry attended the TLU meetings as a member of the public, and in fact, attended the last five of the eight TLU meetings that were held. Moreover, a representative of the Automobile Industry attended two of the six CCAG meetings, on Dec. 12, 2005, and May 16, 2006, at which the CCAG voted unanimously to include the State Clean Car Program policy option as a recommendation in the Climate Change Action Plan.

The recommendations adopted by the CCAG underwent two levels of screening. First, a potential policy option being considered by a TWG was accepted as a "priority for analysis" and developed for full analysis only if it had a supermajority of support from CCAG members (with a "supermajority" defined as five or fewer "no" votes or objections). Second, after the analyses were conducted, only policy options that received at least majority support from CCAG members were adopted as recommendations by the CCAG and included in this report.

Of the 49 policy recommendations adopted by the CCAG, 45 received unanimous consent, two (2) received supermajority support, and two (2) received majority support. The recommendation to implement the California Clean Car Program in Arizona was adopted unanimously by the CCAG.

The CCAG measures, taken together, will achieve Arizona's climate change goal: to reduce GHG emissions to year 2000 levels by 2020, and 50 percent below the year 2000 levels by 2040. Executive Order 2006-13 specifically directed adoption of the California Clean Car Standards, a recommendation that received unanimous support from the CCAG.

The Clean Car Standards establish tailpipe and fleet-wide emission limits for new passenger cars, light-duty trucks and medium-duty passenger vehicles. Beginning in model year 2012 under R18-2-1802, "no dealer or other person within this State shall deliver for sale, offer for sale, sell, import, deliver, purchase, rent, lease, acquire, receive, or register an affected vehicle of model year 2012 or later unless the vehicle has been certified by CARB and has received a CARB Executive Order."

An "affected vehicle" means any passenger car, light duty truck or medium duty vehicle with 7,500 miles or fewer on its odometer, provided that a vehicle sold by a dealer is an affected vehicle if it had 7,500 miles or fewer on its odometer statement at the time the dealer acquired the vehicle that does not qualify for any of the exemptions under A.A.C. R18-2-1802(D).

ADEQ expects this rulemaking to impact the following entities: motor vehicle manufacturers; auto dealers, wholesalers, brokers, and individuals selling affected vehicles; consumers purchasing these vehicles; gasoline stations; gasoline distributors; fuel producers; businesses selling goods and services; consultants; vendors; repair facilities; the general public; insurance sector; Arizona Department of Environmental Quality (ADEQ); Arizona Department of Transportation Motor Vehicle Division (MVD); State Government (revenues); and political subdivisions of the state.

As the standards are phased in, consumers should expect to pay higher prices for vehicles subject to this rulemaking. These costs will be offset, however: (1) because the reduced operating costs of these vehicles are expected to outweigh their higher prices; and (2) reduced operating costs will result in expenditures for other goods and services in the economy. To the extent that some sectors of the economy face negative impacts, such as fuel producers, distributors and retailers, such reduction in economic output should be more than offset through growth of consumption, income, and employment in other sectors of the economy (CARB, "Technical Support Document for Staff Proposal Regarding Reductions of *Greenhouse Gas Emissions from Motor Vehicles: Economic Impacts of the Climate Change Regulations*," August 6, 2004).

The consumer is expected to benefit from reduced operating costs. ADEQ expects this rulemaking to provide public health and environmental benefits as well.

C. Background

Controlling emissions from the transportation sector through the Clean Car Standards is important for Arizona to achieve and maintain existing national air quality standards, reduce emissions of greenhouse gases, mitigate future climate change, and adapt to the future challenges from a changing climate. The complete Clean Car Standards will benefit Arizona by directly reducing criteria pollutant emissions from individual new vehicles, setting pollution limits for the new vehicle fleet; spurring research, development, and commercialization of low- and non-polluting technologies, and contributing significantly to state and regional GHG reduction goals.

The LEV II Standards

Motor vehicles are a significant source of conventional air pollutants that harm public health and the environment, particularly precursors of ozone pollution and carbon monoxide (Oak Ridge National Laboratory, *Transportation Energy Data Book: Edition 24*, 2004, 12-4). The most recent emissions inventories for the Phoenix metropolitan areas show that motor vehicles are responsible for approximately two-thirds of the carbon monoxide pollution, two-thirds of the anthropogenic oxides of nitrogen emissions (ozone precursor), one-third of the anthropogenic volatile organic compound emissions (ozone precursor) (Maricopa County Air Quality Department. 2004, "2002 Periodic Emissions Inventory for Carbon Monoxide for the Maricopa County, Arizona, Nonattainment Area," and "2002 Periodic Emissions Inventory for Ozone Precursors for the Maricopa County, Arizona, Nonattainment Area"). The Clean Air Act allows states two options to regulate vehicle emissions: the federal standards or stricter California standards. As stated before, these regulations would apply the stringent California standards that have already been approved and implemented in many other states to new vehicles sold in Arizona. Reducing pollution beyond the federal program is important to meet stricter federal air quality standards for ozone announced by the EPA Administrator on March 12, 2008, especially in light of Arizona's rapid growth in both population and vehicle use. Further reductions from the transportation sector are also important to meet other commitments under the Clean Air Act, including reduction of regional haze.

Arizona's current air quality problems are directly connected to the rapid population growth and related activities the state has experienced. While population will grow at a fairly constant rate, the growth in vehicle miles traveled (VMT) will increase even more rapidly. This occurs because most of the growth in population occurs at the fringes of urban areas, while many employment centers tend to stay concentrated in the urban center, leading to increasing commuting distances. There will be greater demand for vehicle travel and supporting infrastructure, which will in turn create more pollution through expanded and extended roadways and more vehicles traveling longer distances. Studies have shown that the growth trends of both population and VMT can erase technological improvements in emission controls under the federal regulations (Keyes et al., 2001, "Estimating The Costs of Violating Air Quality Standards," *EM: Air and Waste Management Association's Magazine for Environmental Managers*, April, pp. 22-30). Details of the health and environmental effects of this regulation are discussed more fully in section E.

The Greenhouse Gas Standards

These proposed rules were developed under Executive Order 2006-13 on climate change, issued in 2006 by Governor Janet Napolitano. The CCAG unanimously recommended that Arizona implement the Clean Cars Standards to reduce GHGs from the transportation sector. GHG emissions increased nearly 57 percent in Arizona between 1990 and 2005, compared to 22 percent for the entire U.S. (CCAG, "Arizona Climate Change Action Plan," 2006, E2; 30). It is estimated that at least 40 percent of the GHG emissions were from vehicles. Carbon dioxide was the dominant gas emitted. Managing and reducing GHGs from the transportation sector is crucial to Arizona's climate change mitigation and adaptation strategy.

Theory and Evidence of Climate Change

Energy from the sun drives the earth's climate. It is maintained by complex interactions between the atmosphere, the oceans, and the reflectivity of the earth's surface. As the sun's rays reach the earth, the energy is either reflected back into space or it is absorbed by the earth and subsequently reemitted into the atmosphere. Certain gases—in particular carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons, and sulfur hexafluoride—trap the sun's energy in their bonds. Through a property called radiative forcing, this heat is maintained within the upper atmosphere and causes a warming effect in the atmosphere, the so-called "greenhouse effect" (Intergovernmental Panel on Climate Change, *The Physical Science Basis*, 2007, 131). Radiative forcing is caused naturally by increases in solar radiation and natural GHG emissions. However, these factors only account for a small fraction of the documented warming that has occurred in the past decades (IPCC, "The Physical Science Basis," 2007, 192).

Significant scientific consensus and robust data support the claim that substantial increases in atmospheric concentrations of GHGs are significant contributors to observed increases in mean global surface temperature and corresponding changes in climate. The Intergovernmental Panel on Climate Change (IPCC), a group comprised of hundreds of scientists in dozens of countries, issues assessment reports every five years reflecting the state of knowledge from thousands of peer-reviewed scientific studies. In the most recent assessment report, issued in February 2007, IPCC reported that concentrations of CO_2 have increased from a pre-industrial value of 280 ppm to 379 ppm in 2005 (IPCC, "The Physical Science Basis," 2007, 131). Combined with increased concentrations of other GHGs (principally methane), the atmospheric concentration is equivalent to 430 ppm CO_2 (Nicholas Stern, "Economics of Climate Change," 2006, iii). Furthermore, GHG concentrations have increased 53 percent from pre-industrial levels, a rise that is highly correlated with observed changes in temperature and extreme weather events. Since 1750, it is extremely likely (a 95 percent confidence interval) that humans have exerted a substantial warming influence on climate (IPCC, "The Physical Science Basis," 2007).

IPCC also has found that in the areas studied over the past fifty years, the frequency of extreme weather events (e.g., heavy precipitation, drought, tropical storms, and hurricanes) has increased, but in varying degrees and across regions. Since 1970, for example, the number of category 4 and 5 hurricanes has increased about 75 percent (IPCC, "The Physical Science Basis," 2007, 308).

Researchers at the University of Arizona have documented less winter snowfall, increased winter rainfall, and earlier snow melt resulting in reduced stream flow and more extensive, stronger forest fires (Garfin and Lenart, "Effects on Southwest Water Resources," *Southwest Hydrology*, volume 34, January/February 2007, 16-17, 34; Westerling et al., "Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity" *Science*, volume 313, August 2006, 940-943).

Potential Impacts of Climate Change

Climate change poses serious risks to Arizona's air, water, and land that could result in substantial public health, environmental, and economic damage. The most pronounced effect of climate change on Arizona would be higher surface temperatures that could set off a cascade of further effects. As documented below, climate change is expected to cause more direct and indirect air pollution, more frequent and extensive fires, more heat waves, stronger storms, more flooding, earlier snow melts, greater water consumption, rising sea levels and reduced stream flows.

Climate change is projected to increase temperatures in the desert Southwest by 3.6 to 9 degrees Fahrenheit, with extreme scenarios suggesting up to 14 degrees of warming before the end of the century (Christensen NS, Wood AW, Voisin N, Lettenmaier DP, Palmer RN. The Effects of Climate Change on the Hydrology and Water Resources of the Colorado River Basin. Climatic Change 35: 337-363, 2004.). Higher temperatures will cause greater evaporation of water, changing precipitation and affecting climates. Especially vulnerable in Arizona are alpine regions, rangelands, lakes and reservoirs, riparian regions, the Sonoran desert, and urban areas (Lenart et al., "Global Warming in the Southwest," 2007). Because so much of Arizona's economy and quality of life are tied to the natural surroundings, these changes would severely impact both natural and human systems.

Water resources are always a concern in Arizona's arid environment. Climate change could reduce water resources in the Colorado River basin significantly, including a 15 percent reduction in annual runoff, a 40 percent decrease in basin storage, and a decline in hydroelectric power production of 45-56 percent (CCAG, "Climate Action Plan," 2006, 27) If this generation were supplemented by conventional generation, it would put even greater strains on water resources at the same time that demand increases due to the same temperature changes. Researchers at Arizona State University have shown that a one degree Fahrenheit increase in daily low temperature results in an additional 290 gallons of water consumed per month (Guhatahakurta and Gober, "The Impact of Phoenix Urban Heat Island on Residential Water Use," *Journal of the American Planning Association*, vol. 73, issue 3, 317-329, September 2007).

Air quality will also suffer as a result of climate change. Energy consumption will rise with higher temperatures, especially in the already hot, arid environments of Arizona. This will increase fine particulate and other emissions from power generation. Besides the increased risk of wildfires from diminished water resources, climate change is also predicted to increase coarse particulate matter emissions. Furthermore, secondary ozone formation would increase as a result of the higher temperatures, increased biogenic emissions and the effect of higher ground-level CO_2 emissions (Westerling, et al., Senate testimony, September 24, 2007; Tom Moore, presentation at U.S. EPA workshop, "Integrating Climate Change Adaptation into Air Quality Decision Making, December 5, 2007; Jacobson, "On the Causal Link between Carbon Dioxide and Air Pollution Mortality, *Geophysical Research Letters*, vol 35, 2008).

Projected climate change would profoundly impact Arizona's natural and human-built environments. Researchers at the University of Arizona have identified particular threats to lakes and reservoirs, irrigated and pastoral agricultural lands, forests and mountaintops, riparian habitats the Sonoran desert, and even urban environments as a result of climate change (Lenart et al., 2007, "Global Warming in the Southwest: Projections, Observations, and Impacts").

These effects will, in turn, result in a significant increase in insured losses. Average global temperatures have increased over the past century and are expected to continue to rise over the next century. Scientific assessments anticipate warmer temperatures that will alter the frequency or severity of damaging weather-related events, such as flooding and drought. Further increases in the earth's temperature are very likely to increase the frequency and severity of many damaging weather-related events, such as increased drought across many regions of the globe, including the Great Plains of the U.S. In addition, the intensity of precipitation events is very likely to increase across almost all regions of the world. It is likely that the future holds increased summer drying and associated risks of drought, increased hurricane peak wind intensities and increased hurricane average and peak precipitation intensities (U.S. Government Accountability Office, "Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades Are Potentially Significant," Report to the Committee on Homeland Security and Government Affairs, U.S. Senate, March 2007, 8-9).

Climate change is a global problem and poses risks far beyond Arizona. Its implications also reach far beyond the historical ambit of environmental regulation, creating alarming vulnerabilities to international trade, economic growth, and national security. Projections are that sea levels could rise by the next century, flooding coastal cities and destroying transportation infrastructure. Climate change is also a risk for global security, with reduced access to fresh water from precipitation changes, in turn impairing food production; health catastrophes from the spread of vector-borne diseases; mass migration due to flooding of coastal cities and displacement of their residents (CNA Corporation, "National Security and the Threat of Climate Change," 12-16).

Climate Change Mitigation

Thousands of academic studies have estimated the geophysics, ecology, economics, and policy implications of climate change. The scientific consensus suggests that, in order to limit the worst effects of climate change, atmospheric concentrations of CO_2 should be limited to around 500 ppm (Charles Kutcher, "Tackling Climate Change in the U.S.," 3; IPCC, "Synthesis Report: Summary for Policy Makers," 2007, 20; Stern, 2006, x). The Stern Review Report suggested that, if left unchecked, climate change could cause a 20 percent decrease in global Gross Domestic Product (GDP) by the end of the century, whereas taking early and aggressive action to mitigate GHG emissions now would only cost about one percent of GDP (Stern, 2006, xiii).

While this regulation alone will not substantially reduce or reverse ongoing global climate change, it is inconceivable that those reduction targets could be achieved without actors like the state of Arizona undertaking reductions like this. Furthermore, this policy is not being advanced in isolation. The Clean Car Standards link with other regulatory and market-based initiatives to reduce GHG emissions across all sectors of the economy. Twelve states, representing over 35 percent of the U.S. population, have adopted the Clean Car Standards and more states are in process. With adoption of the standards by Arizona and the other three states that have proposed adoption, the Clean Car Standards will cover about 46 percent of the U.S. population. These state-level actions are in addition to aggressive measures by other nations to reduce GHG emissions from automobiles (An and Sauer, 2004, "Comparison of Passenger Vehicle Fuel Economy and Greenhouse Gas Emission Standards around the World," 25).

Climate Change Adaptation

Adopting the Clean Car Standards will not only help mitigate GHG emissions and future climate change, the savings generated for consumers will allow resources otherwise spent on fuel to go toward other adaptive strategies. These standards will require automakers to manufacture vehicles that emit 30 percent less GHGs by 2016. By 2020, the twelve states, besides California, that have already adopted the Clean Car Standards would reduce GHG emissions by 434 million $MTCO_2e$ (metric tons carbon dioxide equivalent), 89 percent more than under the federal program (CARB, "Comparison of GHG Reductions for the U.S. and Canada under U.S. CAFE Standards and CARB GHG Regulations," February 25, 2008, vii).

Arizona's program consists of three parts: (1) Low-Emission Vehicle (LEV) standards for emissions of smog-forming and toxic pollutants; (2) Zero-Emission Vehicle (ZEV) standards that promote advanced technology vehicles (e.g., hybrids, fuel-cell vehicles, and electric vehicles) and (3) GHG emission standards that limit emissions of pollutants that contribute to global warming. As noted elsewhere in this preamble, EPA has issued a notice of disapproval of California's request for a waiver under section 209(b) of the Clean Air Act for the GHG emission standards. The costs and benefits of the GHG emission standards, as described below, are contingent on a reversal of EPA's decision.

E. Cost-Benefit Analysis (potential direct impacts)

The costs of this regulation will be borne primarily by those who produce and purchase vehicles. The direct benefits will primarily accrue to vehicle users through reduced operation and maintenance costs, and to society generally through reduced publichealth risks. The higher prices consumers will have to pay for new vehicles will be offset by a savings in vehicle operating costs. Thus, ADEQ expects that a net benefit will accrue to consumers in the state. This section provides information and data about potential costs and benefits of implementing this rulemaking. ADEQ expects probable benefits of implementing this rulemaking to outweigh probable costs.

1. Health and Environmental Impacts

ADEQ's evaluation of emission reductions projected that by implementing the LEV II program, 2018 emissions in the state will be lower than the federal Tier II control by 892 tons of NMOG, 5,505 tons of CO, and 1,436 tons of NO_xThese projections are based on approximately 86.7 billion projected vehicle miles traveled using emission factors in EPA's MOBILE6 model. More than 58 percent of these VMT are predicted to occur in the metropolitan Phoenix area, where population density and the dynamics of air pollution formation may yield nonlinear benefits. Two-thirds or more of the reductions in NMOG, CO, and NO_x are projected to occur in Maricopa, Pima and Pinal Counties combined (Chen, 2008, "Calculation and Analysis of Emission Reduction Benefits of Adopting California LEVII Program in Arizona"). These projections do not reflect potential reductions in upstream emissions from avoided petroleum extraction, refining, transportation and storage.

Under revisions to the ozone NAAQS announced by EPA on March 12, 2008, four counties in Arizona (Maricopa, Pima, Pinal and Gila) may be designated ozone nonattainment areas in the future. The reductions in ozone precursor emissions achieved by the LEV II standards may therefore prove critical in reaching the new ozone standard of 0.075 parts per million (ppm), which is more protective of human health than the previous (effective) standard of 0.084 ppm.

Since vehicles are a major contributor to air pollution, a minimal to moderate reduction in tailpipe emissions will help improve air quality in Arizona. The new vehicles complying with these standards will produce lower emissions of ozone-forming pollutants and cancer-causing hazardous air pollutants that lead to acute and chronic health endpoints. In urban areas with increasing vehicle miles traveled and daily traffic congestion, even a minimal reduction in tailpipe emissions will reduce exposure to urban residents, thereby having the potential to reduce illness and premature death. ADEQ expects residents in rural areas also to experience a reduction in exposure. According to the Amer-

ican Lung Association (2006; 2004), vehicle-related pollutants are associated with thousands of cases of chronic respiratory illness and cardiovascular problems in the U.S.

Arizona is projected to have a 2011 population of 7,186,070. By 2020, the state's population is expected to grow to 8.8 million; 11.7 million by 2040 (Arizona Department of Economic Security, "Arizona Population Projections 2006-2055," March 31, 2006). In addition to net immigration to Arizona, births contribute about 104,000 annually, with a birth rate second to Texas' birth rate (U.S. Census Bureau). With the projected population growth of Arizona, pediatric and adult cases of asthma are expected to increase, with rates compounded in the more urbanized areas.

Because sensitive subpopulations of the state are disproportionately affected by air pollution, they may experience greater benefits from the stricter emission standards. Subpopulations include infants and the elderly, persons with pre-existing lung diseases (e.g., cardiopulmonary diseases and asthma), and individuals with congenital defects. Compounding and synergistic effects from multiple air pollutants could pose special risks to these sensitive subpopulations.

Asthma is a chronic inflammatory disorder of the respiratory passages. Asthma rates for 2003 were as follows: 8% for Maricopa County, 8.3% for Arizona as a whole, and 7.5% for the U.S. (Rimsza et al., 2006, "Asthma in Maricopa County, A Report to the Maricopa County Community from Arizona Health Query," Center for Health Information and Research, ASU). If that same rate applies for Arizona as a whole, by 2011 more than 587,000,persons would be classified as having asthma. Since the consumption of gasoline and diesel by vehicles is a major cause of air pollution, any policy to reduce tailpipe emissions should have a positive impact on human health.

Metropolitan Phoenix, ranked as the fifth largest U.S. city, is one of the top five U.S. cities for asthma-related mortality. There also is spatial variability in asthma hospitalization and emergency room rates. For example, the ZIP codes with the highest rates of asthma have rates that are 15-18 times higher than ZIP codes with the lowest rates. The highest rates for emergency room visits occurred in downtown Phoenix and the western regions of Maricopa County; the lowest rates occurred on the northern, southern, and eastern regions of the county. The highest rates for asthma hospitalizations occurred in the western region of the county and along the northern stretches of I-17; the lowest rates occurred in the northeastern part of Maricopa County (Grineski, "Social Vulnerability, Environmental Inequality, and Childhood Asthma in Phoenix, Arizona, A Report to the Community," 2006).

Although asthma results in lost days at school and work, as well as emergency room visits and hospitalizations, the symptoms are not always severe enough to require an emergency room visit or hospitalization. Asthma symptoms, however, can prevent children from living a fully active life. The severity of asthma can be categorized based on symptoms and diagnostic tests (mild intermittent, mild persistent, moderate persistent, or severe persistent).

Table 1, prepared by the U.S. Environmental Protection Agency, shows monetized values of health endpoints (adverse-health effects). For example, per-incident values of hospital admission for asthma, asthma emergency room visit, and acute bronchitis have monetized values of $6,634; $299 and $57, respectively. Other health endpoints have considerably higher values, such as chronic bronchitis ($331,000), which is based on individual willingness-to-pay to avoid a case of pollution-related chronic bronchitis. Premature mortality due to long-term exposure of air pollution has a monetized value of $6 million (1999 dollars).

Table 1. Monetized Values of Health Endpoints

Health Endpoint (avoided health effect)	Value per Incidence (1999$)	Derivation of Estimate
Premature Mortality (long-term exposure) VSL	6,000,000	Mean of value-of-statistical-life estimates from 26 studies (5 CV and 21 LM studies) reviewed for section 812 Costs and Benefits of the CAA, 1990-2010 (EPA, 1999); also see www.InsideEPA.com (April 10, 2003)
Chronic Bronchitis	331,000	Mean of a generated distribution of WTP to avoid a case of pollution-related chronic bronchitis (see note below)
Chronic Bronchitis	107,000	COI estimate based on Cropper and Krupnick, 1990
MRAD	48	Median WTP estimate to avoid one minor restricted activity day (Tolley et al., 1986)
Decreased Worker Productivity	1	Each worker per 10 percent change in ozone
Work Loss Day (WLD)	varies	

Hospital Admissions		
Cardiovascular (ICD codes 390-429)	18,387	COI estimates are based on ICD-9 code level information (mean hospital care costs, mean length of hospital stay, and weighted share of total cardiovascular illnesses) reported in Elixhauser, 1993
Pneumonia (ICD codes 480-487)	14,693	COI estimates are based on ICD-9 code level information (mean hospital care costs, mean length of hospital stay, and weighted share of total pneumonia category illnesses) reported in Elixhauser, 1993
COPD (ICD codes 490-494, 494-496)	12,378	COI estimates are based on ICD-9 code level information (mean hospital care costs, mean length of hospital stay, and weighted share of total COPD category illnesses) reported in Elixhauser, 1993
Respiratory (ozone)	9,823	All ozone related respiratory
Asthma	6,634	COI estimates are based on ICD-9 code level information (mean hospital care costs, mean length of hospital stay, and weighted share of total asthma category illnesses) reported in Elixhauser, 1993
Asthma (emergency room visits)	299	COI estimate based on data reported by Smith et al., 1997
Respiratory Ailments Not Requiring Hospitalization		
Acute Bronchitis	57	Mean of low and high values recommended for use in section 812 analysis (Neumann et al., 1994)
Upper Respiratory Symptoms (URS)	24	Combinations of the 3 symptoms for which WTP estimates are available that closely match those listed by Pope et al. result in 7 different symptom "clusters," each describing a "type" of upper respiratory symptom (see note below)
Acute Symptoms (19 ozone-related)	22	
Lower Respiratory Symptoms (LRS)	15	Combinations of the 4 symptoms for which WTP estimates are available that closely match those listed by Schwartz et al. (see note below)

Source: U.S. EPA, 2002, "Regulatory Impact Analysis for the Proposed Reciprocating Internal Combustion Engines NESHAP," OAQPS, EPA-452/R-02-012 (November), pp. 8-23 and 8-24.

To the extent air pollution is reduced, public health improves. Air pollution can cause adverse health effects or exacerbate pre-existing health conditions that can impose hundreds of thousands of annual costs in terms of health care expenditures, pain and suffering, as well as reducing the quality of life and economic security of Arizona's population. Table 2. is included to show human health effects of criteria air pollutants. Implementation of this rulemaking is expected to reduce 5,505 tons of carbon CO, 892 tons of hydrocarbons (expressed as NMOG) and 1,436 tons of NO_x in 2018. NO_x and hydrocarbons contribute to ozone formation. Quantifiable health effects of CO include congestive heart failure and decreased time to the onset of angina, as well as unquantifiable effects. NO_x leads to respiratory illness and decreased pulmonary functions, inflammation in the lungs, and immunological changes. Table 2. contains both quantified and unquantifiable health effects of criteria air pollutants. Excess mortality is shown to occur from ozone, PM, and lead pollutants.

Table 2. Human Health Effects of Criteria Air Pollutants

Pollutant	Quantifiable Effect	Unquantifiable Effect	Other Potential Effects
Ozone (O_3)	Excess mortality, respiratory symptoms, MRA days, RRA days, hospital admissions, asthma attacks, changes in pulmonary function, chronic sinusitis and Hay Fever	Increased airway responsiveness to stimuli, centroacinar fibrosis, inflammation in the lungs	Immunologic changes, chronic respiratory diseases, extrapulmonary effects (e.g., changes in structure and function of other organs)

PM (TSP/ sulfates)	Excess mortality, bronchitis (chronic and acute), hospital admissions, LRI, URI, chest illness, respiratory symptoms, MRA days, ARA days, days of work loss, moderate or worse asthma status for asthmatics	Changes in pulmonary function	Chronic respiratory diseases other than chronic bronchitis, inflammation in the lungs
Carbon monoxide (CO)	Hospital admissions (congestive heart failure), decreased time to onset of angina	Behavior effects, other hospital admissions	Other cardiovascular effects, developmental effects
Nitrogen oxides (NO_x)	Respiratory illness	Increased airway responsiveness	Decreased pulmonary function, inflammation in the lungs, immunological changes
Sulfur dioxide (SO_2)	Respiratory symptoms, combined responses of respiratory symptoms and pulmonary function changes, changes in pulmonary function in exercising asthmatics		Respiratory symptoms in non-asthmatics, hospital admissions
Lead (Pb)	Excess mortality, hypertension, non-fatal coronary heart disease, non-fatal strokes, IQ loss effects on lifetime earnings, IQ loss effects on special education needs	Health effects for individuals in age range other than those studies, neurobehavioral disease, reproductive effects, fetal effects from maternal exposure, delinquent and anti-social behavior in children	

Source: Extracted from U.S. EPA 1997, Table D-4, Appendix D-6. Excess mortality for ozone and PM was estimated using PM_{10} as an indicator of the pollutant mix to which individuals were exposed.

MRA=minor restricted activity; RRA=respiratory restricted activity; PM=particulate matter; TSP= total suspended particulate; LRI=lower respiratory illnesses; URI=upper respiratory illness; ARA=all restricted activity

Implementation of this rulemaking is expected to reduce ozone-forming pollution. Exposure to ozone negatively impacts children's lung function and lung growth (Gauderman et al., 2004, "The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age," *The New England Journal of Medicine* 351 (11), 2004, 1057-1067). Ozone also prematurely ages the lung (Lippmann, "Health Effects of Ozone: A Critical Review" *JAPCA* 39(5) 1987: 672-695; Kinney and Lippmann, "Respiratory Effects of Seasonal Exposure to Ozone and Particles," *Arch. Environ. Health* 55(3) 2000: 210-216). According to studies by McConnell et al (McConnell R, Berhane K, Gilliland F, London SJ, Vora H, Avol E, Gauderman WJ, Margolis HG, Lurman F, Thomas DC, Perers JM, "Air Pollution and Bronchitic Symptoms in Southern California Children with Asthma," *Environmental Health Perspectives* 107(9) 1999: 757-760) and Sandford and Silverman ("Chronic Obstructive Pulmonary Disease: Susceptibility factors for COPD the Genotype-environmental Interaction," *Thorax* 57 2002:736-741), illness from air pollution in children may produce chronic obstructive pulmonary disease later in their lives. Fine particle emissions from the combustion of diesel and gasoline in internal combustion engines are associated with cardiac arrhythmias, higher markers of inflammation and alternation in blood clotting, and development of atherosclerosis (Brook et al., "Air Pollution: The 'Heart' of the Problem," *Cur Hypertens Rep*. 51(1) 2003: 32-39).

A recent study established a direct link between increased levels of carbon dioxide in the atmosphere and increases in human mortality. Increased temperatures and water vapor from higher carbon dioxide separately increase ozone more in areas that are already polluted. Thus, the global warming phenomenon could exacerbate ozone the most in these highly polluted areas and result in 1,000 annual deaths and cancers by 20-30 cases for each 1 degree Celsius rise in carbon dioxide-induced temperature. Many more cases of respiratory illness and asthma in the U.S. also are predicted to occur as a result. The author of the study, Mark Z. Jacobson, said in the abstract that "[a]bout 40% of the additional deaths may be due to ozone and the rest, to particles, which increase due to CO_2-enhanced stability, humidity, and biogenic particle mass. An extrapolation by population could render 21,600 (7,400-39,000) excess CO_2-caused annual pollution deaths worldwide, more than those from CO_2-enhanced storminess" (Jacobson, "On The Causal Link Between Carbon Dioxide and Air Pollution Mortality," *Geophysical Research Letters*, 2008).

Unquantified adverse impacts include decreased forest productivity; decreased yields for fruits and vegetables, including both commercial and noncommercial crops; damage to urban ornamental plants; damage to ecosystems and their myriad functions and damaged recreational sites and forest aesthetics (U.S. EPA, "Regulatory Impact Analysis

for the Proposed Reciprocating Internal Combustion Engines NESHAP," 2002). The overarching benefit, reducing the risk of catastrophic climate change, was discussed in the Background section.

2. Consumer Impacts

These rules will make it illegal to register, lease or rent for use in Arizona new 2012 or later model year vehicles that are not certified to California standards, unless they meet certain exemptions. The cost of these certified vehicles will increase to pay for the modifications to the vehicle emissions control systems, drive trains and other technologies that will be necessary to meet Clean Car Standards. The higher prices for new vehicles are expected to be passed on to consumers.

ADEQ, however, anticipates that net savings will accrue to consumers from reduced vehicle operating costs. Thus, ADEQ expects that the implementation of this rulemaking will provide cost-saving benefits to consumers in terms of reduced operating costs from reduced fuel costs at the pump and more high-efficiency, low-polluting vehicles from which consumers may choose. In 2003, for example, Arizona consumers used more than 2.6 billion gallons of gasoline, with Arizona sales in excess of $3.4 billion. Of that expenditure, 79 percent left the state (Arizona Department of Commerce, "Energy Dollar Flow Analysis," no date). The Clean Car Standards will promote fuel diversification, including using electricity as a transportation fuel. For example, electricity used in plug-in hybrid vehicles would cost just 6-8 cents per mile compared to 13 cents per mile with gasoline, while reducing GHG emissions 51 percent per mile (Lilienthal and Brown, "Potential Carbon Emissions Reductions from Plug-in Hybrid Electric Vehicles by 2030," 2007, 72, 20). More energy dollars will recirculate in the Arizona economy, creating a multiplier effect. With the increase in Arizona's population and considerably higher gasoline prices, consumption of renewable fuel and electricity for hybrids would be greater.

Even though the proposed standards are emission standards, and not designed to regulate fuel economy standards, the use of advanced technologies to meet both the GHG emission standards and other requirements, such as the fleet NMOG limits and the ZEV mandates, is expected to decrease fuel consumption and operating expenses over the life of these "California certified" vehicles. Although fuel economy is expected to increase, it will vary by the type of vehicle. CARB suggested that the reduction in fuel consumption should range from 1 to 21 percent for PC/LDT1 and from 2 to 25 percent for LDT2/T3 (CARB, "Technical Support Document for Staff Proposal Regarding Reduction of Greenhouse Gas Emissions from Motor Vehicles Economic Impacts of the Climate Change Regulations," August 6, 2004).

Reduced gasoline consumption leads to reduced GHG emissions and generates cost-savings for consumers and the general public. ADEQ anticipates that the increased costs of vehicle prices would be recouped over time by consumers due to reduced fuel and maintenance expenses. According to the Arizona PIRG analysis, once Arizona's program is fully implemented, consumers are projected to save at least $3-$7 per month due to reduced vehicle operating costs (Ridlington and Brown, "Cars and Global Warming: Policy Options to Reduce Arizona's Global Warming Pollution from Cars and Light Trucks," October 2005, 18-20). However, based on current gasoline prices, actual savings are expected to be greater. The calculation was based on a gallon of gasoline costing $1.74, compared to the current price of more than $3.00 per gallon. Gasoline prices are expected to peak at about $3.40 per gallon in the spring of 2008. The national average price was $3.22 per gallon on March 10, 2008, which was $0.69 more than one year ago (National Automobile Dealers Association (NADA), "Headlines, Gas Prices Near record, Following Oil," 2008). Table 3. summarizes the schedule of savings under different gasoline prices.

Table 3. Net Savings for Consumers at Various Gas Prices

	Gasoline Price		
	$1.74 per gallon	$2.20 per gallon	$3.00 per gallon
Annual Net Savings While Repaying Loan	$41-$81	$115-$170	$245-$320
Annual Net Savings After Loan Repayment	$282-$314	$360-$410	$490-$560
Time to Recoup Higher Cost	3.7-4.3 years	2.9-3.4 years	2.2-2.5 years

Source: Ridlington and Brown (2006), 19.

Vehicle purchasers who pay for the vehicle in cash would experience greater savings (Witherspoon, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles," presentation to STAPPLA/ALAPCO Fall Membership Meeting, October 23-27, 2004). The state of Rhode Island, for example, calculated the net savings to consumers that purchase a new vehicle to be $170 annually at a gasoline price of $2.20 per gallon during the term of a 60-month loan (State of Rhode Island Department of Environmental Management, Office of Air Resources, "Proposed Amendments to Air Pollution Control Regulation No. 37, entitled 'Rhode Island's Low Emission Vehicle Program,'" notice published October 31, 2005).

Considering the consumer pocketbook monthly cash flow, the CARB passenger cars and light duty trucks (PC/LDT1) and light duty trucks (LDT2) showed net monthly savings of about $20. These are the likely vehicles that dealers will promote to be in compliance. If the net savings is aggregated over the life of the loan (five years at 7 percent interest), annual net savings will range from $500 to $1,000; the longer the consumer owns the vehicle, the greater the savings will be.

Technological changes required to achieve the emission reductions will result in modest increases in vehicle prices, as shown in Table 4. CARB projected that passenger cars and light trucks would cost consumers from $17 to $367 more in the early years, and that large trucks and SUVs would cost from $36 to $277 more in the early years, and that consumers would more than make up that cost from increased fuel economy. Passenger cars and the light duty trucks will achieve 34 percent reduction in global warming pollution by 2016, with heavier light trucks achieving the required 25 percent reduction in the same period. (Brown and Ridlington, 2005, 18-20; CARB, "Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions form Motor Vehicles," September 10, 2004).

Table 4. Manufacturers Costs: Average Fleet-Wide Incremental Costs 2009-2016

Year	Passenger Cars and Small Trucks and SUVs (PC/LDT1)	Large Trucks and SUVs (LDT2)
2009	$17	$36
2010	$58	$85
2011	$230	$176
2012	$367	$277
2013	$504	$434
2014	$609	$581
2015	$846	$804
2016	$1,064	$1,029

Source: CARB, "Final Statement of Reasons," (2005)11.

If vehicle operating costs are reduced for purchasers of new vehicles, and ultimately for owners of resale vehicles as well, consumers are expected to spend the net savings on additional goods and services, other than gasoline, according to their respective market basket of goods consumed each month. These expenditures would flow through the economy with the potential to create not only job growth but an increase in personal income. The state of Washington estimated personal income in the state to increase by $28 million in 2010, $911 million in 2020 and $1.5 billion in 2030 (Washington Department of Ecology, "Cost, Benefit, and Least Burdensome Analysis for the Proposed Low Emission Vehicles, Chapter 173-423 WAC," October 2005).

With improved vehicle fuel efficiency, owners could increase VMT. This could be an incentive for owners to drive more as a direct result of lowering the marginal cost of driving a vehicle, referred to as the "rebound effect." As a result, it could reduce the intended goal of climate change regulations. Published estimates range from 0-50 percent depending on methodology and data sources. CARB estimated the long-term rebound effect to be 3.08 percent (CARB, "Initial Statement of Reasons," 185).

3. Costs of Regulation (regulated entities)

ADEQ anticipates that this proposed rule will impact the following entities: automobile manufacturers, automobile dealers, fuel producers, gasoline stations, gasoline distributors and other businesses providing goods and services to consumers. ADEQ anticipates a net benefit.

Automobile Manufacturers

All motor vehicle manufacturers must comply with the vehicle certification standards, fleet average emission requirements, warranty, recall and other applicable requirements of Article 18 beginning with model year 2012. For example, each motor vehicle manufacturer's NMOG fleet average emissions from passenger cars, light-duty trucks and medium-duty vehicles delivered for sale in Arizona must not exceed the fleet average NMOG exhaust emission requirement. Each automobile manufacturer will have to demonstrate that all of its vehicles meet the standards imposed under this rulemaking.

If a report shows that the manufacturer has not complied with the NMOG fleet average emission standard, the manufacturer must submit a Fleet Average Remediation Report to ADEQ within 60 days. For model years 2012 through 2014, the manufacturer must submit this report, if needed, to ADEQ by March 1, 2015. If debits are accrued in all three years, the manufacturer must equalize one year of debits by the end of the 2015 model year and the remaining two years of debits by the end of the 2016 model year.

Each manufacturer also must comply with a ZEV sales requirement. The ZEV sales requirement would be based on total vehicle sales in Arizona, and would commence with model year 2012 passenger cars and light-duty trucks produced and delivered for sale in Arizona. The ZEV sales requirement allows manufacturers to choose between two compliance paths. The conventional path requires the manufacturer to place in service (i.e., to sell to an ultimate purchaser) in Arizona a certain number of ZEVs, which number is based upon the number of passenger vehicles and

light-duty trucks that the manufacturer delivers for sale in the state. An alternative compliance path will allow manufacturers to meet the entire ZEV mandate with a combination of ZEVs, Partial ZEVs (PZEVs) and Advanced Technology PZEVs (ATPZEVs).

The rule provides flexibility to manufacturers while improving vehicles through advanced technology. It allows, for instance, manufacturers to average emissions across their entire vehicle mix, aggregate the GHG pollutants into equivalent emissions and bank and trade excess emission credits between vehicle classes and manufacturers. Manufacturers can earn and bank vehicle equivalent credits for any ZEV, ATPZEV or PZEV delivered for sale in Arizona on or after January 1, 1999. The credits may be used at a later time to comply with the ZEV sales requirement in R18-2-1808. Thus, a manufacturer could bank, acquire from another manufacturer and use credits in the same manner as the California program.

Examples of technology that manufacturers could use to meet the standards include discrete variable valve lift or camless valve actuation to optimize valve operation, instead of relying on fixed valve timing and lift; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; improved air conditioning systems that operate optimally and leak less and/or use an alternative refrigerant (CARB, Fact Sheet, "Climate Change Emission Control Regulations," December 10, 2004).

Manufacturers can incorporate current technology to achieve compliance with the Clean Car Standards without having to downsize or reduce vehicle weights. They should be able to offer their current mix of vehicles. According to the Northeast States Center for Clean Air Future (NESCCAF), all of the technologies needed to achieve the GHG standards currently are in production (NESCCAF, "Reducing Greenhouse Gas Emissions from Light Duty Motor Vehicles," September 2004). Examples include: electronic power steering, six-speed automatic transmissions, improved air conditioning systems, cylinder deactivation, and turbocharging.

Emission control regulations impose costs. California estimated the incremental cost of control to meet the GHG emission standards, beginning with the year 2009. Table 4. shows these average costs. When fully implemented, the average increase in the PC/LDT1 category would be $1,064 and $1,029 for the category LDT2. Because Arizona's program will be effective with the 2012 model year, ADEQ has no reason to believe that the initial incremental costs would be any higher or lower than the costs shown in Table 4.

Manufacturers could use marketing tools and technology-based cost decreases over time to recover the higher compliance costs. It is important to point out that in the past automobile manufacturers have had to comply with a variety of regulatory changes that increased production costs. Although costs have been passed on to consumers, the CARB analysis suggests that none of the increased costs have been passed on in the first year. It is suggested that during the second year, about two-thirds of the costs are passed on with the remainder of the costs passed on to consumers in later years (CARB, "Initial Statement of Reasons," 191). Furthermore, not all of the increased production costs are distributed evenly across all of their product lines. When consumers' elasticity of demand can be differentiated, higher costs can be passed on to the group that exhibits the least elasticity of demand, often referred to as price discrimination. For example, this latter group would be just as willing to purchase a vehicle at a price of $29,065 as they would at $28,000.

Whether manufacturers' revenues would increase revolves around the concepts of elasticity of demand and cost recovery techniques. A basic economic principle is that when the price of a good increases, the quantity demanded for that good will fall. If this holds true for vehicles, one would expect new car sales to fall; however, other factors in the market could alter the effect of the Law of Demand. If personal income increased, for example, new car sales actually could increase over the pre-regulated market. Additional factors also could cause a shift in demand that would negate the higher costs of new vehicles.

The price elasticity of demand measures how responsive buyers are to a change in price. The coefficient, which is always negative in value, is calculated by dividing the change in quantity demanded by the change in price. A coefficient (e) of -1.0 means the product is unitary elastic because a change in price will not lead to a change in quantity demanded. However, if a 5 percent increase in price leads to a 10 percent decline in sales, the good would be classified as relatively elastic (e = -2.0). Conversely, if that same 5 percent increase in the price of the good resulted in only a 1 percent decline in sales, that good would be classified as inelastic (e = -0.2) because consumers of that product would be less sensitive to an increase in price. Studies show that -0.2 is the long-run elasticity of demand for vehicles (CARB, "Initial Statement of Reasons," 181).

A product will be more elastic if substitute products are readily available, if the product is relatively important in consumers' budgets, and if the time-frame is relatively short because consumers are likely to be more sensitive to price over a longer period of time. A general rule is that most increased compliance costs can be passed on to consumers if demand for a product is relatively inelastic and supply is elastic. However, the rule is based on holding other factors constant that potentially could change this rule.

Basically, consumers have three choices: keep their current vehicle longer, purchase an older vehicle that does not have to comply with the Clean Car Standards, or pay the nominal amount extra for a new car. With the potential that consumers' incomes could increase and the desire for reduced operating costs of new vehicles, it is very likely that higher prices may not lead to a decline in quantity demanded. A logical conclusion could be that if automobile sales decline, it may not be a result of higher prices for LEV II vehicles. New car sales are a function of several factors other than price. These factors include: household income, demographics, unemployment, national economic growth,

consumer confidence, consumer preferences and financing options. Any of these factors could shift the demand for new vehicles.

Automobile Dealers

Automobile dealers, especially those selling new vehicles, will also be affected by this rulemaking. New auto dealerships play an important role in Arizona's economy, comprising 8.4 percent of total retail employment in the state and generating $19 billion in sales, based on 2006 data (NADA, "Driving Arizona's Economy," 2007). There were 4,147 Arizona licensed new and used automobile dealers trading 626,782 vehicles in fiscal year 2007. Vehicle sales and registrations comprise an important source of revenue for the state and local government, as well. Vehicle License Tax (VLT) revenue from new, never-before-titled vehicles was about $120,755,000, or about 13.6 percent of the total VLT income (ADOT statistics, personal communication, 2008).

Dealers may increase their prices to reflect the cost increases manufacturers incur from complying with these regulations. Theoretically, higher prices will reduce demand for new vehicles, in turn reducing tax revenues for state and local governments. The price increases from compliance with these regulations, however, will be small relative to the overall purchase price of new vehicles. As discussed earlier, ADEQ expects consumer response to these price increases to be marginal.

Beginning in model year 2012, any low-mileage (7,500 miles or less on the odometer) vehicles sold by Arizona dealers for registration in Arizona must be "California certified." These vehicles are expected to cost about $277 to $367 more than federally-certified vehicles in the first year of implementation in Arizona. They may still retain noncompliant vehicles in their inventory for sale and registration out of state. Franchise dealers must order new certified vehicles from manufacturers. Dealers will face costs to adjust their inventory, conduct training, and alter business practices. However, the delayed effective date of this rule affords ample lead time to diminish these ultimate costs.

Fuel Producers, Gasoline Stations, and Gasoline Distributors

Because the Clean Car Standards will reduce fuel consumption, sales may decrease somewhat. This could have a negative impact on sales and employment in this sector. In Arizona, however, this impact may be mitigated completely due to expected population growth. Industries and employees impacted by this rulemaking would be those engaged in the refining and distribution of gasoline. ADEQ notes that distribution, sales and service industries will be the least impacted.

Other Businesses Providing Goods and Services to Consumers

Because the rule will result in the introduction of advanced technologies that reduce gasoline consumption, ADEQ expects that the savings over the life cycle of the vehicle will outweigh the higher prices for vehicles. This surplus of savings is expected to be expended on other goods and services as savings flow through the economy. Indirect impacts could be business expansions and new business creations. Therefore, even if some sectors of the economy experience losses (e.g., fuel producers, distributors, and gasoline retailers), other sectors could experience gains.

4. Small Business Impacts

State statutes require agencies to reduce the impact of a rule on small businesses by using certain methods, when they are legal and feasible, in meeting the statutory objectives of the rulemaking. Under § 41-1055(B)(5)(c)(i-iii), the methods that agencies may employ to reduce the impact on small businesses include the following: (1) establish less costly compliance requirements; (2) establish less costly schedules or less stringent deadlines for compliance and (3) exempt small businesses from any or all requirements.

Under A.R.S. § 41-1035, agencies must consider each of the methods set forth in that section and reduce the impact by using one or more, if the agency finds that the methods are legal and feasible in meeting the statutory objectives of the rulemaking. These methods include: (1) establish less stringent compliance or reporting requirements; (2) establish less stringent schedules or deadlines in the rule for compliance or reporting requirements; (3) consolidate or simplify compliance or reporting requirements; (4) establish performance standards to replace design or operational standards and (5) exempt small businesses from any or all rule requirements.

Some of the businesses impacted will be classified as small businesses. Because the cost of higher priced vehicles will be more than offset by reduced operating costs, ADEQ does not expect that small businesses purchasing or leasing new vehicles will be negatively impacted. Other small business entities could benefit from increased revenues as consumers increase their expenditures due to reduced operating costs of vehicles. These increases in expenditures can be explained by consumers' marginal propensity to consume over the years.

Section 177 the Clean Air Act requires that states adopting the California regulations maintain identical standards and consistent programs for a given weight class of vehicles. Therefore, ADEQ cannot reduce any regulatory impact on small businesses by changing any of the substantive requirements of the Clean Car Standards.

5. Consultants, Vendors, Repair Facilities

These are classified as affiliated businesses to the automobile industry. In the near future, employment, payroll, and revenues could be affected. Advanced emissions control systems will require new diagnostic and repair equipment and training, which will have a cost. However, these costs will occur in the future regardless of this regulation due to technological evolution in the automotive industry. ADEQ expects responses will be similar to those of the automo-

tive service industry when catalytic converters and other emissions controls were first introduced. These innovations ultimately created new economic opportunities and fostered business creation.

6. ADEQ

ADEQ does not expect that the vehicle emissions inspection programs in Phoenix and Tucson will be negatively impacted. All vehicles of model years 1996 and newer are tested using on-board computer diagnostic test instead of a tailpipe test that measures emissions. Implementation of the Clean Car Standards will be fully consistent with the vehicle registration law that requires all vehicles of model year 1968 or newer to be equipped with emissions control devices that meet standards established by the Director [A.R.S. § 28-955(D)]. ADEQ will continue to exempt new vehicles for the first five years. When the "California certified" vehicles reach six years old, they will be tested using on-board diagnostics.

Each manufacturer shall submit a report to ADEQ by March 1 (procedures and format set forth in CCR, section 1961) that contains end-of-year data that calculates the fleet average NMOG exhaust emissions for the model year just ended. ADEQ staff will need to review these reports to verify compliance.

7. Arizona Department of Transportation, Arizona Motor Vehicle Division (MVD)

ADEQ does not expect significant impacts to MVD; however, in addition to developing and implementing appropriate forms, impacts could include increased time and monies for training, staffing, and programming. Based on experiences in other states that have adopted LEV II, this rulemaking could result in slightly longer wait times for MVD customers in its field offices and call centers. Due to complaints and investigations, the Office of the Inspector General Investigations could be impacted. MVD collected vehicle license taxes (VLT) for new vehicles of about $120,755,000 for fiscal year 2007 (MVD March 11, 2008). Even if sales of new vehicles decline, ADEQ does not anticipate a decline in VLT, due to continued population growth and the need for new automobiles.

8. State Government (Revenue Impacts)

ADEQ does not expect this rulemaking to adversely impact state revenues. Sales tax revenues could increase or decrease, depending on how new and used vehicle sales change once the Clean Car Standards are implemented. The slightly higher vehicle prices should cause an increase in sales taxes collected. Any decline in the quantity demanded is not expected to result in a decline in sales taxes. Additionally, with the anticipated improvement in fuel economy, gasoline taxes are expected to decline. However, with the expectation that consumers will purchase additional goods and services, due to savings from reduced vehicle operating costs, sales tax revenues could increase. Finally, with the potential for increases in personal income, the Arizona Department of Revenue could collect more tax revenues.

9. Subdivisions of the state of Arizona

State and local governments, and other political subdivisions of the state, that own, lease or operate passenger vehicles and light trucks that are subject to this rulemaking will be required to use only "California certified" vehicles. The cost of these higher priced vehicles will be offset by reduced operating costs. Therefore, these proposed rules will not result in any significant adverse economic impacts to political subdivisions. Fleet owners should experience reduced operating costs.

10. Insurance Sector (indirect impacts)

Private and federal insurers paid about $320 billion in claims on weather-related losses (1980 through 2005). In constant dollars, private insurers paid $243.5 billion, the largest part of the claims, followed by federal crop insurance, $43.6 billion, and federal flood insurance, $34.1 billion. Although the amount of the claims generally increased during this time period, they varied significantly due to the incidence and effects of catastrophic weather events (e.g., hurricanes and droughts). The years with the largest insured losses generally were associated with major hurricanes, comprising more than one-third of all weather-related losses since 1980. Growth in population in hazard-prone areas and real estate developments have increased federal and private insurers' exposure, which helps to explain the increase in losses.

The heavily-populated areas along the Northeast, Southeast, and Texas coasts, for instance, have among the highest value of insured properties in the United States, which means these areas face the highest likelihood of major hurricane losses. Thus, because of these and other factors, federal insurers' exposures have grown substantially. Since 1980, the National Flood Insurance Program's exposure has quadrupled, nearing $1 trillion, and program expansion has increased the Federal Crop Insurance Corporation's (FCICs) exposure nearly 26-fold to $44 billion. These escalating exposures to catastrophic weather events are leaving the federal government at increased financial risk. FCIC officials said that if the widespread Midwest floods of 1993 were to occur today, losses would be five times greater, or $1.3 billion vs. $6.5 billion. However, after adjusting for inflation, the cost would be $8.5 billion in 2005 dollars, which is about one-half the costs of Hurricanes Katrina and Rita in 2005, and more than four times the premiums taken in by the program annually. Even without considering the impacts of climate change, federal flood insurance is of questionable financial sustainability without major and frequent subsidies (U.S. GAO, "Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades Are Potentially Significant," 2007).

11. Employment Impacts

ADEQ expects the net employment impact to be positive. California concluded that employment actually would increase in the state because money previously spent by consumers on gasoline would circulate longer within the economy, which would increase employment. Even if employment in the automotive industry (i.e., manufacturing, suppliers and distribution facilities) did decline, the net effect would be an increase in overall employment and not a decline (CARB, "Technical Support Document for Staff Proposal Regarding Reductions of Greenhouse Gas Emissions from Motor Vehicles: Economic Impacts of the Climate Change Regulations," August 6, 2004).

Concerns over potential job losses if many vehicle models would not be offered for sale in Arizona was characterized by CARB as "unrealistic and based on selective data sources." The state of Washington and other states agreed ("Concise Explanatory Statement and Responsiveness Summary," Washington State Department of Ecology, November 28, 2005, 18-19). ADEQ concludes that these analyses are reasonable and that these rules will have positive employment effects.

The state of Washington used the Environmental Dynamic Revenue Analysis Model (E-DRAM) simulation scaled to Washington's economy to demonstrate the impact of low emission vehicle regulations. The state's net employment impact showed an increase by over 519 jobs in 2010; 9,506 jobs in 2020; and 14,345 jobs in 2030 ("Cost, Benefit, and Least Burdensome Analysis for the Proposed Low emission Vehicles, Chapter 173-423 WAC," October 2005).

F. Social Costs

The general public, governments, the insurance sector, and other businesses face economic losses from weather-related events due to climate change. Losses include both the insured and the uninsured. The 15-fold increase in insured losses from catastrophic events alone has far outstripped inflation, premium increases and population growth. Climate change is very likely to increase the weather-related events so that the risk will significantly increase. Escalating losses are a direct result of increased costs to society in the form of higher premiums, lowered coverage limits and increased restrictions in coverage. State and federal governments could expect additional financial liability in response to private insurers restricting coverage and withdrawing from markets ("New Report Warns of Rising Threat to Industry from Climate Change," *Insurance Journal*, 9/08/05).

Policy on climate change hinges on two factors: probability and consequence. Extensive scientific research has established a very high probability of very consequential damages resulting from climate change. A program that reduces GHG emissions can help reduce the probability of future climate change while creating alternatives to minimize the consequences to society. Reducing GHG emissions could help reduce expected future costs to society, but it also could reduce the chances of irreversible or potentially catastrophic damage (Peter R. Orszag, "Approaches to Reducing Carbon Dioxide Emissions," Congressional Budget Office Testimony, November 1, 2007).

Anthropogenic activities are accelerating the warming of the atmosphere by adding significant quantities of carbon dioxide and other GHGs. These activities have created and will continue to create negative externalities (adverse third party effects). This is the result of an inefficient market since prices, which could be distorted or absent, do not reflect true social costs and benefits from using the air to discharge these pollutants. In these cases, air is treated as a free good without internalizing potential damages caused by GHGs and other pollutants. Society bears the costs of adverse impacts to human health, property, and the environment.

G. Less Costly Alternatives

ADEQ could implement neither a less costly alternative to this rulemaking nor less costly compliance options. Federal standards are less stringent than California's standards. Requiring "California certified" vehicles is the most protective standard for human health and the environment. Since section 177 of the Clean Air Act requires that a state adopting the California regulations maintain identical standards and consistent programs for a given weight class of vehicles, the only regulatory alternative to adopting GHG standards would be to revert back to less stringent federal standards that fail to address GHG emissions. Thus, no alternatives or combination of compliance options could be implemented that would be equally effective in achieving the emission reductions projected.

H. Limitations of the Data [§ 41-1055(C)]

ADEQ relied on various studies on the technological and economic feasibility of these regulations, including other states that have adopted the Clean Car Standards. The state of Washington, for example, used California data as a basis for showing costs and benefits to its residents (through mathematical proportioning). ADEQ requested information about economic impacts when it proposed this rulemaking (14 A.A.R. 258, February 1, 2008), but received only meager information.

ADEQ determined that the costs and benefits to Arizona will be similar to impacts identified by other states adopting the Clean Car Standards. Furthermore, the economic impacts set forth by CARB correctly identify and monetize the impacts of the Clean Car Standards, and that the conclusions are applicable to Arizona. These support documents substantiating the technical and economic feasibility and public policy merits of the Clean Car Standards have withstood numerous legal challenges, lending further credence to their veracity. Therefore, the net impact of these rules on Arizona's economy is anticipated to be positive but small in comparison to the overall economy. This rulemaking will not impose a significant adverse impact on Arizona's economy or businesses that operate here.

10. A description of the changes between the proposed rules, including supplemental notices, and final rules (if applicable):

1. The defined term "affected vehicle" was substituted for the defined term "new vehicle" in response to Comment 30 in order to avoid confusion with the different definition of "new vehicle" used in the Motor Vehicle Division's programs. In addition, the definition was modified to clarify that it only applies to passenger cars, light duty trucks and medium duty vehicles, since it is used exclusively in the definition of "ultimate purchaser" (R18-2-1801(52)), the applicability language for the certification standards (R18-2-1802) and the introduction to Appendix 13. Those provisions apply exclusively to the itemized classes of vehicles.

2. The definition of "delivered for sale" was modified to conform to the California definition in order to avoid identicality issues in response to Comment 19.

3. In response to concerns raised by the staff of the Governor's Regulatory Review Council (G.R.R.C.), the definition of "greenhouse gas model year" was modified to delete a provision that would allow application of the greenhouse gas standards to the model year commencing two years after "any judicial decision … that has the effect of authorizing states to adopt" the standards. G.R.R.C. was concerned that whether a judicial decision had this effect could be unclear and open to dispute.

4. The definition of "state" to mean the state of Arizona was deleted because it conflicted with a number of instances where the term refers to other states. Wherever the state of Arizona is intended, it is identified by name.

5. The applicability provisions in R18-2-1802(A) and (D) were modified to use the defined term "affected vehicle." Since the defined term now itemizes the vehicle classes to which it applies, the itemizations of vehicle types formerly included in these subsections were removed.

6. In response to Comment 11, R18-2-1802(A); R18-2-1804(A) and (B); R18-2-1806(A); R18-2-1807(A), (B), (C), (K), (M) and (N) and R18-2-1809(A) and (C) were modified to change the start date for all requirements except the GHG standards in R18-2-1805 from model year 2011 to model year 2012 in order to assure compliance with the lead time requirements in section 177 of the Clean Air Act. In addition, in order to more closely conform to California's rules and simplify compliance, compliance will now be determined on the basis of complete model years, rather than calendar years, as proposed. Under 40 CFR 85.2303:

> A specific model year must always include January 1 of the calendar year for which it is designated and may not include a January 1 of any other calendar year. Thus, the maximum duration of a model year is one calendar year plus 364 days.

7. R18-2-1803 was amended to delete the incorporation by reference of numerous sections of the California Code of Regulations in order to assure compliance with A.R.S. § 41-1028(A), which does not expressly authorize incorporation of the rules of other states. The sections formerly incorporated by reference are now set forth in full in new Appendix 13 to Title 18, Chapter 2, which R18-2-1803 incorporates into Article 18.

8. Subsection titles were eliminated from R18-2-1804(A), (B), (C) and (F) and R18-2-1805(B), (C), (D) and (F).

9. In response to Comment 27, the unnecessary requirement to report pre-model year data in R18-2-1804(C)(1) was eliminated.

10. The reporting date in R18-2-1804(E) was changed from model year 2013 to model year 2014 to conform to the new initial compliance date of model year 2012.

11. The deadlines for the initial three-year compliance period for the fleet-wide NMOG emission limits were moved back two years in order to correct an error in the proposed rule and to conform to the new initial compliance date of model year 2012.

12. The dates to which the requirements in R18-2-1807(N) apply were moved back one year to conform to the new initial compliance date of model year 2012.

13. In response to Comment 29 and Comment 35, reporting requirements that are unnecessary and arguably in conflict with California requirements were eliminated from R18-2-1808(B), (C) and (E).

14. R18-2-1812 was deleted in response to Comment 20, which raised Commerce Clause concerns about this provision.

15. Minor technical and grammatical changes were made to improve the rule's clarity and to conform to requirements of the Secretary of State.

11. A summary of the comments made regarding the rule and the agency response to them:

Support for Rule

Comment 1: ADEQ received numerous comments from concerned citizens in writing and at the public hearing thanking the Governor for her Executive Order directing adoption of this rule and urging ADEQ to finalize its adoption in order to improve air quality overall, reduce pollution, protect public health, save consumers money by reducing gasoline expenditures and contribute to the reduction of GHG emissions. The comments included: over 4,000 post cards signed by students from the University of Arizona, Arizona State University (ASU) and campuses across the state and delivered by the Arizona Public Interest Research Group (PIRG); 202 signatures by ASU West Campus

students on a papier mâché car; 370 signatures on banners prepared by ASU students; a letter signed by 79 public interest groups and businesses; a petition signed by 98 citizens and a letter from the Sierra Club—Grand Canyon Chapter ("Sierra Club").

Response: ADEQ appreciates the overwhelming support for the rule demonstrated by these comments and agrees that the rule will accomplish the benefits identified.

Comment 2: Numerous commenters identified specific health problems that they or family members suffered and that are attributable to air pollution and urged adoption of the rule to address these types of problems.

Response: ADEQ appreciates these comments and agrees that the rules will help to reduce ozone pollution, which exacerbates many of the health problems identified by the commenters.

Comment 3: ADEQ has the authority to adopt this rule under federal law and A.R.S. §§ 28-955, 49-447 and other provisions of Title 49, A.R.S. *[Sierra Club]*

Response: ADEQ agrees with this comment.

Comment 4: The rule will not make vehicles unaffordable or limit the availability of certain types of vehicles, as claimed by the manufacturers. Consumers will more than recoup the cost increases attributable to the rule through fuel cost savings. *[Sierra Club; Consumer Federation of America]*

Response: As indicated elsewhere in this Notice of Final Rulemaking, ADEQ agrees with this comment.

Comment 5: Arizona should adopt the Clean Car Rule and not let the federal government dictate the State's policy. *[Numerous commenters]*

Response: ADEQ agrees that current federal standards for GHG emissions, including the recent amendments to the CAFE standards, are not adequate to address climate change.

Comment 6: There are many types of clean car technology already available to car makers, including: hydrogen, ethanol, compressed natural gas, vegetable oil, biodiesel, and hybrid technology. *[Numerous commenters]*

Response: ADEQ agrees with this comment.

Comment 7: The Clean Car Rule is a tool that will be used in solving the problem of global warming. The Rule will make Arizona more sustainable place to live for future generations. *[Numerous commenters]*

Response: ADEQ agrees that the rule will contribute to sustainability.

Comment 8: Arizona should adopt the most stringent measures possible for new and used cars. *[Numerous commenters]*

Response: As noted elsewhere in this Notice of Final Rulemaking, California standards are in fact the most stringent standards for new vehicles that Arizona may adopt under federal law. Arizona's vehicle emissions testing program for in-use vehicles is the most advanced and effective in the nation.

<u>Procedure</u>

Comment 9: There have been no stakeholder meetings for this rule. The earlier meetings of the Climate Change Advisory Group (CCAG) are not a substitute for the traditional stakeholder vetting of proposed rules. *[Arizona Chamber of Commerce and Industry (Arizona Chamber)]*

Response: The CCAG process provided greater opportunity for public involvement and attracted a far more diverse representation of stakeholder interests than ADEQ's typical stakeholder process. The CCAG held 40 technical work group and six full meetings while reaching its recommendations and writing its reports. All meetings of CCAG and CCAG's technical work groups were open to the public, and calls to the public were made at the end of each meeting. Any stakeholder was allowed to participate in any technical work group meeting. A representative of the automobile manufacturers attended two full CCAG meetings and the last five (out of eight total) Transportation and Land Use Work Group meetings.

Appointed by the Governor, the CCAG comprised a diverse group of stakeholders who brought broad perspective and expertise to the topic of climate change in Arizona. Members represented the following sectors: electric power generation, fossil fuel industry, manufacturing, mining, agriculture, forestry, construction and building, tourism and recreation, heath care, non-governmental organizations, Indian tribes, state and local government, and the general public.

Although Arizona administrative law does not require that a stakeholder process precede a rule proposal, ADEQ met with several stakeholder groups and attempted to address their concerns in the Notice of Proposed Rulemaking.

Comment 10: The proposed rule represents an important policy decision with far reaching ramifications for the state and its citizens. We believe that policy decisions of this nature are best developed through a collaborative effort between the legislative and executive branches. That did not occur in this instance, as the legislature was completely bypassed. *[Arizona Chamber; Automotive Service Association of Arizona (ASA)]*

Response: ADEQ already has the authority to adopt vehicle emission standards under A.R.S. §§ 49-447, 49-421(1) and 28-955(D). The legislature has delegated broad rulemaking authority to ADEQ under A.R.S. §§ 49-104(A)(10), (B)(4) and 49-425.

Legality of LEV II Provisions

Comment 11: The proposed adoption of the Low Emission Vehicle phase II (LEV II) and Zero Emission Vehicle (ZEV) regulations beginning in model year 2011 violates the Clean Air Act requirement that states choosing to adopt California standards "adopt such standards at least two years before commencement of such model year." The 2009 model year commenced January 2, 2008. The Arizona proposed regulations attempt to require automakers to meet the standards in the 2011 model year even though the 2011 model year commences on January 2, 2010, less than two years after these regulations will be adopted. *[Alliance of Automobile Manufacturers Written Comments ("Alliance Written Comments")]*

Response: ADEQ agrees that for the reasons given in the comment, the California standards should apply beginning in the 2012 model year and has modified the final rule accordingly.

Comment 12: State standards adopted under section 177 of the Clean Air Act must be "identical to the California standards for which a waiver has been granted for such model year." The identicality requirement means that no state may modify the California regulations. Section 177 goes on to specify that no state may "prohibit or limit, directly or indirectly, the manufacture or sale of a new motor vehicle or motor vehicle engine that is certified in California as meeting California standards." *Id.* Furthermore, no state may "take any action of any kind to create, or have the effect of creating, a motor vehicle or motor vehicle engine different than a motor vehicle or engine certified in California under California standards (a 'third vehicle')." *[Alliance Written Comments]*

Response: ADEQ does not agree that section 177 prohibits states from making *any* modifications to California requirements. For example, the D.C. Circuit has held that section 209(a) of the Clean Air Act does not preempt enforcement mechanisms associated with vehicle emission standards. *Motor & Equip. Mfrs. Ass'n* v. *EPA*, 627 F.2d 1095, 1112-13 (D.C. Cir. 1979), cert. denied, 446 U.S. 952 (1980). Section 177 therefore does not prohibit states from altering the enforcement mechanisms included in California's rules. This same commenter has noted that some states have declined to include the zero emission vehicle (ZEV) mandate in their rules and has advocated that Arizona do the same.

Comment 13: By adopting and attempting to enforce the California fleet NMOG average, Arizona may violate section 177. A manufacturer's fleet NMOG average in Arizona will depend on its particular sales mix in Arizona, which is, of course, determined by Arizona consumers. By virtue of the differences between the Arizona and California markets, it is highly unlikely that a manufacturer will sell exactly the same products in exactly the same proportions in Arizona as it will in California. Data indicate that there is a 56 percent sale of trucks vs. 44 percent passenger cars in Arizona. However, the sales in California are 51 percent cars and 49 percent passenger cars. (This is how the comment describes the breakdown. Presumably the commenter intended to state that one of these percentages applies to trucks.) If Arizona consumers demand a particular manufacturer's sales mix in Arizona that results in a higher fleet NMOG average, the manufacturer may be required to artificially limit sales of certain California certified vehicles that Arizona consumers prefer in order to comply with Arizona's fleet average requirement. Such a limitation on the sale of California certified vehicles would, at a minimum, be an indirect limit on the sale of a motor vehicle that is certified to California standards and thus would violate section 177.

This potential violation could be corrected if the Department simply required *reporting* rather than *compliance with,* the fleet average NMOG. *[Alliance Written Comments]*

Response: The sales mix in every state will necessarily be somewhat different than California's and therefore may have the effect described in this comment. Congress nevertheless specifically authorized the states to adopt California's standards in section 177. The mere possibility that a manufacturer might need to restrict the sale of some vehicles in order to meet fleet average requirements therefore cannot be a limitation on the sale of California certified vehicles within the meaning of that section. This conclusion is supported by the decision of the Second Circuit in *Motor Vehicle Mfrs. Assn.* v. *New York State Dept. of Environmental Conservation*, 17 F.3d 521 (2d Cir. 1994), in which the court held that a "marketing choice" adopted by manufacturers to comply with a state's adoption of the California vehicle emission standards did not constitute "a requirement imposed by" the state agency.

Comment 14: Arizona's proposed ZEV standards are not identical to the California standards in several different respects. Due to the lack of identicality, the proposed regulations violate section 177 and are preempted by section 209 of the Clean Air Act. It is therefore recommended that Arizona decline to adopt the California ZEV standards altogether. *[Alliance Written Comments]*

Response: The commenter identifies only three differences between Arizona's ZEV requirement and California's. [See Comment 15 through Comment 17.] As noted below, the final rule eliminates one of these, and the other two do not raise identicality issues, as explained below. The final rule therefore includes the ZEV standards.

Comment 15: The "Section 177 Provision" in 13 California Code of Regulations (CCR) § 1962(d)(5)(D) effectively counts any model year 2011 or earlier "Type III" ZEV (fuel cell vehicle) in any state that adopts the California standards as if the vehicle were in service in all such states. CARB is considering amending the ZEV rules to extend the sunset date for this provision beyond 2011 and to apply the provision to other types of ZEVs. To avoid inconsistency

with this possible change, ADEQ should eliminate proposed R18-2-1806(C), which would end the Section 177 provision only when certain conditions are satisfied. *[Alliance Written Comments]*

Response: This comment appears to be based on the mistaken assumption that if R18-2-1806(C) were not adopted, CARB's anticipated amendments to § 1962(d)(5)(D) would automatically go into effect. In Arizona, rules from other jurisdictions may only be adopted as of a date certain. This is expressly recognized in R18-2-1803, which incorporates the relevant California standards "as of January 1, 2008, and no future editions or amendment." If CARB does amend § 1962(d)(5)(D) to provide additional flexibility to manufacturers, ADEQ will of course amend Arizona's rules to conform, in order to avoid identicality issues. In the interim, R18-2-1806(C), which is modeled on an Oregon rule, is designed to provide additional flexibility to the Arizona program and to alleviate concerns about fuel cell infrastructure raised by the manufacturers.

Comment 16: To maintain consistency with the California reporting requirements, it is recommended that ADEQ revise R18-2-1807 (ZEV Credit Bank and Reporting) so manufacturers establish a ZEV Credit Bank with Arizona and follow reporting procedures of ZEV credits and debits in accordance with CARB Manufacturers Advisory Correspondence (MAC) #06-03 Zero Emission Vehicle (ZEV) Credit Reporting and Tracking System, dated October 19, 2006 (Attachment II). *[Alliance Written Comments]*

Response: The comment fails to identify any specific discrepancies between the proposed rule and California reporting requirements. The proposed ZEV reporting requirements are modeled on other state incorporations of the LEV II standards and have not been modified in the final rule, except to the extent necessary to reflect the model year 2012 start date.

Comment 17: The Department's elimination of the 15 year/150,000 mile warranty requirement provision for partial zero emission vehicles or PZEVs creates identicality issues with the California regulations and violates the Clean Air Act. In order to successfully eliminate the 15 year/150,000 warranty provision within the confines of the Clean Air Act, Arizona should completely eliminate the ZEV Mandate from its proposed rule. *[Alliance Written Comments]*

Response: ADEQ disagrees. If ADEQ may eliminate the entire ZEV mandate without violating section 177 of the Clean Air Act, as this comment concedes, the Department may take the lesser step of eliminating one component of the requirement, as long as doing so does not require the manufacturers to produce a "third vehicle." Eliminating the warranty *requirement* in R18-2-1809(B) gives manufacturers the *option* of supplying PZEVS to Arizona customers with a more limited warranty than that required by California.

Comment 18: The final rule should exclude the 15 year/150,000 mile warranty. After the original equipment warranty expires, 70 to 80 percent of motorists prefer to go to an independent repair facility for repairs. A Rand Corporation study found that the 15/150,000 mile warranties being imposed under the California PZEV program will cause revenue declines for the independent aftermarket of between $375 million and $1.3 billion in 2020. Other studies also found significant impact on this industry from the warranty requirement. *[California/Nevada/Arizona Automotive Wholesalers' Association (Auto Wholesalers; Randy's Automotive)]*

Response: The final rule retains the exclusion of the 15 year/150,000 mile warranty requirement in R18-2-1809(B).

Comment 19: Arizona has proposed that the definition of delivered for sale in Arizona include vehicles "that have received a bill of lading for sale in another state and have been sold to a purchaser who subsequently registers the vehicle in Arizona while the vehicle has 7,500 miles or less on its odometer." Vehicles delivered for sale in Arizona form the basis of several compliance requirements, including fleet average requirements. Vehicles delivered for sale out-of-state that are sold to a purchaser who subsequently registers the vehicle in Arizona cannot be included in the definition of delivered for sale in Arizona for several reasons. First, manufacturers are not required to include such vehicles in compliance requirements for California (or for that matter, for any state that has adopted California standards) and thus Arizona's proposal violates the identicality requirement of section 177 of the Clean Air Act. Second, manufacturers do not have control over which vehicles are registered in Arizona. Registration is controlled by the Arizona Department of Motor Vehicles, not automobile manufacturers. Manufacturers cannot be held to a compliance requirement over which they cannot control. Third, manufacturers could never submit compliance reports by the dates specified in the regulations. For example, Arizona, like California, requires that the fleet NMOG report be submitted by March 1 following the model year that just ended. A substantial number of vehicles produced in a given model year are not registered by March 1 following the end of the model year. Some vehicles may not be registered until several years after the end of the model year. *[Alliance Written Comments]*

Response: ADEQ agrees that the change to the California definition of delivery for sale raises substantial identicality issues under section 177 of the Clean Air Act and therefore has deleted this provision from R18-2-1801(12) in the final rule.

Comment 20: ADEQ should delete R18-2-1812, which provides that only licensed new car dealers may sell vehicles with 7,500 mile or less on the odometer. Current Arizona law allows a vehicle that has been transferred by the person who first acquired it from the manufacturer to sell the vehicle as a "used motor vehicle." The result is that consumers have alternatives to new motor vehicle dealers. The proposed rule would remove these alternatives by requiring any 2012 model-year or later vehicle with less than 7,500 miles to be sold by a licensed new motor vehicle dealer. This provision also grants preferential treatment for in-state new motor vehicle dealers by securing the exclusive right to sell all low-mileage vehicles and therefore violates the Commerce Clause. The proposed change to the definition of

"delivered for sale" would be a less onerous method of assuring that vehicles sold out of state but subsequently registered in Arizona are counted towards the rule's fleet average standards. *[Centennial Leasing & Sales of Arizona, LLC (Centennial); Arizona Independent Automobile Dealers Association (AIADA); AAA]*

Response: ADEQ agrees that this provision raises Commerce Clause concerns and has deleted R18-2-1812 from the final rule.

Comment 21: ADEQ should retain R18-2-1812. It will not have a substantial affect on interstate commerce and therefore does not rise to the level of a Commerce Clause violation. *[Arizona Automobile Dealers Association]*

Response: This comment was submitted after the close of the public comment period. ADEQ is responding as a matter of courtesy but does not waive any objections it may have in a subsequent proceeding as a result of the late submittal.

As Comment 20 notes, proposed R18-2-1812 would grant preferential treatment to Arizona businesses. Indeed it would flatly prohibit any entity other than an Arizona new car dealer from selling low-mileage vehicles (7,500 miles or less on the odometer) that are to be registered in Arizona. As such, it is not subject to the substantial burden test referenced by this comment but to the nearly *per se* prohibition against state laws that discriminate against interstate commerce.

Legality of Greenhouse Gas Limits

Comment 22: The proposed adoption of the greenhouse gas (GHG) regulations violates the Dormant Commerce Clause because it imposes excessive burdens on interstate commerce in relation to the benefits achieved. *[Alliance Written Comments]*

Response: The comment fails to identify any burdens on interstate commerce, let alone burdens that are excessive in relation to the considerable benefits identified in the Notice of Proposed Rulemaking and the Economic Impact Statement (EIS) for this rulemaking.

Comment 23: EPA's denial of California's request to implement its own fuel economy regulations as part of the existing LEV II program prohibits California and all other states from implementing California's GHG regulations. *[Alliance Written Comments; Arizona Chamber; Matthew Erwin on Behalf of Mazda North American operations ("Mazda")]*

Response: ADEQ agrees that this is the legal effect of EPA's waiver denial. For this reason, ADEQ has made adoption of the GHG emission standards (R18-2-1805) conditional on a reversal of EPA's decision. Conditional adoption now will minimize the delay between any such reversal and the effectiveness of the GHG standards in Arizona. If ADEQ waited until the reversal actually occurred before proposing to adopt the GHG standards, a new model year might begin between the date of the proposal and the rule's adoption, necessitating a delay of an additional model year in the rule's effectiveness.

There is ample precedent for conditional adoption. Under section 110 of the Act, amendments to the state implementation plan (SIP), like new motor vehicle emission standards in California, cannot be adopted until approved by EPA. (*Sweat* v. *Hull*, 200 F. Supp. 2d 1162 (D. Ariz. 2001). Accordingly, in Arizona, both the legislature and an administrative agency (the Department of Weights and Measures) have adopted amendments to existing requirements on the condition that EPA approves the changes. *See* Laws 2004, ch. 293, § 5; Laws 2005, ch. 104, § 7; Laws 2007, ch. 145, §§ 4, 5; A.A.C. R20-2-750(Q).

Comment 24: California's attempt to regulate fuel economy via its proposed GHG regulations is in conflict with federal law which reserves to the national government the sole power to regulate motor vehicle fuel economy, as well as other provisions of federal law. *[Alliance Written Comments; Chris Bostwick on behalf of Chrysler LLC at Oral Proceeding (Chrysler)]*

Response: The courts have uniformly rejected this argument.

The automobile manufacturers have sued in federal courts in Vermont and California to overturn state GHG limits for new cars. Both courts rejected the argument that federal fuel efficiency standards preempt the states from adopting those limits. *Green Mountain Chrysler Plymouth, et al.* v. *Crombie*, 508 F.Supp. 2d 295, 350 (D. Vt. 2007) (240 page memorandum and order); *Central Valley Chrysler Jeep* v. *Goldstone*, No. CV F 04-6663 AWI LJO, slip op. at 40 (E.D. Cal. Dec. 11, 2007) (57 page opinion).

In addition, in *Massachusetts* v. *EPA*, the Supreme Court expressly rejected EPA's argument that the Department of Transportation's regulation of fuel efficiency precluded the agency from regulating vehicle GHG emissions:

> But that DOT sets mileage standards in no way licenses EPA to shirk its environmental responsibilities. EPA has been charged with protecting the public's "health" and "welfare," a statutory obligation wholly independent of DOT's mandate to promote energy efficiency. The two obligations may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.

127 S. Ct. at 1462, 167 L. Ed. 2d at 276 (citations omitted).

Suggested Technical Changes to Rule Language

Comment 25: There is no need to establish a start date separate from the model year start date. *[Alliance Written Comments]*

Response: ADEQ agrees and has eliminated this provision from the final rule.

Comment 26: There is no NMOG Fleet Average requirement for medium-duty vehicles. *[Alliance Written Comments]*

Response: ADEQ agrees and has eliminated this provision from the final rule.

Comment 27: The pre-model year projection requirement in R18-2-1804(C)(1) is unnecessary as manufacturers are required to demonstrate meeting the fleet average requirements at the end of the model year in accordance with 13 CCR §1961. *[Alliance Written Comments]*

Response: ADEQ agrees and has eliminated this provision from the final rule.

Comment 28: Arizona will be adopting California's program mid-stream. Manufacturers have accumulated NMOG credits in California during 2009-2011 model years to use in the 2012-2014 model years. Moving the compliance dates in R18-2-1804(F) by two years would allow manufacturers to earn credits and transition into the NMOG fleet average requirements on a similar path as in California. *[Alliance Written Comments]*

Response: The change suggested is necessary to accomplish ADEQ's intent, which was to provide the manufacturers with three years at the start of the program to come into compliance with the NMOG requirements in Arizona in the same manner as the Oregon LEV II rules. ADEQ therefore has made the suggested revisions to the final rule language.

Comment 29: Reporting VINS as required by proposed R18-2-1808(B) is unnecessary and not required in any other state including California. Second, Arizona cannot mandate manufacturers report operations in other states. *[Alliance Written Comments]*

Response: ADEQ agrees and has eliminated this provision from the final rule.

Comment 30: The definition of new vehicle in R18-2-1801(36) would conflict with the definition in the statute for the Arizona Motor Vehicle Division (MVD) or would create confusion because it differs from that statute's definition. *[AIADA; Centennial]*

Response: The definition would not actually conflict with the MVD definition, since they appear in different regulatory programs. ADEQ's definition would apply only to ADEQ's rules and would not affect any of MVD's programs. However, to avoid confusion between the two programs among entities subject to both, ADEQ is substituting the term "affected vehicle" for "new vehicle." The definitions are identical and are used in the same manner in the rules, thus preserving identicality with the California rules.

Comment 31: The definition of new vehicle is not necessary. The term is only used in R18-2-1812 and in the title to one of the California regulations incorporate by reference. The California regulations incorporated by reference do not contain a definition of new vehicle, let alone define the term in such a manner as to include all motor vehicles with an odometer reading of 7,500 miles or less. *[Centennial]*

Response: The term was also used in the applicability Section, R18-2-1802. As noted above, the term "affected vehicle" has been substituted for "new vehicle."

The California definition of new vehicle as a vehicle with less than 7,500 or fewer miles on the odometer is contained in statute. Section 39042 of the California Health and Safety Code defines a "new motor vehicle" as "a motor vehicle, the equitable or legal title to which has never been transferred to an ultimate purchaser." Section 43156(a) in turn provides that for purposes of the California new vehicle standards:

> It is conclusively presumed … that the equitable or legal title to any motor vehicle with an odometer reading of less than 7,500 miles, has not been transferred to an ultimate purchaser.

In order to be consistent with the California rule, Arizona's program must apply to vehicles with 7,500 miles or less on the odometer.

In addition, this provision protects Arizona new car dealers, independent dealers and brokers who sell low mileage vehicles as used cars from unfair competition and avoids circumvention of the rule by preventing the Arizona registration of used low-mileage vehicles that fail to comply with the California standards.

Comment 32: The exemption in R18-2-1802(E)(11) appears to duplicate that in (E)(2) (now (D)(2)), except it is less specific. *[AIADA]*

Response: ADEQ agrees and has deleted this redundant exemption.

Comment 33: The definition of vehicle identification number should not include the 17-digit restriction. *[AIADA]*

Response: ADEQ agrees and has deleted this language from R18-2-1801(53) in the final rule.

Comment 34: It is not clear why the definition of "sale" or "sell" in R18-2-1801(47) is limited to sales to ultimate purchasers. *[AIADA]*

Response: If this limitation were not included, the rules would prohibit sales of non-California cars between dealers. Since some of the rule's exemptions allow dealers to have non-California certified vehicles on their lots, e.g. R18-2-1802(D)(2), this would be inappropriate.

Comment 35: The requirement in R18-2-1808(E) that every licensed car dealer, new or used, provide a report of each sale of a previously-titled vehicle subject to the rule to ADEQ would create an unnecessary burden for the Department and dealers. *[AIADA]*

Response: ADEQ agrees and has deleted this provision from the rule.

Environmental Benefits

Comment 36: The Energy Independence and Security Act of 2007 (EISA) requires an unprecedented 40 percent increase in Corporate Average Fuel Economy (CAFE) standards by 2020, resulting in a 30 percent reduction in CO2 emissions nationally. With the adoption of EISA and the resulting reductions in GHG emissions, Arizona's goal of addressing climate change has already been addressed at the federal level and alleviates the need for the state to move forward with the California program. *[Alliance Written Comments; Laura Dewey on behalf of Alliance of Automobile Manufacturers at Oral Proceeding (Alliance at Oral Proceeding); Mazda; Chrysler; Arizona Chamber]*

Response: As noted in the EIS, the California GHG emission standards would achieve substantially greater reductions in GHG emissions than the CAFE standards. (CARB, "Comparison of GHG Reductions for the US and Canada under US CAFE Standards and CARB GHG Regulations," February 25, 2008, vii.)

Comment 37: Comparison between the federal Tier 2 emissions program and the LEV II regulations shows that adoption of LEV II will have a minimal impact on air quality improvements as compared to the federal program. When comparing the on-road emission inventory of LEV II with the federal Tier 2 program, it shows a 3 percent difference in VOC + NOx in Arizona. This is minimal and within the error of the model. Therefore, the conclusion drawn from these studies is that there will be no measurable environmental benefit witnessed in Arizona with the adoption of LEV II as compared to the federal program. *[Alliance Written Comments; Alliance at Oral Proceeding]*

Response: As noted in the EIS, the impact on emissions of criteria pollutant from adoption of the LEV II standards will be substantially greater than represented in this comment. Under revisions to the ozone NAAQS announced by EPA on March 12, 2008, four counties in Arizona (Maricopa, Pima, Pinal and Gila) may be ozone nonattainment areas in the future. The reductions in ozone precursor emissions achieved by the LEV II standards may therefore prove critical in reaching the new ozone standard of 0.075 parts per million (ppm), which is more protective of human health than the previous standard of 0.084 ppm.

Costs of Compliance And Effect On Vehicle Market

Comment 38: The Department appears to have done no analysis of the major cost of compliance with the California rule. *[Alliance Written Comments]*

Response: ADEQ disagrees. A preliminary EIS that complies with Arizona statutory requirements was included in the Notice of Proposed Rulemaking, and a final, compliant EIS is included in this notice.

Comment 39: Proponents of the greenhouse gas rule sometimes claim that increases in initial purchase prices for new automobiles subject to the regulation might be offset by the reduced operating cost, such as fuel savings, and thus could result in a net savings to the purchaser. Such an assumption is not consistent with mainstream economic analysis of how consumers value energy cost savings, which recognizes that most consumers apply steep discount rates to the value of future energy cost reductions. *[Alliance Written Comments]*

Response: CARB has demonstrated that the discount rate chosen to estimate fuel savings was reasonable and that the rate advocated by the automobile manufacturing industry was unsupported. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 246-247). In addition, CARB used a very conservative gasoline price of $1.74 to estimate fuel savings. (*Ibid*. 245). Since gasoline prices have risen dramatically in recent years, using a more current gasoline price would result in much higher estimated fuel cost savings.

Comment 40: The proponents of the greenhouse gas rule also ignore opportunity costs, which are important in any mainstream economic analysis of measures like the California rule. The total costs of such a rule include, for example, the value of the foregone opportunity to purchase a vehicle that may be less fuel-efficient but has other features that a consumer desires more than enhanced fuel efficiency. Such features obviously include vehicle performance, safety, capacity, comfort and aesthetics. The Department cannot properly ignore such costs that will be borne by Arizona residents. Consumers who buy a vehicle, but who are forced to purchase technology or other features added or subtracted from the vehicle to meet standards that they would not otherwise prefer, incur costs that are real and quantifiable. *[Alliance Written Comments]*

Response: CARB took into account the potential for opportunity costs such as those described in the comment to be incurred in developing the GHG standards and reasonably determined that they were unlikely to be incurred:

> While it is possible that automakers might choose to achieve compliance by making drastic pricing adjustments or reducing existing levels of vehicle performance or drivability, such approaches are highly unlikely. It is more likely, in staff's view, that competitive imperatives will motivate auto manufacturers to achieve compliance by integrating improved technologies, while maintaining or improving upon vehicle performance.

(CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 255).

The EIS also makes clear that the opportunity costs from *not* adopting the California rule include adverse human health effects and increased health care costs caused by higher emissions of pollutants from vehicles.

Comment 41: The ZEV Mandate requires that automakers power a specified percentage of their new vehicle fleet with only battery electricity or hydrogen fuel cell power. The latest estimate by CARB is that the ZEV mandate will cost between $768 million to $2 billion annually, just for the six largest automobile manufacturers every single year just in California. *[Alliance at Oral Proceeding]*

Response: As CARB has noted, although the short-term cost of the pure ZEV mandate is relatively high compared to other elements of the LEV II rules:

> They must…be viewed in the context of the objective that the Board is trying to achieve. The purpose of the pure ZEV obligation within the ZEV program is to maintain significant pressure on manufacturers to continue ZEV technology development. We know of no other mechanism that can accomplish this objective in a more economical fashion.

(CARB, "The 2003 Amendments to the California Zero Emission Vehicle Program Regulations: Final Statement of Reasons," January 2004, 41-42). In addition, under R18-2-1806(C), manufacturers will not be required to market Type III ZEVs in Arizona until three years after the Director finds an adequate hydrogen fuel infrastructure is in place in this state.

Comment 42: Adopting California's costly vehicle emission program will limit vehicle availability. *[Alliance Written Comments; Chrysler; Mazda; Paul Beebe of Brad's Collision Center]*

Response: CARB reasonably rejected the claim by manufacturers that they would be forced to engage in "mix shifting"—the discontinuation or reduction of sales in certain products in California—in order to meet the GHG standards:

> In order for a strategy such as mix shifting to be effective, a manufacturer would probably need to discontinue its largest vehicles and try to focus sales on smaller ones with lower CO2 emissions. However, their largest vehicles are also their most profitable ones, so that ceding market share in those segments to competitors would be unlikely. Since staff cost estimates for complying with the proposed requirements are much less than the profit manufacturers make on these vehicles, it seems more likely that manufacturers would not abandon the larger segments of the market. GM, for example, has said they will implement a full hybrid powertrain option on their larger SUVs in the 2008 time-frame, which is a more costly approach than staff is suggesting is needed in order to meet the proposed requirements. Consistent with the directive in AB 1493 that the regulation not affect vehicle model availability and consumer choice, staff continues to maintain that all vehicle segments can comply with the requirements cost effectively. Thus, mix shifting would not be a likely compliance path for any manufacturer.

(CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 178).

Comment 43: Arizona has different circumstances than California that include different consumer preferences for vehicles, different driving conditions and different needs for employer and employees in different parts of our state. ADEQ does not appear to have taken those differences into account. *[Arizona Chamber]*

Response: CARB's reasoning in rejecting manufacturer's predictions of mix shifting (see response to Comment 42) is equally applicable to Arizona, regardless of the preferences of Arizona consumers. In addition, Arizona is probably more similar to California in terms of terrain, land-use patterns and other parameters that could affect the mix of vehicles to which the standards will apply than any of the other states that have adopted the LEV II program. (See also response to Comment 48.)

Comment 44: California's latest Initial Statement of Reasons to support the 2008 Proposed Amendments to the ZEV Program projects an incremental cost for a fuel cell vehicle at $250,000 to $300,000 in the 2012-2014 time period and $35,000 to $120,000 for a battery electric vehicle. These are vehicles we are required to place in service, regardless of whether or not a market exists, or if the infrastructure is even there. Plug-in Hybrids, another new, but unproven, technology required under the proposed changes to the ZEV program, are projected to have an incremental cost of $25,000 in the 2012-2014 time period.

Response: Since these changes have not yet been adopted, this comment is premature.

Comment 45: LEV II does not provide the compliance flexibility necessary to allow the use of flexible fueled vehicles or clean diesel technology. *[Chrysler]*

Response: As CARB has noted, the manufacturer's claim that clean diesel vehicles could not comply with LEV II requirements was effectively contradicted by comments from the Manufacturers of Emission Controls Association.

(CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 124). At least seven vehicles that can be fueled with E85 (a blend of 85 percent ethanol and 15 percent gasoline) have been certified as meeting LEV II standards, and one of these has been certified as a ULEV. (CARB, Executive Orders A-006-1467, A-006-1552, A-003-0347, A-009-0808, A-010-1429, A-006-1459, A-006-1451). CARB has identified technologies that will enable future E85 flexible fueled vehicles to qualify as SULEVs (CARB, Letter to Senator John Marty Minnesota Senate, March 12, 2008).

Comment 46: Currently, Mazda does not manufacture vehicles that will meet the California GHG standards. When fully implemented in 2016, the standards equate to an average of over 43 miles per gallon for passenger cars. Mazda's most fuel efficient vehicle achieves 36 miles per gallon. *[Mazda]*

Response: The Pavley legislation charged CARB with developing the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles. 2002 Cal. Stat. ch. 200. CARB gave detailed consideration to extensive comments from the automobile manufacturing industry and reasonably determined that the standards imposed were both feasible and cost-effective. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 255).

Comment 47: The GHG standards go too far too fast and will not be feasible to meet by 2016. Complying with this regulation will force Mazda to develop vehicles that will be too expensive and not provide the performance that our customers demand. *[Mazda]*

Response: See response to Comment 46.

Comment 48: The rules would limit the sale of light and medium trucks consumers depend on for business uses, such as farming and other commerce. *[ASA]*

Response: Even if the GHG standards go into effect, pickup trucks will remain available. There will be a moderate (approximately four percent) increase in cost, but this increase will be more than offset by fuel savings. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 104-05). The increase in cost for medium sized trucks and SUVs in the first year of the standards was projected by CARB to be $36. See Table 4, Economic Impact Statement.

Comment 49: The Arizona Department of Environmental Quality has not undertaken the duty to perform an economic impact study to evaluate the effects these regulations will have on independent automotive repair facilities across the state of Arizona regardless of location. *[ASA]*

Response: A discussion of this impact has been added to the final EIS.

Comment 50: The California GHG rule would needlessly inject the government into consumers' choices about the types of vehicles that best suit their needs. Some supporters of the California rule claim that the rule is beneficial because it will mandate higher fuel economy. That claim assumes, contrary to common sense and experience, that a regulatory agency in California can better define the private economic interests of Arizona consumers than the consumers themselves. Consumers in Arizona or any other state who want to buy high-mileage vehicles can do so today without the need for specific regulations that require them to do so or prohibit them from buying a vehicle with lower mileage but more needed capability. *[Alliance Written Comments]*

Response: The claim that the market can be relied on to establish fuel economy levels that benefit consumers could be applied in opposition to the federal CAFE standards, as well as the California GHG standards. This same commenter, however, supports the recent increase in the CAFE standards. The commenter provides no support for its claim that Arizona consumers will have access to cars meeting California's GHG standards.

Further, the Department has not proposed the rules to achieve higher fuel economy. The GHG standards are being proposed because, if they are allowed to take effect by the federal government, they will reduce GHG emissions from vehicles by about 32 million metric tons from 2012 to 2020 and thereby contribute to the state's efforts to combat global climate change. The LEV II standards will limit emissions that cause ozone, an air pollutant that aggravates asthma, reduces lung function and inflames and damages the linings of the lungs, and assist Arizona as it seeks to reach attainment with the new more protective ozone standard. Improved fuel economy is an important side benefit that offsets the increased vehicle prices that are projected to result from the rule, but it is not the goal of the rule.

Feasibility of Compliance Options

Comment 51: The assumption that the inter-manufacturer credit provisions and alternative compliance features of the California rule will play a significant role in compliance with the regulation is questionable. The alternative compliance features of the California greenhouse gas rule are so stringent that they appear designed to discourage efforts to comply using any means other than the types of fuel economy technologies envisioned in CARB's main regulatory analysis, and they probably could not be used by any major full-line manufacturer. If the Department believes that alternative compliance plans will be part of the compliance strategy for manufacturers in Arizona, it should provide examples of the types of plans that are both economically practicable and approvable under the regulation. *[Alliance Written Comments]*

Response: The alternative compliance mechanisms developed by CARB are consistent with the mandate of the Pavley legislation that any alternatives achieve reductions in GHG emissions equivalent to the underlying requirements.

The alternatives advocated by the automobile manufacturers during the California rulemaking process were inconsistent with this mandate. CARB reasonably concluded that the manufacturers could employ the compliance options incorporated into the rule. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 221-22, 349). As a matter of policy, ADEQ has concluded the Arizona program should be consistent with the Pavley mandate. In any case, modifying California's alternative compliance options in the rule would raise identicality issues.

Comment 52: The notion that companies that can accumulate GHG emission credits will sell those credits to other companies is illogical. Such companies will use any such credits to reduce their own future compliance costs. If the Department believes that the industry will be able to reduce its compliance burdens significantly with inter-company trading, it should explain why. *[Alliance Written Comments]*

Response: CARB reasonably concluded that inter-company trading was a viable alternative compliance option. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 222-23). Indeed, manufacturers have used inter-company credit transfers to comply with the existing LEV II requirements. In any case, eliminating this alternative compliance option would in all likelihood violate section 177 of the Clean Air Act. See also response to Comment 51

Comment 53: The total retail price increase to cover the cost for a grid-connected hybrid vehicle (GHEV) would be approximately $12,634. GHEVs therefore will be commercially infeasible for anything other than niche markets that receive substantial public subsidies. If the Department believes that GHEVs will be a significant factor in manufacturers' compliance plans, it needs to explain why; if not, it should so indicate. *[Alliance Written Comments]*

Response: General Motors (GM) and Toyota have both announced plans to make GHEVs commercially available. GM's Chevy Volt is currently scheduled for initial release in model year 2010, two full years before Arizona's ZEV mandate will take effect. (SeeTalyor E. and Spector M, March 5, 2008, GM, Toyota Doubtful on Fuel Cells' Mass Use," *The Wall Street Journal*) In any case, GHEVs represent an alternative compliance option, not a requirement. As in the case of inter-company trading (see response to Comment 52), eliminating this alternative compliance option would in all likelihood violate section 177 of the Clean Air Act.

Comment 54: Arizona must consider investing in a hydrogen fueling and electric charging infrastructure as California has done. If Arizona is unwilling to invest in the necessary infrastructure, it should decline to adopt California's ZEV Mandate in whole. *[Alliance Written Comments]*

Response: As noted in the response to Comment 15, the extension to the "Section 177 Provision" in R18-2-1806(C) is designed to address concerns about the lack of hydrogen fueling infrastructure. No additional infrastructure is needed for electric charging, since planned grid-connected vehicles can be charged from an ordinary residential outlet.

Assumption of Nationwide Compliance

Comment 55: CARB has assumed that once its greenhouse gas rule is implemented, the automobile industry will choose to deploy the technologies needed to meet the California standards on at least a nationwide (if not global) basis. If CARB's assumption is incorrect, then the costs of the California rule for consumers in California and other states that enforce the California rule will be much higher than estimated by CARB. Because the costs of new regulation is important in Arizona, the Department needs to make an independent assessment of CARB's assumption that the industry will respond to the regulation by producing vehicles that use all the necessary greenhouse gas technologies nationwide. *[Alliance Written Comments]*

Response: As CARB noted in response to a comment by this same commenter, CARB staff did *not* make this assumption. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 156, 174).

Comment 56: As CARB has recognized, the greenhouse gas rule will raise new-vehicle costs and prices, and will also reduce demand for new vehicles. In one regulatory analysis that CARB published prior to its decision to approve the greenhouse gas rule in September 2004, the CARB staff estimated that once the greenhouse gas standards were fully implemented, new-vehicle sales in California would decline by four to five percent. Other estimates predicted larger reductions in sales. It would be illogical and contrary to their customers' interests for automobile manufacturers to produce vehicles for which there is less demand, in the absence of a regulatory requirement to do so. For that reason, it is unlikely that the industry will try to comply with the California greenhouse gas rule by producing all or even most of the necessary technologies at nationwide volumes. *[Alliance Written Comments]*

Response: See response to Comment 55. ADEQ has concluded that the assumptions CARB made in assessing the costs of the GHG regulations were reasonable. See the final EIS for a detailed discussion of the costs of the rule.

Comment 57: The Department also needs to confront serious errors in some analyses of the California rule arising from the technological assessment prepared by the Northeast States Center for a Clean Air Future ("NESCCAF"), on which CARB has relied in part.

First, neither NESCCAF nor the CARB staff has specifically assessed (1) the performance of any specific vehicle actually expected to be in the market when the new rule would take effect or (2) the full range of vehicle types expected in the market. The NESCCAF/CARB analysis was limited to vehicle types that the CARB staff or NESC-

CAF considered "representative." This point was acknowledged in the CARB staff's Final Statement of Reasons, published in August 2005, which stated that "the agency could not reasonably model all vehicles with all of the potential climate change emission reduction technologies" identified by CARB staff or NESCCAF. The predicted costs and fuel economy impacts of the regulation estimated by the CARB staff and NESCCAF are thus no better than the selection of vehicle types that the CARB staff or NESCCAF considered "representative." *[Alliance Written Comments]*

The vehicles that the CARB staff and NESCCAF decided to include in their analysis were hardly "representative" of the U.S. motor vehicle fleet, either today or in the future. All or nearly all the vehicles included in the analysis had significantly downsized, turbocharged engines, which sacrifice reserve power, launch feel and some acceleration performance features, and which were based on tests of engines operated on European-specification premium gasoline. The hypothetical vehicles were also equipped with automatic manual transmissions. Such vehicles are hardly typical of the U.S. fleet today or in the future. In particular, it is unrealistic to suppose that in the future, most Americans will buy vehicles designed for optimal performance on gasoline grades higher than regular unleaded. *[Alliance Written Comments]*

Response: The modeling relied on by CARB demonstrated that none of the technologies identified as being capable of complying the GHG standards, including downsized, turbocharged engines, would impair vehicle performance attributes that consumers expect from their vehicle. All of the turbocharger technology packages that CARB considered in developing the GHG standards consisted of combination direct injection gasoline/turbocharger technology, which do not presume a requirement for premium gasoline. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 104, 135, 408).

Comment 58: Second, the principal contractor for the vehicle performance analysis prepared for NESCCAF and then used by CARB, a firm called AVL Powertrain Engineering, has confirmed that it was not asked to undertake, nor did it undertake, any detailed consideration of launch feel, drive quality or the transient response of the engine, transmission and turbocharger, in connection with the work for NESCCAF and CARB. The only reported metric for performance was 0-60 mph acceleration, and it appears the CARB staff ignored available information from AVL involving other acceleration metrics. *[Alliance Written Comments]*

Response: CARB reasonably concluded that modifications to the technology packages modeled by AVL, such as the

> use of a downsized direct injection variable geometry turbocharged engine that retains a compression ratio similar to a conventional engine and a 6 speed automated manual transmission, launch feel and acceleration characteristics of the modeled turbocharged applications [would] be similar to engines that were being replaced.

(CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 110).

Comment 59: Some confusion may arise from the fact that the CARB staff has not always fully presented the impact of the regulation on the vehicle powertrain or vehicle performance. For example, the CARB staff's Final Statement of Reasons asserts that in the CARB staff's regulatory analysis, "technology packages that included engine downsizing were not generally considered for the truck classes," and "engine downsizing [was] used primarily for the small car, large car, and minivan vehicle classes where vehicle performance can be maintained under all driving conditions." To the contrary, CARB's regulatory scenario assumed the use of downsized engines for the truck engines included in the CARB analysis. For one set of standards, the large truck engines were assumed to be downsized by 9 to 11 percent. For another set of standards, large truck engines were assumed to be downsized by 11 to 15 percent. Small truck engines were assumed to be downsized by as much as 19 percent. But common sense indicates that truck purchasers are generally not willing to accept downsized engines at the same price as full-size engines. *[Alliance Written Comments]*

Response: As noted above, CARB concluded that engine downsizing accompanied by turbocharging and other technology improvements would provide the performance characteristics consumers expect. There is therefore no reason to believe that consumers will not accept downsized engines in future models capable of meeting the GHG standards. (See response to Comment 57.)

Comment 60: CARB staff's Final Statement of Reasons (FSOR) claims that "[i]n assessing smoothness and refinement ... staff assumed in the analysis that 6 cylinder engines would be replaced by 5 cylinder turbocharged models rather than 4 cylinder versions in order to preserve 6 cylinder-like characteristics." That is incorrect. For the "Large Car" analysis performed for NESCCAF, a three-liter, six-cylinder was replaced by a four-cylinder engine with a much smaller displacement of 1.77 liters. For the "Minivan" case, a 3.3 liter, six-cylinder was replaced by another much smaller 1.85 liter four-cylinder engine. For the "Small Truck" case in the NESCCAF study, a 3.4 liter six-cylinder engine was replaced by a smaller 1.64 liter four-cylinder. In addition to "smoothness and refinement," engines need sufficient reserve power for responsive acceleration, full cargo loads, towing, and acceptable "launch" at the start of driving. Neither NESCCAF, its contractors, nor the CARB staff, can credibly claim that such radical downsizing would have no impact on consumer demand for the redesigned engines. *[Alliance Written Comments]*

Response: This comment misreads the FSOR. CARB was not claiming that the NESCCAF modeling included five-cylinder turbocharged models. Rather CARB *staff* considered possible modifications, such as five-cylinder turbocharged models, and reasonably concluded that these would achieve the desired drivability and performance charac-

teristics. (CARB, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Final Statement of Reasons," Aug. 4, 2007, 110).

Comment 61: In the Final Statement of Reasons, the CARB staff admits that some of the technologies that were evaluated would degrade vehicle performance. The consumer demand model used by California in its analysis, however, assumed no loss in any performance attribute, which is clearly an invalid assumption for the reasons summarized above. The Department therefore cannot appropriately rely on the consumer impacts projected by the CARB staff in the California rulemaking. *[Alliance Written Comments]*

Response: This comment is inaccurate. (See response to Comment 57.)

Other Objections and Concerns

Comment 62: Adopting the rule effectively cedes authority to California regulators. Although the rule would adopt the California standards as of a date certain, the practical reality is that Arizona will be effectively compelled to adopt future changes California may make. *[Arizona Chamber; Mazda; ASA; Beebe]*

Response: This comment is mistaken. If California adopted changes to the LEV II regulations that ADEQ determined to be inappropriate for Arizona, the Department would have the option of repealing the LEV II rules and returning the state to the federal standards.

Comment 63: Statewide emission testing would be preferable to the adoption of the California vehicle standards. *[Beebe]*

Response: Statewide emission testing cannot be adopted by rule, because A.R.S. § 49-541 specifically limits vehicle emission testing to Maricopa County, and portions of Gila, Pima, Pinal and Yavapai Counties. Even if statewide emission testing were adopted, it would not obviate the need to adopt this rule, because it would achieve very little if any reductions in GHG emissions and would have no effect on emissions of ozone precursors in the Phoenix or Tucson metropolitan areas, where vehicle testing is already required.

Comment 64: The preliminary EIS did not recognize or consider impacts on the automotive aftermarket parts industry. *[Auto Wholesalers]*

Response: Consideration of this impact has been added to the statement.

Comment 65: The EIS should include consideration of the impact on MVD. *[MVD]*

Response: Consideration of this impact has been added to the final statement.

Comment 66: The rulemaking should clarify Clean Car Standard conversions made to vehicles coming to Arizona from a non-certified state. *[MVD]*

Response: Conversions are not permitted under the California rules.

Comment 67: The rulemaking should clarify the complaint process. *[MVD]*

Response: ADEQ will establish appropriate complaint procedures when it implements the rule.

Comment 68: The rulemaking should clarify consequences for failing to comply. *[MVD]*

Response: This is addressed in R18-2-1812 (R18-2-1813 of the proposal).

Comment 69: The rulemaking should clarify non-compliant vehicles purchased by a licensed dealer prior to the effective date of the rule. *[MVD]*

Response: Since the final rule applies to all vehicles with a model year of 2012 and later, this is no longer an issue.

Comment 70: The rulemaking should clarify remedies for a person who has purchased a vehicle that is not eligible for registration as a result of this rulemaking. *[MVD]*

Response: ADEQ will conduct a public education and outreach program to inform citizens about the Clean Car Standards and its applicability to model year 2012 and subsequent vehicles. ADEQ will attempt to assist consumers caught in this situation through the use of its enforcement authority against dealers and others who may sell non-compliant vehicles with less than 7,500 miles on the odometer. The delay in the rule's effectiveness will provide the time needed to make consumers aware of this issue.

Comment 71: The rulemaking should clarify vehicles repossessed by lienholders. *[MVD]*

Response: It is not clear what is intended by this comment.

12. Any other matter prescribed by statute that is applicable to the specific agency or to any other specific rule or class of rules:

Not applicable

13. Incorporations by reference and their location in the rules:

Title 13 California Code of Regulations (CCR), Section 1900	R18-2-1801, Appendix 13
Title 13 CCR, Sections 1956.8(g) and (h)	Appendix 13
Title 13 CCR, Section 1960.1	R18-2-1801, Appendix 13
Title 13 CCR, Section 1961	R18-2-1801, R18-2-1804, R18-2-1812, Appendix 13
Title 13 CCR, Section 1961.1	R18-2-1801, R18-2-1805, R18-2-1812, Appendix 13
Title 13 CCR, Section 1962	R18-2-1801, R18-2-1804, R18-2-1812, Appendix 13
Title 13 CCR, Section 1962.1	Appendix 13
Title 13 CCR, Section 1965	Appendix 13
Title 13 CCR, Section 1968.2	Appendix 13
Title 13 CCR, Section 1968.5	Appendix 13
Title 13 CCR, Section 1976	Appendix 13
Title 13 CCR, Section 1978	Appendix 13
Title 13 CCR, Section 2035	R18-2-1809, Appendix 13
Title 13 CCR, Section 2037	R18-2-1809, Appendix 13
Title 13 CCR, Section 2038	R18-2-1809, Appendix 13
Title 13 CCR, Section 2039	R18-2-1809, Appendix 13
Title 13 CCR, Section 2040	R18-2-1809, Appendix 13
Title 13 CCR, Section 2046	R18-2-1809, Appendix 13
Title 13 CCR, Section 2109	R18-2-1810, Appendix 13
Title 13 CCR, Section 2111	R18-2-1810, Appendix 13
Title 13 CCR, Section 2112	R18-2-1810, Appendix 13
Title 13 CCR, Appendix A to Article 2.1.	Appendix 13
Title 13 CCR, Section 2113	R18-2-1810, Appendix 13
Title 13 CCR, Section 2114	R18-2-1810, Appendix 13
Title 13 CCR, Section 2115	R18-2-1810, Appendix 13
Title 13 CCR, Section 2116	R18-2-1810, Appendix 13
Title 13 CCR, Section 2117	R18-2-1810, Appendix 13
Title 13 CCR Section 2118	R18-2-1810, Appendix 13
Title 13 CCR, Section 2119	R18-2-1810, Appendix 13
Title 13 CCR, Section 2120	R18-2-1810, Appendix 13
Title 13 CCR, Section 2122.	R18-2-1810, Appendix 13
Title 13 CCR, Section 2123	R18-2-1810, Appendix 13
Title 13 CCR, Section 2124	R18-2-1810, Appendix 13
Title 13 CCR, Section 2125	R18-2-1810, Appendix 13
Title 13 CCR, Section 2126	R18-2-1810, Appendix 13
Title 13 CCR, Section 2127	R18-2-1810, Appendix 13
Title 13 CCR, Section 2128	R18-2-1810, Appendix 13
Title 13 CCR, Section 2129	R18-2-1810, Appendix 13
Title 13 CCR, Section 2130	R18-2-1810, Appendix 13
Title 13 CCR, Section 2131	R18-2-1810, Appendix 13
Title 13 CCR, Section 2132	R18-2-1810, Appendix 13
Title 13 CCR, Section 2133	R18-2-1810, Appendix 13
Title 13 CCR, Section 2135	R18-2-1810, Appendix 13
Title 13 CCR, Section 2141	Appendix 13
Title 13 CCR, Section 2142	Appendix 13

Title 13 CCR, Section 2143	Appendix 13
Title 13 CCR, Section 2144	R18-2-1809, Appendix 13
Title 13 CCR, Section 2145	Appendix 13
Title 13 CCR, Section 2146	Appendix 13
Title 13 CCR, Section 2147	Appendix 13
Title 13 CCR, Section 2148	Appendix 13
Title 13 CCR, Section 2149	Appendix 13
Title 13 CCR, Section 2235	Appendix 13

14. Were these rules previously made as emergency rules?
No

15. The full text of the rules follows:

TITLE 18. ENVIRONMENTAL QUALITY

CHAPTER 2. DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR POLLUTION CONTROL

ARTICLE 18. CLEAN CAR STANDARDS

Section
R18-2-1801. Definitions
R18-2-1802. Applicability
R18-2-1803. Incorporations by Reference
R18-2-1804. Fleet Average Non-Methane Organic Gas (NMOG) Exhaust Emission Requirements, Reporting, and Compliance
R18-2-1805. Fleet Average Greenhouse Gas Exhaust Emission Requirements, Reporting and Compliance
R18-2-1806. ZEV Sales Requirement
R18-2-1807. ZEV Credit Bank and Reporting
R18-2-1808. Additional Reporting Requirements
R18-2-1809. Warranty Requirements
R18-2-1810. Recalls
R18-2-1811. Inspections and Information Requests
R18-2-1812. Enforcement
Appendix 13. Sections of Title 13, California Code of Regulations Applicable to Arizona for Purposes of Article 18 of this Chapter

ARTICLE 18. CLEAN CAR STANDARDS

R18-2-1801. Definitions

The following definitions, the definitions in R18-2-101, the definitions in A.R.S. § 49-401.01, and the definitions in the sections of Title 13 of the California Code of Regulations included in Appendix 13 to this Chapter, apply to this Article unless the context otherwise applies. If the same term is defined more than once, the definitions in this Section, R18-2-101 and A.R.S. § 49-401.01 apply first, followed by the definitions in the sections of Title 13 of the California Code of Regulations included in Appendix 13 to this Chapter.

1. "Advanced technology partial zero emission vehicle" or "ATPZEV" means advanced technology Partial Zero Emission Vehicle as defined in 13 C.C.R. § 1962(i).
2. "Affected vehicle" means any passenger car, light duty truck or medium duty vehicle with 7,500 miles or fewer on its odometer. A vehicle sold by a dealer is an affected vehicle if it had 7,500 miles or fewer on its odometer statement at the time the dealer acquired the vehicle.
3. "Assembled vehicle" means:
   a. A motor vehicle that has a body built to resemble and be a reproduction of another vehicle of a particular year and manufacturer;
   b. A motor vehicle that will be used for occasional transportation, exhibitions, club activities, parades, tours, testing its operation, repairs or maintenance and similar uses;
   c. A motor vehicle that will not be used for general daily transportation; or
   d. A motor vehicle that:

i. Has a body that does not resemble any particular year model or make of vehicle;
ii. Is not a vehicle rebuilt by a manufacturer;
iii. Is not a vehicle built in a factory where the year model and make are assigned at the factory; and
iv. Is not an antique vehicle, a vehicle of special interest, a reconstructed vehicle or a replica.

4. "Business" means an occupation, profession or trade; a person or partnership or corporation engaged in commerce, manufacturing, or a service; a profit-seeking enterprise or concern.
5. "California Air Resources Board" or "CARB" means the agency or its successor established and empowered to regulate sources of air pollution in the state of California, including motor vehicles.
6. "California credit balance" means the balance of credits that a manufacturer has on deposit with the California ZEV Bank on January 2, 2008.
7. "C.C.R." means the California Code of Regulations.
8. "Certificate of conformity" means a document issued by California Air Resources Board certifying that a specified test group or model year has met all applicable requirements adopted by CARB under the applicable sections of 13 C.C.R., or by the United States EPA under the applicable sections of the Clean Air Act, for the control of specified air contaminants from motor vehicles.
9. "Collectible vehicle" means a vehicle that complies with both of the following:
   a. It is a motor vehicle that:
      i. Bears a model year date of original manufacture that is at least 15 years old; or
      ii. Is of unique or rare design, of limited production and an object of curiosity.
   b. It is a motor vehicle that:
      i. Is maintained primarily for use in car club activities, exhibitions, parades or other functions of public interest or for a private collection and is used only infrequently for other purposes; and
      ii. Has a collectible vehicle or classic automobile insurance coverage that restricts the collectible vehicle mileage or use, or both, and requires the owner to have another vehicle for personal use.
10. "Custom Vehicle" means:
   a. A motor vehicle that:
      i. Was manufactured prior to 1949 or was manufactured to resemble a motor vehicle manufactured prior to 1949;
      ii. May be equipped with a drive train, suspension system or brake system that is different from the drive train, suspension system or brake system originally installed on the vehicle;
      iii. May have alterations to the dimensions of the original body of the vehicle; and
      iv. Is not a motorcycle or an assembled vehicle; or
   b. A motor vehicle that was manufactured to resemble a vehicle at least 25 years old and of a model year after 1948, and:
      i. Has been altered from the manufacturer's original design; or
      ii. Has a body constructed from non-original materials.
11. "Dealer" means a person or organization licensed under A.R.S. § 28-4533 by the Arizona Department of Transportation as a new motor vehicle dealer, or used motor vehicle dealer.
12. "Delivered for sale" means vehicles that have received a bill of lading for sale in Arizona and are shipped, or are in the process of being shipped, to a dealer in Arizona.
13. "Department" means the Arizona Department of Environmental Quality.
14. "Emergency vehicle" means any publicly owned vehicle operated by a peace officer in the performance of their duties, any authorized emergency vehicle used for fighting fires or responding to emergency fire calls and any publicly owned authorized emergency vehicle used by an emergency medical technician or paramedic or any ambulance used by a private entity under contract with a public agency.
15. "Engine family" means the basic classification unit comprised of the engine and drive train configuration selected by a manufacturer and used for the purpose of certification testing.
16. "Executive Order" means a document issued by the CARB certifying that a specified test group or model year vehicle has met all applicable requirements adopted by the CARB under the applicable sections of 13 C.C.R. for the control of specified air contaminants from motor vehicles and is thereby certified for sale in California.
17. "Fleet average emission requirements" means limitations on greenhouse or non-methane organic gas exhaust mass emissions from passenger cars, light-duty trucks and medium-duty passenger vehicles.
18. "Greenhouse gas" or "GHG" means the following gases: carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons.
19. "Greenhouse gas emission credit" means the value, earned by a manufacturer when the manufacturer's greenhouse gas fleet average emissions are less than the required fleet average, as determined by the formula in 13 C.C.R. § 1961.1(b).
20. "Greenhouse gas emission debit" means the value, earned by a manufacturer when the manufacturer's greenhouse gas fleet average emissions exceed the required fleet average, as determined by the formula in 13 C.C.R. § 1961.1(b).

21. "Greenhouse gas fleet average emissions" means a motor vehicle manufacturer's average vehicle emissions of greenhouse gases from passenger cars and light duty trucks in any model year subject to this regulation delivered for sale in Arizona.
22. "Greenhouse gas fleet average emission requirement" means limitations on greenhouse gas exhaust mass emissions from passenger cars, light-duty trucks and medium-duty passenger vehicles, as set forth in 13 C.C.R. § 1961.1.
23. "Greenhouse gas model year" or "GHG model year" is defined as follows:
    a. If Congress amends federal law to allow state adoption of the GHG standards in 13 C.C.R. § 1961.1 and the amendment establishes an earliest model year to which the standards may apply, GHG model year means the model year established in that amendment.
    b. If Congress does not adopt the amendment described in subsection (a), GHG model year means the model year commencing two years after EPA grants a waiver under section 209(b) of the Clean Air Act for the standards established by 13 C.C.R. § 1961.1 or after any amendment to federal law that authorizes states to adopt the GHG standards in CCR § 1961.1.
24. "Gross vehicle weight rating" or "GVWR" means the value specified by the manufacturer as the maximum design loaded weight of a single vehicle.
25. "Heavy-duty vehicle" means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6,000 pounds, except passenger cars.
26. "Independent low volume manufacturer" means a manufacturer that has been designated by CARB as an independent low volume manufacturer as defined at 13 C.C.R. § 1900.
27. "Intermediate volume manufacturer" means a manufacturer that has been designated by CARB as an intermediate volume manufacturer as defined at 13 C.C.R. § 1900.
28. "Large volume manufacturer" means a manufacturer that has been designated by CARB as a large volume manufacturer as defined at 13 C.C.R. § 1900.
29. "Light-duty truck" means any 2000 and subsequent model year motor vehicle certified to the standards in 13 C.C.R. § 1961(a)(1), rated at 8,500 pounds gross vehicle weight or less, and any other motor vehicle rated at 6,000 pounds gross vehicle weight or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.
30. "Manufacturer" means any small, intermediate, or large volume vehicle manufacturer as defined at 13 C.C.R. § 1900.
31. "Medium-duty passenger vehicle" means any medium-duty vehicle with a gross vehicle weight rating of less than 10,000 pounds that is designed primarily for the transportation of persons, but does not include:
    a. A truck that does not have the primary load carrying device or container attached;
    b. A vehicle that has a seating capacity of more than 12 persons;
    c. A vehicle that is designed for more than nine persons in seating rearward of the driver's seat; or
    d. A vehicle that is equipped with an open cargo area of 72.0 inches in interior length or more. A covered box not readily accessible from the passenger compartment shall be considered an open cargo area, for purposes of this definition.
32. "Medium-duty vehicle" means:
    a. Any pre-1995 model year heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8,500 pounds or less;
    b. Any 1992 through 2006 model-year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in 13 C.C.R. § 1960.1(h)(2) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and
    c. Any 2000 and subsequent model heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in 13 C.C.R. § 1961(a)(1) or 1962 having a manufacturer's gross vehicle weight rating between 8,501 and 14,000 pounds.
33. "Model year" means a motor vehicle manufacturer's annual production period which includes January 1 of a calendar year or, if the manufacturer has no annual production period, the calendar year. In case any vehicle manufactured in two or more stages, the item of manufacture shall be the date of completion of the chassis.
34. "Motor vehicle" or "vehicle" means any self-propelled vehicle designed for transporting persons or property on public highways, excepting motorcycles.
35. "Motor vehicle engine" means an engine that is used to propel a motor vehicle.
36. "New motor vehicle engine" means a new engine in a motor vehicle.
37. "Non-methane organic gas" or "NMOG" means the sum of non-oxygenated and oxygenated hydrocarbons contained in a gas sample as measured in accordance with the "California Non-Methane Organic Gas Test Procedures," as amended July 30, 2002, with no future editions or amendments, which is incorporated herein by reference and is on file with the Department.
38. "Non-methane organic gas emission credit" or "NMOG emission credit" means the value, earned by a manufacturer when the manufacturer's non-methane organic gas fleet average emissions is less than the required fleet average, as determined by the formula in 13 C.C.R. § 1961(c).

39. "Non-methane organic gas emission debit" or "NMOG emission debit" means the value earned by a manufacturer when the manufacturer's non-methane organic gas fleet average emissions exceeds the required fleet average, as determined by the formula in 13 C.C.R. § 1961(c).
40. "Non-methane organic gas fleet average emissions" or "NMOG fleet average emissions" means a motor vehicle manufacturer's average vehicle emissions of all non-methane organic gases from passenger cars and light duty trucks in any model year subject to this regulation delivered for sale in Arizona.
41. "Non-methane organic gas fleet average emission requirement" or "NMOG fleet average emission requirement" means limitations on non-methane organic gas exhaust mass emissions from passenger cars, light-duty trucks and medium-duty passenger vehicles, as set forth in 13 C.C.R. § 1961.
42. "Partial zero emission vehicle" or "PZEV" means a vehicle that is certified as a partial zero emission vehicle under the CARB vehicle standards for the applicable model year and has received a CARB Executive Order, but shall not include an advanced technology partial zero emission vehicle or a zero emission vehicle.
43. "Passenger car" or "PC" means any motor vehicle designed primarily for transportation of individuals and having a design capacity of 12 individuals or fewer.
44. "Person" means the federal government, state, or any federal or state agency or institution, any municipality, political subdivision, public or private corporation, individual, partnership, association, or other entity, and includes any officer or governing or managing body of any municipality, political subdivision, or public or private corporation.
45. "Placed in service" means having been sold to an ultimate purchaser and not to a dealer or other distribution chain entity, and having been individually registered for on-road use by the Arizona Motor Vehicle Division.
46. "Recall" means:
    a. The issuing of notices directly to consumers that vehicles in their possession or control should be corrected, or
    b. Efforts to actively locate and correct vehicles in the possession or control of consumers.
47. "Sale" or "sell" means the transfer of equitable or legal title to a motor vehicle or motor vehicle engine to the ultimate purchaser.
48. "Small volume manufacturer" means a manufacturer that has been designated by the CARB as a small volume manufacturer as defined at 13 C.C.R. § 1900.
49. "Test group" means a grouping of vehicles as defined by 40 CFR 86.1827-01 as of July 1 2006, incorporated herein by reference with no future editions or amendments.
50. "Test vehicle" means an experimental or prototype motor vehicle that appears to have very low emission characteristics, or a used motor vehicle within which an experimental motor vehicle pollution control device is installed, and which has also received a test vehicle or fleet permit from the CARB.
51. "Ultimate purchaser" means, with respect to any affected vehicle or new motor vehicle engine, the first person who in good faith purchases an affected vehicle or new motor vehicle engine for purposes other than resale.
52. "Vehicle identification number" or "VIN" means a unique alphanumeric code that the vehicle manufacturer assigns to a vehicle.
53. "Zero emission vehicle" or "ZEV" means a vehicle certified as a zero emission vehicle under the CARB zero emission vehicle standards for the applicable model year, but shall not include an advanced technology partial zero emission vehicle or a partial zero emission vehicle.

R18-2-1802. Applicability

A. Except as set forth in subsection (D), no dealer or other person within this state shall deliver for sale, offer for sale, sell, import, deliver, purchase, rent, lease, acquire, receive, or register an affected vehicle of model year 2012 or later unless the vehicle has been certified by CARB and has received a CARB Executive Order.

B. All motor vehicle manufacturers shall comply with the fleet average emission requirements and the warranty, recall, and other applicable requirements of this Article.

C. All motor vehicle dealers shall comply with the sales and reporting requirements of this Article.

D. Subsection (A) shall not apply to affected vehicles that are:
1. Available only for rent to a final destination in a state that is not subject to the California vehicle emissions standards;
2. Sold for registration and use in a state that is not subject to the California vehicle emission standards;
3. Purchased by Arizona residents while assigned to active military duty outside Arizona;
4. Military tactical vehicles, test vehicles and emergency vehicles;
5. Acquired by a resident of Arizona for the purposes of replacing a vehicle registered to that resident, which was damaged, became inoperative beyond reasonable repair, or was stolen outside of Arizona; provided that the replacement vehicle is acquired outside Arizona at the time the previously registered vehicle was damaged, or became inoperative beyond reasonable repair, or was stolen;
6. Transferred as a result of divorce, dissolution, legal separation, court decree, or inheritance;
7. Collectible vehicles, custom vehicles, or assembled vehicles;
8. Covered by a certificate of conformity issued under the Clean Air Act and that were originally registered in another state by a resident of that state who subsequently establishes residence in Arizona;
9. Sold for the purpose of being wrecked or dismantled under A.R.S. § 28-2094 and A.A.C. R17-4-203(A)(1)(d)(i); or

10. Sold exclusively for off-highway use.

R18-2-1803. Incorporations by Reference

Appendix 13 to this Chapter is hereby incorporated by reference. References to sections of title 13 of the C.C.R. in this Article are to the version of the section set forth in Appendix 13 to this Chapter.

R18-2-1804. Fleet Average Non-Methane Organic Gas (NMOG) Exhaust Emission Requirements, Reporting, and Compliance

A. Beginning in model year 2012, each motor vehicle manufacturer's NMOG fleet average emissions from passenger cars and light duty trucks delivered for sale in Arizona shall not exceed the Fleet Average NMOG Exhaust Emission Requirement in 13 C.C.R. § 1961. The Department shall determine compliance based on the number of vehicles, subject to this Article, delivered for sale in Arizona.

B. Beginning model year 2012, each vehicle manufacturer may accrue NMOG emission credits and debits and use credits in accordance with the procedures in 13 C.C.R. § 1961. Debits and credits accrued and used shall be based on the number of vehicles, subject to this Article, produced and delivered for sale by each manufacturer in Arizona.

C. Beginning model year 2012, each manufacturer shall submit to the Department by March 1 a report on end-of-model year data that calculates the fleet average NMOG exhaust emissions for the model year just ended.

D. Each manufacturer submitting a report under subsection (C) shall follow the report procedures in 13 C.C.R. § 1961 and shall employ the same format that the manufacturer uses to report the information required by subsection (C) to the California Air Resources Board.

E. Beginning model year 2014, if a report submitted by the manufacturer under subsection (C) shows that the manufacturer has not complied with the fleet average emission standard, the manufacturer shall submit to the Department a Fleet Average Remediation Report within 60 days. In the Fleet Average Remediation Report, the manufacturer shall:

1. Describe how the manufacturer intends to equalize any accrued debits, as required in 13 C.C.R. § 1961;
2. Identify all vehicle models delivered for sale in Arizona, their corresponding certification standards, and the percentage of each model delivered for sale in Arizona and California in relation to total fleet sales in the respective state; and
3. Describe how the manufacturer plans to achieve compliance with the fleet average in future model years.

F. For model years 2012 through 2014, manufacturers shall submit the Fleet Average Remediation Report, if needed, to the Department by March 1, 2015. If debits are accrued in all three years, the manufacturer shall equalize one year of debits by the end of the 2015 model year, and the remaining two years of debits by the end of the 2016 model year.

R18-2-1805. Fleet Average Greenhouse Gas Exhaust Emission Requirements, Reporting and Compliance

A. Beginning in the GHG model year, each manufacturer shall comply with fleet average greenhouse gas exhaust mass emission requirements for passenger car, light duty truck, medium-duty passenger vehicle weight classes, and other requirements of 13 C.C.R. § 1961.1.

B. Greenhouse gas emission credits and debits. Each manufacturer may accrue greenhouse gas credits and debits and use credits in accordance with the procedures in California Code of Regulations, Title 13, section 1961.1. Debits and credits accrued and used shall be based on the number of vehicles, subject to this Article, produced and delivered for sale by each manufacturer in Arizona.

C. Optional alternative compliance with greenhouse gas emission standards. Greenhouse gas vehicle test groups that are certified under 13 C.C.R. § 1961.1(a)(1)(B)2.a. in California may receive equivalent credit, according to 13 C.C.R. § 1961.1(a)(1)(B)2.a, if:

1. The vehicle test group is delivered for sale and use in Arizona, and
2. The manufacturer of the vehicle test group submits to the Department the information required by 13 C.C.R. § 1961.1(a)(1)(B)2.a.i.

D. Reporting on greenhouse gas requirements. Beginning March 1 of the GHG model year, each manufacturer shall submit a report to the Department that includes:

1. Pre-model year data that projects the fleet average greenhouse gas emissions for vehicles expected to be delivered for sale in Arizona, and
2. End-of-model year data that calculates the fleet average greenhouse gas emissions for the model year just ended.

E. Each manufacturer submitting a report under subsection (D) shall include in the report the number of greenhouse gas vehicle test groups, delineated by model type, certified under 13 C.C.R. § 1961.1. Each manufacturer shall follow the report procedures in 13 C.C.R. § 1961.1 and employ the same format used to report the information required by subsection (D) to the California Air Resources Board.

F. Beginning in the GHG model year, if the report submitted by the manufacturer under subsection (D)(2) shows that the manufacturer has not complied with the fleet average emission standards, the manufacturer shall submit to the Department a Fleet Average Remediation Report within 60 days after submission of the report required under subsection (D)(2). In the Fleet Average Remediation Report, each manufacturer shall:

1. Describe how the manufacturer intends to equalize any accrued debits, as required in 13 C.C.R. § 1961.1;
2. Identify all vehicle models delivered for sale in Arizona, their corresponding certification standards, and the percent-

age of each model delivered for sale in Arizona and California in relation to total fleet sales in the respective state; and

3. Describe how the manufacturer plans to achieve compliance with the fleet average in future model years.

G. Adoption of this Section is conditioned on EPA's approval of a waiver for 13 C.C.R. § 1961.1 under section 209(b) of the Clean Air Act or a change to federal law that has the effect of authorizing states to adopt the GHG standards in 13 C.C.R. § 1961.1. This Section shall take effect immediately upon satisfaction of the above condition and shall be enforced beginning in the model year described in R18-2-1801(23).

R18-2-1806. ZEV Sales Requirement

A. Beginning model year 2012, each manufacturer shall comply with the ZEV sales requirement in 13 C.C.R. § 1962, including early credit and banking provisions.

B. An intermediate volume or large volume manufacturer of ZEVs, ATPZEVs and PZEVs may use vehicle equivalent credits according to 13 C.C.R. § 1962, to offset the ZEV Sales Requirement of subsection (A).

C. The provisions of 13 C.C.R. § 1962(d)(5)(D) regarding "Counting a Type III ZEV Placed in a Section 177 State" shall not end with the 2011 model year, but shall continue in Arizona throughout the duration of the alternate compliance path specified in 13 C.C.R. § 1962(b)(2)(B), except that this subsection shall not apply until three years after the Director finds the following conditions are met:

1. The number of Type III ZEVs required to meet the minimum floor requirements in 13 C.C.R. § 1962(b)(2)(B)(1) between the years 2013 and 2018 is proportioned among all states that have adopted California's vehicle emission standards; and
2. Arizona's hydrogen refueling infrastructure is adequate to accommodate the number of Type III ZEVs needed to meet the minimum floor requirements of 13 C.C.R. § 1962(b)(2)(B)1 between 2013 and 2018.

R18-2-1807. ZEV Credit Bank and Reporting

A. Beginning model year 2012, the Department shall create and operate a Zero-Emission Vehicle Credit Bank.

B. Beginning model year 2012, each intermediate volume and large volume manufacturer of ZEVs, ATPZEVs and PZEVs shall open an account in the ZEV credit bank by January 1, 2012. A manufacturer that wishes to generate and deposit credits for vehicles delivered for sale in Arizona during the 1999 through 2008 model years, shall by September 1, 2009:

1. Open an account with the ZEV Credit Bank, and
2. Submit an appropriate Notice of Generation to the Department pursuant to subsection (F)(2).

C. Beginning in model year 2012, except as provided in subsection (B) for model years 1999 through 2008, each manufacturer shall submit to the Department a Notice of Credit Generation or Notice of Credit Transfer to or from another manufacturer, by September 1 following the close of the model year in which the qualifying vehicle was produced and delivered for sale in Arizona.

D. To open an account with the ZEV credit bank, the manufacturer shall submit to the Department an account application form containing the following information:

1. The manufacturer's name;
2. The manufacturer's mailing address;
3. The manufacturer's telephone number;
4. Type of business (if applicable);
5. The authorized representative's name, title, phone number, fax number and e-mail address; and
6. The authorized representative's signature.

E. When the Department receives a complete account application, the Department shall issue a unique account number for the account and notify the account applicant of the identifier.

F. To deposit credits into the ZEV Credit Bank, each manufacturer shall submit a Notice of Credit Generation to the Department on a form provided by the Department.

1. The Notice of Credit Generation for ZEVs delivered for sale in Arizona shall include:
   a. The manufacturer's ZEV Credit Bank account identifier;
   b. The model year of the vehicle qualifying for credit;
   c. The CARB Executive Order number;
   d. The ZEV Tier type (NEV, 0, I, II, III for California, III for Section 177 states);
   e. The vehicle identification number; and
   f. The date the vehicle was delivered for sale in Arizona.
2. The Notice of Credit Generation for ZEVs placed in service in Arizona shall include:
   a. All information listed under subsection (F)(1),
   b. The date the vehicle was placed in service, and
   c. Whether the vehicle was placed in service with an option to purchase or lease the vehicle;
3. The Notice of Credit Generation For ATPZEVs and PZEVs delivered for sale in Arizona shall include:
   a. The vehicle certification class, ATPZEV or PZEV;
   b. The manufacturer's ZEV Credit Bank account number;

c. The model year of the vehicles;
d. The date the vehicle was delivered for sale in Arizona;
e. For ATPZEVs, the federal test group;
f. The CARB Executive Order number; and
g. The number of vehicles delivered.

G. The number of the credits generated and deposited for each qualifying vehicle shall be the number of qualifying vehicles multiplied by the applicable multiplier set forth in 13 C.C.R. § 1962, except that the multiplier applied to vehicles produced and delivered for sale in Arizona from January 1, 1999, to January 13, 2004, shall be the highest applicable multiplier used by CARB for the period January 1, 1999, to January 13, 2004.

H. A vehicle equivalent credit does not constitute or convey a property right.

I. A manufacturer with an account in the ZEV Credit Bank may acquire credits from another manufacturer with an account in the ZEV Credit Bank; however, if the credits are to be used for future compliance with the ZEV sales requirement in 13 C.C.R. § 1962, both parties to the transaction shall certify the transaction and record it in the ZEV Credit Bank.

J. For each acquisition of credits transferred to or from another manufacturer, each manufacturer shall submit a Notice of Credit Transfer to the Department on a form provided by the Department that includes:
1. The date of the credit transfer;
2. The model year the credits were generated;
3. The type of vehicle, NEV, ZEV type, ATPZEV or PZEV; and
4. The number of credits in grams/mile NMOG.

K. A manufacturer may deposit into its ZEV Credit Bank account a number of credits equal to its California credit balance at the beginning of the 2012 model year. The manufacturer shall multiply the transferred credit balance by the number of affected vehicles registered in Arizona, and divide by the number of affected vehicles registered in California. The proportion of affected vehicles in Arizona and California shall be determined by the average number of vehicles registered in model years 2005 through 2007, or by the average number of vehicles registered in model year 2011. The manufacturer may deposit the credits only after all credit obligations in California for model years 2010 and earlier have been satisfied.

L. The Department shall verify all credits and, if discrepancies are found, shall notify the manufacturer and adjust the account. The Department may audit an account at any time.

M. Each manufacturer with a ZEV Credit Bank account shall report to the Department the following information:
1. By May 1, 2012, the total number of PC and LDT1 vehicles produced and delivered for sale in Arizona and California for the 2006 through 2008 model years; or
2. By May 1, 2012, the total projected number of PC and LDT1 vehicles to be produced and delivered for sale in Arizona and California during model year 2012 and, by March 1, 2013, the actual number of 2012 model year PC and LDT1 vehicles produced and delivered for sale in Arizona and California; and
3. By May 1, 2012, the total number of banked California credits after all 2011 model year and earlier obligations have been met.

N. A manufacturer electing to deposit credits under subsection (K), shall offer for sale in Arizona in model years 2012 through 2014 any PZEV, ATPZEV or ZEV, except Type III ZEVs, that it offers for sale in California during the same period.

R18-2-1808. Additional Reporting Requirements

A. For each engine family to be sold in Arizona, within 30 days of the Department's request, a manufacturer shall submit to the Department one copy of the California Executive Order and one copy of the Certificate of Conformity for certification of affected vehicles. If the reports are available electronically, the manufacturer may send them in an electronic format.

B. The Department may require any vehicle manufacturer to submit any documentation the Department deems necessary for the administration and enforcement of this Article, including all certification materials submitted to CARB.

R18-2-1809. Warranty Requirements

A. Beginning model year 2012 for all vehicles subject to this Article, each manufacturer shall provide a warranty to the ultimate purchaser and each subsequent purchaser that complies with the requirements in 13 C.C.R. §§ 2035 through 2038, 2040, 2041 and 2046.

B. The 15-year or 150,000-mile extended warranty specified in 13 C.C.R. § 1962(c)(2)(D) for PZEVs is not included as a requirement of this rule or of R18-2-1811, provided that PZEVs delivered for sale to Arizona are equipped with the same quality components as PZEVs supplied to areas where the full 15-year or 150,000-mile warranty remains in effect. This Section does not amend the requirements of 13 C.C.R. § 1962(c)(2)(D) that indicate the warranty period for a zero emission energy storage device used for traction power will be 10 years.

C. For all vehicles subject to this Article, beginning model year 2012, each manufacturer shall include the emission control system warranty statement that complies with the requirements in 13 C.C.R. § 2039. Manufacturers may modify this statement as necessary to inform Arizona vehicle owners of the warranty's applicability. The manufacturer shall provide a telephone number that Arizona consumers can use to obtain warranty information.

D. A manufacturer shall submit Failure of Emission-Related Components reports for vehicles subject to this rule, as defined

in 13 C.C.R. § 2144, upon the Department's request. Manufacturers may submit copies of the Failure of Emission-Related Components reports that are submitted to the California Air Resources Board instead of submitting reports for vehicles subject to this Article.

R18-2-1810. Recalls

A. The Department shall consider any order issued or enforcement action taken by CARB that results in the recall of any vehicle under 13 C.C.R. §§ 2109-2135, to establish a rebuttable presumption of noncompliance for applicable vehicles registered in Arizona. If the manufacturer can demonstrate that the order or action is not applicable to vehicles registered in Arizona, the Department shall not pursue a recall of vehicles registered in Arizona.

B. Any emission-related recall campaign initiated by any manufacturer under 13 C.C.R. §§ 2113-2121 shall extend to all applicable vehicles registered in Arizona. If the manufacturer can demonstrate that the recall campaign is not applicable to vehicles registered in Arizona, the campaign shall not apply in Arizona.

C. For vehicles subject to an order of enforcement action under subsection (A), each manufacturer shall send to owners of vehicles registered in Arizona a notice that complies with the requirements in 13 C.C.R. § 2118 or 2127. The manufacturer shall provide a telephone number that Arizona consumers can use to obtain information about any recall that affects Arizona vehicles.

R18-2-1811. Inspections and Information Requests

A. The Department may inspect new and used motor vehicles and related records to determine compliance with the requirements of this Article. Department inspections shall occur during regular business hours and on any premises owned, operated or used by any dealer or rental car agency for the purposes of determining compliance with this Article.

B. The Department may require any vehicle dealer or rental car agency to submit any documentation the Department deems necessary to the effective administration and enforcement of this division. The Department shall not require creation of new records.

R18-2-1812. Enforcement

A. Each vehicle that fails to comply with the standards established by this Article shall constitute a distinct violation for purposes of A.R.S. § 49-463.

B. When a manufacturer fails to comply with Section R18-2-1804, the number of out-of-compliance vehicles shall be calculated in accordance with 13 C.C.R. § 1961(c)(3)(A).

C. When a manufacturer fails to comply with Section R18-2-1805, the number of out-of-compliance vehicles shall be calculated in accordance with 13 C.C.R. § 1961.1(b)(3)(A).

D. When a manufacturer fails to comply with this Section R18-2-1807, the number of out-of-compliance vehicles shall be calculated in accordance with 13 C.C.R. § 1962(g)(8).

APPENDIX 13

A13. Sections of Title 13, *California Code of Regulations* Applicable to Arizona for Purposes of Article 18 of This Chapter

The following sections of Title 13 of the California Code of Regulations or "C.C.R." shall apply in Arizona for purposes of Article 18 of this Chapter, "Clean Car Standards." For purposes of applying these sections of 13 C.C.R., "California" means "Arizona," and "Air Resources Board," "California Air Resources Board" or "CARB" means the Arizona Department of Environmental Quality unless otherwise specified. Each manufacturer of affected vehicles, as defined in R18-2-1801(2), of model year 2012 or later shall comply with each applicable standard specified in 13 C.C.R. set forth below:

13 C.C.R. § 1900. Definitions

(a) The definitions of this section supplement and are governed by the definitions set forth in chapter 2 (commencing with section 39010), part 1, division 26 of the Health and Safety Code. The definitions set forth in the applicable model-year new vehicle certification and assembly-line test procedures adopted in this chapter are hereby incorporated by reference.

(b) In addition to the definitions incorporated under subdivision (a), the following definitions shall govern the provisions of this chapter;

(1) "Add-on part" means any aftermarket part which is not a modified part or a replacement part.

(2) "Consolidated part" means a part which is designed to replace a group of original equipment parts and which is functionally identical of those original equipment parts in all respects which in any way affect emissions (including durability).

(3) "Emissions-related part" means any automotive part, which affects any regulated emissions from a motor vehicles which is subject to California or federal emissions standards. This includes, at a minimum, those parts specified in the "Emissions-Related Parts List," adopted by the State Board on November 4, 1977, as last amended May 19, 1981.

(4) "Gaseous fuels" means any liquefied petroleum gas, liquefied natural gas, or compressed natural gas fuels for use in motor vehicles.

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

(6) "Heavy-duty vehicle" means any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6,000 pounds, except passenger cars.

(7) "Identical device" means a crankcase emission control device identical in all respects, including design, materials, manufacture, installation and operation, with a device which has been certified by the Air Resources Board or the Motor Vehicle Pollution Control Board pursuant to the Health and Safety Code, but which is manufactured by a person other than original manufacturer of the device.

(8) "Independent low volume manufacturer" means a manufacturer with California annual sales of less than 10,000 new passenger cars, light-duty trucks and medium-duty vehicles following aggregation of sales pursuant to this section 1900(b)(8). Annual sales shall be determined as the average number or sales sold for the three previous consecutive model years for which a manufacturer seeks certification; however, for a manufacturer certifying for the first time in California, annual sales shall be based on projected California sales for the model year. A manufacturer's California sales shall consist of all vehicles or engines produced by the manufacturer and delivered for sale in California, except that vehicles or engines produced by the manufacturer and marketed in California by another manufacturer under the other manufacturer's nameplate shall be treated as California sales of the marketing manufacturer. The annual sales from different firms shall be aggregated in the following situations: (1) vehicles produced by two or more firms, one of which is 10% or greater part owned by another; or (2) vehicles produced by any two or more firms if a third party has equity ownership of 10% or more in each of the firms; or (3) vehicles produced by two or more firms having a common corporate officer(s) who is (are) responsible for the overall direction of the companies; or (4) vehicles imported or distributed by all firms where the vehicles are manufactured by the same entity and the importer or distributor is an authorized agent of the entity.

(9) "Intermediate volume manufacturer" means any pre-2001 model year manufacturer with California sales between 3,001 and 60,000 new light- and medium-duty vehicles per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1993; any 2001 through 2002 model year manufacturer with California sales between 4,501 and 60,000 new light- and medium-duty vehicles per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1993; and any 2003 and subsequent model year manufacturer with California sales between 4,501 and 60,000 new light- and medium-duty vehicles based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification. For a manufacturer certifying for the first time in California, model year sales shall be based on projected California sales. A manufacturer's California sales shall consist of all vehicles or engines produced by the manufacturer and delivered for sale in California, except that vehicles or engines produced by the manufacturer and marketed in California by another manufacturer under the other manufacturer's nameplate shall be treated as California sales of the marketing manufacturer. For purposes of applying the 2005 and subsequent model year zero-emission vehicle requirements for intermediate-volume manufacturers under section 1962(b), the annual sales from different firms shall be aggregated in the case of (1) vehicles produced by two or more firms, each one of which either has a greater than 50% equity ownership in another or is more than 50% owned by another; or (2) vehicles produced by any two or more firms if a third party has equity ownership of greater than 50% in each firm.

For purposes of applying the 2009 and subsequent model year Greenhouse Gas requirements for intermediate volume manufacturers under section 1961.1, the annual sales from different firms shall be aggregated in the following situations: (1) vehicles produced by two or more firms, each one of which either has a greater than 10% equity ownership in another or is more than 10% owned by another; or (2) vehicles produced by any two or more firms if a third party has equity ownership of greater than 10% in each firm.

(10) "Large volume manufacturer" means any 2000 and subsequent model year manufacturer that is not a small volume manufacturer, or an independent low volume manufacturer, or an intermediate volume manufacturer.

(11) "Light-duty truck" means any 2000 and subsequent model motor vehicle certified to the standards in section 1961(a)(1) rated at 8,500 pounds gross vehicle weight or less, and any other motor vehicle, rated at 6,000 pounds gross vehicle weight or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.

(12) "Medium-duty passenger vehicle" means any medium-duty vehicle with a gross vehicle weight rating of less than 10,000 pounds that is designed primarily for the transportation of persons. The medium-duty passenger vehicle definition does not include any vehicle which: (1) is an "incomplete truck" i.e., is a truck that does not have the primary load carrying device or container attached; or (2) has a seating capacity of more than 12 persons; or (3) is designed for more than 9 persons in seating rearward of the driver's seat; or (4) is equipped with an open cargo area of 72.0 inches in interior length or more. A covered box not readily accessible from the passenger compartment will be considered an open cargo area, for purposes of this definition.

(13) "Medium-duty vehicle" means any pre-1995 model year heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8,500 pounds or less; any 1992 through 2006 model-year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in section 1960.1(h)(2) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; any 1995 through 2003 model year heavy-duty vehicle certified to the standards in section 1960.1(h)(1) having a manufacturer's gross vehicle weight rating of 14,000 pounds or less; and any 2000

and subsequent model heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in Section 1961(a)(1) or 1962 having a manufacturer's gross vehicle weight rating between 8,501 and 14,000 pounds.

(14) "Modified part" means any aftermarket part intended to replace an original equipment emission-related part and which is not functionally identical to the original equipment part in all respects which in any way affect emissions, excluding a consolidated part.

(15) "Motorcycle Engine" means an engine which is used to propel a new, street-use motorcycle.

(16) [Reserved]

(17) "Passenger car" means any motor vehicle designed primarily for transportation of persons and having a design capacity of twelve persons or less.

(18) "Reactivity adjustment factor" means a fraction applied to the NMOG emissions from a vehicle powered by a fuel other than conventional gasoline for the purpose of determining a gasoline-equivalent NMOG level. The reactivity adjustment factor is defined as the ozone-forming potential of clean fuel vehicle exhaust divided by the ozone-forming potential of gasoline vehicle exhaust.

(19) "Recall" means:

(A) The issuing of notices directly to consumers that vehicles in their possession or control should be corrected, and/or

(B) Efforts to actively locate and correct vehicles in the possession or control of consumers.

(20) "Replacement part" means any aftermarket part intended to replace an original equipment emissions-related part and which is functionally identical to the original equipment part in all respects which in any way affect emissions (including durability), or a consolidated part.

(21) "Subgroup" means a set of vehicles within an engine family distinguishable by characteristics contained in the manufacturer's application for certification.

(22) "Small volume manufacturer" means, with respect to the 2001 and subsequent model-years, a manufacturer with California sales less than 4,500 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years for which a manufacturer seeks certification as a small volume manufacturer; however, for manufacturers certifying for the first time in California model-year sales shall be based on projected California sales. A manufacturer's California sales shall consist of all vehicles or engines produced by the manufacturer and delivered for sale in California, except that vehicles or engines produced by the manufacturer and marketed in California by another manufacturer under the other manufacturer's nameplate shall be treated as California sales of the marketing manufacturer. Except as provided in the next paragraph, beginning with the 2009 model year, the annual sales from different firms shall be aggregated in the following situations: (1) vehicles produced by two or more firms, one of which is 10% or greater part owned by another; or (2) vehicles produced by any two or more firms if a third party has equity ownership of 10% or more in each of the firms; or (3) vehicles produced by two or more firms having a common corporate officer(s) who is (are) responsible for the overall direction of the companies; or (4) vehicles imported or distributed by all firms where the vehicles are manufactured by the same entity and the importer or distributor is an authorized agent of the entity.

For purposes of compliance with the zero-emission vehicle requirements, heavy-duty vehicles and engines shall not be counted as part of a manufacturer's sales. For purposes of applying the 2005 and subsequent model year zero-emission vehicle requirements for small-volume manufacturers under section 1962(b), the annual sales from different firms shall be aggregated in the case of (1) vehicles produced by two or more firms, each one of which either has a greater than 50% equity ownership in another or is more than 50% owned by another; or (2) vehicles produced by any two or more firms if a third party has equity ownership of greater than 50% in each firm.

13 C.C.R. § 1956.8. Exhaust Emissions Standards and Test Procedures--1985 and Subsequent Model Heavy-Duty Engines and Vehicles

(a)(1) The exhaust emissions (i) from new 1985 through 2003 model heavy-duty diesel engines (except methanol-fueled engines), and heavy-duty natural-gas-fueled and liquefied-petroleum-gas-fueled engines derived from diesel-cycle engines, and (ii) from all new 1993 through 2003 model heavy-duty methanol-fueled, diesel engines, except in all cases engines used in medium-duty vehicles, shall not exceed:

Exhaust Emission Standards For 1985-2003 Model Heavy-Duty Engines Other than Urban Bus Engines (grams per brake horsepower-hour [g/bhp-hr])

Model Year	Total Hydrocarbons or OMHCE nA	Optional Non-methane Hydrocarbons nA	Carbon Monoxide	Oxides of Nitrogen	Particulates
1985-1986	1.3		15.5	5.1	
1987 nB	1.3		15.5	5.1	
1988-1989	1.3		15.5	6.0	0.60
1990	1.3	1.2	15.5	6.0	0.60
1991-1993 nC	1.3	1.2	15.5	5.0	0.25 nD
1994-1997	1.3	1.2	15.5	5.0	0.10 nD
1995-1997 nE	1.3	1.2	15.5	3.5 to 0.5	0.10
1998-2003 nF	1.3	1.2	15.5	4.0 nG, nH	0.10 nG
1998-2003 nE	1.3	1.2	15.5	2.5 to 0.5 nI	0.10

nA The total or optional non-methane hydrocarbon standards apply to petroleum-fueled, natural-gas-fueled and liquefied-petroleum-gas-fueled engines. The Organic Material Hydrocarbon Equivalent, or OMHCE, standards apply to methanol-fueled engines.

nB As an option a manufacturer may elect to certify to the 1988 model-year emission standards one year early, for the 1987 model year.

nC For methanol-fueled engines, these standards shall be applicable beginning with the 1993 model year.

nD Emissions averaging may be used to meet this standard. Averaging is restricted to within each useful life subclass and is applicable only through the 1995 model year. Emissions; from engines used in urban buses shall not be included in the averaging program.

nE These are optional standards. A manufacturer may elect to certify to an optional NO[x] standard between the values, inclusive, by 0.5 grams per brake horsepower-hour increments. Engines certified to any of these optional NO[x] standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

nF These are mandatory standards.

nG Engines of 1998 through 2003 model years may be eligible to generate banking credits based on these standards according to the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

nH May be used as the certification standard for the higher emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(3)(4), below.

nI May be used as the certification standard for the lower emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(3)(4), below.

(2)(A) The exhaust emissions from new 2004 and subsequent model heavy-duty diesel engines, heavy-duty natural gas-fueled and liquefied-petroleum-gas-fueled engines derived from diesel-cycle engines, and heavy-duty methanol-fueled diesel engines, and the optional, reduced-emission standards for 2002 and subsequent model engines produced beginning October 1, 2002, except in all cases engines used in medium-duty vehicles, shall not exceed:

Exhaust Emission Standards for 2004 and Subsequent Model Heavy-Duty Engines, and Optional, Reduced Emission Standards for 2002 and Subsequent Model Heavy-Duty Engines Produced Beginning October 1, 2002, Other than Urban Bus Model-Year Engines Produced From October 1, 2002 Through 2006 nL (grams per brake horsepower-hour [g/bhp-hr])

Model Year	Oxides of Nitrogen Plus Non-methane Hydrocarbons	Optional Oxides of Nitrogen Plus Non-methane Hydrocarbons	Oxides of Nitrogen
2004-2006 nH	2.4 nA, nC, nE, nJ	2.5 nB, nC, nE, nJ	n/a
October 1, 2002-2006	n/a	1.8 to 0.3 nA, nD, nF	n/a
2007 and subsequent nM	n/a	n/a	0.20 nI

nA This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, without individual restriction on the individual component values.

nB This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, with the non-methane hydrocarbon individual component value not to exceed 0.5 g/bhp-hr.

nC For 2004 through 2006 model years, emissions averaging may be used to meet this standard. Averaging must be based on the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nD A manufacturer may elect to certify to an optional reduced-emission NO[x]+NMHC standard between the values, inclusive, by 0.3 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission NO[x] standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nE May be used as the certification standard for the higher emitting fueling mode of an engine certified under the dual fueling mode certification process of section 1956.8(a)(4), below.

nF May be used as the certification standard for the lower emitting fueling mode of an engine certified under the dual fueling mode certification process of section 1956.8(a)(4), below.

nG A manufacturer may elect to certify to an optional reduced-emission PM standard between the specified values, inclusive, by 0.01 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission PM standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nH Engine manufacturers subject to the Heavy-Duty Diesel Engine Settlement Agreements (Settlement Agreements)1 must produce engines in compliance with the requirements contained in their respective Settlement Agreement. Most engine manufacturers subject to the Settlement Agreements are required to manufacture engines meeting the exhaust emission standards for 2004 and subsequent model years engines beginning October 1, 2002.

nI A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the NO[x] emissions averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated in section 1956.8 (b), below. If the manufacturer elects to include engine families in any of these programs, the NO[x] family emission limit (FEL) may not exceed the following FEL caps: 2.00 grams per brake horsepower-hour (0.75 grams per megajoule) for model years before 2010; 0.50 grams per brake horsepower-hour (0.19 grams per megajoule) for model years 2010 and later. The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nJ For 2007 through 2009 model years, a manufacturer may use these emission standards in accordance with section 1956.8 (a)(2)(B). A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the NO[x] plus NMHC emissions averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated in section 1956.8 (b), below. If the manufacturer elects to include engine families in any of

these programs, the NO[x] family emission limit (FEL) may not exceed the following FEL caps: 2.00 grams per brake horsepower-hour (0.75 grams per megajoule) for model years. The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nK A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the particulate averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8 (b), below. The particulate FEL for each engine family a manufacturer elects to include in any of these programs may not exceed an FEL cap of 0.02 grams per brake horsepower-hour (0.0075 grams per megajoule). The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nL For 2007 and subsequent model-year urban bus engines, this section applies. For urban bus model-year engines produced from October 1, 2002 through 2006, refer to section 1956.1.

nM For model years between 2007 and 2009, transit agencies purchasing urban buses and/or urban bus engines shall meet the requirements set forth in section 2023.1.

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n1 Seven of the largest heavy-duty diesel engine manufacturers will be implementing measures to reduce emissions beginning October 1, 2002, to meet the requirements of the Heavy-Duty Diesel Engine Settlement Agreements reached with the ARB. The Heavy-Duty Diesel Engine Settlements were agreements reached in response to lawsuits brought by the United States Environmental Protection Agency and violations alleged by the ARB pertaining to excess in-use emissions caused by the use of defeat devices and unacceptable algorithms. Navistar signed its Settlement Agreement on October 22, 1998. Cummins, Detroit Diesel Corporation, Caterpillar, Volvo, Mack and Renault signed their Settlement Agreements on December 15, 1998.

Exhaust Emission Standards for 2004 and Subsequent Model Heavy-Duty Engines, and Optional, Reduced Emission Standards for 2002 and Subsequent Model Heavy-Duty Engines Produced Beginning October 1, 2002, Other than Urban Bus Model-Year Engines Produced From October 1, 2002 Through 2006 nL (grams per brake horsepower-hour [g/bhp-hr])

Model Year	Non-methane Hydrocarbons	Carbon Monoxide	Particulates
2004-2006 nH	n/a	15.5	0.10 nC
October 1, 2002-2006	n/a	15.5	0.03 to 0.01 nG
2007 and subsequent nM	0.14	15.5	0.01 nK

nA This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, without individual restriction on the individual component values.

nB This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, with the non-methane hydrocarbon individual component value not to exceed 0.5 g/bhp-hr.

nC For 2004 through 2006 model years, emissions averaging may be used to meet this standard. Averaging must be based on the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nD A manufacturer may elect to certify to an optional reduced-emission NO[x]+NMHC standard between the values, inclusive, by 0.3 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission NO[x] standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nE May be used as the certification standard for the higher emitting fueling mode of an engine certified under the dual fueling mode certification process of section 1956.8(a)(4), below.

nF May be used as the certification standard for the lower emitting fueling mode of an engine certified under the dual fueling mode certification process of section 1956.8(a)(4), below.

nG A manufacturer may elect to certify to an optional reduced-emission PM standard between the specified values, inclusive, by 0.01 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission PM standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

nH Engine manufacturers subject to the Heavy-Duty Diesel Engine Settlement Agreements (Settlement Agreements)1 must produce engines in compliance with the requirements contained in their respective Settlement Agreement. Most engine manufacturers subject to the Settlement Agreements are required to manufacture engines meeting the exhaust emission standards for 2004 and subsequent model years engines beginning October 1, 2002.

nI A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the NO[x] emissions averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated in section 1956.8 (b), below. If the manufacturer elects to include engine families in any of these programs, the NO[x] family emission limit (FEL) may not exceed the following FEL caps: 2.00 grams per brake horsepower-hour (0.75 grams per megajoule) for model years before 2010; 0.50 grams per brake horsepower-hour (0.19 grams per megajoule) for model years 2010 and later. The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nJ For 2007 through 2009 model years, a manufacturer may use these emission standards in accordance with section 1956.8 (a)(2)(B). A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the NO[x] plus NMHC emissions averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated in section 1956.8 (b), below. If the manufacturer elects to include engine families in any of these programs, the NO[x] family emission limit (FEL) may not exceed the following FEL caps: 2.00 grams per brake horsepower-hour (0.75 grams per megajoule) for model years. The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nK A manufacturer may elect to include any or all of its heavy-duty diesel engine families in any or all of the particulate averaging, banking, or trading programs for heavy-duty diesel engines, within the restrictions described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8 (b), below. The particulate FEL for each engine family a manufacturer elects to include in any of these programs may not exceed an FEL cap of 0.02 grams per brake horsepower-hour (0.0075 grams per megajoule). The FEL cap applies whether credits for the engine family are derived from averaging, banking, or trading programs.

nL For 2007 and subsequent model-year urban bus engines, this section applies. For urban bus model-year engines produced from October 1, 2002 through 2006, refer to section 1956.1.

nM For model years between 2007 and 2009, transit agencies purchasing urban buses and/or urban bus engines shall meet the requirements set forth in section 2023.1.

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n1 Seven of the largest heavy-duty diesel engine manufacturers will be implementing measures to reduce emissions beginning October 1, 2002, to meet the requirements of the Heavy-Duty Diesel Engine Settlement Agreements reached with the ARB. The Heavy-Duty Diesel Engine Settlements were agreements reached in response to lawsuits brought by the United States Environmental Protection Agency and violations alleged by the ARB pertaining to excess in-use emissions caused by the use of defeat devices and unacceptable algorithms. Navistar signed its Settlement Agreement on October 22, 1998. Cummins, Detroit Diesel Corporation, Caterpillar, Volvo, Mack and Renault signed their Settlement Agreements on December 15, 1998.

(B) Phase-in Options.

1. Early NO[x] compliant engines. For model years 2007, 2008, and 2009, a manufacturer may, at their option, certify one or more of their engine families to the combined NO[x] plus NMHC standard or FEL applicable to model year 2006 engines under section 1956.8 (a)(2)(A), in lieu of the separate NO[x] and NMHC standards or FELs applicable to the 2007 and subsequent model years, specified in section 1956.8 (a)(2)(A). Each engine certified under this phase-in option must comply with all other emission requirements applicable to model year 2007 engines. To qualify for this option, a manufacturer must satisfy the U.S.-directed production requirement of certifying no more than 50 percent of engines to the NO[x] plus NMHC standards or FELs applicable to 2006 engines, as specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(1), as adopted January 18, 2001. In addition, a manufacturer may reduce the quantity of engines that are required to be phased-in using the early certification credit program specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(2), as adopted January 18, 2001, and the Blue Sky" engine program specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(4), as adopted January 18, 2001.

2. Early PM compliant engines. A manufacturer certifying engines to the 2007 and subsequent model year PM standard listed in section 1956.8(a)(2)(A) (without using credits, as determined in any averaging, banking, or trading program described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," to comply with the standards) before model year 2007 may reduce the number of engines that are required to meet the 2007 and subsequent model year PM standard listed in section 1956.8(a)(2)(A) in model year 2007, 2008 and/or 2009. To qualify for this option, a manufacturer must satisfy the PM emission requirements pursuant to the methods detailed in 40 Code of Federal Regulations, part 86, section 86.007-11 (g)(2)(ii), as adopted January 18, 2001.

(3) Formaldehyde exhaust emissions from new 1993 and subsequent model methanol-fueled diesel engines, shall not exceed:

Model Year	Formaldehyde (g/bhp-hr)
1993-1995	0.10
1996 and subsequent	0.05

(4) An engine family whose design allows engine operation in either of two distinct alternative fueling modes, where each fueling mode is characterized by use of one fuel or a combination of two fuels and by significantly different emission levels under each mode, may certify to a different NO[x] or NO[x] plus NMHC (as applicable depending on model year) standard for each fueling mode, provided it meets the following requirements:

(A) The NO[x] or NO[x] plus NMHC certification standard used for operation under the higher emitting fueling mode must be one of the standards denoted by footnote H in paragraph (a)(1) and footnote E in paragraph (a)(2).

(B) The NO[x] or NO[x] plus NMHC certification standard used for operation under the lower emitting fueling mode must be one of the reduced-emission standards denoted by footnote I in paragraph (a)(1) and footnote F in paragraph (a)(2).

(C) The engine family is not used to participate in any manufacturer's averaging, banking or trading program.

(D) The engine family meets all other emission requirements contained in this section.

(E) The higher emitting fueling mode must be intended only for fail-safe vehicle operation when a malfunction or inadvertent fuel depletion precludes operation in the lower emitting fueling mode, as evidenced by a significantly reduced horsepower versus engine speed curve when operating in the higher emitting fueling mode when compared to the similar curve for the lower emitting fueling mode.

(5) No crankcase emissions shall be discharged directly into the ambient atmosphere from any new 2007 or later model year diesel heavy-duty diesel engine, with the following exception: heavy-duty diesel engines equipped with turbochargers, pumps, blowers, or superchargers for air induction may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during all emission testing. Manufacturers using this exception must manufacture the engines so that all crankcase emissions can be routed into a dilution tunnel (or other sampling system approved in advance by the Executive Officer), and must account for deterioration in crankcase emissions when determining exhaust deterioration factors. For the purpose of section 1956.8(a)(2), crankcase emissions that are routed to the exhaust upstream of exhaust after treatment during all operation are not considered to be "discharged directly into the ambient atmosphere."

(6) Heavy-Duty Diesel Engine Idling Requirements.

(A) Engine Shutdown System. The requirements in this subsection apply to engine manufacturers and original equipment manufacturers, as applicable, that are responsible for the design and control of engine and/or vehicle idle controls.

1. Requirements. Except as provided in subsections (a)(6)(B) and (a)(6)(C), all new 2008 and subsequent model-year heavy-duty diesel engines shall be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to "neutral" or "park", and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system shall shut down the engine after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to "neutral" or "park." The engine shutdown system must be tamper-resistant and non-programmable. A warning signal, such as a light or sound indicator inside the vehicle cabin, may be used to alert the driver 30 seconds prior to engine shutdown. The engine shutdown system must be capable of allowing the driver to reset the engine shutdown system timer by momentarily changing the position of the accelerator, brake, or clutch pedal, or other mechanism within 30 seconds prior to engine shutdown. Once reset, the engine shutdown system shall restart the engine shutdown sequence described in this paragraph above, and shall continue to do so until the engine shuts down or the vehicle is driven.

2. Engine Shutdown System Override. The engine shutdown system may be overridden, to allow the engine to run continuously at idle, only under the following conditions:

a. If the engine is operating in power take-off (PTO) mode. The PTO system shall have a switch or a setting that can be switched "on" to override the engine shutdown system and will reset to the "off" position when the vehicle's engine is turned off or when the PTO equipment is turned off. Subject to advance Executive Officer approval, other methods for detecting or activating PTO operation may be allowed; or,

b. if the vehicle's engine coolant temperature is below 60oF. The engine shutdown system shall automatically be activated once the coolant temperature reaches 60oF or above. The engine coolant temperature shall be measured with the engine's existing engine coolant temperature sensor used for engine protection, if so equipped. Other methods of measuring engine coolant temperature may be allowed, subject to advance Executive Officer approval.

c. if an exhaust emission control device is regenerating, and keeping the engine running is necessary to prevent after treat-

ment or engine damage, the engine shutdown system may be overridden for the duration necessary to complete the regeneration process up to a maximum of 30 minutes. Determination of what constitutes the need for regeneration will be based on data provided by the manufacturer at time of certification. Regeneration events that may require longer than 30 minutes of engine idling to complete shall require advance Executive Officer approval. At the end of the regeneration process, the engine shutdown system shall automatically be enabled to restart the engine shutdown sequence described in subparagraph (a)(6)(A)1. above. A vehicle that uses a regeneration strategy under engine idling operating conditions shall be equipped with a dashboard indicator light that, when illuminated, indicates that the exhaust emission control device is regenerating. Other methods of indicating that the exhaust emission control device is regenerating may be used with advance Executive Officer approval.

d. if servicing or maintenance of the engine requires extended idling operation. The engine's electronic control module may be set to temporarily deactivate the engine shutdown system for up to a maximum of 60 minutes. The deactivation of the engine shutdown system shall only be performed with the use of a diagnostic scan tool. At the end of the set deactivation period, the engine's electronic control module shall reset to restart the engine shutdown system sequence described in subparagraph (a)(6)(A)1. above.

(B) Exempt Vehicles. Heavy-duty diesel engines to be used in buses as defined in California Vehicle Code sections 233, 612 and 642, school buses as defined in California Vehicle Code section 545, recreational vehicles as defined in Health and Safety Code 18010, medium duty vehicles as defined in section 1900(b)(13) of title 13, California Code of Regulations, military tactical vehicles as defined in section 1905 of title 13, California Code of Regulations, and authorized emergency vehicles as defined in California Vehicle Code section 165 are exempted from these requirements.

(C) Optional NO[x] idling emission standard. In lieu of the engine shutdown system requirements specified in subsection (a)(6)(A) above, an engine manufacturer may elect to certify its new 2008 and subsequent model-year heavy-duty diesel engines to an optional NO[x] idling emission standard of 30 grams per hour. Compliance with this optional standard will be determined based on testing conducted pursuant to the supplemental NO[x] idling test cycle and procedures specified in section 86.1360-2007.B.4 of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," as incorporated by reference in subsection (b). The manufacturer may request an alternative test procedure if the technology used cannot be demonstrated using the procedures in section 86.1360-2007.B.4, subject to advance approval of the Executive Officer. A manufacturer certifying to the optional NO[x] idling standard must not increase emissions of CO, PM, or NMHC, determined by comparing results from the supplemental NO[x] idling test cycle and procedures specified in section 86.1360-2007.B.4 of the referenced "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" to emission results from the idle mode of the supplemental steady state test cycle or emission results from idle portions of the transient test cycle for heavy duty diesel engines, respectively specified in sections 86-1360-2007 and 86.1327-98 of the referenced "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles." With advance Executive Officer approval, a manufacturer may use other methods of ensuring that emissions of CO, PM, and NMHC are not adversely affected in meeting the optional NO[x] requirement. Also, manufacturers shall state in their application for certification that meeting the optional NO[x] idling requirement will not adversely affect the associated emissions of CO, PM and NMHC.

An engine manufacturer certifying its engine to the optional NO[x] idling emission standard must also produce a vehicle label, as defined in subsection 35.B.4 of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," as incorporated by reference in subsection (b).

(D) Optional Alternatives to Main Engine Idling. All new 2008 and subsequent model year heavy duty diesel engines may also be equipped with idling emission reduction devices that comply with the compliance requirements specified in title 13, CCR, section 2485(c)(3).

(b) The test procedures for determining compliance with standards applicable to 1985 and subsequent model heavy-duty diesel engines and vehicles and the requirements for participation in the averaging, banking and trading programs, are set forth in the "California Exhaust Emission Standards and Test Procedures for 1985 through 2003 Model Heavy-Duty Diesel Engines and Vehicles," adopted April 8, 1985, as last amended December 12, 2002, the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel-Engines and Vehicles," adopted December 12, 2002, as last amended October 17, 2007, and the "California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes," adopted October 24, 2002, which are incorporated by reference herein.

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

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

Model Year	Total Hydrocarbons or OMHCE nA	Optional Non-Methane Hydrocarbons nA	Carbon Monoxide nB	Oxides of Nitrogen
1987C	1.1 nD		14.4 nD	10.6
	1.9 nE		37.1 nE	10.6
1988-1989	1.1 nD		14.4 nD	6.0
	1.9 nE		37.1 nE	6.0
1990	1.1	0.9 nD	14.4 nD	6.0
	1.9 nE	1.7 nE	37.1 nE	6.0
1991-1994	1.1 nD	0.9 nD	14.4 nD	5.0
	1.9 nE	1.7 nE	37.1 nE	5.0
1995-1997	1.9 nE	1.7 nE	37.1 nE	5.0
	1.9 nE	1.7 nE	37.1 nE	2.5 to 5.0 nF
1998-2003 nG	1.9 nE	1.7 nE	37.1 nE	4.0
	1.9 nE	1.7 nE	37.1 nE	1.5 to 0.5 nF
	Non-Methane Hydrocarbons plus Oxides of Nitrogen (NMHC + NO[x])		**Carbon Monoxide**	
2004 nG	2.4 g/bph-hr; or		37.1	
	2.5 with 0.5 g/bhp-hr cap on NMHC			

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

nB Prior to the 2002 model year, carbon monoxide emissions from engines utilizing exhaust after treatment technology shall also not exceed 0.5 percent of the exhaust gas flow at curb idle.

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

nD These standards are applicable to Otto-cycle engines intended for use in all heavy-duty vehicles.

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

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

nG A manufacturer may request to certify to Option 1 or Option 2 federal NMHC + NO[x] standards as set forth in 40 CFR 86.005-10(f), as adopted October 6, 2000.

(B) The exhaust emissions from new 2005 and subsequent model heavy-duty Otto-cycle engines, except for Otto-cycle medium- and heavy-duty engines subject to the alternative standards in 40 CFR 86,005-10(f), shall not exceed:

California Emission Standards for 2005 and Subsequent Model Heavy-Duty Otto-Cycle Engines nA (in g/bhp-hr)

Model Year	Emission Category	NMHC + NO<x>	NMHC	NO<x>	CO nF	HCHO	PM
Standards for Heavy-Duty Otto-Cycle Engines Used In Incomplete Medium-Duty Vehicles 8,501 to 14,000 pounds GVW nB							
2005 through 2007	ULEV	1.0 nC, nE	n/a	n/a	14.4	0.05	n/a
	SULEV	0.5	n/a	n/a	7.2	0.025	n/a
2008 and subsequent	ULEV	n/a	0.14 nE	0.20 nE	14.4	0.01	0.01
	SULEV	n/a	0.07 nE	0.10 nE	7.2	0.005	0.005
Standards for Heavy-Duty Otto-Cycle Engines Used In Heavy-Duty Vehicles Over 14,000 pounds GVW							
2005 through 2007	n/a	1.0 nC, nE	n/a	n/a	37.1	0.05 nD	n/a
2008 and subsequent	n/a	n/a	0.14 nE	0.20 nE	14.4	0.01	0.01

nA These standards apply to petroleum-fueled, alcohol-fueled, liquefied petroleum gas-fueled and natural gas-fueled Otto-cycle engines.

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

nC A manufacturer may request to certify to the Option 1 or Option 2 federal NMHC + NO[x] standards as set forth in 40 CFR 86.005-10(f). However, for engines used in medium-duty vehicles, the formaldehyde level must meet the standard specified above.

nD This standard only applies to methanol-fueled Otto-cycle engines.

nE A manufacturer may elect to include any or all of its medium- and heavy-duty Otto-cycle engine families in any or all of the emissions ABT programs for HDEs, within the restrictions described in section I.15 of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," incorporated by reference in section 1956.8(d). For engine families certified to the Option 1 or 2 federal standards, the FEL must not exceed 1.5 g/bhp-hr. If a manufacturer elects to include engine families certified to the 2005 and subsequent model year standards, the NO[x] plus NMHC FEL must not exceed 1.0 g/bhp-hr. For engine families certified to the 2008 and subsequent model year standards, the FEL is the same as set forth in 40 CFR 86.008-10(a)(1).

nF Idle carbon monoxide: For all Otto-cycle heavy-duty engines utilizing aftertreatment technology, and not certified to the on-board diagnostics requirements of section 1968, et seq, as applicable, the CO emissions shall not exceed 0.50 percent of exhaust gas flow at curb idle.

(2) Formaldehyde exhaust emissions from new 1993 and subsequent model methanol-fueled otto cycle engines shall not exceed:

Model Year	Formaldehyde (g/bhp-hr)
1993-1995.....	0.10
1996 and Subsequent....	0.05

(d) The test procedures for determining compliance with standards applicable to 1987 and subsequent model heavy-duty Otto-cycle engines and vehicles are set forth in the "California Exhaust Emission Standards and Test Procedures for 1987 through 2003 Model Heavy-Duty Otto-Cycle Engines and Vehicles," adopted April 25, 1986, as last amended December 27, 2000, the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," adopted December 27, 2000, as last amended October 17, 2007, the "California Non-Methane Organic Gas Test Procedures," adopted July 12, 1991, as last amended July 30, 2002, and the "California Interim Certification Procedures

for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes," adopted October 24, 2002, which are incorporated by reference herein.

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

(f)(1) In 1985 and future years, the executive officer may authorize use of engines certified to meet federal emission standards, or which are demonstrated to meet appropriate federal emission standards, in up to a total of 100 heavy-duty vehicles, including otto-cycle and diesel heavy-duty vehicles, in any one calendar year when the executive officer has determined that no engine certified to meet California emission standards exists which is suitable for use in the vehicles.

(2) In order to qualify for an exemption, the vehicle manufacturer shall submit, in writing, to the executive officer the justification for such exemption. The exemption request shall show that, due to circumstances beyond the control of the vehicle manufacturer, California certified engines are unavailable for use in the vehicle. The request shall further show that redesign or discontinuation of the vehicle will result in extreme cost penalties and disruption of business. In evaluating a request for an exemption, the executive officer shall consider all relevant factors, including the number of individual vehicles covered by the request and the anti-competitive effect, if any, of granting the request. If a request is denied, the executive officer shall state in writing the reasons for the denial.

(3) In the event the executive officer determines that an applicant may meet the criteria for an exemption under this subsection, but that granting the exemption will, together with previous exemptions granted, result in over 100 vehicles being permitted under this subsection to use non-California engines in heavy-duty vehicles in any one calendar year, the exemption may be granted only by the state board, under the criteria set forth herein.

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

Exhaust Emission Standards nA
(gram per brake horsepower-hour, or g/bhp-hr)

Model Year	Carbon Monoxide	NMHC + NO<x> nB	Particulates nC
1995D through 2003	14.4	3.9	0.10

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

nB This standard is the sum of the individual non-methane hydrocarbon emissions and oxides of nitrogen emissions. For methanol-fueled engines, non-methane hydrocarbons shall mean organic material hydrocarbon equivalent.

nC This standard shall only apply to diesel engines and vehicles.

nD In the 1995 model-year only, manufacturers may certify up to 50 percent of their medium-duty engines or vehicles to the applicable 1994 model-year standards and test procedures. For the 1995 through 1997 models, alternative in-use compliance is available for medium-duty manufacturers. A manufacturer may use alternative in-use compliance for up to 100 percent of its fleet in the 1995 and 1996 model years and up to 50 percent of its fleet in the 1997 model year. The percentages shall be determined from the manufacturers' projected California sales of medium-duty vehicles. For engines certified to the standards and test procedures of this subsection, "alternative in-use compliance" shall consist of an allowance of 25 percent over the HC + NO[x] standard. In-use compliance testing shall be limited to vehicles or engines with less than 90,000 miles.

(h) The exhaust emissions from new:

(1) 1992 through 2004 model-year Otto-cycle engines used in incomplete medium-duty low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles; and

(2) 1992 and subsequent model diesel engines used in medium-duty low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles shall not exceed:

Exhaust Emission Standards for Engines Used in Incomplete Otto-Cycle Medium-Duty Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and Super Ultra-Low-Emission Vehicles, and for Diesel Engines Used in Medium-Duty Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and Super Ultra-Low-Emission Vehicles nA, nF (grams per brake horsepower-hour)

Model Year	Vehicle Emissions Category nB	Carbon Monoxide	NMHC + NO[x] nC	Non-Methane Hydrocarbons
1992 nE-2001	LEV	14.4	3.5 nK	n/a
2002-2003 nE	LEV	14.4	3.0 nK	n/a
1992-2003 nE, nH	ULEV	14.4	2.5 nK	n/a
2004 and subsequent nL	ULEV - Opt A	14.4	2.5 nI, nJ, nK	n/a
2004 and subsequent nL	ULEV - Opt. Bn/a	14.4	2.4 nI, nJ, nK	n/a
2007 and subsequent nD	ULEV	15.5	n/a	0.14
1992 and subsequent nL	SULEV	7.2	2.0 nK	n/a
2007 and subsequent nD	SULEV	7.7	n/a	0.07

nA This set of standards is optional. Manufacturers of engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles from 8501-14,000 pounds gross vehicle weight rating may choose to comply with these standards as a alternative to the primary emission standards and test procedures specified in section 1960.1, or section 1961, Title 13, California Code of Regulations. Manufacturers that choose to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

nB "LEV" means low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

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

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

nD These standards apply only to diesel engines and vehicles.

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

nF In-use compliance testing shall be limited to vehicles or engines with fewer than 90,000 miles.

nG [Reserved]

nH For engines certified to the 3.5 grams per brake horsepower-hour (g/bhp-hr) LEV standards, the in-use compliance standard shall be 3.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 2002 and 2003 model year LEV standards, the in-use compliance standard shall be 3.2 g/bhp-hr. For engines certified to the 1992 through 2003 model year ULEV standards, the in-use compliance standard shall be 2.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 1992 and subsequent SULEV standards, the in-use compliance standard shall be 2.2 g/bhp-hr for the first two model years of introduction.

nI Manufacturers have the option of certifying to either option A or B. Manufacturers electing to certify to Option A must demonstrate that the NMHC emissions do not exceed 0.5 g/bhp-hr.

nJ Emissions averaging may be used to meet these standards for diesel engines, using the requirements for participation in averaging, banking and trading programs, as set forth in the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in section 1956.8(b), above.

nK Engines of 1998 and subsequent model years may be eligible to generate averaging, banking and trading credits based

on these standards according to the requirements of the averaging, banking and trading programs described in the "California Exhaust Emission Standards and Test Procedures for 1985 through 2003 Model Heavy-Duty Diesel Engines and Vehicles" and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in section 1956.8(b), above.

nL For 2007 and subsequent model year diesel engines used in medium-duty vehicles, these emission standards are not applicable.

Exhaust Emission Standards for Engines Used in Incomplete Otto-Cycle Medium-Duty Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and Super Ultra-Low-Emission Vehicles, and for Diesel Engines Used in Medium-Duty Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and Super Ultra-Low-Emission Vehicles nA, nF (grams per brake horsepower-hour)

Model Year	Vehicle Emissions Category nB	Oxides of Nitrogen	Formaldehyde	Particulates nD
1992 nE-2001	LEV	n/a	0.050	0.10 nK
2002-2003 nE	LEV	n/a	0.050	0.10 nK
1992-2003 nE, nH	ULEV	n/a	0.050	0.10 nK
2004 and subsequent nL	ULEV - Opt A	n/a	0.050	0.10 nJ, nK
2004 and subsequent nL	ULEV - Opt. Bn/a	n/a	0.050	0.10 nJ, nK
2007 and subsequent nD	ULEV	0.20	0.050	0.01
1992 and subsequent nL	SULEV	n/a	0.025	0.05 nK
2007 and subsequent nD	SULEV	0.10	0.025	0.005

nA This set of standards is optional. Manufacturers of engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles from 8501-14,000 pounds gross vehicle weight rating may choose to comply with these standards as a alternative to the primary emission standards and test procedures specified in section 1960.1, or section 1961, Title 13, California Code of Regulations. Manufacturers that choose to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

nB "LEV" means low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

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

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

nD These standards apply only to diesel engines and vehicles.

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

nF In-use compliance testing shall be limited to vehicles or engines with fewer than 90,000 miles.

nG [Reserved]

nH For engines certified to the 3.5 grams per brake horsepower-hour (g/bhp-hr) LEV standards, the in-use compliance standard shall be 3.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 2002 and 2003 model year LEV standards, the in-use compliance standard shall be 3.2 g/bhp-hr. For engines certified to the 1992 through 2003 model year ULEV standards, the in-use compliance standard shall be 2.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 1992 and subsequent SULEV standards, the in-use compliance standard shall be 2.2 g/bhp-hr for the first two model years of introduction.

nI Manufacturers have the option of certifying to either option A or B. Manufacturers electing to certify to Option A must demonstrate that the NMHC emissions do not exceed 0.5 g/bhp-hr.

nJ Emissions averaging may be used to meet these standards for diesel engines, using the requirements for participation in averaging, banking and trading programs, as set forth in the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in section 1956.8(b), above.

nK Engines of 1998 and subsequent model years may be eligible to generate averaging, banking and trading credits based on these standards according to the requirements of the averaging, banking and trading programs described in the "California Exhaust Emission Standards and Test Procedures for 1985 through 2003 Model Heavy-Duty Diesel Engines and Vehicles" and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," incorporated by reference in section 1956.8(b), above.

nL For 2007 and subsequent model year diesel engines used in medium-duty vehicles, these emission standards are not applicable.

(3) 2007 and later model year engines subject to (h)(2) have the following Phase-in Options.

(A) Early NO[x] compliant engines. For model years 2007, 2008, and 2009, a manufacturer may, at their option, certify one or more of their engine families to the combined NO[x] plus NMHC standard or FEL applicable to model year 2006 engines under section 1956.8(h)(2), in lieu of the separate NO[x] and NMHC standards or FELs applicable to the 2007 and subsequent model years, specified in section 1956.8(h)(2). Each engine certified under this phase-in option must comply with all other emission requirements applicable to model year 2007 engines. To qualify for this option, a manufacturer must satisfy the U.S.-directed production requirement of certifying no more than 50 percent of engines to the NO[x] plus NMHC standards or FELs applicable to 2006 engines, as specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(1), as adopted January 18, 2001. In addition, a manufacturer may reduce the quantity of engines that are required to be phased-in using the early certification credit program specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(2), as adopted January 18, 2001, and the "Blue Sky" engine program specified in 40 Code of Federal Regulations, part 86, section 86.007-11(g)(4), as adopted January 18, 2001.

(B) Early PM compliant engines. A manufacturer certifying engines to the 2007 and subsequent model year PM standard listed in section 1956.8 (h)(2) (without using credits, as determined in any averaging, banking, or trading program described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," to comply with the standards) before model year 2007 may reduce the number of engines that are required to meet the 2007 and subsequent model year PM standard listed in section 1956.8(h)(2) in model year 2007, 2008 and/or 2009. To qualify for this option, a manufacturer must satisfy the PM emission requirements pursuant to the methods detailed in 40 Code of Federal Regulations, part 86, section 86.007-11 (g)(2)(ii), as adopted January 18, 2001.

(4) No crankcase emissions shall be discharged directly into the ambient atmosphere from any new 2007 or later model year diesel heavy-duty diesel engine, with the following exception: heavy-duty diesel engines equipped with turbochargers, pumps, blowers, or superchargers for air induction may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during, all emission testing. Manufacturers taking advantage of this exception must manufacture the engines so that all crankcase emission can be routed into a dilution tunnel (or other sampling system approved in advance by the Executive Officer), and must account for deterioration in crankcase emissions when determining exhaust deterioration factors. For the purpose of section 1956.8(h)(2), crankcase emissions that are routed to the exhaust upstream of exhaust aftertreatment during all operation are not considered to be "discharged directly into the ambient atmosphere."

13 C.C.R. § 1960.1.Exhaust Emissions Standards and Test Procedures--1981 through 2006 Model Passenger Cars, Light-Duty and Medium-Duty Vehicles

(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 EMISSION STANDARDS (grams per mile)

Vehicle Type [FN2]	Equivalent Inertia Weight (lbs.) [FN3]	Durability Basis (mi.)	Non-Methane Hydrocarbons [FN4]	Carbon Monoxide	Oxides of Nitrogen
PC	All	50,000	(0.41)	3.4	1.0
PC [FN6]	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39 [FN7]	3.4	1.5

PC (Option 2)	All	100,000	0.46 [FN7]	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) [FN7]	9.0	1.5
LDT, MDV (Option 2)	0-3999	100,000	0.46 [FN7]	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) [FN7]	9.0	2.0
MDV	6000 and larger	50,000	0.60 (0.60)	9.0	2.0
MDV (Option 1)	6000 and larger	100,000	0.60 (0.60) [FN7]	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 regulation 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 of expiration.

2 "PC" means passenger cars.

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 gm/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: HCex = .75 (.185 - [(Di + 3.3 Hs) (29.4)])+ HCo Where: HCex = adjusted exhaust hydrocarbon standardHCo = unadjusted exhaust hydrocarbon standardDi= diurnal evaporative emissionsHs= 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 exceed1:

1982 EXHAUST EMISSION STANDARDS (grams per mile)

Vehicle Type [FN2]	**Equivalent Inertia Weight (lbs.) [FN3]**	**Durability Basis (mi.)**	**Non-Methane Hydrocarbons [FN4]**	**Carbon Monoxide**	**Oxides of Nitrogen**
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC [FN6]	All	50,000	0.39 (0.41)	7.0	0.7
PC (Option 1)	All	100,000	0.39	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 and larger	50,000	0.60 (0.60)	9.0	2.0
MDV (Option 1)	6000 and 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 regulation 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 exceed1:

1983 EXHAUST EMISSION STANDARDS (grams per mile)

Vehicle Type [FN2]	**Equivalent Inertia Weight (lbs.) [FN3]**	**Durability Basis (mi.)**	**Non-Methane Hydrocarbons [FN4]**	**Carbon Monoxide**	**Oxides of Nitrogen**
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC [FN6]	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 [FN6]	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 (Option 1)	4000-5999	100,000	0.50 (0.50)	9.0	2.0
MDV	6000 and larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 and 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 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 This set of standards for 1983 model vehicles is optional. A manufacturer may choose to certify these optional standards pursuant to the conditions set forth in Section 1960.15.

(d)(1) The exhaust emissions from new 1984 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 EMISSION STANDARDS [FN6] (grams per mile)

Vehicle Type [FN1]	**Equivalent Inertia Weight (lbs.) [FN2]**	**Durability Basis (mi.)**	**Non-Methane Hydrocarbons [FN3]**	**Carbon Monoxide**	**Oxides of Nitrogen**
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC [FN5]	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 [FN5]	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 and larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	6000 and 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 time the applicable passenger car standards and 2.00 times the applicable light-duty truck and medium-duty truck 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 through 1987 model vehicles is optional. A manufacturer may choose to certify 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 0.2g/mi for the 1986 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 EMISSION STANDARDS [FN5]

Vehicle Type [FN1]	Equivalent Inertia Weight (lbs.)	Durability Basis (mi.)	Non-Methane Hydrocarbons [FN2]	Carbon Monoxide	Oxides of Nitrogen [FN3]
PC	All	50,000	0.39 (0.41)	7.0	0.4
PC [FN4]	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 [FN4]	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 and larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751 and 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 Hydrocarbons 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 g/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 basis.

(e)(1) The exhaust emissions from (A) new 1989 through 1992 model passenger cars and light-duty trucks, except those produced by a small volume manufacturer, (B) new 1991 through 1994 model passenger cars and light-duty trucks produced by a small volume manufacturer, (C) new 1989 through 1994 model medium-duty vehicles, except those produced by a small volume manufacturer, and (D) new 1991 through 1994 model medium-duty vehicles produced by a small volume manufacturer, shall not exceed:

1989 THROUGH 1994 MODEL-YEAR EXHAUST EMISSION STANDARDS [FN5] (grams per mile)

Vehicle Type [FN1]	Loaded Vehicle Weight (lbs.)	Durability Basis (mi.)	Non-Methane Hydrocarbons [FN2]	Carbon Monoxide	Oxides of Nitrogen [FN3, FN4]
PC	All	50,000	0.39 (0.41)	7.0	0.4

PC [FN6]	All	50,000	0.39 (0.41)	7.0	0.7
Diesel PC (Option 2)	All	100,000 [FN8]	0.46	8.3	1.0
LDT, MDV	0-3750	50,000	0.39 (0.41)	9.0	0.4
LDT, MDV [FN6]	0-3750	50,000	0.39 (0.41)	9.0	0.7
Diesel LDT, MDV (Option 2)	0-3750	100,000 [FN8]	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 and larger	50,000	0.60 (0.60)	9.0	1.5
MDV (Option 1)	5751 and 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 Hydrocarbons standards in parentheses apply to total hydrocarbons. For 1993 through 1994 model methanol-fueled vehicles certifying to these standards, including flexible-fueled vehicles, “Non-Methane Hydrocarbons” shall mean “Organic Material Hydrocarbon Equivalent” (or “OMHCE”).

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 truck 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 g/mi before being compared.

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 Office 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, and identifiable, systematic defect in a component listed in section 1950.1.5(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 Office may invoke the enforcement authority under subchapter 2.5, Title 13, California Code of Regulations, commencing with section 2111, 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 1992 model years only. For small volume manufacturers, this provision is applicable for the 1991 through 1994 model years only.

5 Diesel passenger cars, light-duty trucks, and medium-duty vehicles certifying to these standards are subject to a particulate exhaust emissions 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 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 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.

8 The optional 100,000 mile certification standards and provisions are not applicable to methanol vehicles.

(e)(2) The exhaust emissions from new 1993 through 2003 model methanol-fueled vehicles, including fuel-flexible vehicles, shall meet all the applicable requirements in (e)(1), (f)(1) and (f)(2) with the following modifications and additions:

1993 through 2003 METHANOL-SPECIFIC EXHAUST EMISSION STANDARDS

Vehicle Type [FN1]	Loaded Vehicle Weight (lbs.) [FN3]	Durability Basis (mi)	Vehicle Certification	Formaldehyde (mg/mi) In-Use Compliance [FN2]
PC	All	50,000	15	23 (1993-1995) 15 (1996-2003)
LDT, MDV	0-3750	50,000	15	23 (1993-1995) 15 (1996-2003)
LDT, MDV	3751-5750	50,000	18	27 (1993-1995) 18 (1996-2003)
MDV	5751-8500	50,000	22	33 (1993-1995) 22 (1996-2003)
MDV	8501-10,000	50,000	28	36 (1995) 28 (1996-2003)
MDV	10,001-14,000	50,000	36	45 (1995) 36 (1996-2003)

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

2 If the formaldehyde in-use compliance level is above the respective certification level but does not exceed the in-use compliance level, and based on a review of information derived from statistically valid and representative sample of vehicles, the Executive Office determines that a substantial percentage of any class or category of such vehicle exhibits, prior to 50,000 miles or 5 years, whichever occurs first, an identifiable, systematic defect in a component listed is section 1960.5(c)(2), Title 13, California Code of Regulation, 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, the Executive Office my invoke the enforcement authority under subchapter 2.5, Title 13, California Code of Regulations, commencing with section 2111, 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.

3 For 1995-2003 model-year medium-duty vehicles certifying to the standards specified in section 1960.1(h)(1), "Loaded Vehicle Weight" shall mean "Test Weight", which is the average of the vehicle's curb weight and gross vehicle weight.

(e)(3) The exhaust emissions from new 1992 through 2006 model-year LEV I" transitional low-emission vehicles, low-emission vehicles, ultra-low emission vehicles, and super ultra-low-emission vehicles, including fuel-flexible and dual-fuel vehicles, shall meet all the requirements of (g)(1) and (h)(2) with the following additions:

FORMALDEHYDE EXHAUST EMISSION STANDARDS IN THE LIGHT-DUTY AND MEDIUM-DUTY VEHICLE WEIGHT CLASSES [FN5, FN6, FN7] ["milligrams per mile" (or "mg/mi")]

Vehicle Type [FN1]	Vehicle Weight (lbs.) [FN2]	Durability Vehicle Basis (mi)	Emission Category	Vehicle Formaldehyde (mg/mi) [FN4, FN5]
PC and LDT	All	50,000	TLEV	15 (23)
	0-3750		LEV	15 (15)
			ULEV	8 (12)
		100,000	TLEV	18
			LEV	18
			ULEV	11
LDT	3751-5750	50,000	TLEV	18 (27)
			LEV	18 (18)
			ULEV	9 (14)
		100,000	TLEV	23
			LEV	23
			ULEV	13

MDV	0-3750	50,000	LEV	15 (15)
			ULEV	8 (12)
		120,000	LEV	22
			ULEV	12
MDV	3751-5750	50,000	LEV	18 (18)
			ULEV	9 (14)
			SULEV	4 (7)
		120,000	LEV	27
			ULEV	13
			SULEV	6
MDV	5751-8500	50,000	LEV	22 (22)
			ULEV	11 (17)
			SULEV	6 (8)
		120,000	LEV	32
			ULEV	16
			SULEV	8
MDV	8501-10,000	50,000	LEV	28 (28)
			ULEV	14 (21)
			SULEV	7 (10)
		120,000	LEV	40
			ULEV	21
			SULEV	10
MDV	10,001-14,000	50,000	LEV	36 (36)
			ULEV	18 (27)
			SULEV	9 (14)
		120,000	LEV	52
			ULEV	26
			SULEV	13

1 “PC” means passenger cars. “LDT” means light-duty trucks. “MDV” means medium-duty vehicles.

2 For light-duty or medium-duty vehicles, Vehicle Weight shall mean “Loaded Vehicle Weight” (or “LVW”) or “Test Weight” (or “TW”) respectively.

3 “TLEV” means transitional low-emission vehicle. “LEV” means low-emission vehicle. “ULEV” means ultra-low-emissions vehicle. “SULEV” means super-ultra-low-emission vehicle.

4 Formaldehyde exhaust emission standards apply to vehicles certified to operate on any available fuel, including fuel-flexible and dual-fuel vehicles.

5 The standards in parentheses are intermediate in-use compliance standards for 50,000 miles.

a. For PCs and LDTs from 0-5750 lbs. LVW, including fuel-flexible and dual-fuel vehicles, intermediate in-use compliance standards shall apply to TLEVs through the 1995 model year, and LEVs and ULEVs through 1998 model year. In-use compliance with standards beyond 50,000 miles shall be waived through the 1995 model year for TLEVs, and through the 1998 model year for LEVs and ULEVs.

b. For MDVs from 0-14,000 lbs. TW, including fuel-flexible and dual-fuel vehicles, intermediate in-use compliance standards shall apply to LEVs. ULEVs and SULEVs through the 1999 model year. In-use compliance with standards beyond 50,000 miles shall be waived through the 1999 model year for LEVs, ULEVs, and SULEVs.

6 Manufacturers shall demonstrate compliance with the above standards for formaldehyde at 50 degrees F according to the procedures specified in section 11k of the “California Exhaust Emission Standards and Test Procedures for 1988 through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” as incorporated by reference in section 1960.1(k) or section E.1.4 of the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles” as incorporated by reference in section 1961 (d). Hybrid electric, natural gas, and diesel-fueled vehicles shall be exempt from 50 degrees F test requirements.

7 In-use compliance testing shall be limited to PCs and LDTs with fewer than 75,000 miles and MDVs with fewer than 90,000 miles.

(f)(1) The exhaust emissions from new 1993 and 1994 model passenger cars and light-duty trucks, except those produced by a small volume manufacturer, shall not exceed:

1993 AND 1994 MODEL YEAR PASSENGER CAR AND LIGHT-DUTY TRUCK EXHAUST EMISSIONS STANDARDS [F5, FN8, FN9] (grams per mile)

Vehicle Type [FN1]	**Loaded Vehicle Weight (lbs.)**	**Durability Basis (mi.)**	**Non-Methane Hydrocarbons [FN2, FN7]**	**Carbon Monoxide**	**Oxides of Nitrogen [FN1, FN3, FN4]**
PC	All	50,000	0.39 (0.25)	7.0 (3.4)	0.4
PC [FN6]	All	50,000	0.39 (0.25)	7.0 (3.4)	0.7
Diesel PC (Option 2)	All	100,000	0.46 (0.31)	8.3 (4.2)	1.0
LDT	0-3750	50,000	0.39 (0.25)	9.0 (3.4)	0.4
LDT [FN6]	0-3750	50,000	0.39 (0.25)	9.0 (3.4)	0.7
Diesel LDT (Option 2)	0-3750	100,000 [FN8]	0.46 (0.31)	10.6 (4.2)	1.0
LDT	3751-5750	50,000	0.50 (0.32)	9.0 (4.4)	1.0
LDT	3751-5750	100,000	(0.40)	(5.5)	n/a
Diesel LDT (Option 1)	3751-5750	50,000	0.50 (0.40)	9.0 (5.5)	1.5

1 “PC” means passenger cars. “LDT” means light-duty trucks. “n/a” means not applicable.

2 For methanol-fueled vehicles certifying to these standards, including fuel-flexible vehicles, when certifying on methanol, “Non-Methane Hydrocarbons” shall mean “Organic Material Hydrocarbon Equivalent” (or “OMHCE”). For methanol- or ethanol-fueled vehicles certifying to the phase-in standards in parenthesis, including fuel-flexible vehicles when certifying on methanol or ethanol, “Non-Methane Hydrocarbons” shall mean “Organic Material on-Methane Hydrocarbon Equivalent” (or “OMNMHCE”).

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 truck 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 g/mi before being compared.

4 The standard for in-use compliance for passenger cars and light-duty trucks 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 section1960.1.5(c)(2), Title 13, California Code of Regulations, 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 subchapter 2.5, Title 13, California Code of Regulations commencing with section 2111, 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 1993 model year only.

5 Diesel passenger cars and light-duty trucks certifying to these standards are subject to a particulate exhaust emission standard of 0.08g/mi, determined on a 50,000 mile durability vehicle basis.

6 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 The emission standards in parenthesis are phase-in standards. For the1993 model-year, each manufacturer must certify a minimum of 40% of their vehicles to the phase-in standards or the more stringent standards in section 1960.1 (g)(1). The percentage shall be applied to the manufacturer’s total projected sales of California-certified passenger cars and light-duty trucks

for the 1993 model year. For 1994 and subsequent model years, each manufacturer shall comply with the fleet average requirements specified in section 1960.1(g)(2).

8 The following conditions shall apply to the in-use compliance standards for 1993 and 1994 model-year passenger cars and light-duty trucks only.

a. The in-use compliance standards for those passenger cars and light-duty trucks certifying to the 0.25 g/mi non-methane hydrocarbon and 3.4 g/mi carbon monoxide standards shall be 0.32 g/mi non-methane hydrocarbon and 5.2g/mi carbon monoxide for 50,000 miles.

b. The in-use compliance standards for those light-duty trucks certifying to the 0.32 g/mi non-methane hydrocarbon and 4.4 g/mi carbon monoxide standards shall be 0.41 g/mi non-methane hydrocarbon and 6.7 g/mi carbon monoxide for 50,000 miles.

c. In-use compliance standards shall be waived beyond 50,000 miles.

9 All passenger cars and light-duty trucks, except those diesel vehicles certifying to optional 100,000 mile standards, are subject to non-methanehydrocarbon, carbon monoxide, and oxides of nitrogen standards determined on a 50,000 mile durability basis and non-methane hydrocarbon and carbon monoxide standards determined on a 100,000 mile basis.

(f)(2) Tier 1" Exhaust Emission Standards for PCs and LDTs. The exhaust emissions from new 1995 through 2003 model Tier 1 passenger cars and light-duty trucks shall not exceed:

1995-2003 MODEL-YEAR TIER 1 PASSENGER CAR AND LIGHT-DUTY TRUCK EXHAUST EMISSIONS STANDARDS [F5, FN6, FN8, FN10] (grams per mile)

Vehicle Type [FN1]	**Loaded Vehicle Weight (lbs.)**	**Durability Basis (mi.)**	**Non-Methane Hydrocarbons [FN2, FN7]**	**Carbon Monoxide [FN7]**	**Oxides of Nitrogen [FN1, FN3]**
PC	All	50,000	0.25	3.4	0.4 [FN4]
PC	All	50,000	0.31	4.2	0.6 [FN9]
Diesel PC (Option 2)	All	100,000	0.31	4.2	1.0
LDT	0-3750	50,000	0.25	3.4	0.4 [FN4]
LDT	0-3750	50,000	0.31	4.2	0.6 [FN9]
Diesel LDT (Option 2)	0-3750	100,000 [FN8]	0.31	4.2	1.0
LDT	3751-5750	50,000	0.32	4.4	0.7
LDT	3751-5750	100,000	0.40	5.5	0.97 [FN9]
Diesel LDT (Option 1)	3751-5750	50,000	0.40	5.5	1.5

1 “PC” means passenger cars. “LDT” means light-duty trucks. “n/a” means not applicable.

2 For methanol-fueled vehicles certifying to these standards, including fuel-flexible vehicles, when certifying on methanol, “Non-Methane Hydrocarbons” shall mean “Organic Material Hydrocarbon Equivalent” (or “OMHCE”). For methanol- or ethanol-fueled vehicles certifying to the phase-in standards in parenthesis, including fuel-flexible vehicles when certifying on methanol or ethanol, “Non-Methane Hydrocarbons” shall mean “Organic Material Non-Methane Hydrocarbon Equivalent” (or “OMNMHCE”).

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 truck 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 g/mi before being compared.

4 The standard for in-use compliance for passenger cars and light-duty trucks 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), Title 13, California Code of Regulations, 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 subchapter 2.5, Title 13, California Code of Regulations commencing with section 2111, 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 1993 model year only.

5 Diesel passenger cars and light-duty trucks certifying to these standards are subject to a particulate exhaust emission standard of 0.08 g/mi, determined on a 50,000 mile durability vehicle basis.

6 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 The emission standards in parenthesis are phase-in standards. For the 1993 model-year, each manufacturer must certify a minimum of 40% of their vehicles to the phase-in standards or the more stringent standards in section 1960.1 (g)(1). The percentage shall be applied to the manufacturer's total projected sales of California-certified passenger cars and light-duty trucks for the 1993 model year. For 1994 and subsequent model years, each manufacturer shall comply with the fleet average requirements specified in section 1960.1(g)(2).

8 The following conditions shall apply to the in-use compliance standards for 1993 and 1994 model-year passenger cars and light-duty trucks only.

a. The in-use compliance standards for those passenger cars and light-duty trucks certifying to the 0.25 g/mi non-methane hydrocarbon and 3.4 g/mi carbon monoxide standards shall be 0.32 g/mi non-methane hydrocarbon and 5.2 g/mi carbon monoxide for 50,000 miles.

b. The in-use compliance standards for those light-duty trucks certifying to the 0.32 g/mi non-methane hydrocarbon and 4.4 g/mi carbon monoxide standards shall be 0.41 g/mi non-methane hydrocarbon and 6.7 g/mi carbon monoxide for 50,000 miles.

c. In-use compliance standards shall be waived beyond 50,000 miles.

9 All passenger cars and light-duty trucks, except those diesel vehicles certifying to optional 100,000 mile standards, are subject to non-methane hydrocarbon, carbon monoxide, and oxides of nitrogen standards determined on a 50,000 mile durability basis and non-methane hydrocarbon and carbon monoxide standards determined on a 100,000 mile basis.

(g)(1) "LEV I" Exhaust Emission Standards for PCs and LDTs. The exhaust emissions from new 1992 through 2003 model-year "LEV I" transitional low-emission vehicles, and new 1992 through 2006 model-year "LEV I" low-emission vehicles and ultra-low-emission vehicles, in the passenger car and light-duty truck classes shall not exceed:

LEV I EXHAUST EMISSION STANDARDS FOR TRANSITIONAL LOW-EMISSION VEHICLES, LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES AND ZERO-EMISSION VEHICLES IN PASSENGER CAR AND LIGHT-DUTY TRUCK VEHICLE CLASSES (FN6, FN7, FN8, FN9, FN10 [grams per mile (or "g/mi")])

Vehicle Type [FN1]	Loaded Vehicle Weight (lbs.)	Durability Basis (mi.)	Emission Category	Non-Methane Organic Gases [FN3, FN4]	Carbon Monoxide	Oxides of Nitrogen [FN5]
PC and LDT	All	50,000	TLEV	0.125	3.4	0.4
	0-3750		LEV	0.075	3.4	0.2
			ULEV	0.040	1.7	0.2
		100,000	TLEV	0.156	4.2	0.6
			LEV	0.090	4.2	0.3
			ULEV	0.55	2.1	0.3
LDT	3751-5750	50,000	TLEV	0.160	4.4	0.7
			LEV	0.100	4.4	0.4
			ULEV	0.050	2.2	0.4
		100,000	TLEV	0.200	5.5	0.9

LEV	0.130	5.5	0.5
ULEV	0.070	2.8	0.5

1 "PC" means passenger cars. "LDT" means light-duty trucks. "LVW" means loaded vehicle weight. "Non-Methane Organic Gases" or "NMOG" means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.

2 "TLEV" means transitional low-emission vehicle. "LEV" means low-emission vehicle. "ULEV" means ultra-low-emissions vehicle.

3 Compliance with NMOG Standard. To demonstrate compliance with an NMOG standard, NMOG emissions shall be measured in accordance with the "California Non-Methane Organic Gas Test Procedures" as adopted July 12, 1991 and last amended August 5, 1999, which is incorporated herein by reference.

a. Reactivity Adjustment. For TLEVs, LEVs, and ULEVs certified to operate exclusively on any fuel other than conventional gasoline, and for fuel-flexible and dual-fuel TLEVs, LEVs, and ULEVs when certifying on a fuel other than gasoline, manufacturers shall multiply NMOG exhaust certification levels by the applicable reactivity adjustment factor set forth in section 13 of the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or in sections I.E.5. of the "California Exhaust Emission Standards and Text Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), or established by the Executive Officer pursuant to Appendix VIII or section II.D. respectively of the foregoing test procedures. In addition, natural gas vehicles certifying to TLEV, LEV, or ULEV standards shall calculate a reactivity-adjusted methane exhaust emission value by multiplying the methane exhaust certification level by the applicable methane reactivity adjustment factor set forth in section 13 or in section I.E.5. of the above referenced test procedures as applicable. The product of the NMOG exhaust certification levels and the reactivity adjustment factor shall be compared to the exhaust NMOG mass emission standards established for the particular vehicle emission category to determine compliance. For natural gas vehicles, the reactivity-adjusted NMOG value shall be added to the reactivity-adjusted methane value and then compared to the exhaust NMOG mass emission standards established for the particular vehicle emission category to determine compliance.

b. Fleet Average Requirement. Each manufacturer shall certify PCs or LDTs to meet the exhaust mass emission standards for TLEVs, LEVs, ULEVs, or the exhaust emission standards of sections 1960.1 (e)(1), 1960.1 (f)(1), or 1960.1 (f)(2), Title 13, California Code of Regulations, or as Zero-Emission Vehicles such that the manufacturer's fleet average NMOG values for California-certified PCs and LDTs from 0-3750 lbs. LVW, and LDTs from 3751-5750 lbs. LVW produced and delivered for sale in California are less than or equal to the requirement for the corresponding Model Year, Vehicle Type, and LVW Class in section 1960.1 (g)(2), Title 13, California Code of Regulations.

4 NMOG Standards for Fuel-Flexible and Dual-Fuel Vehicles. Fuel-flexible and dual-fuel PCs and LDTs from 0-5750 lbs. LVW shall be certified to exhaust mass emission standards for NMOG established for the operation of the vehicle on any available fuel other than gasoline, and gasoline.

a. Reactivity Adjustment. For TLEVs, LEVs, and ULEVs, when certifying for operation on a fuel other than gasoline, manufacturers shall multiply exhaust NMOG certification levels by the applicable reactivity adjustment factor. In addition to multiplying the exhaust NMOG certification levels by the applicable reactivity adjustment factor, exhaust methane certification levels for natural gas vehicles shall be multiplied by the applicable methane reactivity adjustment factor and the resulting value shall be added to the reactivity-adjusted NMOG value. The exhaust NMOG certification levels for fuel-flexible or dual-fuel vehicles when certifying on gasoline shall not be multiplied by a reactivity adjustment factor.

b. Standards for Fuel-Flexible and Duel-Fuel Vehicles Operating on Gasoline. For PCs and LDTs from 0-5750 lbs. LVW, the applicable exhaust mass emission standard for NMOG when certifying the vehicle for operation on gasoline shall be:

Vehicle Type	*Loaded Vehicle Weight (LVW)*	*Emission Category*	*Durability Vehicle Basis (g/mi)*	
			50,000 Mile	*100,000 Mile*
PCS, LDT	All, 0–3750	TLEV	0.25	0.31
		LEV	0.125	0.156
		ULEV	0.075	0.090
LDT	3751–5750	TLEV	0.32	0.40
		LEV	0.160	0.200
		ULEV	0.100	0.130

[5] *Highway NOx.* The maximum projected emissions of "Oxides of Nitrogen" (or "NOx") measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR 600 Subpart B) shall be not greater than 1.33 times the applicable light–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 g/mi before being compared.

[6] *Intermediate In–Use Compliance Standards.* The following standards are intermediate in–use compliance standards for 50,000 and 100,000 miles for PCs and LDTs from 0–5750 lbs. LVW, including fuel–flexible and dual–fuel vehicles when operating on any available fuel other than gasoline. Intermediate in–use compliance standards shall apply to TLEVs through the 1995 model year as follows:

	NMOG (g/mi)
PCS and LDTs 0–3750 lbs. LVW	0.188
LDTs 3751–5750 lbs. LVW	0.238

In use compliance with standards beyond 50,000 miles shall be waived through the 1995 model year for TLEVs, and through the 1998 model year for LEVs and ULEVs. For LEVs and ULEVs, the following intermediate in–use standards shall apply:

Vehicle Type	*Durability Vehicle Basis*	*LEV (g/mi)*			*ULEV (g/mi)*			
		Model Year	*NMOG*	*NOx*	*Model Year*	*NMOG*	*CO*	*NOx*
PCS, 0–3750 lb. LVW LDTs	50,000	through 1998	0.100	0.3	through 1998	0.058	2.6	0.3
	50,000	1999	0.100	0.3	1999–2002	0.055	2.1	0.3
	100,000	1999	0.125	0.4	1999–2002	0.075	3.4	0.4
3751–5750 lb. LVW LDTs	50,000	through 1998	0.128	0.5	through 1998	0.075	3.3	0.5
	50,000	1999	0.130	0.5	1999–2002	0.070	2.8	0.5
	100,000	1999	0.160	0.7	1999–2002	0.100	4.4	0.7

a. *Reactivity Adjustment.* For TLEVs, LEVs, and ULEVs designed to operate on any fuel other than conventional gasoline, including fuel–flexible and dual–fuel vehicles when operating on any fuel other than gasoline, exhaust NMOG mass emission results shall be multiplied by the applicable reactivity adjustment factor to determine compliance with intermediate in–use compliance standards for NMOG. In addition to multiplying the exhaust NMOG emission results by the applicable reactivity adjustment factor, the exhaust methane emission results for natural gas vehicles shall be multiplied by the applicable methane reactivity adjustment factor and the resulting value shall be added to the reactivity–adjusted NMOG value. Exhaust NMOG mass emissions from fuel–flexible or dual–fuel vehicles when operating on gasoline shall not be multiplied by a reactivity adjustment factor.

b. *Intermediate In–Use Standards for Fuel–Flexible and Dual–Fuel Vehicles Operating on Gasoline.* For fuel–flexible and dual–fuel PCs and LDTs from 0–5750 lbs. LVW intermediate in–use compliance standards for NMOG emissions at 50,000 miles, when the vehicle is operated on gasoline, shall be:

Vehicle Type	*Loaded Vehicle Weight (LVW)*	*Emission Category*	*Durability Vehicle Basis (g/mi) 50,000 mi*
PCS, LDT	All, 0–3750	TLEV	0.32
		LEV	0.188
		ULEV	0.100
LDT	3751–5750	TLEV	0.41
		LEV	0.238
		ULEV	0.128

Intermediate in–use compliance standards shall apply to TLEVs through the 1995 model year, and to LEVs and ULEVs through the 1998 model year. In use compliance with standards beyond 50,000 miles shall be waived through the 1995 model year for TLEVs and through the 1998 model year for LEVs and ULEVs.

[7] *Diesel Standards.* Manufacturers of diesel vehicles shall also certify to particulate standards at 100,000 miles. For all PCs and LDTs from 0–3750 lbs. LVW, the particulate standard is 0.08 g/mi, 0.08 g/mi, and 0.05 g/mi for TLEVs, LEVs, and ULEVs, respectively. For LDTs from 3751–5750 lbs. LVW, the particulate standard is 0.10 g/mi, 0.10 g/mi, and 0.05 g/mi for TLEVs, LEVs and ULEVs, respectively. For diesel vehicles certifying to the standards set forth in Title 13, section 1960.1(g)(1), "NMOG" shall mean non–methane hydrocarbons.

[8] *50°F Requirement.* Manufacturers shall demonstrate compliance with the above standards for NMOG, CO, and NOx at 50 degrees F according to the procedure specified in section I.H. of the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1960.1(k), or according to the procedure specified in section II.C. of the "California Exhaust Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1961(d), as applicable. Hybrid electric, natural gas, and diesel–fueled vehicles shall be exempt from 50 degrees F test requirements.

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Vehicle Type	Loaded Vehicle	Emission Category	Durability Vehicle Basis (g/mi) 50,000 Mile	100,000 Mile
PCS, LDT	All, 0-3750	TLEV	0.25	0.31
		LEV	0.125	0.156
		ULEV	0.075	0.090
LDT	3751-5750	TLEV	0.32	0.40
		LEV	0.160	0.200
		ULEV	0.100	0.130

5 Highway NOx. The maximum projected emissions of "Oxides of Nitrogen" (or "NOx") measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR 600 Subpart B) shall be not greater than 1.33 times the applicable light-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 g/mi before being compared.

6 Intermediate In-Use Compliance Standards. The following standards are intermediate in-use compliance standards for 50,000 and 100,000 miles for PCs and LDTs from 0-5750 lbs. LVW, including fuel-flexible and dual-fuel vehicles when operating on any available fuel other than gasoline. Intermediate in-use compliance standards shall apply to TLEVs through the 1995 model year as follows:

	NMOG (g/mi)
PCS and LDTs 0-3750 lbs. LVW	0.188
LDTs 3751-5750 lbs. LVW	0.238

In-use compliance with standards beyond 50,000 miles shall be waived through the 1995 model year for TLEVs, and through the 1998 model year for LEVs and ULEVs. For LEVs and ULEVs, the following intermediate in-use standards shall apply:

Vehicle Type	Durability Vehicle Basis	LEV (g/mi) Model Year	NMOG	NOx	ULEV (g/mi) Model Year	NMOG	CO	NOx
PCs, 0-3750 lb. LVW LDTs	50,000	through 1998	0.100	0.3	through 1998	0.058	2.6	0.3
	50,000	1999	0.125	0.3	1999-2000	0.055	2.1	0.3
	100,000	1999	0.125	0.4	1999-2000	0.075	3.4	0.4
3751-5750 lb. LVW LDTs	50,000	through 1998	0.128	0.5	through 1998	0.075	3.3	0.5
	50,000	1999	0.130	0.5	1999-2000	0.070	2.8	0.5
	100,000	1999	0.160	0.7	1999-2000	0.100	4.4	0.7

a. Reactivity Adjustment. For TLEVs, LEVs, and ULEVs designed to operate on any fuel other than conventional gasoline, including fuel-flexible and dual-fuel vehicles when operating on any fuel other than gasoline, exhaust NMOG mass emission results shall be multiplied by the applicable reactivity adjustment factor to determine compliance with intermediate in-use compliance standards for NMOG. In addition to multiplying the exhaust NMOG emission results by the applicable reactivity adjustment factor, the exhaust methane emission results for natural gas vehicles shall be multiplied by the applicable methane reactivity adjustment factor and the resulting value shall be added to the reactivity-adjusted NMOG value. Exhaust NMOG mass emissions from fuel-flexible or dual-fuel vehicles when operating on gasoline shall not be multiplied by a reactivity adjustment factor.

b. Intermediate In-Use Standards for Fuel-Flexible and Dual-Fuel Vehicles Operating on Gasoline. For fuel-flexible and dual-fuel PCs and LDTs from 0-5750 lbs. LVW intermediate in-use compliance standards for NMOG emissions at 50,000 miles, when the vehicle is operated on gasoline, shall be:

Vehicle Type	Loaded Vehicle Weight	Emission Category	Durability Basis (g/mi) 50,000 mi
PCS, LDT	All, 0-3750	TLEV	0.32
		LEV	0.188
		ULEV	0.100
LDT	3751-5750	TLEV	0.41
		LEV	0.238
		ULEV	0.128

Intermediate in-use compliance standards shall apply to TLEVs through the 1995 model year, and to LEVs and ULEVs through the 1998 model year. In-use compliance with standards beyond 50,000 miles shall be waived through the 1995 model year for TLEVs and through the 1998 model year for LEVs and ULEVs. [FN7] Diesel Standards. Manufacturers of diesel vehicles shall also certify to particulate standards at 100,000 miles. For all PCs and LDTs from 0-3750 lbs. LVW, the particulate standard is 0.08 g/mi, 0.08 g/mi, and 0.04 g/mi for TLEVs, LEVs, and ULEVs, respectively. For LDTs from 3751-5750 lbs. LVW, the particulate standard is 0.10 g/mi, 0.10g/mi, and 0.05 g/mi for TLEVs, LEVs and ULEVs, respectively. For diesel vehicles certifying to the standards set forth in Title 13, section 1960.1(g)(1), "NMOG" shall mean non-methane hydrocarbons.

8 50º F Requirement. Manufacturers shall demonstrate compliance with the above standards for NMOG, CO, and NOx at 50 degrees F according to the procedure specified in section 11k of the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or according to the procedure specified in section II.C. of the "California Exhaust Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), as applicable. Hybrid electric, natural gas, and diesel-fueled vehicles shall be exempt from 50 degrees F test requirements.

9 Limit on In-Use Testing. In-use compliance testing shall be limited to vehicles with fewer than 75,000 miles.

10 HEV Requirements. Deterioration factors for hybrid electric vehicles shall be based on the emissions and mileage accumulation of the auxiliary power unit. For certification purposes only, Type A hybrid electric vehicles shall demonstrate compliance with 50,000 mile emission standards (using 50,000 mile deterioration factors), and demonstrating compliance with 100,000 mile emission standards shall not be required. For certification purposes only, Type B hybrid electric vehicles shall demonstrate compliance with 50,000 mile emission standards (using 50,000 mile deterioration factors) and 100,000 mile emission standards (using 75,000 mile deterioration factors). For certification purposes only, Type C hybrid electric vehicles shall demonstrate compliance with 50,000 mile emission standards (using 50,000 mile deterioration factors) and 100,000 mile emission standards (using 100,000 mile deterioration factors).

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

(a) a demonstration of the airflow rate through the direct ozone reduction device and the ozone reducing efficiency of the device over the range of speeds encountered in the SFTP test cycle;

(b) an evaluation of the durability of the device for the full useful life of the vehicle; and

(c) a description of the on-board diagnostic strategy for monitoring the performance of the device in-use.

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

(g)(2) The fleet average non-methane organic gas exhaust emission values from passenger cars and light-duty trucks produced and delivered for sale in California by a manufacturer each model year from 1994 through 2000 shall not exceed:

FLEET AVERAGE NON-METHANE ORGANIC GAS EXHAUST EMISSION REQUIREMENTS FOR LIGHT-DUTY VEHICLE WEIGHT CLASSES [FN7, FN8, FN9] [grams per mile (or g/mi")]

Vehicle Type [FN1]	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Model Year	Fleet Average Non-Methane Organic Gases
PC and LDT	All, 0-3750	50,000	1994	0.250
			1995	0.231
			1996	0.225
			1997	0.202
			1998	0.157
			1999	0.113
			2000	0.073
LDT	3751-5750	50,000	1994	0.320
			1995	0.295
			1996	0.287
			1997	0.260
			1998	0.205
			1999	0.150
			2000	0.099

1 "PC" means passenger cars. "LDT" means light-duty trucks. "TLEV" means transitional low-emission vehicle. "LEV" means low-emission vehicle. "ULEV" means ultra-low-emission vehicle. "LVW" means loaded vehicle weight.

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

3 HEV Categories. For the purpose of calculating fleet average NMOG values, a manufacturer may adjust the certification levels of hybrid electric vehicles (or "HEVs") based on the range of the HEV without the use of the engine. For the purpose of calculating the adjusted NMOG emissions, the following definitions shall apply:

"Type A HEV" shall mean an HEV which achieves a minimum range of 60 miles over the All-Electric Range Test as defined in "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), as applicable.

"Type B HEV" shall mean an HEV which achieves a range of 40-59 miles overt the All-Electric Range Test as defined in "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), as applicable.

"Type C HEV" shall mean an HEV which achieves a range of 0-39 miles over the All-Electric Range Test as defined in "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), as applicable, and all other HEVs excluding "Type A" and "Type B" HEVs.

a. For the purpose of calculating fleet average NMOG values, vehicles which have no tailpipe emissions but use fuel-fired heaters and which are not certified as ZEVs shall be treated as "Type A HEV ULEVs."

4 Calculation of Fleet Average NMOG Value (PCS and LDTs 0-3750 lbs. LVW). Each manufacturer's fleet average NMOG value for the total number of PCs and LDTs from 0-3750 lbs. LVW produced and delivered for sale in California shall be calculated in units of g/mi NMOG according to the following equation, where the term "Produced" means produced and delivered for sale in California:

((No. of Vehicles Certified to the Exhaust Emission Standards in section1960.1(e)(1) and Produced) x (0.39) +

No. of Vehicles Certified to the Phase-In Exhaust Emission Standards in section 1960.1(f)(1) and Produced x (0.25) +

No. of Vehicles Certified to the Phase-Out Exhaust Emission Standards in section 1960.1(f)(1) and Produced x (0.39) +

(No. of Vehicles Certified to the Exhaust Emission Standards in section 1960.1(f)(2) and Produced) x (0.25) +

(No. of TLEVs excluding HEVs and Produced) x (0.125) +

(No. of LEVs excluding HEVs and Produced) x (0.075) +

(No. of ULEVs excluding HEVs and Produced) x (0.040) +

(HEV contribution factor))P

(Total No. of Vehicles Produced, Including Zero-Emission Vehicles and

HEVs):

a. "HEV contribution factor" shall mean the NMOG emission contribution of HEVs to the fleet average NMOG value. The HEV contribution factor shall be calculated in units of g/mi as follows, where the term "Produced" means produced and delivered for sale in California:

HEV contribution factor = (No. of "Type A HEV" TLEVs Produced x (0.100) +

No. of "Type B HEV" TLEVs Produced x (0.113) +

No. of "Type C HEV" TLEVs Produced x (0.125)) +

(No. of "Type A HEV" LEVs Produced x (0.057) +

No. of "Type B HEV" LEVs Produced x (0.066) +

No. of "Type C HEV" LEVs Produced x (0.075)) +

(No. of "Type A HEV" ULEVs Produced x (0.020) +

No. of "Type B HEV" ULEVs Produced x (0.030) +

No. of "Type C HEV" ULEVs Produced x (0.040))

b. "Zero-Emission Vehicles" (or "ZEVs") classified as LDTs 3751-5750 lbs. LVW which have been counted toward the ZEV requirements for PCs and LDTs 0-3750 lbs. LVW as specified in note (9) shall be included in the equation of note (4).

c. Beginning with the 1996 model year, manufacturers that produce and deliver for sale in California PCs and LDTs 0-3750 lbs. LVW that are certified to federal Tier I exhaust emission standards in 40 CFR 86.094-8 and86.094-9 shall add the following term to the numerator of the fleet average NMOG equation in note (4) and calculate their fleet average NMOG values accordingly:

(No. of Vehicles Certified to federal Tier I exhaust emission standards and Produced) x (0.25)

5 Calculation of Fleet Average NMOG Value (LDTs 3751-5750 lbs. LVW). Manufacturers that certify LDTs from 3751-5750 lbs. LVW, shall calculate a fleet average NMOG value in units of g/mi NMOG according to the following equation, where the term "Produced" means produced and delivered for sale in California:

((No. of Vehicles Certified to the Exhaust Emission Standards in section 1960.1(e)(1), and Produced x (0.50) +

(No. of Vehicles Certified to the Phase-In Exhaust Emission Standards in section 1960.1(f)(1), and Produced x (0.32) +

No. of Vehicles Certified to the Phase-Out Exhaust Standards in section 1960.1(f)(1), and Produced x (0.50) +

(No. of Vehicles Certified to the Exhaust Emission Standards in section 1960.1(f)(2), and Produced x (0.32) +

(No. of TLEVs Produced excluding HEVs) x (0.160) +

(No. of LEVs Produced excluding HEVs) x (0.100) +

(No. of ULEVs Produced excluding HEVs) x (0.050) + (HEV contribution factor))P

(Total No. of Vehicles Produced, Including ZEVs and HEVs).

a. "HEV contribution factor" shall mean the NMOG emission contribution of HEVs to the fleet average NMOG. The HEV contribution factor shall be calculated in units of g/mi as follows, where the term "Produced" means produced and delivered for sale in California:

HEV contribution factor =

(No. of "Type A HEV" TLEVs Produced x (0.130) +

No. of "Type B HEV" TLEVs Produced x (0.145) +

No. of "Type C HEV" TLEVs Produced x (0.160)) +

(No. of "Type A HEV" LEVs Produced x (0.075) +

No. of "Type B HEV" LEVs Produced x (0.087) +

No. of "Type C HEV" LEVs Produced x (0.100)) +

(No. of "Type A HEV" ULEVs Produced x (0.025) +

No. of "Type B HEV" ULEVs Produced x (0.037) +

No. of "Type C HEV" ULEVs Produced x (0.050))

b. Only ZEVs which have been certified as LDTs 3751-5750 lbs. LVW and which have not been counted toward the ZEV requirements for PCs and LDTs 0-3750lbs. LVW as specified in note (9) shall be included in the equation of note(5).

c. In the 2000 model year, small volume manufacturers shall not exceed a fleet average NMOG value of 0.100 g/mi for LDTs from 3751-5750 lbs. LVW calculated in accordance with note (5).

d. If a manufacturer's average California sales exceeds 3000 units of new PCs, LDTs, and MDVs based on the average number of vehicles sold for any three consecutive model years, the manufacturer shall no longer be treated as a small volume manufacturer and shall comply with the fleet average requirements applicable for larger manufacturers as specified in section 1960.1(g)(2) beginning with the fourth model year after the last of the three consecutive model years.

e. If a manufacturer's average California sales falls below 3000 units of new PCs, LDTs, and MDVs based on the average number of vehicles sold for any three consecutive model years, the manufacturer shall be treated as a small volume manufacturer and shall be subject to requirements for small volume manufacturers as specified in section 1960.1(g)(2) beginning with the next model year.

7 Calculation of NMOG Credits/Debits and Procedures for Offsetting Debits. a. In 1992 through 2000 model years, manufacturers that achieve fleet average NMOG values lower than the fleet average NMOG requirement for the corresponding model year shall receive credits in units of g/mi NMOG determined as: ((Fleet Average NMOG Requirement) - (manufacturer's Fleet Average NMOG Value) x (Total No. of Vehicles Produced and Delivered for Sale in California, Including ZEVs and HEVs)).

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

b. For the 1994 through 1997 model years, manufacturers shall equalize emission debits within three model years and prior to the end of the 1998 model year by earning g/mi NMOG emission credits in an amount equal to their g/mi NMOG debits, or by submitting a commensurate amount of g/mi NMOG credits to the Executive Officer that were earned previously or acquired from another manufacturer. For 1998 through 2000 model years, manufacturers shall equalize emission debits by the end of the following model year. If emission debits are not equalized within the specified time period, the manufacturer shall be subject to the Health and Safety Code section 43211 civil penalty applicable to a manufacturer which sells a new motor vehicle that does not meet the applicable emission standards adopted by the state board. The cause of action shall be deemed to accrue when the emission debits are not equalized by the end of the specified time period. For the purposes of Health and Safety Code section 43211, the number of vehicles not meeting the state board's emission standards shall be determined by dividing the total amount of g/mi NMOG emission debits for the model year by the g/mi NMOG fleet average requirement for PCs and LDTs 0-3750 lbs. LVW applicable for the model year in which the debits were first incurred.

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

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

8 Credits for Pre-1994 Model Year Vehicles. Manufacturers that produce and deliver for sale in California vehicles certified to the phase-in exhaust emission standards in section 1960.1(f)(1), or vehicles certified to the exhaust emission standards in sections 1960.1(f)(2) or 1960.1(g)(1) and/or ZEVs, in the 1992 and 1993 model years, shall receive emission credits as determined by the equations in footnotes (4), (5), and (7).

a. For PCs and LDTs from 0-3750 lbs. LVW, the fleet average NMOG requirement for calculating a manufacturer's emission credits shall be 0.390 and 0.334 g/mi NMOG for vehicles certified for the 1992 and 1993 model years, respectively.

b. For LDTs from 3751-5750 lbs. LVW, the fleet average NMOG requirement for calculating a manufacturer's emission credits shall be 0.500 and 0.428 g/mi NMOG for vehicles certified for the 1992 and 1993 model years, respectively.

c. Emission credits earned prior to the 1994 model year shall be considered as earned in the 1994 model year and discounted in accordance with the schedule specified in footnote (7).

6 Requirements for Small Volume Manufacturers. As used in this subsection, the term "small volume manufacturer" shall mean any vehicle manufacturer with California sales less than or equal to 3000 new PCs, LDTs and MDVs per model year based on the average number of vehicles sold by the manufacturer each model year from 1989 to 1991, except as noted below.

For manufacturers certifying for the first time in California, model-year sales shall be based on projected California sales. In 2000 and subsequent model years, small volume manufacturers shall comply with the fleet average NMOG requirements set forth below.

a. Prior to the model year 2000, compliance with the specified fleet average NMOG requirements shall be waived.

b. In the 2000 model year, small volume manufacturers shall not exceed a fleet average NMOG value of 0.075 g/mi for PCs and LDTs from 0-3750 lbs. LVW calculated in accordance with note (4).

c. Beginning with the 1996 model year, manufacturers that produce and deliver for sale in California LDTs 3751-5750 lbs. LVW that are certified to the Tier I exhaust emission standards in 40 CFR 86.094-9 shall add the following term to the numerator of the fleet average NMOG equation in note (5) and calculate their fleet average NMOG values accordingly: (No. of Vehicles Certified to federal Tier I exhaust emission standards and Produced and Delivered for Sale in California) x (0.32)

(h)(1) Tier 1" Exhaust Emission Standards for MDVs. The exhaust emissions from new 1995 through 2003 model Tier 1 medium-duty vehicles shall not exceed:

1995-2003 MODEL-YEAR TIER 1 MEDIUM-DUTY VEHICLE EXHAUST EMISSIONS STANDARDS [FN1, FN2, FN3, FN7, FN8] (grams per mile)

Test Weight (lbs.)	Durability Vehicle Basis (mi)	Non-Methane Hydrocarbons [FN4]	Carbon Monoxide	NOx [FN5]	Particulates [FN6]
0-3,750	50,000	0.25	3.4	0.4	n/a
0-3,750	120,000	0.36	5.0	0.55	0.08
3,751-5,750	50,000	0.32	4.4	0.7	n/a
3,751-5,750	120,000	0.46	6.4	0.98	0.10
5,751-8,500	50,000	0.39	5.0	1.1	n/a
5,751-8,500	120,000	0.56	7.3	1.53	0.12
8,501-10,000	50,000	0.46	5.5	1.3	n/a
8,501-10,000	120,000	0.66	8.1	1.81	0.12
10,001-14,000	50,000	0.60	7.0	2.0	n/a
10,001-14,000	120,000	0.86	10.3	2.77	0.12

1 “n/a” means not applicable. “Test Weight” shall mean the average of the vehicle’s curb weight and gross vehicle weight.

2 Manufacturers have the option of certifying engines used in incomplete and diesel medium-duty vehicles from 8501-14,000 pounds, gross vehicle weight to the heavy-duty engine standards and test procedures set forth in section 1956.8(e), Title 13, California Code of Regulations. Manufacturers certifying incomplete or diesel medium-duty vehicles to the heavy-duty engine standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

3 For the 1995 model-year only, manufacturers of medium-duty vehicles may certify a maximum of 50 percent of their vehicles to the applicable 1994 model-year standards and test procedures. For the 1995 model year only, small volume manufacturers may certify 100 percent of their vehicles to the applicable 1994 model-year standards and test procedures. The percentage shall be based upon each manufacturer’s projected sales of California-certified medium-duty vehicles.

4 For methanol- and ethanol-fueled vehicles certifying to these standards, including flexible-fueled vehicles when certifying on methanol or ethanol, “Non-Methane Hydrocarbons” shall mean “Organic Material Non-Methane Hydrocarbon Equivalent” (or “OMNMHCE”).

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 2.00 times the applicable medium-duty vehicle standards shown in the table. Both the projected emissions and the HWFET standards shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 g/mi before being compared.

6 Particulate standards are only applicable for diesel vehicles and shall be determined on a 120,000 mile basis.

7 In-use compliance testing shall be limited to vehicles with less than 90,000 miles. For the 1995 through 1997 models, alternative in-use compliance is available for medium-duty vehicle manufacturers. A manufacturer may use alternative in-use compliance for up to 100 percent of its fleet in the 1995 and 1996 model years and up to 50 percent of its fleet in the 1997 model year. Small volume manufacturers may use alternative in-use compliance for up to 100 percent of their fleets in the 1995 through 1997 model years. The percentages shall be determined from the manufacturers’ projected California sales of

medium-duty vehicles. For vehicles certified to the standards and test procedures of this subsection, "alternative in-use compliance" shall consist of an in-use allowance of 25 percent over the applicable 1995 model-year non-methane hydrocarbon, carbon monoxide, and oxides of nitrogen 50,000 mile emission standards and a waiver of the emission standards beyond 50,000 miles.

8 All medium-duty vehicles, except diesel-fueled vehicles and those incomplete and diesel vehicles certifying to heavy-duty engine test procedures, are subject to 50,000 mile and 120,000 mile non-methane hydrocarbon, carbon monoxide, and oxides of nitrogen standards. Diesel-fueled vehicles shall be subject to 120,000 mile non-methane hydrocarbon, carbon monoxide, oxides of nitrogen, and particulate standards only.

(h)(2) "LEV I" Exhaust Emission Standards for MDVs. The exhaust emissions from new 1992 through 2006 model-year medium-duty LEV I low-emission vehicles, ultra-low-emission vehicles and super-ultra-low-emission vehicles shall not exceed:

LEV I EXHAUST EMISSION STANDARDS FOR LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES AND SUPER-ULTRA-LOW-EMISSION VEHICLES IN THE MEDIUM-DUTY VEHICLE WEIGHT CLASS [FN8,9,10,11,12,13,14,15,16] [grams per mile (or "g/mi")]

Vehicle Test Weight (lbs.)	Durability Vehicle Basis (mi)	Emission Category [FN2]	Non-Methane Organic Gases [FN3, 4]	Carbon Monoxide	Oxides of Nitrogen [FN5]	Particulates [FN6, 7]
0-3750	50,000	LEV	0.125	3.4	0.4	n/a
		ULEV	0.075	1.7	0.2	n/a
	120,000	LEV	0.180	5.0	0.6	0.08
		ULEV	0.107	2.5	0.3	0.04
3751-5750	50,000	LEV	0.160	4.4	0.4	n/a
		ULEV	0.100	4.4	0.4	n/a
		SULEV	0.050	2.2	0.2	n/a
	120,000	LEV	0.230	6.4	0.6	0.10
		ULEV	0.143	6.4	0.6	0.05
		SULEV	0.072	3.2	0.3	0.05
5751-8500	50,000	LEV	0.195	5.0	0.6	n/a
		ULEV	0.117	5.0	0.6	n/a
		SULEV	0.059	2.5	0.3	n/a
	120,000	LEV	0.280	7.3	0.9	0.12
		ULEV	0.167	7.3	0.9	0.06
		SULEV	0.084	3.7	0.45	0.06
8501-10,000	50,000	LEV	0.230	5.5	0.7	n/a
		ULEV	0.138	5.5	0.7	n/a
		SULEV	0.069	2.8	0.035	n/a
	120,000	LEV	0.030	8.1	1.0	0.12
		ULEV	0.197	8.1	1.0	0.06
		SULEV	0.100	4.1	0.5	0.06
10,001-14,000	50,000	LEV	0.300	7.0	1.0	n/a
		ULEV	0.180	7.0	1.0	n/a
		SULEV	0.09	3,5	9,5	n/a
	120,000	LEV	0.430	10.3	1.5	0.12
		ULEV	0.257	10.3	1.5	0.06
		SULEV	0.130	5.2	0.7	0.06

[1] "Test Weight" (or "TW") shall mean the average of the vehicle's curb weight and gross vehicle weight
"Non-Methane Organic Gases" (or "NMOG") means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.

[2] "LEV" means low-emission vehicle.
"ULEV" means ultra-low-emission vehicle.
"SULEV" means super-ultra-low-emission vehicle.

[3] *Compliance with NMOG Standards.* To determine compliance with an NMOG standard, NMOG emissions shall be measured in accordance with the "California Non-Methane Organic Gas Test Procedures" adopted July 12, 1991 and last amended July 30, 2002, which is incorporated herein by reference.

a. *Reactivity Adjustment.* For LEVs and ULEVs certified to operate on an available fuel other than conventional gasoline, including fuel-flexible or dual-fuel vehicles when certifying on a fuel other than gasoline, manufacturers shall multiply the exhaust NMOG certification levels by the applicable reactivity adjustment factor set forth in section 13 of the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), or in section I.E.5. of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1961(d), or established by the Executive Officer pursuant to Appendix VIII or section II.D. respectively of the foregoing test procedures. In addition, natural gas vehicles certifying to LEV or ULEV standards shall calculate a reactivity-adjusted methane exhaust emission value by multiplying the methane exhaust certification level by the applicable methane reactivity adjustment factor set forth in section 13 or in section I.E.5. of the above-referenced test procedures as applicable. The product of the exhaust NMOG certification levels and the reactivity adjustment factor shall be compared to the exhaust NMOG mass emission standard established for the particular vehicle emission category to determine compliance. For natural gas vehicles, the reactivity-adjusted NMOG value shall be added to the reactivity-adjusted methane value and then compared to the exhaust NMOG mass emission standards established for the particular vehicle emission category to determine compliance.

b. *Pre-1998 NOx standards.* Prior to the 1998 model year, the 50,000 mile and 120,000 mile LEV exhaust mass emission standards for NOx shall be: 0.7 and 1.0 g/mi for MDVs from 3751-5750 lbs. TW, 1.1 and 1.5 g/mi MDVs from 5751-8500 lbs. TW, 1.3 and 1.8 g/mi for MDVs from 8501-10,000 lbs. TW, and 2.0 and 2.8 g/mi for MDVs from 10,001-14,000 lbs. TW, respectively.

[4] *NMOG Standards for Fuel-Flexible and Dual-Fuel Vehicles.* Fuel-flexible and dual-fuel medium-duty vehicles (or "MDVs") from 0-14,000 lbs. TW shall be certified to exhaust mass emission standards for NMOG established for the operation of the vehicle on a fuel other than gasoline, and gasoline.

a. *Reactivity Adjustment.* For LEVs and ULEVs when certifying on the fuel other than gasoline, manufactures shall multiply the exhaust NMOG certification levels by the applicable reactivity adjustment factor. In addition to multiplying the exhaust NMOG certification levels by the applicable reactivity adjustment factor, the exhaust methane certification level for natural gas vehicles shall be multipled by the applicable methane reactivity adjustment factor and the resulting value shall be added to the reactivity-adjusted NMOG value. When certifying on gasoline, the exhaust NMOG certification levels of fuel-flexible and dual-fuel vehicles shall not be multiplied by a reactivity adjustment factor.

b. *Standards for Fuel-Flexible and Dual-Fuel Vehicles Operating on Gasoline.* For MDVs from 14,000 lbs. TW, the applicable exhaust mass emission standard for NMOG when certifying the vehicle for operation on gasoline shall be:

Test Weight (lbs.)	*Vehicle Emission Category*	*50,000 (g/mi)*	*120,000 (g/mi)*
0-3750	LEV	0.25	0.36
	ULEV	0.125	0.180
3751-5750	LEV	0.32	0.46
	ULEV	0.160	0.230
	SULEV	0.100	0.143
5751-8500	LEV	0.39	0.56
	ULEV	0.195	0.280
	SULEV	0.117	0.167
8501-10,000	LEV	0.46	0.66
	ULEV	0.230	0.330
	SULEV	0.138	0.197
10,001-14,000	LEV	0.60	0.86
	ULEV	0.300	0.430
	SULEV	0.180	0.257

[5] *Highway NOx.* The maximum projected emissions of "Oxides of Nitrogen" (or "NOx") measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR Part 600 Subpart B) shall be not greater than 2.00 times the applicable MDV 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 g/mi before being compared.

[6] Particulate standards are only applicable for diesel vehicles and shall be determined on a 120,000 mile basis.

[7] "n/a" means not applicable.

[8] *Certification of Incomplete and Diesel Vehicles.* Manufacturers have the option of certifying engines used in incomplete and diesel MDVs to the heavy-duty engine standards and test procedures set forth in section 1956.8(g) or (h), Title 13, California Code of Regulations. Manufacturers certifying incomplete or diesel MDVs to the heavy-duty engine standards and test procedures shall specify in the application for certification an in-use compliance procedure as provided in section 2139(c), Title 13, California Code of Regulations. For diesel vehicles certifying to the standards set forth in Title 13, section 1960.1(h)(2), "NMOG" shall mean non-methane hydrocarbons.

[9] *Intermediate In-Use Compliance Standards.* The following intermediate in-use compliance standards for 50,000 miles and 120,000 miles for MDVs from 3751-14,000 lbs. TW, including fuel-flexible and dual-fuel vehicles when operating on an available fuel other than gasoline, shall apply for the specified model years only:

*Intermediate In-Use Compliance Standards** (in grams per mile)										
Emission Category	*Model Year*	*Durability Vehicle Basis (mi)*	*3751-5750 lbs.*		*5751-8500 lbs.*		*8501-10,000 lbs.*		*10,001-14,000 lbs.*	
			NMOG	*NOx*	*NMOG*	*NOx*	*NMOG*	*NOx*	*NMOG*	*NOx*
LEV	through 1997	50,000	0.238	0.7	0.293	1.1	0.345	1.3	0.450	2.0
	1998-1999	50,000	0.238	0.6	0.293	0.9	0.345	1.0	0.450	1.5
	2000	50,000	—	0.6	—	0.9	—	1.0	—	1.5
	2000	120,000	—	0.8	—	1.2	—	1.3	—	2.0
ULEV	through 1999	50,000	0.128	0.6	0.156	0.9	0.184	1.0	0.240	1.5
	2000	50,000	0.128	0.6	0.156	0.9	0.184	1.0	0.240	1.5
	2000	120,000	0.160	0.8	0.195	1.2	0.230	1.3	0.300	2.0
	2001-2002	50,000	0.128	—	0.156	—	0.184	—	0.240	—
	2001-2002	120,000	0.160	—	0.195	—	0.230	—	0.300	—
SULEV	through 2002	50,000	0.072	0.3	0.084	0.45	0.100	0.5	0.130	0.7
	2002	120,000	0.100	0.4	0.117	0.6	0.138	0.65	0.180	1.0

In-use compliance with standards beyond 50,000 miles shall be waived through the 1999 model year for LEVs and ULEVs and through the 2001 model year for SULEVs. Dashes mean that the standard in the section (h)92) table applies.

*Dashes mean that the standard in the section (h)(2) table applies.

a. *Reactivity Adjustment.* For LEVs and ULEVs designed to operate on any available fuel other than conventional gasoline, including fuel–flexible and dual–fuel vehicles when operating on any available fuel other than gasoline, NMOG exhaust mass emission results shall be multiplied by the applicable reactivity adjustment factor to determine compliance with intermediate in–use compliance standards for NMOG. In addition to multiplying the exhaust NMOG mass emission results by the applicable reactivity adjustment factor, natural gas vehicles shall multiply the exhaust methane mass emission results by the applicable methane reactivity adjustment factor and add that value to the reactivity–adjusted NMOG value. For fuel–flexible and dual–fuel vehicles when operating on gasoline, NMOG emission results shall not be multiplied by a reactivity adjustment factor.

b. *Gasoline Standards for Fuel–Flexible and Dual–Fuel Vehicles.* For fuel–flexible and dual–fuel MDVs from 0–14,000 lbs. TW, intermediate in–use compliance standards for NMOG emissions at 50,000 miles when the vehicle is operated on gasoline, shall be:

Fuel–Flexible and Dual–Fuel MDVs Intermediate In–Use Compliance Standards		
Test Weight (lbs.)	*Vehicle Emission Category*	*50,000 (g/mi)*
0–3750	LEV	0.32
	ULEV	0.188
3751–5750	LEV	0.41
	ULEV	0.238
	SULEV	0.128
5751–8500	LEV	0.49
	ULEV	0.293
	SULEV	0.156
8501–10,000	LEV	0.58
	ULEV	0.345
	SULEV	0.184
10,000–14,000	LEV	0.75
	ULEV	0.450
	SULEV	0.240

Intermediate in–use compliance standards shall apply to LEVs and ULEVs through the 1999 model year and to SULEVs through the 2001 model year. Compliance with the standards beyond 50,000 miles shall be waived through the 1999 model year for LEVs and ULEVs and through the 2001 model year for SULEVs.

10 *Medium–Duty Vehicle Phase–In Requirements.* Each manufacturer's MDV fleet shall be defined as the total number of MDVs from 0–14,000 lbs. TW certified and produced and delivered for sale in California.

a. Manufacturers of MDVs shall certify an equivalent percentage of their MDV fleet according to the following phase–in schedule:

Model Year	*Vehicles Certified to Title 13 CCR Section 1960.1(h)(1) or (h)(2) (%)*			*Vehicles Certified to Title 13 CCR Section 1956.8(g) or (h) (%)*		
	Tier 1	*LEV*	*ULEV*	*Tier 1*	*LEV*	*ULEV*
1998	73	25	2	100	0	0
1999	48	50	2	100	0	0
2000	23	75	2	100	0	0

c. The percentages shall be applied to the manufacturer's total production of California–certified medium–duty vehicles delivered for sale in California.

d. These requirements shall not apply to small volume manufacturers. Small volume manufacturers shall comply with the requirements of note (16) below.

11 *Definition of HEV.* For the purpose of calculating "Vehicle Equivalent Credits" (or "VECs"), the contribution of hybrid electric vehicles (or "HEVs") will be calculated based on the range of the HEV without the use of the engine. For the purpose of calculating the contribution of HEVs to the VECs, the following definitions shall apply:

"*Type A HEV*" shall mean an HEV which achieves a minimum range of 60 miles over the All–Electric Range Test as defined in the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1961(d), as applicable.

"*Type B HEV*" shall mean an HEV which achieves a range of 40–59 miles over the All–Electric Range Test as defined in the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1961(d), as applicable.

"*Type C HEV*" shall mean an HEV which achieves a range of 0–39 miles over the All–Electric Range Test as defined in the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1960.1(k), or in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light–Duty Trucks, and Medium–Duty Vehicles" as incorporated by reference in section 1961(d), as applicable, and all other HEVs excluding "Type A" and "Type B" HEVs.

a. For the purpose of calculating VECs, electric vehicles which utilize fuel fired heaters and which are not otherwise certified as ZEVs shall be treated as "Type A HEV ULEVs."

12 *Calculation of Vehicle Equivalent Credits.* In 1992 through 2000 model years, manufacturers that produce and deliver for sale in California MDVs in excess of the equivalent requirements for LEVs and/or ULEVs certified to the exhaust emission standards set forth in this section (h)(2) or Title 13, CCR Section 1956.8(h), shall receive VECs calculated in accordance with the following equation, where the term "Produced" means produced and delivered for sale in California:

[[(No. of LEVs Produced excluding HEVs) + (No. of "Type C HEV" LEVs Produced)] +
[(No. of "Type A HEV" LEVs Produced) x (1.2)] +
[(No. of "Type B HEV" LEVs Produced) x (1.1)] –
(Equivalent No. of LEVs Required to be Produced)] +
[[(1.4) x [(No. of ULEVs Produced excluding HEVs) – (No. of "Type C HEV" ULEVs Produced)] +
[(1.7) x (No. of "Type A HEV" ULEVs Produced)] +
[(1.5) x (No. of "Type B HEV" ULEVs Produced)]
[(1.4) x (Equivalent No. of ULEVs Required to be Produced)]] –
[[(1.7) x [(No. of SULEVs Produced excluding HEVs) + (No. of "Type C HEV" SULEVs Produced)] +
[(No. of "Type A HEV" SULEVs Produced) x (1.7)] +
[(No. of "Type B HEV" SULEVs) x (1.5)] –
[(1.7) x [(Equivalent No. of SULEVs Required to be Produced)]] +
[(2.0) x (No. of ZEVs Certified and Produced as MDVs)].

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

(i) 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 Code of Regulations, shall not exceed1:

SPECIAL EXHAUST10 EMISSION STANDARDS (grams per mile)

Year	Vehicle Type	Equivalent Inertia Weight [FN2]	Durability Basis	Non-Methane Hydro-car-bons	Carbon Monoxide	Oxides of Nitrogen
1981	PC [FN6]	All	50,000	0.39 (0.41)	7.0	1.5
	LDT, MDV	0-3999	50,000	0.39 (0.41)	9.0	1.5
1982 [FN8]	PC	All	50,000	0.39 (0.41)	7.0	1.0
1983 [FN8]	PC	All	50,000	0.39 (0.41)	7.0	0.7
	LDT, MDV	0-3999	50,000	0.39 (0.41)	9.0	1.0
1984 [FN8]	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
1985 [FN8]	LDT, MDV	0-3999	50,000	0.39 (0.41)	9.0	0.7

1 Subsection (i) 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 regulation 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, Subpart B) shall be no greater than 1.33 times the applicable passenger car standards and 2.0 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 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.

(j) For Option 1 in the tables in sections (f)(1) and (f)(2), the hydrocarbon and carbon monoxide compliance shall be determined on a 50,000-mile durability vehicle basis. For Option 2 in the table in section (f)(2), the hydrocarbon and carbon monoxide compliance shall be determined on a 100,000-mile durability basis.

(k) The test procedures for determining compliance with these standards are set forth in "California Exhaust Emission Standards and Test Procedures for 1981 through 1987 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," adopted by the state board on November 23, 1976, as last amended May 20, 1987, and in "California Exhaust Emission Standards and Test Procedures for 1988 through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," adopted by the state board on May 20, 1987, as last amended August 5, 1999, both of which are incorporated herein by reference, and in "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as incorporated by reference in section 1961(d). The test procedures for determining the compliance of 2001 through 2006 model-year hybrid electric vehicles with the standards set forth in this section are set forth in "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck, and Medium-Duty Vehicle Classes," as incorporated by reference in section 1962(h).

(l) With respect to any new vehicle required to comply with the standards set forth in paragraphs (a) through (h), the man-

ufacturer's written maintenance instructions for in-use vehicles shall not require scheduled maintenance more frequently than or beyond the scope of maintenance permitted under the test procedures referenced in paragraph (k) above. Any failure to perform scheduled maintenance shall not excuse an emissions violation unless the failure is related to or causative of the violation.

(m) Any 1982, 1983, and 1984 model year vehicle required to comply with the standards set forth in paragraphs (b), (c), (d), and (f) which is subject to a standard set by federal law or regulation controlling emissions of particulate matter must conform to such standard.

(n) For purposes of section 1960.1(a) through (f), section 1960.1(h)(1), and section 1960.1.5, small volume manufacturer" for the 2000 and earlier model years is any vehicle manufacturer which was subject to in lieu" standards pursuant to section 202(b)(1)(B) of the Federal Clean Air Act (42 U.S.C. section 7521(b)(1)(B), as amended November 16, 1977) or a vehicle manufacturer with California sales not exceeding 3,000 new motor vehicles per model year based on previous model-year sales; however, for manufacturers certifying for the first time in California model year sales shall be based on projected California sales.

(o) [Reserved]

(p) The cold temperature exhaust carbon monoxide emission levels from new 1996 through 2000 and subsequent model-year passenger cars, light-duty trucks, and medium-duty vehicles shall not exceed:

1996 AND SUBSEQUENT MODEL-YEAR COLD TEMPERATURE carbon monoxide EXHAUST EMISSIONS STANDARDS FOR PASSENGERCARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES [FN1,2] (grams per mile)

Vehicle Type	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	Carbon Monoxide
Passenger Car	All	50,000	10.0
Light-Duty Truck	0-3750	50,000	10.0
Light-Duty Truck	3751-5750	50,000	12.5
Medium-Duty Vehicle	0-3750	50,000	10.0
Medium-Duty Vehicle	3750-8500 [FN3]	50,000	12.5

1 These standards are applicable to vehicles tested in accordance with 40 CFR Part 86 Subpart C, at a nominal temperature of 200F (-70C).

2 Natural gas vehicles, diesel-fueled vehicles, hybrid electric vehicles, and zero-emission vehicles are exempt from these standards.

3 Medium-duty vehicles with a gross vehicle weight rating greater than 8,500 lbs. are exempt from this standard.

(q) The Supplemental Federal Test Procedure (SFTP) exhaust emission levels from new 2001 and subsequent model passenger cars and light-duty trucks, other than low-emission vehicles, ultra-low-emission vehicles, and zero-emission vehicles, shall not exceed:

SFTP EXHAUST EMISSION STANDARDS FOR 2001 AND SUBSEQUENT MODEL-YEAR PASSENGER CARS AND LIGHT-DUTY TRUCKS OTHER THAN LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES, AND ZERO-EMISSION VEHICLES (grams per mile) [FN4,5,6,7,8,9,10]

Vehicle Type	Loaded Vehicle Weight (lbs.)	Durability Vehicle Basis (mi)	NMHC Fuel Type	NOx Composite	A/C Test	US06 Test	CO Composite Option
PC	All	50,000	Gasoline	0.65	3.0	9.0	3.4
			Diesel	1.48	NA	9.0	3.4
		100,000	Gasoline	0.91	3.7	11.1	4.2
			Diesel	2.07	NA	11.1	4.2
LDT	0-3750	50,000	Gasoline	0.65	3.0	9.0	3.4
			Diesel	1.48	NA	9.0	3.4
		100,000	Gasoline	0.91	3.7	11.1	4.2

			Diesel	2.07	NA	11.1	4.2
LDT	3751-5750	50,000	Gasoline	1.02	3.9	11.6	4.4
			Diesel	NA	NA	NA	NA
		100,000	Gasoline	1.37	4.9	14.6	5.5
			Diesel	NA	NA	NA	NA

1 Abbreviations.

"PC" means passenger car.

"LDT" means light-duty truck.

"NMHC+NOx" means non-methane hydrocarbon plus oxides of nitrogen emissions.

"CO" means carbon monoxide emissions.

"A/C" means air-conditioning.

"US06" means the test cycle designed to evaluate emissions during aggressive and microtransient driving.

2 Non-Methane Hydrocarbon Emissions. For PCs and LDTs certified to the FTP exhaust standards in section 1960.1(f)(2), hydrocarbon emissions shall be measured in accordance with the "California Non-Methane Hydrocarbon Test Procedures" as last amended May 15, 1990, which is incorporated herein by reference. For PCs and LDTs certified as transitional low-emission vehicles, hydrocarbon emissions shall be measured in accordance with Part B (Determination of Non-Methane Hydrocarbon Mass Emissions by Flame Ionization Detection) of the "California Non-Methane Organic Gas Test Procedures" as incorporated by reference in section 1960.1(g)(1), note (3). For alcohol-fueled vehicles certifying to these standards, including flexible-fuel vehicles when certifying on methanol or ethanol, "Non-Methane Hydrocarbons" shall mean "Organic Material Non-Methane Hydrocarbon Equivalent."

3 Composite Standards. Compliance with the composite standards shall be demonstrated using the calculations set forth in the section 86.164-00, Title 40, Code of Federal Regulations, as adopted October 22, 1996, which is incorporated herein by reference.

4 SFTP. SFTP means the additional test procedure designed to measure emissions during aggressive and microtransient driving, as described in section 86.159-00, Title 40, Code of Federal Regulations, as adopted October 22, 1996, over the US06 cycle, and also the test procedure designed to measure urban driving emissions while the vehicle's air conditioning system is operating, as described in section 86.160-00, Title 40, Code of Federal Regulations, as adopted October 22, 1996, over the SC03 cycle. These sections of the Code of Federal Regulations are incorporated herein by reference.

5 Applicability to Alternative Fuel Vehicles. These SFTP standards do not apply to vehicles certified on fuels other than gasoline and diesel fuel, but the standards do apply to the gasoline and diesel fuel operation of flexible-fuel vehicles and dual-fuel vehicles.

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

7 A/C-on Specific Calibrations. A/C-on specific calibrations (e.g. air to fuel ratio, spark timing, and exhaust gas recirculation), may be used which differ from A/C-off calibrations for given engine operating conditions (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters). Such calibrations must not unnecessarily reduce the NMHC+NOx emission control effectiveness during A/C-on operation when the vehicle is operated under conditions which may reasonably be expected to be encountered during normal operation and use. If reductions in control system NMHC+NOx effectiveness do occur as a result of such calibrations, the manufacturer shall, in the Application for Certification, specify the circumstances under which such reductions do occur, and the reason for the use of such calibrations resulting in such reductions in control system effectiveness.

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

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

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

1. Such strategies are substantially employed during the FTP or SFTP, or

2. Such strategies are demonstrated not to significantly reduce vehicle NMHC+NOx emission control effectiveness over the operating conditions in which they are employed, or

3. Such strategies are demonstrated to be necessary to protect the vehicle, occupants, engine, or emission control hardware.

If the manufacturer proposes to use a "lean-on-cruise" calibration strategy, the manufacturer shall specify the circumstances under which such a calibration would be used, and the reason or reasons for the proposed use of such a calibration.

The above provisions shall not apply to vehicles powered by "lean-burn" engines or Diesel-cycle engines. A "lean-burn" engine is defined as an Otto-cycle engine designed to run at an air-fuel ratio significantly greater than stoichiometry during the large majority of its operation.

9 Phase-In Requirements. For the purposes of this section 1960.1(q) only, each manufacturer's PC and LDT fleet shall be defined as the total projected number of PCs and LDTs from 0-5750 pounds loaded vehicle weight certified to the FTP exhaust standards of section 1960.1(f)(2) and certified as transitional low-emission vehicles sold in California. As an option, a manufacturer may elect to have its total PC and LDT fleet defined, for the purposes of this section 1960.1(q) only, as the total projected number of the manufacturer's PCs and LDTs, other than zero-emission vehicles, certified and sold in California.

a. Manufacturers of PCs and of LDTs, except small volume manufacturers, shall certify a minimum percentage of their PC and LDT fleet according to the following phase-in schedule.

b. Small volume manufacturers of PCs and LDTs shall certify 100% of their PC and LDT fleet in the 2004 and subsequent model years.

10 Single-Roll Electric Dynamometer Requirement. For all vehicles certified to the SFTP standards, a single-roll electric dynamometer or a dynamometer which produces equivalent results, as set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), must be used for all types of emission testing to determine compliance with the associated emission standards.

(r) The Supplemental Federal Test Procedure (SFTP) standards in this section represent the maximum SFTP exhaust emissions at 4,000 miles + 250 miles or at the mileage determined by the manufacturer for emission-data vehicles in accordance with the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as incorporated by reference in section 1960.1(k), and with the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as incorporated by reference in section 1961(d). The SFTP exhaust emission levels from new 2001 and subsequent model low-emission vehicles, ultra-low-emission vehicles and super-ultra-low-emission vehicles in the passenger car and light-duty truck class, and new 2003 and subsequent low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles in the medium-duty class, shall not exceed:

SFTP EXHAUST EMISSION STANDARDS FOR LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES, AND SUPER-ULTRA-LOW-EMISSION VEHICLES IN THE PASSENGER CAR, LIGHT-DUTY TRUCK, AND MEDIUM-DUTY VEHICLE CLASSES (grams per mile) [FN6,7,8,9,10,11]

Vehicle Type [FN1]	Loaded Weight (lbs.) [FN2]	US06 Test NOx [FN1]	NMHC [FN4] + CO [FN1]	A/C Test [FN1,5] NMHC [FN4] + NOx	CO [FN1]
PC	All	0.14	8.0	0.20	2.7
LDT	0-3750	0.14	8.0	0.20	2.7
LDT	3751-5750	0.25	10.5	0.27	3.5
MDV	3751-5750	0.25	10.5	0.31	3.5
MDV	5751-8500	0.60	11.8	0.44	4.0

1 Abbreviations and Definitions. For the purposes of this SFTP standards table only, the following abbreviations and definitions apply:

"PC" means passenger car.

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

"MDV" means medium-duty truck, defined as any motor vehicle having a manufacturer's gross vehicle weight rating of greater than 6,000 pounds and less than 14,001 pounds, except passenger cars.

"NMHC+NOx" means non-methane hydrocarbon plus oxides of nitrogen emissions.

"CO" means carbon monoxide emissions.

"US06" means the test cycle designed to evaluate emissions during aggressive and microtransient driving.

"A/C" means air-conditioning.

2 For MDVs, "Loaded Vehicle Weight" shall mean "Test Weight," which is the average of the vehicle's curb weight and gross vehicle weight.

3 Vehicles with a gross vehicle weight rating over 8,500 pounds are exempted from the requirements of this subsection.

4 Non-Methane Hydrocarbon Emissions. Hydrocarbon emissions shall be measured in accordance with Part B (Determination of Non-Methane Hydrocarbon Mass Emissions by Flame Ionization Detection) of the "California Non-Methane Organic Gas Test Procedures" as incorporated by reference in section 1960.1(g)(1), note (3). For alcohol-fueled vehicles certifying to these standards, including flexible-fuel vehicles when certifying on methanol or ethanol, Non-Methane Hydrocarbons" shall mean Organic Material Non-Methane Hydrocarbon Equivalent."

5 A/C-on Specific Calibrations. A/C-on specific calibrations (e.g. air to fuel ratio, spark timing, and exhaust gas recirculation), may be used which differ from A/C-off calibrations for given engine operating conditions (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters). Such calibrations must not unnecessarily reduce the NMHC+NOx emission control effectiveness during A/C-on operation when the vehicle is operated under conditions which may reasonably be expected to be encountered during normal operation and use. If reductions in control system NMHC+NOx effectiveness do occur as a result of such calibrations, the manufacturer shall, in the Application for Certification, specify the circumstances under which such reductions do occur, and the reason for the use of such calibrations resulting in such reductions in control system effectiveness.

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

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

6 SFTP. SFTP means the additional test procedure designed to measure emissions during aggressive and microtransient

driving, as described in section 86.159-00, Title 40, Code of Federal Regulations, as adopted October 22, 1996, over the US06 cycle, and also the test procedure designed to measure urban driving emissions while the vehicle's air conditioning system is operating, as described in section 86.160-00, Title 40, Code of Federal Regulations, as adopted October 22, 1996, over the SC03 cycle. These sections of the Code of Federal Regulations are incorporated herein by reference.

7 Applicability to Alternative Fuel Vehicles. These SFTP standards do not apply to vehicles certified on fuels other than gasoline and diesel fuel, but the standards do apply to the gasoline and diesel fuel operation of flexible-fuel vehicles and dual-fuel vehicles.

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

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

1. Such strategies are substantially employed during the FTP or SFTP, or

2. Such strategies are demonstrated not to significantly reduce vehicle NMHC+NOx emission control effectiveness over the operating conditions in which they are employed, or

3. Such strategies are demonstrated to be necessary to protect the vehicle, occupants, engine, or emission control hardware.

If the manufacturer proposes to use a "lean-on-cruise" calibration strategy, the manufacturer shall specify the circumstances under which such a calibration would be used, and the reason or reasons for the proposed use of such a calibration.

The above provisions shall not apply to vehicles powered by "lean-burn" engines or Diesel-cycle engines. A "lean-burn" engine is defined as an Otto-cycle engine designed to run at an air-fuel ratio significantly greater than stoichiometry during the large majority of its operation.

10 Phase-In Requirements. For the purposes of this 1960.1(r) section only, each manufacturer's PC and LDT fleet shall be defined as the total projected number of low-emission and ultra-low-emission PCs and LDTs from 0-5750 pounds loaded vehicle weight sold in California. Each manufacturer's MDV fleet shall be defined as the total projected number of low-emission, ultra-low-emission, and super-ultra-low-emission MDVs less than 8501 pounds gross vehicle weight rating sold in California.

a. Manufacturers of PCs, LDTs, and MDVs, except small volume manufacturers, shall certify a minimum percentage of their PC and LDT fleet, and a minimum percentage of their MDV fleet, according to the following phase-in schedule.

b. Manufacturers may use an "Alternative or Equivalent Phase-in Schedule" to comply with the phase-in requirements. An "Alternative Phase-in" is one that achieves at least equivalent emission reductions by the end of the last model year of the scheduled phase-in. Model-year emission reductions shall be calculated by multiplying the percent of vehicles (based on the manufacturer's projected California sales volume of the applicable vehicle fleet) meeting the new requirements per model year by the number of model years implemented prior to and including the last model year of the scheduled phase-in. The "cumulative total" is the summation of the model-year emission reductions (e.g., a four model-year 25/50/85/100 percent phase-in schedule would be calculated as: (25%*4 years) + (50%*3 years) + (85%*2 years) + (100%*1 year) = 520). Any alternative phase-in that results in an equal or larger cumulative total than the required cumulative total by the end of the last model year of the scheduled phase-in shall be considered acceptable by the Executive Officer under the following conditions: 1) all vehicles subject to the phase-in shall comply with the respective requirements in the last model year of the required phase-in schedule and 2) if a manufacturer uses the optional phase-in percentage determination in section 1960.1(q) note (9), the cumulative total of model-year emission reductions as determined only for PCs and LDTs certified to this section 1960.1(r) must also be equal to or larger than the required cumulative total by end of the 2004 model year. Manufacturers shall be allowed to include vehicles introduced before the first model year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as: (10%*5 years) and added to the cumulative total).

c. Small volume manufacturers of PCs, LDTs, and MDVs shall certify 100% of their PC and LDT fleet in 2004 and subsequent model years, and 100% of their MDV fleet in 2005 and subsequent model years.

11 Single-Roll Electric Dynamometer Requirement. For all vehicles certified to the SFTP standards, a single-roll electric dynamometer or a dynamometer which produces equivalent results, as set forth in the "California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles" as

incorporated by reference in section 1960.1(k), must be used for all types of emission testing to determine compliance with the associated emission standards.

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

Introduction. This section 1961 contains the California "LEV II" exhaust emission standards for 2004 and subsequent model passenger cars, light-duty trucks and medium-duty vehicles. A manufacturer must demonstrate compliance with the exhaust standards in section 1961(a) applicable to specific test groups, and with the composite phase-in requirements in section 1961(b) applicable to the manufacturer's entire fleet. Section 1961(b) also includes the manufacturer's fleet-wide composite phase-in requirements for the 2001 - 2003 model years.

Prior to the 2004 model year, a manufacturer that produces vehicles that meet the standards in section 1961(a) has the option of certifying the vehicles to those standards, in which case the vehicles will be treated as LEV II vehicles for purposes of the fleet-wide phase-in requirements. Similarly, 2004 - 2006 model-year vehicles may be certified to the "LEV I" exhaust emission standards in section 1960.1(g)(1) and (h)(2), in which case the vehicles will be treated as LEV I vehicles for purposes of the fleet-wide phase-in requirements.

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

(a) Exhaust Emission Standards.

(1) "LEV II" Exhaust Standards. The following standards represent the maximum exhaust emissions for the intermediate and full useful life from new 2004 and subsequent model-year "LEV II" LEVs, ULEVs, and SULEVs, including fuel-flexible, bi-fuel and dual fuel vehicles when operating on the gaseous or alcohol fuel they are designed to use:

LEV II Exhaust Mass Emission Standards for New 2004 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes

Vehicle Type	Durability Vehicle Basis (mi)	Vehicle Emission Category	NMOG (g/mi)	Carbon Monoxide (g/mi)	Oxides of Nitrogen (g/mi)
All PCs;	50,000	LEV	0.075	3.4	0.05
LDTs 8500 lbs. GVW or					
less		LEV, Option 1	0.075	3.4	0.07
Vehicles in this category					
are tested at their loaded		ULEV	0.040	1.7	0.05
vehicle weight	120,000	LEV	0.090	4.2	0.07
		LEV, Option 1	0.090	4.2	0.10
		ULEV	0.055	2.1	0.07
		SULEV	0.010	1.0	0.02
	150,000 (Optional)	LEV	0.090	4.2	0.07
		LEV, Option 1	0.090	4.2	0.10
		ULEV	0.055	2.1	0.07
		SULEV	0.010	1.0	0.02
MDVs 8501 - 10,000	120,000	LEV	0.195	6.4	0.2
lbs. GVW		ULEV	0.143	6.4	0.2

Vehicles in this category are tested at their adjusted loaded vehicle weight		SULEV	0.100	3.2	0.1
	150,000 (Optional)	LEV	0.195	6.4	0.2
		ULEV	0.143	6.4	0.2
		SULEV	0.100	3.2	0.1
MDVs 10,001-14,000 lbs. GVW	120,000	LEV	0.230	7.3	0.4
		ULEV	0.167	7.3	0.4
		SULEV	0.117	3.7	0.2
Vehicles in this category are tested at their adjusted loaded vehicle weight	150,000 (Optional)	LEV	0.230	7.3	0.4
		ULEV	0.167	7.3	0.4
		SULEV	0.117	3.7	0.2

LEV II Exhaust Mass Emission Standards for New 2004 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes

Vehicle Type	Vehicle Basis (mi)	Emission Category	Formaldehyde (mg/mi)	Particulates (g/mi)
All PCs; LDTs 8500 lbs. GVW or less	50,000	LEV	15	n/a
		LEV, Option 1	15	n/a
Vehicles in this category are tested at their loaded vehicle weight	120,000	ULEV	8	n/a
		LEV	18	0.01
		LEV, Option 1	18	0.01
		ULEV	11	0.01
		SULEV	4	0.01
	150,000 (Optional)	LEV	18	0.01
		LEV, Option 1	18	0.01
		ULEV	11	0.01
		SULEV	4	0.01
MDVs 8501 - 10,000 lbs. GVW	120,000	LEV	32	0.12
		ULEV	16	0.06
Vehicles in this category are tested at their adjusted loaded vehicle weight		SULEV	8	0.06
	150,000 (Optional)	LEV	32	0.12
		ULEV	16	0.06
		SULEV	8	0.06
MDVs 10,001-14,000120,000		LEV	40	0.12

lbs. GVW		ULEV	21	0.06
		SULEV	10	0.06
Vehicles in this category are tested at their adjusted loaded vehicle weight	150,000 (Optional)	LEV	40	0.12
		ULEV	21	0.06
		SULEV	10	0.06

(2) Reactivity Adjustment in Determining Compliance with the NMOG Standard

(A) The NMOG emission results from all TLEVs, LEVs, ULEVs and SULEVs certifying on a fuel other than conventional gasoline shall be numerically adjusted to establish an NMOG exhaust mass emission value equivalent. The manufacturer shall multiply measured NMOG exhaust emission results by the appropriate reactivity adjustment factor set forth in section 1961(a)(2)(B) or established in accordance with the test procedures incorporated by reference in section 1961(d). The reactivity adjustment factor represents the ratio of the NMOG specific reactivity of a low-emission vehicle designed to operate on a fuel other than conventional gasoline compared to the NMOG baseline specific reactivity of vehicles in the same vehicle emission category operated on conventional gasoline.

(B) The following reactivity adjustment factors apply:

	Light-Duty Vehicles 0-6000 lbs. GVW			**Medium-Duty Vehicles 6001 lbs. - 14,000 lbs. GVW**	
	TLEV	**LEV**	**ULEV**	**LEV**	**ULEV**
Fuel	Baseline Specific Reactivity (grams ozone / gram NMOG)				
Conventional Gasoline	3.42	3.13	3.13	3.13	3.13
	Reactivity Adjustment Factors				
RFG (through the 2003 model year)	0.98	0.94	0.94	0.94	0.94
M85	0.41	0.41	0.41	0.41	0.41
Natural Gas	1.0	0.43	0.43	0.43	0.43
LPG	1.0	0.50	0.50	0.50	0.50
	Methane Reactivity Adjustment Factors				
Natural Gas	0.0043	0.0047	0.0047	0.0047	0.0047

(3) NMOG Standards for Bi-Fuel, Fuel-Flexible and Dual-Fuel Vehicles Operating on Gasoline. For fuel-flexible, bi-fuel, and dual-fuel PCs, LDTs and MDVs, compliance with the NMOG exhaust mass emission standards shall be based on exhaust emission tests both when the vehicle is operated on the gaseous or alcohol fuel it is designed to use, and when the vehicle is operated on gasoline. A manufacturer must demonstrate compliance with the applicable exhaust mass emission standards for NMOG, CO, NO[x] and formaldehyde set forth in the table in section 1961(a)(1) when certifying the vehicle for operation on the gaseous or alcohol fuel.

The following standards represent the maximum NMOG emissions when the vehicle is operating on gasoline. A manufacturer shall not apply a reactivity adjustment factor to the exhaust NMOG mass emission result when operating on gasoline. A manufacturer may measure NMHC in lieu of NMOG when fuel-flexible, bi-fuel and dual-fuel vehicles are operated on gasoline, in accordance with the test procedures incorporated by reference in section 1961(d). Testing at 50°F is not required for fuel-flexible, bi-fuel and dual-fuel vehicles when operating on gasoline. The applicable CO, NO[x] and formaldehyde standards are set forth in section 1961(a)(1).

LEV II NMOG Standards for Bi-Fuel, Fuel-Flexible and Dual- Fuel Vehicles Operating on Gasoline (g/mi)

Vehicle Type	**Vehicle Emission Category**	**Durability Vehicle Basis**	
		50,000 mi	**120,000 mi**
All PCs; LDTs,	LEV	0.125	0.156
0-8500 lbs. GVW	ULEV	0.075	0.090
	SULEV	0.010	0.040
MDVs, 8501-10,000	LEV	n/a	0.230
lbs. GVW	ULEV	n/a	0.167

	SULEV	n/a	0.117
MDVs, 10,001-	LEV	n/a	0.280
14,000 lbs. GVW	ULEV	n/a	0.195
	SULEV	n/a	0.143

(4) 50oF Exhaust Emission Standards. All light- and medium-duty LEVs, ULEVs and SULEVs must demonstrate compliance with the following exhaust emission standards for NMOG and formaldehyde (HCHO) measured on the FTP (40 CFR, Part 86, Subpart B) conducted at a nominal test temperature of 50ºF, as modified by Part II, Section C of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" incorporated by reference in section 1961(d). The NMOG mass emission result shall be multiplied by the applicable reactivity adjustment factor, if any, prior to comparing to the applicable adjusted 50,000 mile certification standards set forth below. A manufacturer may demonstrate compliance with the NMOG and HCHO certification standards contained in this subparagraph by measuring NMHC exhaust emissions or issuing a statement of compliance for HCHO in accordance with Section D.1, subparagraph (p) and Section G.3.1.2, respectively, of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" incorporated by reference in section 1961(d). Emissions of CO and NO[x] measured at 50ºF shall not exceed the standards set forth in §1961(a)(1) applicable to vehicles of the same emission category and vehicle type subject to a cold soak and emission test at 68o to 86oF. Natural gas and diesel-fueled vehicles are exempt from the 50º F test requirements.

Vehicle Weight Class	**Vehicle Emission Category (g/mi)**					
	LEV NMOG	**HCHO**	**ULEV NMOG**	**HCHO**	**SULEV NMOG**	**HCHO**
PCs; LDTs 0-8500 lbs. GVW	0.150	0.030	0.080	0.016	0.020	0.008
MDVs 8501-10,000 lbs. GVW	0.390	0.064	0.286	0.032	0.200	0.016
MDVs 10,001-14,000 lbs. GVW	0.460	0.080	0.334	0.042	0.234	0.020

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

2001 AND SUBSEQUENT MODEL-YEAR COLD TEMPERATURE CARBON MONOXIDE EXHAUST EMISSIONS STANDARDS FOR PASSENGER CARS, LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES

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

These standards are applicable to vehicles tested at a nominal temperature of 20ºF (-7ºC) in accordance with 40 CFR Part 86 Subpart C, as amended by the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles" incorporated by reference in section 1961(d). Natural gas, diesel-fueled and zero-emission vehicles are exempt from these standards.

(6) Highway NO[x] Standard. The maximum emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test (HWFET; 40 CFR 600 Subpart B, which is incorporated herein by reference) shall not be greater than 1.33 times the applicable PC and LDT standards or 2.0 times the applicable MDV standards set forth in section 1961(a)(1). Both the projected emissions and the HWFET standard shall be rounded in accordance with ASTM E29-67 to the nearest 0.1 g/mi (or 0.01 g/mi for vehicles certified to the 0.05 or 0.02 g/mi NO[x] standards) before being compared.

(7) Supplemental Federal Test Procedure (SFTP) Off-Cycle Emission Standards. The SFTP exhaust emission levels from new 2004 and subsequent model LEVs, ULEVs, and SULEVs shall not exceed the standards set forth in section 1960.1(r).

(8) Requirements for Vehicles Certified to the Optional 150,000 Mile Standards.

(A) Requirement to Generate Additional Fleet Average NMOG Credit. A vehicle that is certified to the 150,000 mile standards in section 1961(a) shall generate additional NMOG fleet average credit as set forth in 1961(b)(1) or additional vehicle equivalent credits as set forth in 1961(b)(2) provided that the manufacturer extends the warranty on high cost parts to 8 years or 100,000 miles, whichever occurs first, and agrees to extend the limit on high mileage in-use testing to 112,500 miles.

(B) Requirement to Generate a Partial ZEV Allowance. A vehicle that is certified to the 150,000 mile SULEV standards shall also generate a partial ZEV allocation according to the criteria set forth in section C.3 of the "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.

(9) Optional LEV II NO[x] Standard. A manufacturer may certify up to 4% of its light-duty truck fleet from 3751 lbs. LVW - 8500 lbs. GVW with a maximum base payload of 2500 lbs. or more to the LEV, option 1, standard set forth in 1961(a)(1) based on projected sales of trucks in the LDT2 category. Passenger cars and light-duty trucks 0-3750 lbs. LVW are not eligible for this option.

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

Emission Category	**Durability Vehicle Basis**	**LEV II PCs and LDTs**		**LEV II MDVs 8500 - 10,000 lbs. GVW**
		NMOG	**NO[x]**	**NO[x]**
LEV/ULEV	50,000	n/a	0.07	n/a
	120,000	n/a	0.10	0.3
	150,000	n/a	0.10	0.3
LEV, Option 1	50,000	n/a	0.10	n/a
	120,000	n/a	0.14	n/a
	150,000	n/a	0.14	n/a
SULEV	120,000	0.020	0.03	0.15
	150,000	0.020	0.03	0.15

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

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

(A) a demonstration of the airflow rate through the direct ozone reduction device and the ozone-reducing efficiency of the device over the range of speeds encountered in the Unified Cycle Driving Schedule.

(B) an evaluation of the durability of the device for the full useful life of the vehicle; and

(C) a description of the on-board diagnostic strategy for monitoring the performance of the device in-use.

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

(13) NO[x] Credits for Pre-2004 MDVs Certified to the LEV I LEV or ULEV Standards. Prior to the 2004 model year, a manufacturer may earn a 0.02 g/mi per vehicle NO[x] credit for MDVs between 6,000-8500 lbs. GVW certified to the LEV I LEV or ULEV standards for PCs and LDTs set forth in section 1960.1(g)(1). The manufacturer may apply the credit on a per vehicle basis to the NO[x] emissions of LDTs between 6,000-8500 lbs. GVW certified to the PC/LDT LEV or ULEV standards in section 1961(a)(1) for the 2004 through 2008 model years.

(14) When a Federally-Certified Vehicle Model is Required in California.

(A) General Requirement. Whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to the standards for a particular emissions bin that are more stringent than the standards for an applicable California emission category, the equivalent California model may only be certified to (i) the Cali-

fornia standards for a vehicle emissions category that are at least as stringent as the standards for the corresponding federal emissions bin, or (ii) the exhaust emission standards to which the federal model is certified. However, where the federal exhaust emission standards for the particular emissions bin and the California standards for a vehicle emissions category are equally stringent, the California model may only be certified to either the California standards for that vehicle emissions category or more stringent California standards. The federal emission bins are those contained in Tables S04-1 and S04-2 of 40 CFR § 86.1811-04(c) as adopted February 10, 2000. The criteria for applying this requirement are set forth in Part I. Section H.1 of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles," as incorporated by reference in section 1961(d).

(B) Exception for clean fuel fleet vehicles. Section 1961(a)(14)(A) does not apply in the case of a federally-certified vehicle model that is only marketed to fleet operators for applications that are subject to clean fuel fleet requirements established pursuant to section 246 of the federal Clean Air Act (42 U.S.C. sec. 7586). In addition, the Executive Officer shall exclude from the requirement a federally-certified vehicle model where the manufacturer demonstrates to the Executive Officer's reasonable satisfaction that the model will primarily be sold or leased to clean fuel fleet operators for such applications, and that other sales or leases of the model will be incidental to marketing to those clean fuel fleet operators.

(C) Opt-in for 2003 or prior model year vehicles. A manufacturer may certify a passenger car, light-duty truck or medium-duty vehicle to federal exhaust emission standards pursuant to section 1961(a)(14)(A) prior to the 2004 model year.

(15) Emission Standard for a Fuel-Fired Heater. Whenever a manufacturer elects to utilize an on-board fuel-fired heater on any passenger car, light-duty truck or medium-duty vehicle, the fuel-fired heater must meet LEV II ULEV standards for passenger cars and light-duty trucks less than 8,500 pounds GVW as set forth in section 1961(a)(1). On-board fuel-fired heaters may not be operable at ambient temperatures above 40oF.

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

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

(A) The fleet average non-methane organic gas exhaust mass emission values from the passenger cars and light-duty trucks certified to the Tier 1, LEV I and LEV II standards that are produced and delivered for sale in California each model year by a manufacturer other than a small volume manufacturer or an independent low volume manufacturer shall not exceed:

FLEET AVERAGE NON-METHANE ORGANIC GAS EXHAUST MASS EMISSION REQUIREMENTS FOR LIGHT-DUTY VEHICLE WEIGHT CLASSES

Model Year	**Fleet Average NMOG (grams per mile)**	
	All PCs; LDTs 0-3750 lbs. LVW	**LDTs 3751 lbs. LVW - 8500 lbs. GVW**
2001	0.070	0.098
2002	0.068	0.095
2003	0.062	0.093
2004	0.053	0.085
2005	0.049	0.076
2006	0.046	0.062
2007	0.043	0.055
2008	0.040	0.050
2009	0.038	0.047
2010+	0.035	0.043

(B) Calculation of Fleet Average NMOG Value.

1. Basic Calculation.

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

([sigma] [Number of vehicles in a test group x applicable emission standard] + [sigma] [Number of hybrid electric vehicles in a test group x HEV NMOG factor]) [divided by]

Total Number of Vehicles Produced, Including ZEVs and HEVs

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

([sigma] [Number of vehicles in a test group x applicable emission standard] + [sigma] [Number of hybrid electric vehicles in a test group x HEV NMOG factor]) [divided by]

Total Number of Vehicles Produced, Including ZEVs and HEVs

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

Model Year	**Emission Category**	**Emission Standard Value All PCs; LDTs 0-3750 lbs. LVW**	**LDTs 3751-5750 lbs. LVW**
2001 and subsequent (§ 1960.5 "AB 965" vehicles only)	All	Federal Emission Standard to which Vehicle is Certified	Federal Emission Standard to which Vehicle is Certified
2001 - 2003 (§ 1960.1(f)(2))	Tier 1	0.25	0.32
2001 - 2006 model year vehicles certified to the "LEV I" standards in § 1960.1(g)(1) (For TLEVs, 2001 - 2003 model years only)	TLEVs	0.125	0.160
	LEVs	0.075	0.100
	ULEVs	0.040	0.050

Model Year	**Emission Category**	**All PCs; LDTs 0-3750 lbs. LVW**	**LDTs 3751 lbs. LVW-8500 lbs. GVW**
2004 and subsequent model year vehicles certified to the "LEV II" standards § 1961(a)(1)	LEVs	0.075	0.075
	ULEVs	0.040	0.040
	SULEVs	0.01	0.01
2004 and subsequent model year vehicles certified to the optional 150,000 mile "LEV II" standards for PCs and LDTs in § 1961 (a)(1)	LEVs	0.06	0.06
	ULEVs	0.03	0.03
	SULEVs	0.0085	0.0085

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

LEV HEV Contribution Factor = 0.075 - [(Zero-emission VMT Factor) x 0.035]

ULEV HEV Contribution Factor = 0.040 - [(Zero-emission VMT Factor) x 0.030]

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

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

(C) Requirements for Small Volume Manufacturers.

1. In 2001 through 2006 model years, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 g/mi for PCs and LDTs from 0-3750 lbs. LVW or 0.100 g/mi for LDTs from 3751-5750 lbs. LVW calculated in accordance with section 1961(b)(1)(B). In 2007 and subsequent model years, a small volume manufacturer shall not exceed a fleet average NMOG value of 0.075 for PCs and LDTs from 0-3750 lbs. LVW or 0.075 for LDTs from 3751 lbs. LVW - 8500 lbs. GVW cal-

culated in accordance with section 1961(b)(1)(B).

2. If a manufacturer's average California sales exceed 4500 units of new PCs, LDTs, MDVs and heavy duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall no longer be treated as a small volume manufacturer and shall comply with the fleet average requirements applicable to larger manufacturers as specified in section 1961(b)(1) beginning with the fourth model year after the last of the three consecutive model years.

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

(D) Phase-in Requirements for Independent Low Volume Manufacturers. In 2001 through 2006 model years, an independent low volume manufacturer shall not exceed a fleet average NMOG value of 0.075 g/mi for PCs and LDTs from 0-3750 lbs. LVW or 0.100 g/mi for LDTs from 3751-5750 lbs. LVW calculated in accordance with section 1961(b)(1)(B). In 2007 and subsequent model years, an independent low volume manufacturer shall not exceed a fleet average NMOG value of 0.060 for PCs and LDTs from 0-3750 lbs. LVW or 0.065 g/mi for LDTs from 3751 lbs. LVW - 8500 lbs. GVW calculated in accordance with section 1961(b)(1)(B).

(E) Treatment of ZEVs. ZEVs classified as LDTs (>3750 lbs. LVW) that have been counted toward the ZEV requirement for PCs and LDTs (0-3750 lbs. LVW) as specified in section 1962 shall be included as LDT1s in the calculation of a fleet average NMOG value.

(2) LEV II Phase-In Requirement for PCs and LDTs. Beginning in the 2004 model year, a manufacturer, except a small volume manufacturer or an independent low volume manufacturer, shall certify a percentage of its PC and LDT fleet to the LEV II standards in section 1961(a) according to the following phase in schedule:

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

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

A manufacturer may use an alternative phase-in schedule to comply with these phase-in requirements as long as equivalent NO[x] emission reductions are achieved by the 2007 model year from each of the two categories -- PC/LDT1 and LDT2. Model year emission reductions shall be calculated by multiplying the percent of either PC/LDT1 or LDT2 vehicles meeting the LEV II standards in a given model year (based on a manufacturer's projected sales volume of vehicles in each category) by 4 for the 2004 model year, 3 for the 2005 model year, 2 for the 2006 model year and 1 for the 2007 model year. The yearly results for PCs/LDT1s shall be summed together to determine a separate cumulative total for PCs/LDT1s and the yearly results for LDT2s shall be summed together to determine a cumulative total for LDT2s. The cumulative total for each category must be equal to or exceed 500 to be considered equivalent. A manufacturer may add vehicles introduced before the 2004 model year (e.g., the percent of vehicles introduced in 2003 would be multiplied by 5) to the cumulative total.

(3) Medium-Duty Vehicle Phase-In Requirements.

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

	Vehicles Certified to § 1960.1(h)(1), (h)(2), and § 1961(a)(1) (%)		**Vehicles Certified to § 1956.8(g) or (h) (%)**		
	LEV	**ULEV**	**Tier 1**	**LEV**	**ULEV**
2001	80	20	100	0	0
2002	70	30	0	100	0
2003	60	40	0	100	0
2004 +	40	60	0	0	100

(B) Phase-In Requirements for LEV II MDVs. For the 2004 through 2006 model years, a manufacturer, other than a small

volume manufacturer must phase-in at least one test group per model year to the MDV LEV II standards. All 2007 and subsequent model year MDVs, including those produced by a small volume manufacturer, are subject to the LEV II MDV standards. Beginning in the 2005 model year, all medium-duty engines certified to the optional medium-duty engine standards in title 13, CCR §1956.8(c) or (h), including those produced by a small volume manufacturer, must meet the standards set forth in title 13, CCR §1956.8(c) or (h), as applicable. A manufacturer that elects to certify to the Option 1 or Option 2 federal standards as set forth in 40 CFR §86.005-10(f) is not subject to these phase-in requirements.

(C) Identifying a manufacturer's MDV Fleet. For the 2001 and subsequent model years, each manufacturer's MDV fleet shall be defined as the total number of California-certified MDVs produced and delivered for sale in California. The percentages shall be applied to the manufacturers' total production of California-certified medium-duty vehicles delivered for sale in California. For the 2005 and subsequent model years, a manufacturer that elects to the optional medium-duty engine standards in title 13, CCR, §1956.8(c) or (h) shall not count those engines in the manufacturer's total production of California-certified medium-duty vehicles for purposes of this subsection.

(D) Requirements for Small Volume Manufacturers. In 2001 through 2003 model years, a small volume manufacturer shall certify, produce, and deliver for sale in California vehicles or engines certified to the MDV Tier 1 standards in a quantity equivalent to 100% of its MDV fleet. In 2004 through 2006 model years, a small volume manufacturer shall certify, produce, and deliver for sale in California vehicles or engines certified to the MDV LEV I standard in a quantity equivalent to 100% of its MDV fleet. Engines certified to these MDV LEV I standards are not be eligible for emissions averaging.

(E) For a manufacturer that elects to certify to the optional medium-duty engine standards in title 13, CCR §1956.8(c) or (h), all such 2005 and subsequent model year MDVs, including those produced by a small volume manufacturer, shall be subject to the emissions averaging provisions applicable to heavy-duty diesel or Otto-cycle engines as set forth in the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," or the "California Exhaust Emissions Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines, incorporated by reference in §1956.8(b) or (d), as applicable.

(c) Calculation of NMOG Credits/Debits

(1) Calculation of NMOG Credits for Passenger Cars and Light-Duty Trucks. In 2001 and subsequent model years, a manufacturer that achieves fleet average NMOG values lower than the fleet average NMOG requirement for the corresponding model year shall receive credits in units of g/mi NMOG determined as:

[(Fleet Average NMOG Requirement) - (manufacturer's Fleet
Average NMOG Value)] x (Total No. of Vehicles Produced and
Delivered for Sale in California, Including ZEVs and HEVs).

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

(2) Calculation of Vehicle Equivalent NMOG Credits for Medium-Duty Vehicles.

(A) In 2001 and subsequent model years, a manufacturer that produces and delivers for sale in California MDVs in excess of the equivalent requirements for LEVs, ULEVs and/or SULEVs certified to the exhaust emission standards set forth in section 1961(a)(1) or to the exhaust emission standards set forth in Title 13, CCR, Section 1956.8(h) shall receive "Vehicle-Equivalent Credits" (or "VECs") calculated in accordance with the following equation, where the term "produced" means produced and delivered for sale in California:

[(No. of LEVs Produced excluding HEVs) +
(No. of LEV HEVs x HEV VEC factor for LEVs)] +
(1.20 x No. of LEVs certified to the 150,000 mile standards) -
(Equivalent No. of LEVs Required to be Produced) +
[(1.4) x (No. of ULEVs Produced excluding HEVs) +
(No. of ULEV HEVs x HEV VEC factor for ULEVs)] +
(1.50 x No. of ULEVs certified to the 150,000 mile standards) -
[(1.4) x (Equivalent No. of ULEVs Required to be Produced)] +
[(1.7) x (No. of SULEVs Produced excluding HEVs) +
(No. of SULEV HEVs x HEV VEC factor for SULEVs)] +
(1.75 x No. of SULEVs certified to the 150,000 mile standards) - [(1.7) x [(Equivalent No. of SULEVs Required to be

Produced)] +

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

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

[(1.6) x (No. of MDVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW excluding HEVs) +

(No. of HEVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW x HEV VEC factor for MDVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW)]+

[(1.65 x No. of MDVs certified to the 150,000 mile LEV I LEV standards for PCs and LDTs 0-3750 lbs.)] +

[(1.8) x (No. of MDVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW excluding HEVs) +

(No. of HEVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW x HEV VEC factor for MDVs meeting the LEV I ULEV standards for PCs and LDTs 0-3750 lbs. LVW)]+

[(1.85 x No. of MDVs certified to the 150,000 mile LEV I ULEV standards for PCs and LDTs 0-3750 lbs.)].

(B) MDV HEV VEC factor. The MDV HEV VEC factor is calculated as follows:

1 + [(LEV standard - ULEV standard) x (Zero-emission VMT Factor) [divided by] LEV standard] for LEVs;

1 + [(ULEV standard - SULEV standard) x (Zero-emission VMT Factor) [divided by] ULEV standard] for ULEVs;

1 + [(SULEV standard - ZEV standard) x (Zero-emission VMT Factor) [divided by] SULEV standard] for SULEVs;

where "Zero-emission VMT Factor" for an HEV is determined in accordance with section 1962.

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

1 + [(MDV SULEV standard - PC LEV I LEV standard) x (Zero-emission VMT Factor) [divided by] PC LEV I LEV standard] for MDVs meeting the LEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW;

1 + [(MDV SULEV standard - PC ULEV standard) x (Zero-emission VMT Factor) [divided by] PC LEV I ULEV standard] for MDVs meeting the ULEV I LEV standards for PCs and LDTs 0-3750 lbs. LVW.

(C) A manufacturer that fails to produce and deliver for sale in California the equivalent quantity of MDVs certified to LEV, ULEV and/or SULEV exhaust emission standards, shall receive "Vehicle-Equivalent Debits" (or "VEDs") equal to the amount of negative VECs determined by the equation in section 1961(c)(2)(A).

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

(3) Procedure for Offsetting Debits.

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

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

(d) Test Procedures. The certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as amended October 17, 2007, and the "California Non-Methane Organic Gas Test Procedures," as amended July 30, 2002, which are incorporated herein by reference. In the case of hybrid electric vehicles and on-board fuel-fired heaters, the certification requirements and test procedures for deter-

mining compliance with the emission, standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.

(e) Abbreviations. The following abbreviations are used in this section 1961:

"ALVW" means adjusted loaded vehicle weight.

"ASTM" means American Society of Testing and Materials.

"CO" means carbon monoxide.

"FTP" means Federal Test Procedure.

"g/mi" means grams per mile.

"GVW" means gross vehicle weight.

"GVWR" means gross vehicle weight rating.

"HEV" means hybrid-electric vehicle.

"LDT" means light-duty truck.

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

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

"LEV" means low-emission vehicle.

"LPG" means liquefied petroleum gas.

"LVW" means loaded vehicle weight.

"MDV" means medium-duty vehicle.

"mg/mi" means milligrams per mile.

"NMHC" means non-methane hydrocarbons.

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

"NO[x]" means oxides of nitrogen.

"PC" means passenger car.

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

"TLEV" means transitional low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

"VEC" means vehicle-equivalent credits.

"VED" means vehicle-equivalent debits.

"VMT" means vehicle miles traveled.

"ZEV" means zero-emission vehicle.

13 C.C.R. § 1961.1. Greenhouse Gas Exhaust Emission Standards and Test Procedures -- 2009 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles

(a) Greenhouse Gas Emission Requirements. The greenhouse gas emission levels from new 2009 and subsequent model year passenger cars, light-duty trucks, and medium-duty passenger vehicles shall not exceed the following requirements. Light-duty trucks from 3751 lbs. LVW -- 8500 lbs. GVW that are certified to the Option 1 LEV II NOx Standard in section 1961(a)(1) are exempt from these greenhouse gas emission requirements, however, passenger cars, light-duty trucks 0-3750 lbs. LVW, and medium-duty passenger vehicles are not eligible for this exemption.

(1) Fleet Average Greenhouse Gas Requirements for Passenger Cars, Light-Duty Trucks, and Medium-Duty Passenger Vehicles.

(A) The fleet average greenhouse gas exhaust mass emission values from passenger cars, light-duty trucks, and medium-duty passenger vehicles that are produced and delivered for sale in California each model year by a large volume manufacturer shall not exceed:

FLEET AVERAGE GREENHOUSE GAS EXHAUST MASS EMISSION REQUIREMENTS FOR PASSENGER CAR, LIGHT-DUTY TRUCK, AND MEDIUM-DUTY PASSENGER VEHICLE WEIGHT CLASSES n1

(4,000 mile Durability Vehicle Basis)

Fleet Average Greenhouse Gas Emissions
(grams per mile CO[2]-equivalent)

Model Year	**All PCs; LDTs 0-3750 lbs. LVW**	**LDTs 3751 lbs. LVW -- 8500 lbs. GVW; MDPVs**
2009	323	439
2010	301	420
2011	267	390
2012	233	361
2013	227	355
2014	222	350
2015	213	341
2016+	205	332

n1 Each manufacturer shall demonstrate compliance with these values in accordance with section 1961.l(a)(1)(B).

(B) Calculation of Fleet Average Greenhouse Gas Value.

1. Basic Calculation.

a. Each manufacturer shall calculate both a "city" grams per mile average CO[2]-equivalent value for each GHG vehicle test group and a "highway" grams per mile average CO[2]-equivalent value for each GHG vehicle test group, including vehicles certified in accordance with section 1960.5 and vehicles certified in accordance with section 1961(a)(14), using the following formula. Greenhouse Gas emissions used for the "city" CO[2]-equivalent value calculation shall be measured using the "FTP" test cycle (40 CFR, Part 86, Subpart B). Greenhouse Gas emissions used for the "highway" CO[2]-equivalent value calculation shall be based on emissions measured using the Highway Test Procedures.

CO[2]-Equivalent Value = CO[2] + 296 x N20 + 23 x CH4 - A/C Direct Emissions Allowance - A/C Indirect Emissions Allowance

A manufacturer may use N[2]O = 0.006 grams per mile in lieu of measuring N[2]O exhaust emissions.

b. A/C Direct Emissions Allowance. A manufacturer may use the following A/C Direct Emission Allowances, upon approval of the Executive Officer, if that manufacturer demonstrates that the following requirements are met. Such demonstration shall include specifications of the components used and an engineering evaluation that verifies the estimated lifetime emissions from the components and the system. A manufacturer shall also provide confirmation that the number of fittings and joints has been minimized and components have been optimized to minimize leakage. No A/C Direct Emissions Allowance is permitted if the following requirements are not met.

i. A "low-leak air conditioning system" shall be defined as one that meets all of the following criteria:

A. All pipe and hose connections are equipped with multiple o-rings, seal washers, or metal gaskets only (e.g., no single o-rings);

B. All hoses in contact with the refrigerant must be ultra-low permeability barrier or veneer hose on both the high-pressure and the low-pressure sides of the system (e.g., no rubber hoses); and

C. Only multiple-lip compressor shaft seals shall be used (with either compressor body o-rings or gaskets).

ii. For an air conditioning system that uses HFC-134a as the refrigerant:

A. An A/C Direct Emissions Allowance of 3.0 CO[2]-equivalent grams per mile shall apply if the system meets the criteria for a "low-leak air conditioning system."

B. An A/C Direct Emissions Allowance of 3.0 CO[2]-equivalent grams per mile shall apply if the manufacturer demonstrates alternative technology that achieves equal or lower direct emissions than a "low-leak air conditioning system."

C. An A/C Direct Emissions Allowance greater than 3.0 CO[2]- equivalent grams per mile may apply for an air conditioning system that reduces refrigerant leakage further than would be obtained from a "low-leak air conditioning system." A maximum A/C Direct Emissions Allowance of 6.0 CO[2]-equivalent grams per mile may be earned for an air conditioning system that has 100 percent containment of refrigerant during "normal operation." To obtain an A/C Direct Emissions Allowance greater than 3.0 CO[2]-equivalent grams per mile, the manufacturer must provide an engineering evaluation that supports the allowance requested.

iii. For an air conditioning system that uses HFC-152a, CO[2] refrigerant, or any refrigerant with a GWP of 150 or less: An A/C Direct Emissions Allowance shall be calculated using the following formula:

A/C Direct Emissions Allowance = A - (B x C)

where: A = 9 CO[2]-equivalent grams per mile (the lifetime vehicle emissions expected from an air conditioning system that uses refrigerant HFC-134a);

B = 9CO[2] – equivalent g/mi × GWP / 1300

where: B is the lifetime vehicle emissions expected from an air conditioning system that uses a refrigerant with a GWP of 150 or less, and

"GWP" means the GWP of this refrigerant; and

C = 1, except for an air conditioning system that meets the criteria of a "low-leak air conditioning system."

For an air conditioning system that meets or exceeds the criteria of a "low-leak air conditioning system," the following formula shall apply:

C =1 - (0.12 x credit)

where: "credit" equals 3.0 CO[2]-equivalent grams per mile for a "low-leak air conditioning system" that meets the criteria of section 1961.1(a)(1)(B)1.b.i., or

"credit" equals a value greater than 3.0 CO[2]-equivalent grams per mile for an air conditioning system that reduces refrigerant leakage further than would be obtained from a "low-leak air conditioning system." A maximum credit of 6.0 CO[2]-equivalent grams per mile may be earned for an air conditioning system that has 100 percent containment of refrigerant during normal operation. To obtain a credit greater than 3.0 CO[2]-equivalent grams per mile, the manufacturer must provide an engineering evaluation that supports the credit requested.

c. A/C Indirect Emissions Allowance. A manufacturer may use the following A/C Indirect Emissions Allowances, upon approval of the Executive Officer, if the manufacturer demonstrates using data or an engineering evaluation that the air conditioning system meets the following requirements. A manufacturer may use the following A/C Indirect Emissions Allowances for other technologies, upon approval of the Executive Officer, if that manufacturer demonstrates that the air conditioning system achieves equal or greater CO[2]-equivalent grams per mile emissions reductions.

i. An "A/C system with reduced indirect emissions" shall be defined as one that meets; all of the following criteria:

A. Has managed outside and recirculated air balance to achieve comfort, demisting, and safety requirements, based on such factors as temperature, humidity, pressure, and level of fresh air in the passenger compartment to minimize compressor usage;

B. Is optimized for energy efficiency by utilizing state-of-the-art high efficiency evaporators, condensors, and other components; and

C. Has an externally controlled compressor (such as an externally controlled variable displacement or variable speed compressor or an externally controlled fully cycling fixed displacement compressor) that adjusts evaporative temperature to minimize the necessity of reheating cold air to satisfy occupant comfort.

ii. For an A/C system that meets all of the criteria for an "A/C system with reduced indirect emissions," the allowance shall be calculated using the following emission factors, up to a maximum allowance of 9.0 CO[2]-equivalent grams per mile if the system has one evaporator and up to a maximum allowance of 11.0 CO[2]-equivalent grams per mile if the system has two evaporators:

A. 5.0 CO[2]-equivalent grams per mile per 100 cc of maximum compressor displacement for a system that does not use CO[2] as the refrigerant

B. 27.5 CO[2]-equivalent grams per mile per 100 cc of maximum compressor displacement for a system that uses CO[2] as the refrigerant

iii. For an air conditioning system equipped with a refrigerant having a GWP of 150 or less, the allowance shall be calculated using the following emission factors, up to a maximum allowance of 0.5 CO[2]-equivalent grams per mile:

A. 0.2 CO[2]-equivalent grams per mile per 100cc of maximum compressor displacement for a system that does not use CO[2] as the refrigerant and

B. 1.1 CO[2]-equivalent grams per mile per 100cc of maximum compressor displacement for a system that uses CO[2] as the refrigerant.

d. Upstream Greenhouse Gas Emission Adjustment Factors for Alternative Fuel Vehicles. A grams per mile average CO[2]-equivalent value for each GHG vehicle test group certifying on a fuel other than conventional gasoline, including vehicles certified in accordance with section 1960.5 and vehicles certified in accordance with section 1961(a)(14), shall be calculated as follows:

(CO[2] + A/C Indirect Emissions) x (Fuel Adjustment Factor) +

296 x N[2]O + 23 x CH[4] + A/C Direct Emissions

where:

A/C Indirect Emissions = A - B

where: "A" represents the indirect emissions associated with an A/C system that does not incorporate any of the A/C improvements described in section 1961.1(a)(1)(B)1.c. A is determined by the following emission factors, with a maximum value of 17.0 CO[2]-equivalent grams per mile for a system that has one evaporator and a maximum value of 21.0 CO[2]-equivalent grams per mile for a system that has two evaporators.

A = 9.6 CO[2]-equivalent grams per mile per 100cc of maximum compressor displacement for an A/C system that does not use CO[2] as the refrigerant or

A = 52.8 CO[2]-equivalent grams per mile per 100cc of maximum compressor displacement for an A/C system that uses CO[2] as the refrigerant.

B = A/C Indirect Emissions Allowance as calculated per section 1961.1(a)(1)(B)1.c.

A/C Direct Emissions = 9 CO[2]-equivalent grams per mile -- A/C Direct Emissions Allowance as calculated per section 1961. 1(a)(1)(B)1.b.

The Fuel Adjustment Factors are:

Fuel	Fuel Adjustment Factor
Natural Gas	1.03
LPG	0.89
E85	0.74

e. Calculation of CO[2]-Equivalent Emissions for Hydrogen Internal Combustion Engine Vehicles and for Electric and Hydrogen ZEVs. The grams per mile average CO[2]-equivalent value for each GHG vehicle test group certifying to ZEV standards, including vehicles certified in accordance with section 1960.5 and vehicles certified in accordance with section 1961(a)(14), shall be:

A/C Direct Emissions + Upstream Emissions Factor

where: A/C Direct Emissions = 9 CO[2]-equivalent grams per mile -- A/C Direct Emissions Allowance as calculated per section 1961.1(a)(1)(B)1.b.

The Upstream Emissions Factors are:

Vehicle Type	Upstream Emissions Factor n1 (CO[2]-equivalent g/mi)
Electric ZEV	130
Hydrogen Internal Combustion Engine Vehicle	290
Hydrogen ZEV	210

n1 The Executive Officer may approve use of a lower upstream emissions factor if a manufacturer demonstrates the appropriateness of the lower value by providing information that includes, but is not limited to, the percentage of hydrogen fuel or the percentage of electricity produced for sale in California using a "renewable energy resource."

2. Calculation of Greenhouse Gas Values for Bi-Fuel Vehicles, Fuel-Flexible Vehicles, Dual-Fuel Vehicles, and Grid-connected Hybrid Electric Vehicles. For bi-fuel, fuel-flexible, dual-fuel, and grid-connected hybrid, electric vehicles, a manufacturer shall calculate a grams per mile average CO[2]-equivalent value for each GHG vehicle test group, in accordance with section 1961.1(a)(1)(B)1., based on exhaust mass emission tests when the vehicle is operating on gasoline.

a. Optional Alternative Compliance Mechanisms. Beginning with the 2010 model year, a manufacturer that demonstrates that a bi-fuel, fuel-flexible, dual-fuel, or grid-connected hybrid electric GHG vehicle test group will be operated in use in California on the alternative fuel shall be eligible to certify those vehicles using this optional alternative compliance procedure, upon approval of the Executive Officer.

i. To demonstrate that bi-fuel, fuel-flexible, dual-fuel, or grid-connected hybrid electric vehicles within a GHG vehicle test group will be operated in use in California on the alternative fuel, the manufacturer shall provide data that shows the previous model year sales of such vehicles to fleets that provide the alternative fuel on-site or, for grid-connected hybrid electric vehicles, to end users with the capability to recharge the vehicle on-site. This data shall include both the total number of vehicles sales that were made to such fleets or end users with the capability to recharge the vehicle on-site and as the percentage of total GHG vehicle test group sales. The manufacturer shall also provide data demonstrating the percentage of total vehicle

miles traveled by the bi-fuel, fuel-flexible, dual-fuel, or grid-connected hybrid electric vehicles sold to each fleet or to end users with the capability to recharge the vehicle on-site in the previous model year using the alternative fuel and using gasoline.

ii. For each GHG vehicle test group that receives approval by the Executive Officer under section 1961.1(a)(1)(B)2.a.i., a grams per mile CO[2]-equivalent value shall be calculated as follows:

CO[2]-equivalent value = [A x E x B x C] + [(1 - (A x E x B)) x D]

where: A = the percentage of previous model year vehicles within a GHG vehicle test group that were operated in use in California on the alternative fuel during the previous calendar year;

B = the percentage of miles traveled by "A" during the previous calendar year;

C = the CO[2]-equivalent value for the GHG vehicle test group, as calculated in section 1961.1(a)(1)(B)1, when tested using the alternative fuel;

D = the CO[2]-equivalent value for the GHG vehicle test group, as calculated in section 1961.1(a)(1)(B)1, when tested using gasoline; and

E = 0.9 for grid-connected hybrid electric vehicles or

E = 1 for bi-fuel, fuel-flexible, and dual-fuel vehicles.

The Executive Officer may approve use of a higher value for "E" for a grid-connected hybrid electric vehicle GHG vehicle test group if a manufacturer demonstrates that the vehicles can reasonably be expected to maintain more than 90 percent of their original battery capacity over a 200,000 mile vehicle lifetime. The manufacturer may demonstrate the appropriateness of a higher value either by providing data from real world vehicle operation; or by showing that these vehicles are equipped with batteries that do not lose energy storage capacity until after 100,000 miles; or by offering 10 year/150,000 mile warranties on the batteries.

iii. For the first model year in which a grid-connected hybrid electric vehicle model is certified for sale in California, the manufacturer may estimate the sales and percentage of total vehicle miles traveled information requested in section 1961.1(a)(1)(B)2.a.i. in lieu of providing actual data, and provide final sales data and data demonstrating the percentage of total vehicle miles traveled using electricity by no later than March 1 of the calendar year following the close of the model year.

3. Calculation of Fleet Average Greenhouse Gas Values.

a. Each manufacturer's PC and LDT1 fleet average Greenhouse Gas value for the total number of PCs and LDT1s produced and delivered for sale in California, including vehicles certified in accordance with section 1960.5 and vehicles certified in accordance with section 1961(a)(14), shall be calculated as follows:

[0.55 x ([SIGMA] City Test Group Greenhouse Gas Values) + 0.45 x ([SIGMA] Highway Test Group Greenhouse Gas Values)] [divided by] Total Number of PCs and LDT1s Produced, Including ZEVs and HEVs

where: City Test Group Greenhouse Gas Value = [(Total Number of Vehicles in a Test Group -- [SIGMA] Number of Vehicles in Optional GHG Test Vehicle Configurations) x "worst-case" calculated CO[2]-equivalent value + [SIGMA] (Number of vehicles in Optional GHG Test Vehicle Configurations x applicable calculated CO[2]-equivalent value)] measured using the FTP test cycle; and

Highway Test Group Greenhouse Gas Value = [(Total Number of Vehicles in a Test Group -- [SIGMA] (Number of Vehicles in Optional GHG Test Vehicle Configurations) x "worst-case" calculated CO[2]-equivalent value + [SIGMA] (Number of vehicles in Optional GHG Test Vehicle Configurations x applicable calculated CO[2]-equivalent value)] measured using the Highway Test Procedures.

b. Each manufacturer's LDT2 and MDPV fleet average Greenhouse Gas value for the total number of LDT2s and MDPVs produced and delivered for sale in California, including vehicles certified in accordance with section 1960.5 and vehicles certified in accordance with section 1961(a)(14), shall be calculated as follows:

[0.55 x ([SIGMA] City Test Group Greenhouse Gas Values) + 0.45 x ([SIGMA] Highway Test Group Greenhouse Gas Values)] [divided by] Total Number of LDT2s and MDPVs Produced, Including ZEVs and HEVs

where: City Test Group Greenhouse Gas Value = [(Total Number of Vehicles in a Test Group -- [SIGMA] Number of Vehicles in Optional GHG Test Vehicle Configurations) x "worst-case" calculated CO[2]-equivalent value + [SIGMA] (Number of vehicles in Optional GHG Test Vehicle Configurations x applicable calculated CO[2]-equivalent value)] measured using the FTP test cycle; and

Highway Test Group Greenhouse Gas Value = [(Total Number of Vehicles in a Test Group - [SIGMA] Number of Vehicles in Optional GHG Test Vehicle Configurations) x "worst-case" calculated CO[2]-equivalent value + [SIGMA] (Number of vehicles in Optional GHG Test Vehicle Configurations x applicable calculated CO[2]-equivalent value)] measured using the Highway Test Procedures.

(C) Requirements for Intermediate Volume Manufacturers.

1. Before the 2016 model year, compliance with this section 1961.1 shall be waived for intermediate volume manufacturers.

2. For each intermediate volume manufacturer, the manufacturer's baseline fleet average greenhouse gas value for PCs and LDT1s and baseline fleet average greenhouse gas value for LDT2s and MDPVs shall be calculated, in accordance with section 1961.1(a)(1)(B) using its 2002 model year fleet.

3. In 2016 and subsequent model years, an intermediate volume manufacturer shall either:

a. not exceed a fleet average greenhouse gas emissions value of 233 g/mi for PCs and LDT1s and 361 g/mi for LDT2s and MDPVs, or

b. not exceed a fleet average greenhouse gas value of 0.75 times the baseline fleet average greenhouse gas value for PCs and LDT1s and 0.82 times the baseline fleet average greenhouse gas value for LDT2s and MDPVs, as calculated in section 1961.1(a)(1)(C)2.

4. If a manufacturer's average annual California sales exceed 60,000 units of new PCs, LDTs, MDVs and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall no longer be treated as a intermediate volume manufacturer and shall comply with the fleet average requirements applicable to large volume manufacturers as specified in section 1961.1(a)(1) beginning with the fourth model year after the last of the three consecutive model years.

5. If a manufacturer's average annual California sales fall below 60,001 units of new PCs, LDTs, MDVs and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall be treated as a intermediate volume manufacturer and shall be subject to the requirements for intermediate volume manufacturers beginning with the next model year.

(D) Requirements for Small Volume Manufacturers and Independent Low Volume Manufacturers.

1. Before the 2016 model year, compliance with this section 1961.1 shall be waived for small volume manufacturers and independent low volume manufacturers.

2. At the beginning of the 2013 model year, each small volume manufacturer and independent low volume manufacturer shall identify all 2012 model year vehicle models, certified by a large volume manufacturer that are comparable to that small volume manufacturer or independent low volume manufacturer's 2016 model year vehicle models, based on horsepower and horsepower to weight ratio. The small volume manufacturer and independent low volume manufacturer shall demonstrate to the Executive Officer the appropriateness of each comparable vehicle model selected. Upon approval of the Executive Officer, s/he shall provide to the small volume manufacturer and to the independent low volume manufacturer the CO[2]-equivalent value for each 2012 model year vehicle model that is approved. The small volume manufacturer and independent low volume manufacturer shall calculate an average greenhouse gas emissions value for each of its greenhouse gas vehicle test groups based on the CO[2]-equivalent values provided by the Executive Officer.

3. In the 2016 and subsequent model years, a small volume manufacturer and an independent low volume manufacturer shall either:

a. not exceed the fleet average greenhouse gas emissions value calculated for each GHG vehicle test group for which a comparable vehicle is sold by a large volume manufacturer, in accordance with section 1961.1(a)(1)(D)2; or

b. not exceed a fleet average greenhouse gas emissions value of 233 g/mi for PCs and LDT1s and 361 g/mi for LDT2s and MDPVs; or

c. upon approval of the Executive Officer, if a small volume manufacturer demonstrates a vehicle model uses an engine, transmission, and emission control system that is identical to a configuration certified for sale in California by a large volume manufacturer, those small volume manufacturer vehicle models are exempt from meeting the requirements in paragraphs 3.a. and b. of this section.

4. If a manufacturer's average annual California sales exceed 4,500 units of new PCs, LDTs, MDVs and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall no longer be treated as a small volume manufacturer and shall comply with the fleet average requirements applicable to larger volume manufacturers as specified in section 1961.1(a)(1) beginning with the fourth model year after the last of the three consecutive model years.

5. If a manufacturer's average annual California sales exceed 10,000 units of new PCs, LDTs, MDVs and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall no longer be treated as an independent low volume manufacturer and shall comply with the fleet average requirements applicable to larger volume manufacturers as specified in section 1961.1(a)(1) beginning with the fourth model year after the last of the three consecutive model years.

6. If a manufacturer's average annual California sales fall below 4,501 units of new PCs, LDTs, MDVs and heavy-duty engines based on the average number of vehicles sold for the three previous consecutive model years, the manufacturer shall be treated as a small volume manufacturer and shall be subject to the requirements for small volume manufacturers beginning

with the next model year.

(b) Calculation of Greenhouse Gas Credits/Debits.

(1) Calculation of Greenhouse Gas Credits for Passenger Cars, Light-Duty Trucks, and Medium-Duty Passenger Vehicles.

(A) In the 2000 through 2008 model years, a manufacturer that achieves fleet average Greenhouse Gas values lower than the fleet average Greenhouse Gas requirement applicable to the 2012 model year shall receive credits for each model year in units of g/mi determined as:

[(Fleet Average Greenhouse Gas Requirement for the 2012 model year) -- (manufacturer's Fleet Average Greenhouse Gas Value)] x (Total No. of Vehicles Produced and Delivered for Sale in California, Including ZEVs and HEVs).

(B) In 2009 and subsequent model years, a manufacturer that achieves fleet average Greenhouse Gas values lower than the fleet average Greenhouse Gas requirement for the corresponding model year shall receive credits in units of g/mi Greenhouse Gas determined as:

[(Fleet Average Greenhouse Gas Requirement) -- (manufacturer's Fleet Average Greenhouse Gas Value)] x (Total No. of Vehicles Produced and Delivered for Sale in California, Including ZEVs and HEVs).

(2) A manufacturer with 2009 and subsequent model year fleet average Greenhouse Gas values greater than the fleet average requirement for the corresponding model year shall receive debits in units of g/mi Greenhouse Gas equal to the amount of negative credits determined by the aforementioned equation. For the 2009 and subsequent model years, the total g/mi Greenhouse Gas credits or debits earned for PCs and LDT1s and for LDT2s and MDPVs shall be summed together. The resulting amount shall constitute the g/mi Greenhouse Gas credits or debits accrued by the manufacturer for the model year.

(3) Procedure for Offsetting Greenhouse Gas Debits.

(A) A manufacturer shall equalize Greenhouse Gas emission debits by earning g/mi Greenhouse Gas emission credits in an amount equal to the g/mi Greenhouse Gas debits, or by submitting a commensurate amount of g/mi Greenhouse Gas credits to the Executive Officer that were earned previously or acquired from another manufacturer. A manufacturer shall equalize Greenhouse Gas debits for PCs, LDTs, and MDPVs within five model years after they are earned. If emission debits are not equalized within the specified time period, the manufacturer shall be subject to the Health and Safety Code section 43211 civil penalty applicable to a manufacturer which sells a new motor vehicle that does not meet the applicable emission standards adopted by the state board. The cause of action shall be deemed to accrue when the emission debits are not equalized by the end of the specified time period. For the purposes of Health and Safety Code section 43211, the number of passenger cars and LDT1s not meeting the state board's emission standards shall be determined by dividing the total amount of g/mi Greenhouse Gas emission debits for the model year by the g/mi Greenhouse Gas fleet average requirement for PCs and LDTs 0-3750 lbs. LVW applicable for the model year in which the debits were first incurred. For the purposes of Health and Safety Code section 43211, the number of LDT2s and MDPVs not meeting the state board's emission standards shall be determined by dividing the total amount of g/mi Greenhouse Gas emission debits for the model year by the g/mi Greenhouse Gas fleet average requirement for LDTs 3751 lbs. LVW -- 8500 lbs. GVW and MDPVs applicable for the model year in which the debits were first incurred.

(B) Greenhouse Gas emission credits earned in the 2000 through 2008 model years shall be treated as if they were earned in the 2011 model year and shall retain full value through the 2012 model year. Greenhouse Gas emission credits earned in the 2009 and subsequent model years shall retain full value through the fifth model year after they are earned. The value of any credits earned in the 2000 through 2008 model years that are not used to equalize debits accrued in the 2009 through 2012 model years shall be discounted by 50% at the beginning of the 2013 model year, shall be discounted to 25% of its original value if not used by the beginning of the 2014 model year, and will have no value if not used by the beginning of the 2015 model year. Any credits earned in the 2009 and subsequent model years that are not used by the end of the fifth model year after they are accrued shall be discounted by 50% at the beginning of the sixth model year after being earned, shall be discounted to 25% of its original value if not used by the beginning of the seventh model year after being earned, and will have no value if not used by the beginning of the eighth model year after being earned.

(c) Test Procedures. The certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in section 1961(d). In the case of hybrid electric vehicles and on-board fuel-fired heaters, the certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962.

(d) Abbreviations. The following abbreviations are used in this section 1961.1:

"cc" mean cubic centimeters.

"CH[4]" means methane.

"CO[2]" means carbon dioxide.

"E85" means a blend of 85 percent ethanol and 15 percent gasoline.

"FTP" means Federal Test Procedure.

"GHG" means greenhouse gas.

"g/mi" means grams per mile.

"GVW" means gross vehicle weight.

"GVWR" means gross vehicle weight rating.

"GWP" means the global warming potential.

"HEV" means hybrid-electric vehicle.

"LDT" means light-duty truck.

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

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

"LEV" means low-emission vehicle.

"LPG" means liquefied petroleum gas.

"LVW" means loaded vehicle weight.

"MDPV" means medium-duty passenger vehicle.

"MDV" means medium-duty vehicle.

"mg/mi" means milligrams per mile.

"N[2]O" means nitrous oxide.

"PC" means passenger car.

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

"ULEV" means ultra-low-emission vehicle.

"ZEV" means zero-emission vehicle.

(e) Definitions Specific to this Section. The following definitions apply to this section 1961.1:

(1) "A/C Direct Emissions" means any refrigerant released from a motor vehicle's air conditioning system.

(2) "A/C Indirect Emissions" means any increase in motor vehicle exhaust CO[2] emissions that can be attributed to the operation of the air conditioning system.

(3) "GHG Vehicle Test Group" means vehicles that have an identical test group, vehicle make and model, transmission class and driveline, aspiration method (e.g., naturally aspirated, turbocharged), camshaft configuration, valve train configuration, and inertia weight class.

(4) "Greenhouse Gas" means the following gases: carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons.

(5) "Grid-Connected Hybrid Electric Vehicle" means a hybrid electric vehicle that has the capacity for the battery to be recharged from an off-board source of electricity and has some all-electric range.

(6) "GWP" means the 100-year global warming potential specified in IPCC (Intergovernmental Panel on Climate Change) 2000: Emissions Scenarios. N. Nakicenovic et. al. editors, Special Report of Working Group III of the IPCC, Cambridge University Press, Cambridge UK, ISBN 0-521-80493-0.

(7) "Normal Operation" of an air conditioning system means typical everyday use of the A/C system to cool a vehicle. "Normal Operation" does not include car accidents, dismantling of an air conditioning system, or any other non-typical events.

(8) "Optional GHG Test Vehicle Configuration" means any GHG vehicle configuration that is selected for testing by the manufacturer as allowed by section G.2.3 of the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," other than the worst-case configuration.

(9) "Renewable Energy Resource" means a facility that meets all of the criteria set forth in Public Resources Code section 25741(a), except that the facility is not required to be located in California or near the border of California.

(10) "Variable Displacement Compressor" means a compressor in which the mass flow rate of refrigerant is adjusted independently of compressor speed by the control system in response to cooling load demand.

(11) "Variable Speed Compressor" means a compressor in which the mass flow rate of refrigerant can be adjusted by control of the compressor input shaft speed, independent of vehicle engine speed. For example, a variable speed compressor can have electric drive, hydraulic drive, or mechanical drive through a variable speed transmission.

(12) "Worst-Case" means the vehicle configuration within each test group that is expected to have the highest CO[2]-

equivalent value, as calculated in section 1961.1(a)(1)(B)1.

(f) Severability. Each provision of this section is severable, and in the event that any provision of this section is held to be invalid, the remainder of this article remains in full force and effect.

(g) Effective Date of this Section. The requirements of this section 1961.1 shall become effective on January 1, 2006.

13 C.C.R. § 1962. Zero-Emission Vehicle Standards for 2005 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles

(a) ZEV Emission Standard. The Executive Officer shall certify new 2005 and subsequent model passenger cars, light-duty trucks and medium-duty vehicles as ZEVs if the vehicles produce zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions. Incorporation of a fuel-fired heater shall not preclude a vehicle from being certified as a ZEV provided: (1) the fuel-fired heater cannot be operated at ambient temperatures above 40oF, (2) the heater is demonstrated to have zero fuel evaporative emissions under any and all possible operational modes and conditions, and (3) the emissions of any pollutant from the fuel-fired heater when operated at an ambient temperature between 68oF and 86oF do not exceed the emission standard for that pollutant for a ULEV under section 1961(a)(1).

A vehicle that would meet the emissions standards for a ZEV except that it uses a fuel-fired heater that can be operated at ambient temperatures above 40oF, that cannot be demonstrated to have zero fuel evaporative emissions under any and all possible operation modes and conditions, or that has emissions of any pollutant exceeding the emission standard for that pollutant for a ULEV under section 1961(a)(1), shall be certified based on the emission level of the fuel-fired heater.

(b) Percentage ZEV Requirements.

(1) General Percentage ZEV Requirement.

(A) Basic Requirement. The minimum percentage ZEV requirement for each manufacturer is listed in the table below as the percentage of the PCs and LDT1s, and LDT2s to the extent required by section (b)(1)(C), produced by the manufacturer and delivered for sale in California that must be ZEVs, subject to the conditions in this section 1962(b).

Model Years	Minimum ZEV Requirement
2005 through 2008	10 percent
2009 through 2011	11 percent
2012 through 2014	12 percent
2015 through 2017	14 percent
2018 and subsequent	16 percent

(B) Calculating the Number of Vehicles to Which the Percentage ZEV Requirement is Applied. A manufacturer's volume of PCs and LDT1s produced and delivered for sale in California will be averaged for the 1997, 1998, and 1999 model years to determine the California PC and LDT1 production volume for the model year 2005 ZEV requirements. For subsequent three-year periods following model year 2005, a manufacturer's California production volume of PCs and LDT1s, and LDT2s as applicable, will be based on a three-year average of the manufacturer's volume of PCs and LDT1s, and LDT2s as applicable, produced and delivered for sale in California in the prior fourth, fifth and sixth years (e.g. 2006 to 2008 model-year ZEV requirements will be based on California production volumes of PCs and LDT1s, and LDT2s as applicable, for 2000 to 2002 model years). This production averaging is used to determine ZEV requirements only, and has no effect on a manufacturer's size determination. As an alternative to the three year averaging of prior year production described above, a manufacturer may during model year 2005 or the first model year of a subsequent three year period elect to base its ZEV obligation on the number of PCs and LDT1s, and LDT2s to the extent required by section (b)(1)(C), produced by the manufacturer and delivered for sale in California that same year. If a manufacturer elects to use this method after model year 2005 it must be used for each year of the three-year period. In applying the ZEV requirement, a PC, LDT1, or LDT2 (beginning in the 2007 model year) that is produced by a small volume manufacturer, but is marketed in California by another manufacturer under the other manufacturer's nameplate, shall be treated as having been produced by the marketing manufacturer.

(C) Phase-in of ZEV Requirements for LDT2s. Beginning with the ZEV requirements for the 2007 model year, a manufacturer's LDT2 production shall be included in determining the manufacturer's overall ZEV requirement under section (b)(1)(A) in the increasing percentages shown the table below.

2007	2008	2009	2010	2011	2012+
17%	34%	51%	68%	85%	100%

(D) Exclusion of ZEVs in Determining a manufacturer's Sales Volume. In calculating for purposes of sections 1962(b)(1)(B) and 1962(b)(1)(C) the volume of PCs, LDT1s and LDT2s a manufacturer has produced and delivered for sale in California, the manufacturer shall exclude the number of ZEVs produced by the manufacturer, or by a subsidiary in which the

manufacturer has a greater than 50% ownership interest, and delivered for sale in California.

(2) Requirements for Large Volume Manufacturers.

(A) Primary Requirements for Large Volume Manufacturers. In the 2005 through 2008 model years, a large-volume manufacturer must meet at least 20% of its ZEV requirement with ZEVs or ZEV credits generated by such vehicles, and at least another 20% with ZEVs, advanced technology PZEVs, or credits generated by such vehicles. The remainder of the large-volume manufacturer's ZEV requirement may be met using PZEVs or credits generated by such vehicles. As the ZEV requirement increases over time from 10% in model year 2005 to 16% in model years 2018 and subsequent, the maximum portion of a large volume manufacturer's percentage ZEV requirement that may be satisfied by PZEVs that are not advanced technology PZEVs, or credits generated by such vehicles, is limited to 6% of the manufacturer's applicable California PC, LDT1, and LDT2 production volume; advanced technology PZEVs or credits generated by such vehicles may be used to meet up to one-half of the manufacturer's remaining ZEV requirement.

(B) Alternative Requirements for Large Volume Manufacturers.

1. Minimum Floor for Production of Type III ZEVs.

a. Requirement For the 2005-2008 Model Years. A large volume manufacturer electing to be subject to the alternative compliance requirements during model years 2005 through 2008 must produce, deliver for sale, and place in service in California enough 2001-2008 model-year Type III ZEVs to generate ZEV credits sufficient to meet a cumulative percentage ZEV requirement of 1.09 percent of the manufacturer's average annual California sales of PCs and LDT1s over the five year period from model years 1997 through 2001, or submit an equivalent number of credits generated by such vehicles. The manufacturer may meet up to one half of this requirement with [i] 2004-2008 model-year Type I or Type II ZEVs, provided that 20 Type I ZEVs or 10 Type II ZEVs will equal one Type III ZEV, and [ii] 1997-2003 model-year Type I or Type II ZEVs that qualify for an extended service multiplier under section 1962(f) for a year primarily during calendar years 2004-2008, provided that 33 years of such a multiplier will equal one Type III ZEV.

b. Requirement For the 2009-2011 Model Years. A large volume manufacturer electing to be subject to the alternative compliance requirements during model years 2009 through 2011 must produce, deliver for sale, and place in service in California enough 2009-2011 model-year Type III ZEVs to generate ZEV credits sufficient to meet the 2009-2011 alternative path percentage, as calculated pursuant to section 1962(b)(2)(B)1.e., of the manufacturer's section 1962(b)(1) percentage ZEV requirement for the 2010 model year, based on the prior year method described in section 1962(b)(1)(B), or submit an equivalent number of credits generated by such vehicles. The manufacturer may meet up to one half of this requirement with [i] 2009-2011 model-year Type I or Type II ZEVs, provided that 20 Type I ZEVs or 10 Type II ZEVs will equal one Type III ZEV, and [ii] 1997-2003 model-year ZEVs that qualify for an extended service multiplier under section 1962(f) for a year primarily during calendar years 2009-2011, provided that 33 years of such a multiplier will equal one Type III ZEV.

c. Requirement For the 2012-2014 Model Years. A large volume manufacturer electing to be subject to the alternative compliance requirements during model years 2012 through 2014 must produce, deliver for sale, and place in service in California enough 2012-2014 model-year Type III ZEVs to generate ZEV credits sufficient to meet the 2012-2014 alternative path percentage, as calculated pursuant to section 1962(b)(2)(B)1.e., of the manufacturer's section 1962(b)(1) percentage ZEV requirement for the 2013 model year, based on the prior year method described in section 1962(b)(1)(B), or submit an equivalent number of credits generated by such vehicles. The manufacturer may meet up to one half of this requirement with 2012-2014 model-year Type I or Type II ZEVs, provided that 10 Type I ZEVs or 5 Type II ZEVs will equal one Type III ZEV.

d. Requirement For the 2015-2017 Model Years. A large volume manufacturer electing to be subject to the alternative compliance requirements during model years 2015 through 2017 must produce, deliver for sale, and place in service in California enough 2015-2017 model-year Type III ZEVs to generate ZEV credits sufficient to meet the 2015-2017 alternative path percentage, as calculated in section 1962(b)(2)(B)1.e., of the manufacturer's section 1962(b)(1) percentage ZEV requirement for the 2016 model year, based on the prior year method described in section 1962(b)(1)(B), or submit an equivalent number of credits generated by such vehicles. The manufacturer may meet up to one half of this requirement with 2015-2017 model-year Type I or Type II ZEVs, provided that 10 Type I ZEVs or 5 Type II ZEVs will equal one Type III ZEV.

e. Calculation of a manufacturer's Alternative Path Percentage. A manufacturer's alternative path percentage for a given time period is calculated as the target number of credits for each time period divided by the applicable combined model year ZEV obligation of all large volume manufacturers for that same time period, where:

Time Period (MYs)	**Target Number of Alternative Path Type III ZEVS**	**Credits per Vehicle**	**Target Number of Credits**	**Combined Model Year ZEV Obligation**	**Alternative Path Percentage**
2009 - 2011	2,500	4	10,000	A	(10,000/A)x100
2012 - 2014	25,000	3	75,000	B	(75,000/B)x100
2015 - 2017	50,000	3	150,000	C	(150,000/C)x100

And where:

A = The combined total section 1962(b)(1) percentage ZEV requirement, based on the prior year method described in section 1962(b)(1)(B), that would apply for all large manufacturers for the 2010 model year,

B = The combined total section 1962(b)(1) percentage ZEV requirement, based on the prior year method described in section 1962(b)(1)(B), that would apply for all large manufacturers for the 2013 model year, and

C = The combined total section 1962(b)(1) percentage ZEV requirement, based on the prior year method described in section 1962(b)(1)(B), that would apply for all large manufacturers for the 2016 model year.

f. Exclusion of Additional Credits for Transportation Systems. Any additional credits for transportation systems generated in accordance with section 1962(g)(5) shall not be counted towards compliance with this section 1962(b)(2)(B)1.a.-d.

g. Carry-over of Excess Credits. Where a manufacturer generates more qualifying ZEV credits than are needed to meet the minimum floor requirement for the production of Type III ZEVs in one of the periods identified in section 1962(b)(2)(B)1.a.-c., the qualifying ZEV credits may be used towards meeting the minimum floor requirement for the production of Type III ZEVs in a subsequent period, provided that the value of these carryover credits shall be based on the model year in which the credits are used.

h. Failure to Meet Requirement for Production of Type III ZEVs. A manufacturer that, after electing to be subject to the alternative requirements in section 1962(b)(2)(B) for any model year from 2005 through 2017, fails to meet the requirement in section 1962(b)(2)(B)1.a.-d. by the end of the specified three or four year period in which the model year falls, shall be treated as subject to the primary requirements in section 1962(b)(2)(A) for all model years in the specified three or four year period.

i. The number of Type III ZEVs needed for a manufacturer under section 1962(b)(2)(B)1. a.-d shall be rounded to the nearest whole number.

2. Compliance With Percentage ZEV Requirements. In the 2005 through 2008 model years, a large volume manufacturer electing to be subject to the alternative compliance requirements in a given model year must meet at least 40 percent of its ZEV requirement for that model year with ZEVs, advanced technology PZEVs, or credits generated from such vehicles. The remainder of the large volume manufacturer's ZEV requirement may be met using PZEVs or credits generated from such vehicles. As the ZEV requirement increases over time from 11% in model year 2009 to 16% in model years 2018 and subsequent, the maximum portion of the large volume manufacturer's percentage ZEV requirement that may be satisfied by PZEVs that are not advanced technology PZEVs, or credits generated by such vehicles, is limited to 6% of the manufacturer's applicable California PC, LDT1, and LDT2 production volume; ZEVs, AT PZEVs, or credits generated by such vehicles may be used to meet the manufacturer's remaining ZEV requirement.

3. Sunset of Alternative Requirements After the 2017 Model Year. The alternative requirements in section 1962(b)(2)(B) are not available after the 2017 model year.

(C) Election of the Primary or Alternative Requirements for Large Volume Manufacturers. A large volume manufacturer shall be subject to the primary ZEV requirements for the 2005 model year unless it notifies the Executive Officer in writing prior to the start of the 2005 model year that it is electing to be subject to the alternative compliance requirements for that model year. Thereafter, a manufacturer shall be subject to the same compliance option as applied in the, previous model year unless it notifies the Executive Officer in writing prior to the start of a new model year that it is electing to switch to the other compliance option for that new model year. However, a large volume manufacturer that has previously elected to be subject to the primary ZEV requirements for one or more of the model years in the three or four year periods identified in section 1961(b)(1(B)1.a.-d. may prior to the end of the three or four year period elect to become subject to the alternative compliance requirements for the full three or four year period upon a demonstration that it has complied with all of the applicable requirements for that period in section 1962(b)(2)(B)1.a.-d.

(D) Use of Credits from Model Year 2003-2004 PZEVs. A large volume manufacturer may produce, and deliver for sale in California, model year 2003 or 2004 PZEVs that generate credits exceeding the number of credits equal to 6 percent of the average annual volume of 1997, 1998 and 1999 PCs and LDT1s produced and delivered for sale in California by the manufacturer. In that event, the manufacturer may use those excess credits as AT PZEV credits in the 2005 and 2006 model years.

(3) Requirements for Intermediate Volume Manufacturers. In the 2005 and subsequent model years, an intermediate volume manufacturer may meet its ZEV requirement with up to 100 percent PZEVs or credits generated by such vehicles.

(4) Requirements for Small Volume Manufacturers and Independent Low Volume Manufacturers. A small volume manufacturer or an independent low volume manufacturer is not required to meet the percentage ZEV requirements. However, a small volume manufacturer or an independent low volume manufacturer may earn and market credits for the ZEVs or PZEVs it produces and delivers for sale in California.

(5) Counting ZEVs and PZEVs in Fleet Average NMOG Calculations. For purposes of calculating a manufacturer's fleet average NMOG value and NMOG credits under sections 1960.1(g)(2) and 1961(b) and (c), a vehicle certified as a ZEV is counted as one ZEV, and a PZEV is counted as one SULEV certified to the 150,000 mile standards regardless of any ZEV or PZEV multipliers.

(6) Implementation Prior to 2005 Model Year. Prior to the 2005 model year, a manufacturer that voluntarily produces vehicles meeting the ZEV emission standards applicable to 2005 and subsequent model year vehicles may certify the vehicles to those standards and requirements for purposes of calculating fleet average NMOG exhaust emission values and NMOG credits under sections 1960.1(g)(2) and 1961(b) and (c), and for calculating ZEV credits as set forth in section 1962(g).

(7) Changes in Small Volume, Independent Low Volume, and Intermediate Volume Manufacturer Status.

(A) Increases in California Production Volume. In the 2003 and subsequent model years, if a small volume manufacturer's average California production volume exceeds 4,500 units of new PCs, LDTs, and MDVs based on the average number of vehicles produced and delivered for sale for the three previous consecutive model years, or if an independent low volume manufacturer's average California production volume exceeds 10,000 units of new PCs, LDTs, and MDVs based on the average number of vehicles produced and delivered for sale for the three previous consecutive model years, or if an intermediate volume manufacturer's average California production volume exceeds 60,000 units of new PCs, LDTs, and MDVs based on the average number of vehicles produced and delivered for sale for the three previous consecutive model years, the manufacturer shall no longer be treated as a small volume, independent low volume, or intermediate volume manufacturer, as applicable, and shall comply with the ZEV requirements for independent low volume, intermediate volume or large volume manufacturers, as applicable, beginning with the sixth model year after the last of the three consecutive model years. The lead time shall be four rather than six years where a manufacturer ceases to be a small or intermediate volume manufacturer in the 2003 or; subsequent years due to the aggregation requirements in majority ownership situations, except that if the majority ownership in the manufacturer was acquired prior to the 2001 model year, the manufacturer must comply with the stepped-up ZEV requirements starting in the 2010 model year.

(B) Decreases in California Production Volume. If a manufacturer's average California production volume falls below 4,500, 10,000 or 60,000 units of new PCs, LDTs, and MDVs, as applicable, based on the average number of vehicles produced and delivered for sale for the three previous consecutive model years, the manufacturer shall be treated as a small volume, independent low volume, or intermediate volume manufacturer, as applicable, and shall be subject to the requirements for a small volume, independent low volume, or intermediate volume manufacturer beginning with the next model year.

(C) Calculating California Production Volume in Change of Ownership Situations. Where a manufacturer experiences a change in ownership in a particular model year, the change will affect application of the aggregation requirements on the manufacturer starting with the next model year. The manufacturer's small or intermediate volume manufacturer status for the next model year shall be based on the average California production volume in the three previous consecutive model years of those manufacturers whose production must be aggregated for that next model year. For example, where a change of ownership during the 2004 model year results in a requirement that the production volume of Manufacturer A be aggregated with the production volume of Manufacturer B, Manufacturer A's status for the 2005 model year will be based on the production volumes of Manufacturers A and B in the 2002-2004 model years. Where the production volume of Manufacturer A must be aggregated with the production volumes of Manufacturers B and C for the 2004 model year, and during that model year a change in ownership eliminates the requirement that Manufacturer B's production volume be aggregated with Manufacturer A's, Manufacturer A's status for the 2005 model year will be based on the production volumes of Manufacturers A and C in the 2002-2004 model years. In either case, the lead time provisions in section 1962(b)(5)(A) and (B) will apply.

(c) Partial ZEV Allowance Vehicles (PZEVs).

(1) Introduction. This section 1962(c) sets forth the criteria for identifying vehicles delivered for sale in California as PZEVs. A PZEV is a vehicle that cannot be certified as a ZEV but qualifies for a PZEV allowance of at least 0.2.

(2) Baseline PZEV Allowance. In order for a vehicle to be eligible to receive a PZEV allowance, the manufacturer must demonstrate compliance with all of the following requirements. A qualifying vehicle will receive a baseline PZEV allowance of 0.2.

(A) SULEV Standards. Certify the vehicle to the 150,000-mile SULEV exhaust emission standards for PCs and LDTs in section 1961(a)(1) (for model years 2003 through 2006, existing SULEV intermediate in-use compliance standards shall apply to all PZEVs). Bi-fuel, fuel-flexible and dual-fuel vehicles must certify to the applicable 150,000-mile SULEV exhaust emission standards when operating on both fuels;

(B) Evaporative Emissions. Certify the vehicle to the evaporative emission standards in section 1976(b)(1)(E) ("zero" evaporative emissions standards);

(C) OBD. Certify that the vehicle will meet the applicable on-board diagnostic requirements in section 1968.1 for 150,000 miles; and

(D) Extended Warranty. Extend the performance and defects warranty period set forth in sections 2037(b)(2) and 2038(b)(2) to 15 years or 150,000 miles, whichever occurs first, except that the time period is to be 10 years for a zero emission energy storage device used for traction power (such as battery, ultracapacitor, or other electric storage device).

(3) Zero-Emission VMT PZEV Allowance.

(A) Calculation of Zero Emission VMT Allowance. A vehicle that meets the requirements of section 1962(c)(2) and has zero-emission vehicle miles traveled ("VMT") capability will generate an additional zero emission VMT PZEV allowance,

calculated as follows:

Urban All-Electric Range	Zero-emission VMT Allowance
<= 10 miles	0.0
10 miles to 90 miles	(33.8 + [0.5 x Urban AER])/35
90 miles	2.25

The urban all-electric range shall be determined in accordance with section E.3.(2)(a) of the "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962(h).

(B) Alternative Procedures. As an alternative to determining the zero-emission VMT allowance in accordance with the preceding section 1962(c)(3)(A), a manufacturer may submit for Executive Officer approval an alternative procedure for determining the zero-emission VMT potential of the vehicle as a percent of total VMT, along with an engineering evaluation that adequately substantiates the zero-emission VMT determination. For example, an alternative procedure may provide that a vehicle with zero-emissions of one regulated pollutant (e.g. NOx) and not another (e.g. NMOG) will qualify for a zero-emission VMT allowance of 1.5.

(C) Additional Allowances for Qualifying HEVs. The Executive Officer shall approve an additional 0.1 zero-emission VMT partial ZEV allowance for an HEV with an all-electric range if the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer that the HEV is equipped with software and/or other strategies that would promote maximum use of off-vehicle charging, and that the strategies employed are reasonably reliable and tamper-proof.

(4) PZEV Allowance for Advanced ZEV Componentry. A vehicle that meets the requirements of section 1962(c)(2) may qualify for an advanced componentry PZEV allowance as provided in this section 1962(c)(4).

(A) Use of High Pressure Gaseous Fuel or Hydrogen Storage System. A vehicle equipped with a high pressure gaseous fuel storage system capable of refueling at 3600 pounds per square inch or more and operating exclusively on this gaseous fuel shall qualify for an advanced componentry PZEV allowance of 0.2. A vehicle capable of operating exclusively on hydrogen stored in a high pressure system capable of refueling at 3600 pounds per square inch or more, or stored in nongaseous form, shall instead qualify for an advanced componentry PZEV allowance of 0.3.

(B) Use of Qualifying HEV Electric Drive System.

1. Classification of HEVs. HEVs qualifying for additional allowances or allowances that may be used in the AT PZEV category are classified in one of five types of HEVs based on the criteria in the following table.

Characteristics	Type A	Type B	Type C
Electric Drive System Peak Power Output	>= 4 kW	>= 4 kW <= 10kw	>= 10 kW
Traction Drive System Voltage	<= 60 Volts	>= 60 Volts	<= 60 Volts
Traction Drive Boost	Yes	Yes	Yes
Regenerative Braking	Yes	Yes	Yes
Idle Start/Stop	Yes	Yes	Yes

Characteristics	Type D	Type E
Electric Drive System Peak	>= 10 kW	>= 50 kW

Power Output		
Traction Drive System Voltage	>/= 60 Volts	>/= 60 volts
Traction Drive Boost	Yes	Yes
Regenerative Braking	Yes	Yes
Idle Start/Stop	Yes	Yes

2. Type A HEVs. A 2008 or earlier model-year PZEV that the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer meets all of the criteria for a Type A HEV does not receive an additional allowance for meeting those criteria but generates credits that may be used in the AT PZEV category through the 2008 model year.

3. Type B HEVs. A 2008 or earlier model-year PZEV that the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer meets all of the criteria for a Type B HEV qualifies for an additional advanced componentry allowance of 0.2.

4. Type C HEVs. A 2011 or earlier model-year PZEV that the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer meets all of the criteria for a Type C HEV, and that is equipped with an advanced traction energy storage system - such as nickel metal-hydride batteries, ultracapacitors, or other similar systems - with a design lifetime of at least 10 years, qualifies for an additional advanced componentry allowance of 0.2.

5. Type D HEVs. A PZEV that the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer meets all of the criteria for a Type D HEV qualifies for an additional advanced componentry allowance of 0.4 in the 2003 through 2011 model years, 0.35 in the 2012 through 2014 model years, and 0.25 in the 2015 and subsequent model years.

6. Type E HEVs. A PZEV that the manufacturer demonstrates to the reasonable satisfaction of the Executive Officer meets all of the criteria for a Type E HEV qualifies for an additional advanced componentry allowance of 0.5 in the 2003 through 2011 model years, 0.45 in the 2012 through 2014 model years, and 0.35 in the 2015 and subsequent model years.

7. Severability. In the event that all or part of section 1962(c)(4)(B)1.-6. is found invalid, the remainder of section 1962, including the remainder of section 1962(c)(4)(B)1.-6. if any, remains in full force and effect.

(5) PZEV Allowance for Low Fuel-Cycle Emissions. A vehicle that uses fuel(s) with very low fuel-cycle emissions shall receive a PZEV allowance not to exceed 0.3 (0.15 in the case of an HEV that uses for propulsion any fuel that does not have very low fuel-cycle emissions). In order to receive the fuel-cycle PZEV allowance, a manufacturer must demonstrate to the Executive Officer, using peer-reviewed studies or other relevant information, that NMOG emissions associated with the fuel(s) used by the vehicle (on a grams/mile basis) are lower than or equal to 0.01 grams/mile. Fuel-cycle emissions must be calculated based on near-term production methods and infrastructure assumptions, and the uncertainty in the results must be quantified. The fuel-cycle PZEV allowance is calculated according to the following formula:

PZEV Fuel Cycle Allowance = 0.3 x [(percent of VMT using fuel(s) meeting the requirements of the preceding paragraph) / 100]

A manufacturer's demonstration to the Executive Officer that a vehicle qualifies for a fuel-cycle PZEV allowance shall include test results and/or empirical data supporting the estimate of the relative proportion of VMT while operating on fuel(s) with very low fuel-cycle emissions.

(6) Calculation PZEV Allowance.

(A) Calculation of Combined PZEV Allowance for a Vehicle. The combined PZEV allowance for a qualifying vehicle in a particular model year is the sum of the PZEV allowances listed in this section 1962(c)(6), multiplied by any PZEV introduction phase-in multiplier listed in section 1962(c)(7), subject to the caps in section 1962(c)(6)(B).

1. Baseline PZEV Allowance. The baseline PZEV allowance of 0.2 for vehicles meeting the criteria in section 1962(c)(2);

2. Zero Emission VMT PZEV Allowance. The zero-emission VMT PZEV allowance, if any, determined in accordance with section 1962(c)(3);

3. Advanced ZEV Componentry PZEV Allowance. The advanced ZEV componentry PZEV allowance, if any, determined in accordance with section 1962(c)(4); and

4. Fuel-cycle Emissions PZEV Allowance. The fuel-cycle emissions PZEV allowance, if any, determined in accordance

with section 1962(c)(5).

(B) Caps on the Value of an AT PZEV Allowance.

1. Cap for 2012 and Subsequent Model-Year Vehicles. The maximum value of AT PZEV allowances a 2012 and subsequent model-year vehicle may earn, including the baseline PZEV allowance, is 3.0.

2. Cap Based on the Credit Value of a Type III ZEV. In no case may the combined AT PZEV allowance for a qualifying vehicle in a particular model year, including the baseline PZEV allowance, exceed the ZEV credits for a Type III ZEV placed in service in the same model year.

(7) PZEV Multipliers.

(A) PZEV Introduction Phase-In Multiplier. Each 2000 through 2005 model-year PZEV that is produced and delivered for sale in California, other than a PZEV qualifying for a phase-in multiplier under section 1962(c)(7)(B), qualifies for a PZEV introduction phase-in multiplier as follows:

	MY 2000-2003	**MY 2004**	**MY 2005**
Multiplier	4.0	2.0	1.33

(B) Introduction Phase-In Multiplier for PZEVs That Earn a Zero Emission VMT Allowance. Each 2000 through 2011 model year PZEV that earns a zero emission VMT allowance under section 1962(c)(3) and is produced and delivered for sale in California qualifies for a phase-in multiplier as follows:

	MY 2000-2008	**MY 2009-2011**
Multiplier	6.0	3.0

(d) Qualification for ZEV Multipliers and Credits.

(1) 1996-1998 Model-Year ZEV Multipliers.

(A) 1996-1998 Model-Year ZEV Multiplier Based on Vehicle Range. 1996-1998 model-year ZEVs shall qualify for a ZEV multiplier based on vehicle range as follows:

ZEV Multiplier	**Vehicle Range (miles) Model Years 1996 and 1997**	**Model Year 1998**
2	any	>/=100
3	>/=70	>/=130

Range shall be determined in accordance with section 9.f.(2)(a) of the "California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in section 1960.1(k).

(B) 1996-1998 Model-Year ZEV Multiplier Based on Specific Energy of Battery. 1996-1998 model-year ZEVs shall qualify for a ZEV multiplier based on specific energy of the battery as follows:

ZEV Multiplier	**Specific Energy of Battery (w-hr/kg)**
2	any
3	>/=40

(C) Election of Multiplier. A 1996-1998 model-year ZEV may qualify for a ZEV multiplier according to section 1962(d)(1)(A) or section 1962(d)(1)(B), but not both.

(2) 1999-2000 Model-Year ZEV Multiplier Calculation for Extended Electric Range Vehicles. Each ZEV that is produced and delivered for sale in California in the 1999 - 2000 model years and that has an extended electric range shall qualify for a ZEV multiplier as follows:

All-electric range	**MY 1999-2000**
100-175	6-10

ZEV multipliers under the above schedule will be determined by linear interpolation between the values shown in the above schedule. Range shall be determined in accordance with section E.3.(2)(a) of the "California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid

Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," incorporated by reference in section 1962(h). ZEVs that have a refueling time of less than 10 minutes and a range of 100 miles or more shall be counted as having unlimited all-electric range, and shall consequently earn the maximum allowable ZEV multiplier for a specific model year. ZEVs that have a range of 80 to 99 miles shall qualify for ZEV multipliers in the 1999-2000 model years in accordance with the following equation:

ZEV multiplier = (6) x (AER equivalent to a 10 minute recharge/100) x 0.5.

As an option to the above mechanism, the manufacturer of a 1999 model-year ZEV may elect to have its multiplier based on the regulatory requirements pertaining to multipliers based on range or specific energy in section 1960.1(g)(2) and (h)(2). title 13, California Code of Regulations that were applicable to 1999 model-year ZEVs immediately before this section 1962 became operative on November 27, 1999 as a result of the "LEV II" rulemaking.

(3) ZEV Multipliers for 2001-2002 Model Years.

(A) ZEV Phase-In Multiplier. Each 2001 and 2002 model-year ZEV that is placed in service in California by September 30, 2003 qualifies for a ZEV phase-in multiplier of 4.0. A 2001 or 2002 model-year ZEV that is placed in service in California after September 30, 2003 earns credits in accordance with section 1962(d)(5) instead of section 1962(d)(3).

(B) ZEV Extended Electric Range Multiplier.

1. Basic Multiplier Schedule. Each 2001 and 2002 model-year ZEV that is placed in service in California and that has an extended urban electric range qualifies for a ZEV extended electric range multiplier as follows:

Urban All-Electric Range	Multiplier
<= 50 miles	1
>= 50 miles to < 275 miles	(Urban AER-25)/25
>= 275 miles	10

A NEV is not eligible to earn a ZEV extended electric range multiplier. In determining ZEV range multipliers, specialty ZEVs may, upon Executive Officer approval, be tested at the parameters used to determine the ZEV multipliers for the existing ZEV.

2. Fast refueling.

a. Full Fueling in 10 Minutes or Less. A 2001-2002 model-year ZEV with the demonstrated capability to accept fuel or electric charge until achieving at least 95% SOC or rated fuel capacity in 10 minutes or less when starting from all operationally allowable SOC or fuel states is counted as having unlimited zero emission range and qualifies for the maximum allowable ZEV extended electric range multiplier.

b. At Least 60-Mile Range in Less Than 10 Minutes. A 2001-2002 model year ZEV with the demonstrated capacity to accept fuel or electric charge equivalent to at least 60 miles of UDDS range when starting from 20% SOC in less than 10 minutes is counted as having 60 additional miles (up to a 275 mile maximum) of UDDS range in the range multiplier determination in section 1962(d)(3)(C)1.

(C) Combined ZEV Multiplier. During the 2001-2002 model years, the combined ZEV multiplier for each ZEV in a specific model year is the product of:

1. The ZEV phase-in multiplier if any as set forth in section 1962(d)(3)(A), times

2. The extended electric range multiplier if any as set forth in section 1962(d)(3)(B).

(4) Effect of ZEV Multipliers in the 1996-2002 Model Years. In calculating the number of ZEVs produced and delivered for sale in California by a manufacturer in the 1996-2002 model years and the ZEV credits from such vehicles, the number of ZEVs qualifying for a particular ZEV multiplier shall be multiplied by the combined ZEV multiplier.

(5) ZEV Credits for 2003 and Subsequent Model Years.

(A) ZEV Tiers for Credit Calculations. Starting in the 2003 model year, ZEV credits from a particular ZEV are based on the assignment of a given ZEV into one of the following five ZEV tiers:

ZEV Tier	Common Description	UDDS ZEV Range	Fast Refueling Capability
NEV	NEV	No minimum	N/A
Type 0	Utility EV	<= 50 miles	N/A
Type I	City EV	>= 50, <=100 miles	N/A
Type II	Full Function	>= 100 miles	N/A

	EV		
Type III	Fuel Cell EV	>/= 100 miles	Must be capable of replacing 95% maximum rated energy capacity in <= 10 minutes

A specialty ZEV that has the same zero emission energy storage device and chassis as an existing ZEV from which it was modified may, upon Executive Officer approval, be categorized on the basis of that existing ZEV. A specialty vehicle that optimized for a particular duty cycle that conflicts with optimization for maximum vehicle range may be promoted to the next higher ZEV tier upon a determination by the Executive Officer that the specialty vehicle has ZEV componentry equivalent to the utilized by ZEVs in the next tier and would meet the requirements for the next tier if optimized for maximum range.

(B) ZEV Credits for 2003 and Subsequent Model-Year ZEVs. A 2003 and subsequent model-year ZEV, other than a NEV, earns 1 ZEV credit when it is produced and delivered for sale in California. A 2003 and subsequent model-year ZEV earns additional credits based on the earliest model year in which the ZEV is placed in service (not earlier than the ZEV's model year). The following table identifies the credits that a ZEV in each of the five ZEV tiers will earn, including the credit not contingent on placement in service, if it is placed in service in the specified model year or by June 30 after the end of the specified model year.

(C) Multiplier for Certain Type I and Type II ZEVs. A 2004 through 2011 model-year Type I and Type II ZEV shall qualify for a multiplier of 1.25 if it is either sold to a motorist or is leased for three or more years to a motorist who is given the option to purchase or re-lease the vehicle for two years or more at the end of the first lease term.

Model Year in Which ZEV is Placed in Service

Tier	**2003**	**2004**	**2005**	**2006**	**2007**
NEV	1.25	0.625	0.625	0.15	0.15
Type 0 (Utility)	1.5	1.5	1.5	1.5	1.5
Type 1 (City)	8	8	8	7	7
Type II	12	12	12	10	10
Type III	40	40	40	40	40

Model Year in Which ZEV is Placed in Service

Tier	**2008**	**2009**	**2010**	**2011**	**2012+**
NEV	0.15	0.15	0.15	0.15	0.15
Type 0 (Utility)	1.5	1	1	1	1
Type 1 (City)	7	2	2	2	2
Type II	10	3	3	3	3
Type III	40	4	4	4	3

(D) Counting a Type III ZEV Placed in a Section 177 State. Through the 2011 model year, a Type III ZEV that is certified to the California ZEV standards and is placed in service in a state that is administering the California ZEV requirements pursuant to section 177 of the federal Clean Air Act (42 U.S.C. 7507) applicable for the ZEV's model year may be counted towards compliance with the California percentage ZEV requirements in section 1962(b), including the requirements in section 1962(b)(2)(B), as if it were delivered for sale and placed in service in California. Similarly, a 2011 and earlier model-year Type III ZEV that is certified to the California ZEV standards and is placed in service in California may be counted towards the percentage ZEV requirements of any state that is administering the California ZEV requirements pursuant to section 177 of the federal Clean Air Act, including requirements based on section 1962(b)(2)(B).

(e) [Reserved]

(f) Extended Service Multiplier for 1997-2003 Model-Year ZEVs and PZEVs With 10 Mile Zero Emission Range. Except in the case of a NEV, an additional ZEV or PZEV multiplier will be earned by the manufacturer of a 1997 through 2003 model-year ZEV, or PZEV with . 10 mile zero emission range, for each full year it is registered for operation on public roads in California beyond its first three years of service, through the 2011 calendar year. For additional years of service starting earlier than April 24, 2003, the manufacturer will receive 0.1 times the ZEV credit that would be earned by the vehicle if it were leased or sold new in that year, including multipliers, on a year-by-year basis beginning in the fourth year after the vehicle is initially placed in service. For additional years of service starting April 24, 2003 or later, the manufacturer will receive 0.2 times the ZEV credit that would be earned by the vehicle if it were leased or sold new in that year, including multipliers, on a year-by-year basis beginning in the fourth year after the vehicle is initially placed in service. The extended service multiplier is reported and earned in the year following each continuous year of service.

(g) Generation and Use of ZEV Credits; Calculation of Penalties

(1) Introduction. A manufacturer that produces and delivers for sale in California ZEVs or PZEVs in a given model year exceeding the manufacturer's ZEV requirement set forth in section 1962(b) shall earn ZEV credits in accordance with this section 1962(g).

(2) ZEV Credit Calculations.

(A) Credits from ZEVs. The amount of g/mi ZEV credits earned by a manufacturer in a given model year from ZEVs shall be expressed in units of g/mi NMOG, and shall be equal to the number of credits from ZEVs produced and delivered for sale in California that the manufacturer applies towards meeting the ZEV requirements for the model year subtracted from the number of ZEVs produced and delivered for sale in California by the manufacturer in the model year and then multiplied by the NMOG fleet average requirement for PCs and LDT1s for that model year.

(B) Credits from PZEVs. The amount of g/mi ZEV credits from PZEVs earned by a manufacturer in a given model year shall be expressed in units of g/mi NMOG, and shall be equal to the total number of PZEV allowances from PZEVs produced and delivered for sale in California that the manufacturer applies towards meeting its ZEV requirement for the model year subtracted from the total number of PZEV allowances from PZEVs produced and delivered for sale in California by the manufacturer in the model year and then multiplied by the NMOG fleet average requirement for PCs and LDT1s for that model year.

(C) Separate Credit Accounts. The number of credits from a manufacturer's [i] ZEVs [ii] advanced technology PZEVs, and [iii] all other PZEVs shall each be maintained separately.

(3) ZEV Credits for MDVs and LDTs Other Than LDT1s. ZEVs and PZEVs classified as MDVs or as LDTs other than LDT1s may be counted toward the ZEV requirement for PCs and LDT1s, and included in the calculation of ZEV credits as specified in this section 1962(g) if the manufacturer so designates.

(4) ZEV Credits for Advanced Technology Demonstration Programs. A vehicle, other than a NEV, that is placed in a California advanced technology demonstration program may earn ZEV credits even if it is not "delivered for sale." To earn such credits, the manufacturer must demonstrate to the reasonable satisfaction of the Executive Officer that the vehicles will be regularly used in applications appropriate to evaluate issues related to safety, infrastructure, fuel specifications or public education, and that for more than 50 percent of the first year of placement the vehicle will be situated in California. Such a vehicle is eligible to receive the same allowances and credits that it would have earned if placed in service. To determine vehicle credit, the model-year designation for a demonstration vehicle shall be consistent with the model-year designation for conventional vehicles placed in the same timeframe.

(5) ZEV Credits for Transportation Systems.

(A) General. In model years 2001 through 2011, a ZEV, advanced technology PZEV or PZEV placed as part of a transportation system may earn additional ZEV credits, which may used in the same manner as other credits earned by vehicles of that category, except as provided in section (g)(5)(C) below. A NEV is not eligible to earn credit for transportation systems. To earn such credits, the manufacturer must demonstrate to the reasonable satisfaction of the Executive Officer that the vehicle will be used as a part of a project that uses an innovative transportation system as described in section (g)(5)(B) below.

(B) Credits Earned. In order to earn additional credit under this section (g)(5), a project must at a minimum demonstrate [i] shared use of ZEVs, AT PZEVs or PZEVs, and [ii] the application of "intelligent" new technologies such as reservation management, card systems, depot management, location management, charge billing and real-time wireless information systems. If, in addition to factors [i] and [ii] above, a project also features linkage to transit, the project may receive further additional credit. For ZEVs only, not including NEVs, a project that features linkage to transit, such as dedicated parking and charging facilities at transit stations, but does; not demonstrate shared use or the application of intelligent new technologies, may also receive additional credit for linkage to transit. The maximum credit awarded per vehicle shall be determined by the Executive Officer, based upon an application submitted by the manufacturer and, if appropriate, the project manager. The maximum credit awarded shall not exceed the following:

Type of Vehicle	Shared Use, Intelligence	Linkage to Transit
PZEV	2	1

Advanced Technology PZEV	4	2
ZEV	6	3

(C) Cap on Use of Credits.

1. ZEVs. Credits earned or allocated by ZEVs pursuant to this section (g)(5), not including all credits earned by the vehicle itself, may be used to satisfy up to one-tenth of a manufacturer's ZEV obligation in any given model year.

2. AT PZEVs. Credits earned or allocated by AT PZEVs pursuant to this section (g)(5), not including all credits earned by the vehicle itself, may be used to satisfy up to one-twentieth of a manufacturer's ZEV obligation in any given model year, but may only be used in the same manner as other credits earned by vehicles of that category.

3. PZEVs. Credits earned or allocated by PZEVs pursuant to this section (g)(5), not including all credits earned by the vehicle itself, may be used to satisfy up to one-fiftieth of the manufacturer's ZEV obligation in any given model year, but may only be used in the same manner as other credits earned by vehicles of that category.

(D) Allocation of Credits. Credits shall be assigned by the Executive Officer to the project manager or, in the absence of a separate project manager, to the vehicle manufacturers upon demonstration that a vehicle has been placed in a project. Credits shall be allocated to vehicle manufacturers by the Executive Officer in accordance with a recommendation submitted in writing by the project manager and signed by all manufacturers participating in the project, and need not be allocated in direct proportion to the number of vehicles placed.

(6) Submittal of ZEV Credits. A manufacturer may meet the ZEV requirements in any given model year by submitting to the Executive Officer a commensurate amount of g/mi ZEV credits, consistent with section 1962(b). These credits may be earned previously by the manufacturer or acquired from another party, except that beginning with the 2006 model year credits earned from NEVs offered for sale or placed in service in model years 2001 through 2005 cannot be used to satisfy more than the following portion of a manufacturer's percentage ZEV obligation that may only be satisfied with credits from ZEVs and, starting with the 2009 model year, the manufacturer's percentage ZEV obligation that may be satisfied by credits from AT PZEVs but not PZEVs:

ZEV Category		**AT PZEV Category**	
2006	2007 and beyond	2009	2010 and beyond
75%	50%	75%	50%

This limitation applies to credits earned in model years 2001 through 2005 by the same manufacturer or earned in model years 2001 through 2005 by another manufacturer and acquired. The amount of g/mi ZEV credits required to be submitted shall be calculated according to the criteria set forth in this section 1962(g).

(7) Requirement to Make Up a ZEV Deficit.

(A) General. A manufacturer that produces and delivers for sale in California fewer ZEVs than required in a given model year shall make up the deficit by the end of the next model year by submitting to the Executive Officer a commensurate amount of ZEV g/mi credits, except that credits generated from PZEVs may be used to offset deficits for two model years. The amount of g/mi ZEV credits required to be submitted shall be calculated by [i] adding the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year to the number of ZEV allowances from partial ZEV allowance vehicles produced and delivered for sale in California by the manufacturer for the model year (for a large volume manufacturer, not to exceed that permitted under section 1962(b)(2)), [ii] subtracting that total from the number of ZEVs required to be produced and delivered for sale in California by the manufacturer for the model year, and [iii] multiplying the resulting value by the fleet average requirements for PCs and LDT1s for the model year in which the deficit is incurred.

(8) Penalty for Failure to Meet ZEV Requirements. Any manufacturer that fails to produce and deliver for sale in California the required number of ZEVs or submit an appropriate amount of g/mi ZEV credits and does not make up ZEV deficits within the specified time period shall be subject to the Health and Safety Code section 43211 civil penalty applicable to a manufacturer that sells a new motor vehicle that does not meet the applicable emission standards adopted by the state board. The cause of action shall be deemed to accrue when the ZEV deficits are not balanced by the end of the specified time period. For the purposes of Health and Safety Code section 43211, the number of vehicles not meeting the state board's standards shall be calculated according to the following equation, provided that the percentage of a large volume manufacturer's ZEV requirement for a given model year that may be satisfied with partial ZEV allowance vehicles or ZEV credits from such vehicles may not exceed the percentages permitted under section 1962(b)(2)(A):

(No. of ZEVs required to be produced and delivered for sale in California for the model year) - (No. of ZEVs produced and delivered for sale in California for the model year) - (No. of ZEV allowances from partial ZEV allowance vehicles produced and delivered for sale in California for the model year) - [(Amount of ZEV credits submitted for the model year) / (the fleet average requirement for PCs and LDT1s for the model-year)].

(h) Test Procedures. The certification requirements and test procedures for determining compliance with this section 1962 are set forth in "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes," adopted by the state board on August 5, 1999, and last amended December 19, 2003, which is incorporated herein by reference.

(i) ZEV-Specific Definitions. The following definitions apply to this section 1962.

(1) "Advanced technology PZEV" or "AT PZEV" means any PZEV with an allowance greater than 0.2 before application of the PZEV early introduction phase-in multiplier.

(2) "Battery electric vehicle" means any vehicle that operates solely by use of a battery or battery pack, or that is powered primarily through the use of an electric battery or battery pack but uses a flywheel or capacitor that stores energy produced by the electric motor or through regenerative braking to assist in vehicle operation.

(2.5) "Electric drive system" means an electric motor and associated power electronics which provide acceleration torque to the drive wheels sometime during normal vehicle operation. This does not include components that could act as a motor, but are configured to act only as a generator or engine starter in a particular vehicle application.

(3) "Neighborhood electric vehicle" means a motor vehicle that meets the definition of Low-Speed Vehicle either in section 385.5 of the Vehicle Code or in 49 CFR 571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

(4) "Placed in service" means having been sold or leased to an end-user and not to a dealer or other distribution chain entity, and having been individually registered for on-road use by the California Department of Motor Vehicles.

(4.5) "Regenerative braking" means the partial recovery of the energy normally dissipated into friction braking that is returned as electrical current to an energy storage device.

(5) "Specialty ZEV" means a ZEV that is designed for a commercial or governmental fleet application, and either [i] has the same zero emissions energy storage device and chassis as an existing ZEV from which it is modified, or [ii] in the case of a vehicle that is not based on an existing ZEV platform, is optimized for a particular duty cycle, such as urban delivery service, that conflicts with optimization for maximum vehicle range.

(6) "Type 0, I, II, and III ZEV" all have the meanings set forth in section 1962(d)(5)(A).

(j) Abbreviations. The following abbreviations are used in this section 1962:

"AER" means all-electric range.

"BEV" means battery electric vehicle.

"HEV" means hybrid-electric vehicle.

"LDT" means light-duty truck.

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

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

"MDV" means medium-duty vehicle.

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

"MY" means model year.

"NEV" means neighborhood electric vehicle.

"NOx" means oxides of nitrogen.

"PC" means passenger car.

"PZEV" means any vehicle that is delivered for sale in California and that qualifies for a partial ZEV allowance of at least 0.2.

"SOC" means state of charge.

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

"UDDS" means urban dynamometer driving cycle.

"ULEV" means ultra-low emission vehicle.

"VMT" means vehicle miles traveled.

"ZEV" means zero-emission vehicle.

(k) Severability. Each provision of this section is severable, and in the event that any provision of this section is held to be invalid, the remainder of this article remains in full force and effect.

13 C.C.R. § 1962.1. Electric Vehicle Charging Requirements

(a) Applicability. This section applies to (1) all battery electric vehicles that qualify for 1.0 or greater ZEV credit under section 1962, and (2) all hybrid electric vehicles that are capable of being recharged by a battery charger that transfers energy from the electricity grid to the vehicle for purposes of recharging the vehicle traction battery, other than battery electric vehicles and hybrid electric vehicles that are only capable of Level 1 charging.

(b) Definitions.

(1) The definitions in section 1962 apply to this section.

(2) "Level 1 charging" means a charging method that allows an electric vehicle or hybrid electric vehicle to be charged by having its charger connected to the most common grounded receptacle (NEMA 5-15R). A vehicle that is only capable of Level 1 charging is one that is charged by an on-board or off-board charger capable of accepting energy from the existing AC supply network. The maximum power is 12 amps, with a branch circuit rating of 15 amps, and continuous power of 1.44 kilowatts.

(c) Requirements. Beginning with the 2006 model year, all vehicles identified in subsection (a) must be equipped with a conductive charger inlet port which meets all the specifications contained in Society of Automotive Engineers (SAE) Surface Vehicle Recommended Practice SAE J1772 REV NOV 2001, SAE Electric Vehicle Conductive Charger Coupler, which is incorporated herein by reference. All such vehicles must be equipped with an on-board charger with a minimum output of 3.3 kilovolt amps.

13 C.C.R. § 1965. Emission Control and Smog Index Labels--1979 and Subsequent Model-Year Motor Vehicles

In addition to all other requirements, emission control labels are required by the California certification procedures contained in the "California Motor Vehicle Emission Control and Smog Index Label Specifications for 1978 through 2003 Model Year Motorcycles, Light-, Medium- And Heavy-Duty Engines And Vehicles," adopted March 1, 1978, as last amended September 5, 2003, which is incorporated herein by reference, the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty trucks and Medium-Duty Vehicles," incorporated by reference in §1961(d), the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel-Engines and Vehicles," incorporated by reference in §1956.8(b), the "California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicle Classes," incorporated by reference in §1956.8(b) and (d), and the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines," incorporated by reference in §1956.8(d). Smog index labels for passenger cars and light-duty trucks shall conform to the "California Smog Index Label Specifications," adopted September 5, 2003, which is incorporated herein by reference. Motorcycles shall meet the requirements of Title 40 Code of Federal Regulations section 86.413-78, as last amended October 28, 1977, which is incorporated herein by reference.

13 C.C.R. § 1968.2. Malfunction and Diagnostic System Requirements--2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines

(a) Purpose.

The purpose of this regulation is to establish emission standards and other requirements for onboard diagnostic systems (OBD II systems) that are installed on 2004 and subsequent model-year passenger cars, light-duty trucks, and medium-duty vehicles and engines certified for sale in California. The OBD II systems, through the use of an onboard computer(s), shall monitor emission systems in-use for the actual life of the vehicle and shall be capable of detecting malfunctions of the monitored emission systems, illuminating a malfunction indicator light (MIL) to notify the vehicle operator of detected malfunctions, and storing fault codes identifying the detected malfunctions.

(b) Applicability.

Except as specified elsewhere in this regulation (title 13, CCR section 1968.2), all 2004 and subsequent model-year vehicles, defined as passenger cars, light-duty trucks, and medium-duty vehicles, including medium-duty vehicles with engines certified on an engine dynamometer and medium-duty passenger vehicles, shall be equipped with an OBD II system and shall meet all applicable requirements of this regulation (title 13, CCR section 1968.2). Except as specified in section (d)(2.2.5), medium-duty vehicles with engines certified on an engine dynamometer may comply with these requirements on an engine model year certification basis rather than a vehicle model year basis.

(c) Definitions.

"Actual life" refers to the entire period that a vehicle is operated on public roads in California up to the time a vehicle is retired from use.

"Alternate phase-in" is a phase-in schedule that achieves equivalent compliance volume by the end of the last year of a scheduled phase-in provided in this regulation. The compliance volume is the number calculated by multiplying the percent of vehicles (based on the manufacturer's projected sales volume of all vehicles) meeting the new requirements per year by the number of years implemented prior to and including the last year of the scheduled phase-in and then summing these yearly

results to determine a cumulative total (e.g., a three year, 30/60/100 percent scheduled phase-in would be calculated as (30*3 years) + (60*2 years) + (100*1 year) = 310). On phase-ins scheduled to begin prior to the 2004 model year, manufacturers are allowed to include vehicles introduced before the first year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as (10*4 years) and added to the cumulative total). However, on phase-ins scheduled to begin in 2004 or subsequent model years, manufacturers are only allowed to include vehicles introduced up to one model year before the first year of the scheduled phase-in. The Executive Officer shall consider acceptable any alternate phase-in that results in an equal or larger cumulative total by the end of the last year of the scheduled phase-in and ensures that all vehicles subject to the phase-in will comply with the respective requirements no later than two model years following the last year of the scheduled phase-in.

For alternate phase-in schedules resulting in all vehicles complying one model year following the last year of the scheduled phase-in, the compliance volume shall be calculated as described directly above. For example, a 30/60/100 percent scheduled phase-in during the 2010-2012 model years would have a cumulative total of 310. If the manufacturer's planned alternate phase-in schedule is 40/50/80/100 percent during the 2010-2013 model years, the final compliance volume calculation would be (40*3 years) + (50*2 years) + (80*1 year) = 300, which is less than 310 and therefore would not be acceptable as an alternate phase-in schedule.

For alternate phase-in schedules resulting in all vehicles complying two model years following the last year of the scheduled phase-in, the compliance volume calculation shall be calculated as described directly above and shall also include a negative calculation for vehicles not complying until one or two model years following the last year of the scheduled phase-in. The negative calculation shall be calculated by multiplying the percent of vehicles not meeting the new requirements in the final year of the phase-in by negative one and the percent of vehicles not meeting the new requirements in the one year after the final year of the phase-in by negative two. For example, if 10 percent of a manufacturer's vehicles did not comply by the final year of the scheduled phase-in and 5 percent did not comply by the end of the first year after the final year of the scheduled phase-in, the negative calculation result would be (10*(-1 years)) + (5*(-2 years)) = -20. The final compliance volume calculation is the sum of the original compliance volume calculation and the negative calculation. For example, a 30/60/100 percent scheduled phase-in during the 2010-2012 model years would have a cumulative total of 310. If a manufacturer's planned alternate phase-in schedule is 40/70/80/90/100 percent during the 2010-2014 model years, the final compliance volume calculation would be (40*3 years) + (70*2 years) + (80*1 year) + (20*(-1 year)) + (10*(-2 years)) = 300, which is less than 310 and therefore would not be acceptable as an alternate phase-in schedule.

"Applicable standards" refers to the specific exhaust emission standards or family emission limits (FEL) of the Federal Test Procedure (FTP) to which the vehicle or engine is certified. For 2010 and subsequent model year diesel engines, "applicable standards" shall also refer to the specific exhaust emission standards or family emission limits (FEL) of either the FTP or the Supplemental Emission Test (SET) to which the engine is certified, as determined according to section (d)(6).

"Auxiliary Emission Control Device (AECD)" refers to any approved AECD (as defined by 40 Code of Federal Regulations (CFR) 86.082-2 and 86.094-2).

"Emission Increasing Auxiliary Emission Control Device (EI-AECD)" refers to any approved AECD that: reduces the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered in normal vehicle operation and use; and the need for the AECD is justified in terms of protecting the vehicle against damage or accident. For medium-duty vehicles certified to an engine dynamometer tailpipe emission standard, an AECD that is certified as an NTE deficiency shall not be considered an EI-AECD. An AECD that does not sense, measure, or calculate any parameter or command or trigger any action, algorithm, or alternate strategy shall not be considered an EI-AECD. An AECD that is activated solely due to operation of the vehicle above 8000 feet in elevation shall not be considered an EI-AECD.

"Base fuel schedule" refers to the fuel calibration schedule programmed into the Powertrain Control Module or PROM when manufactured or when updated by some off-board source, prior to any learned on-board correction.

"Calculated load value" refers to an indication of the percent engine capacity that is being used and is defined in Society of Automotive Engineers (SAE) J1979 "E/E Diagnostic Test Modes - Equivalent to ISO/DIS 15031-5:April 30, 2002", April 2002 (SAE J1979), incorporated by reference (section (g)(1.4)1). For diesel applications, the calculated load value is determined by the ratio of current output torque to maximum output torque at current engine speed as defined by suspect parameter number (SPN) 92 of SAE J1939 "Recommended Practice for a Serial Control and Communications Vehicle Network" (SAE J1939), incorporated by reference.

"Confirmed fault code" is defined as the diagnostic trouble code stored when an OBD II system has confirmed that a malfunction exists (e.g., typically on the second driving cycle that the malfunction is detected) in accordance with the requirements of sections (e), (f), and (g)(4.4).

"Continuously," if used in the context of monitoring conditions for circuit continuity, lack of circuit continuity, circuit faults, and out-of-range values, means monitoring is always enabled, unless alternate enable conditions have been approved by the Executive Officer in accordance with section (d)(3.1.1), and sampling of the signal used for monitoring occurs at a rate no less than two samples per second. If for control purposes, a computer input component is sampled less frequently, the signal of the component may instead be evaluated each time sampling occurs.

"Deactivate" means to turn-off, shutdown, desensitize, or otherwise make inoperable through software programming or other means during the actual life of the vehicle.

"Diagnostic or emission critical" electronic powertrain control unit refers to the engine and transmission control unit(s). For the 2005 and subsequent model years, it also includes any other on-board electronic powertrain control unit containing software that has primary control over any of the monitors required by sections (e)(1.0) through (e)(14.0), (e)(16.0), (f)(1) through (f)(14), and (f)(16) or, excluding anti-lock brake system (ABS) control units or stability/traction control units, has primary control over the diagnostics for more than two of the components required to be monitored by sections (e)(15.0) and (f)(15).

"Diesel engines" refers to engines using a compression ignition thermodynamic cycle.

"Driving cycle" consists of engine startup and engine shutoff and includes the period of engine off time up to the next engine startup. For vehicles that employ engine shutoff strategies (e.g., engine shutoff at idle), the manufacturer may request Executive Officer approval to use an alternate definition for driving cycle (e.g., key on and key off). Executive Officer approval of the alternate definition shall be based on equivalence to engine startup and engine shutoff signaling the beginning and ending of a single driving event for a conventional vehicle. For applications that are used in both medium-duty and heavy-duty classes, the manufacturer may use the driving cycle definition of title 13, CCR, section 1971.1 in lieu of this definition. Engine restarts following an engine shut-off that has been neither commanded by the vehicle operator nor by the engine control strategy but caused by an event such as an engine stall may be considered a new driving cycle or a continuation of the existing driving cycle.

"Engine misfire" means lack of combustion in the cylinder due to absence of spark, poor fuel metering, poor compression, or any other cause. This does not include lack of combustion events in non-active cylinders due to default fuel shut-off or cylinder deactivation strategies.

"Engine start" is defined as the point when the engine reaches a speed 150 rpm below the normal, warmed-up idle speed (as determined in the drive position for vehicles equipped with an automatic transmission). For hybrid vehicles or for engines employing alternate engine start hardware or strategies (e.g., integrated starter and generators, etc.), the manufacturer may request Executive Officer approval to use an alternate definition for engine start (e.g., ignition key "on"). Executive Officer approval of the alternate definition shall be based on equivalence to an engine start for a conventional vehicle.

"Family Emission Limit (FEL)" refers to the exhaust emission levels to which an engine family is certified under the averaging, banking, and trading program incorporated by reference in title 13, CCR section 1956.8.

"Fault memory" means information pertaining to malfunctions stored in the onboard computer, including fault codes, stored engine conditions, and MIL status.

"Federal Test Procedure (FTP) test" refers to an exhaust emission test conducted according to the test procedures incorporated by reference in title 13, CCR section 1961(d) that is used to determine compliance with the FTP standard to which a vehicle is certified.

"FTP cycle". For passenger vehicles, light-duty trucks, and medium-duty vehicles certified on a chassis dynamometer, FTP cycle refers to the driving schedule in Code of Federal Regulations (CFR) 40, Appendix 1, Part 86, section (a) entitled, "EPA Urban Dynamometer Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks." For medium-duty engines certified on an engine dynamometer, FTP cycle refers to the engine dynamometer schedule in CFR 40, Appendix 1, Part 86, section (f)(1), entitled, "EPA Engine Dynamometer Schedule for Heavy-Duty Otto-Cycle Engines," or section (f)(2), entitled, "EPA Engine Dynamometer Schedule for Heavy-Duty Diesel Engines."

"FTP standard" refers to the certification tailpipe exhaust emission full useful life standards and test procedures applicable to the FTP cycle and to the class to which the vehicle is certified.

"FTP full useful life standard" refers to the FTP standard applicable when the vehicle reaches the end of its full useful life as defined in the certification requirements and test procedures incorporated by reference in title 13, CCR section 1961(d).

"Fuel trim" refers to feedback adjustments to the base fuel schedule. Short-term fuel trim refers to dynamic or instantaneous adjustments. Long-term fuel trim refers to much more gradual adjustments to the fuel calibration schedule than short-term trim adjustments.

"Functional check" for an output component or system means verification of proper response of the component and system to a computer command.

"Gasoline engine" refers to an Otto-cycle engine or an alternate-fueled engine.

"Keep-alive memory (KAM)," for the purposes of this regulation, is defined as a type of memory that retains its contents as long as power is provided to the on-board control unit. KAM is not erased upon shutting off the engine but may be erased if power to the on-board control unit is interrupted (e.g., vehicle battery disconnected, fuse to control unit removed). In some cases, portions of KAM may be erased with a scan tool command to reset KAM.

"Key on, engine off position" refers to a vehicle with the ignition key in the engine run position (not engine crank or accessory position) but with the engine not running.

"Light-duty truck" is defined in title 13, CCR section 1900 (b).

"Low Emission Vehicle I application" refers to a vehicle or engine certified in California to the exhaust emission standards defined in title 13, CCR sections 1956.8(g), 1960.1(g)(1), and 1960.1(h)(1) for any of the following vehicle emission categories: Transitional Low Emission Vehicle (TLEV), Low Emission Vehicle (LEV), Ultra Low Emission Vehicle (ULEV), or Super Ultra Low Emission Vehicle (SULEV). Additionally, vehicles certified to Federal emission standards (bins) in California but categorized in a Low Emission Vehicle I vehicle emission category for purposes of calculating NMOG fleet average in accordance with the certification requirements and test procedures incorporated by reference in title 13, CCR section 1961 (d) are subject to all monitoring requirements applicable to Low Emission Vehicle I applications but shall use the Federal tailpipe emission standard (i.e., the Federal bin) for purposes of determining the malfunction thresholds in sections (e) and (f).

"MDV SULEV vehicles" refer only to medium-duty Low Emission Vehicle I applications certified to the SULEV vehicle emission category.

"TLEV vehicles" refer only to Low Emission Vehicle I applications certified to the TLEV vehicle emission category.

"LEV vehicles" refer only to Low Emission Vehicle I applications certified to the LEV vehicle emission category.

"ULEV vehicles" refer only to Low Emission Vehicle I applications certified to the ULEV vehicle emission category.

"Low Emission Vehicle II application" refers to a vehicle or engine certified in California to the exhaust emission standards defined in title 13, CCR section 1961, or optionally certified to the exhaust emission standards defined in title 13, CCR section 1956.8, for any of the following emission categories: LEV, ULEV, or SULEV. Additionally, except as provided for in sections (e)(17.1.3) and (f)(17.1.2), vehicles certified to Federal emission standards (bins) in California but categorized in a Low Emission Vehicle II vehicle emission category for purposes of calculating NMOG fleet average in accordance with the certification requirements and test procedures incorporated by reference in title 13, CCR section 1961 (d) are subject to all monitoring requirements applicable to Low Emission Vehicle II applications but shall use the Federal tailpipe emission standard (i.e., the Federal bin) for purposes of determining the malfunction thresholds in sections (e) and (f).

"PC/LDT SULEV II vehicles" refer only to passenger car and light-duty truck Low Emission Vehicle II applications certified to the SULEV vehicle emission category.

"MDV SULEV II vehicles" refer only to medium-duty Low Emission Vehicle II applications certified to the SULEV vehicle emission category.

"LEV II vehicles" refer only to Low Emission Vehicle II applications certified to the LEV vehicle emission category.

"ULEV II vehicles" refer only to Low Emission Vehicle II applications certified to the ULEV vehicle emission category.

"Malfunction" means any deterioration or failure of a component that causes the performance to be outside of the applicable limits in sections (e) and, (f).

"Medium-duty vehicle" is defined in title 13, CCR section 1900 (b).

"Medium-duty passenger vehicle" or "MDPV" is defined in Title 40, Section 86.1803-01, Code of Federal Regulations.

"Non-volatile random access memory (NVRAM)," for the purposes of this regulation, is defined as a type of memory that retains its contents even when power to the on-board control unit is interrupted (e.g., vehicle battery disconnected, fuse to control unit removed). NVRAM is typically made non-volatile either by use of a back-up battery within the control unit or through the use of an electrically erasable and programmable read-only memory (EEPROM) chip.

"Not-To-Exceed (NTE) control area" refers to the bounded region of the engine's torque and speed map, as defined in 40 CFR 86.1370-2007, where emissions must not exceed a specific emission cap for a given pollutant under the NTE requirement.

"Manufacturer-specific NO[x] NTE carve-out area" refers to regions within the NTE control area for NO[x] where the manufacturer has limited NTE testing as allowed by 40 CFR 86.1370-2007(b)(7).

"Manufacturer-specific PM NTE carve-out area" refers to regions within the NTE control area for PM where the manufacturer has limited NTE testing as allowed by 40 CFR 86.1370-2007(b)(7).

"NTE deficiency" refers to regions or conditions within the NTE control area for NO[x] or PM where the manufacturer has received a deficiency as allowed by 40 CFR 86.007-11(a)(4)(iv).

"Normal production" is the time after the start of production when the manufacturer has produced two percent of the projected volume for the test group or calibration, whichever is being evaluated in accordance with section (j).

"Passenger car" is defined in title 13, CCR section 1900(b).

"Pending fault code" is defined as the diagnostic trouble code stored upon the initial detection of a malfunction (e.g., typically on a single driving cycle) prior to illumination of the MIL in accordance with the requirements of sections (e), (f), and (g)(4.4).

"Percentage of misfire" as used in (e)(3.2) and (f)(3.2) means the percentage of misfires out of the total number of firing events for the specified interval.

"Permanent fault code" is defined as a confirmed fault code that is currently commanding the MIL on and is stored in NVRAM as specified in sections (d)(2) and (g)(4.4).

"Power Take-Off (PTO) unit" refers to an engine driven output provision for the purposes of powering auxiliary equipment (e.g., a dump-truck bed, aerial bucket, or tow-truck winch).

"Rationality fault diagnostic" for an input component means verification of the accuracy of the input signal while in the range of normal operation and when compared to all other available information.

"Redline engine speed" shall be defined by the manufacturer as either the recommended maximum engine speed as normally displayed on instrument panel tachometers or the engine speed at which fuel shutoff occurs.

"Response rate" for exhaust gas sensors refers to the delay from when the sensor is exposed to a different make-up of exhaust gas constituents until it outputs a signal reflecting the different make-up of exhaust gas constituents. For example, for oxygen sensors, response rate is the delay from when the oxygen sensor is exposed to a change in exhaust gas from richer/leaner than stoichiometric to leaner/richer than stoichiometric to the time when the oxygen sensor indicates the lean/rich condition. Similarly, for wide-range air-fuel (A/F) sensors, response rate is the delay from when the sensor is exposed to a different A/F ratio to the time it indicates the different A/F ratio. For NO[x] and PM sensors, response rate is the delay from when the sensor is exposed to a different NO[x] or PM exhaust gas level until it indicates the different NO[x] or PM exhaust gas level.

"SC03 emission standards" refers to the certification tailpipe exhaust emission standards for the air conditioning (A/C) test of the Supplemental Federal Test Procedure Off-Cycle Emission Standards specified in title 13, CCR section 1961(a) applicable to the class to which the vehicle is certified.

"Secondary air" refers to air introduced into the exhaust system by means of a pump or aspirator valve or other means that is intended to aid in the oxidation of HC and CO contained in the exhaust gas stream.

"Similar conditions" as used in sections (e)(3), (e)(6), (f)(3), and (f)(4) means engine conditions having an engine speed within 375 rpm, load conditions within 20 percent, and the same warm-up status (i.e., cold or hot) as the engine conditions stored pursuant to (e)(3.4.4), (e)(6.4.5), (f)(3.4.2)(C), and (f)(4.4.2)(E). The Executive Officer may approve other definitions of similar conditions based on comparable timeliness and reliability in detecting similar engine operation.

"Small volume manufacturer" is defined in title 13, CCR section 1900(b). However, for a manufacturer that transitions from a small volume manufacturer to a non-small volume manufacturer, the manufacturer is still considered a small volume manufacturer for the first three model years that it no longer meets the definition in title 13, CCR section 1900(b).

"Supplemental Emission Test (SET) cycle" refers to the driving schedule defined as the "supplemental steady state emission test" in 40 CFR 86.1360-2007, as amended July 13, 2005.

"SET standard" refers to the certification exhaust emission standards and test procedures applicable to the SET cycle incorporated by reference in title 13, CCR sections 1956.8(b) and (d) to which the engine is certified.

"Unified cycle" is defined in "Speed Versus Time Data for California's Unified Driving Cycle", dated December 12, 1996, incorporated by reference.

"US06 cycle" refers to the driving schedule in 40 CFR 86, Appendix 1, section (g), as amended July 13, 2005, entitled, "EPA US06 Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks."

"Warm-up cycle" means sufficient vehicle operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of at least 160 degrees Fahrenheit (140 degrees Fahrenheit for applications with diesel engines).

(d) General Requirements.

Section (d) sets forth the general requirements of the OBD II system. Specific performance requirements for components and systems that shall be monitored are set forth in sections (e) and (f) below.

(1) The OBD II System.

(1.1) If a malfunction is present as specified in sections (e) and (f), the OBD II system shall detect the malfunction, store a pending or confirmed fault code in the onboard computer's memory, and illuminate the MIL as required.

(1.2) The OBD II system shall be equipped with a standardized data link connector to provide access to the stored fault codes as specified in section (g).

(1.3) The OBD II system shall be designed to operate, without any required scheduled maintenance, for the actual life of the vehicle in which it is installed and may not be programmed or otherwise designed to deactivate based on age and/or mileage of the vehicle during the actual life of the vehicle. This section is not intended to alter existing law and enforcement practice regarding a manufacturer's liability for a vehicle beyond its useful life, except where a vehicle has been programmed or otherwise designed so that an OBD II system deactivates based on age and/or mileage of the vehicle.

(1.4) Computer-coded engine operating parameters may not be changeable without the use of specialized tools and procedures (e.g. soldered or potted computer components or sealed (or soldered) computer enclosures). Subject to Executive Officer

approval, manufacturers may exempt from this requirement those product lines that are unlikely to require protection. Criteria to be evaluated in making an exemption include current availability of performance chips, high performance capability of the vehicle, and sales volume.

(2) MIL and Fault Code Requirements.

(2.1) MIL Specifications.

(2.1.1) The MIL shall be located on the driver's side instrument panel and be of sufficient illumination and location to be readily visible under all lighting conditions and shall be amber in color when illuminated. The MIL, when illuminated, shall display the phrase "Check Engine" or "Service Engine Soon". The word "Powertrain" may be substituted for "Engine" in the previous phrases. Alternatively, the International Standards Organization (ISO) engine symbol may be substituted for the word "Engine" or for the entire phrase.

(2.1.2) The MIL shall illuminate in the key on, engine off position before engine cranking to indicate that the MIL is functional. For all 2005 and subsequent model year vehicles, the MIL shall continuously illuminate during this functional check for a minimum of 15-20 seconds. During this functional check of the MIL, the data stream value for MIL status shall indicate commanded off (see section (g)(4.2)) unless the MIL has also been commanded on for a detected malfunction. This functional check of the MIL is not required during vehicle operation in the key on, engine off position subsequent to the initial engine cranking of each driving cycle (e.g., due to an engine stall or other non-commanded engine shutoff).

(2.1.3) At the manufacturer's option, the MIL may be used to indicate readiness status in a standardized format (see section (g)(4.1.3)) in the key on, engine off position.

(2.1.4) A manufacturer may request Executive Officer approval to also use the MIL to indicate which, if any, fault codes are currently stored (e.g., to "blink" the stored codes). The Executive Officer shall approve the request upon determining that the manufacturer has demonstrated that the method used to indicate the fault codes will not be activated during a California Inspection and Maintenance test or during routine driver operation.

(2.1.5) The MIL may not be used for any purpose other than specified in this regulation.

(2.2) MIL Illumination and Fault Code Storage Protocol.

(2.2.1) Upon detection of a malfunction, the OBD system shall store a pending fault code within ten seconds indicating the likely area of the malfunction.

(2.2.2) After storage of a pending fault code, if the identified malfunction is again detected before the end of the next driving cycle in which monitoring occurs, the MIL shall illuminate continuously and a confirmed fault code shall be stored within 10 seconds. If a malfunction is not detected before the end of the next driving cycle in which monitoring occurs (i.e., there is no indication of the malfunction at any time during the driving cycle), the corresponding pending fault code set according to section (d)(2.2.1) shall be erased at the end of the driving cycle.

(2.2.3) The OBD system shall illuminate the MIL and store a fault code within 10 seconds to inform the vehicle operator whenever the powertrain enters a default or "limp home" mode of operation that can affect emissions or the performance of the OBD II system or in the event of a malfunction of an on-board computer(s) itself that can affect the performance of the OBD II system.

(A) If the default or "limp home" mode of operation is recoverable (i.e., the diagnostic or control strategy that caused the default or "limp home" mode of operation can run on the next driving cycle and confirm the presence of the condition that caused the default or "limp home" operation), the OBD II system may, in lieu of illuminating the MIL within 10 seconds on the first driving cycle where the default or "limp home" mode of operation is entered, delay illumination of the MIL until the condition causing the default or "limp home" mode of operation is again detected before the end of the next driving cycle.

(B) MIL illumination and fault code storage is not required for engine overtemperature default strategies that are only initiated after the temperature gauge indicates a temperature in the red zone, or after an overtemperature "hot" light is illuminated, or due to the verified occurrence of severe operating conditions (e.g., extended trailer towing up a grade).

(2.2.4) For all 2010 and subsequent model year vehicles, the OBD II system shall default to a MIL on state if the instrument panel receives and/or processes instructions or commands from other diagnostic or emission critical electronic powertrain control units to illuminate the MIL and a malfunction occurs (e.g., communication is lost) such that the instrument panel is no longer able to properly receive the MIL illumination requests. Storage of a fault code is not required for this malfunction.

(2.2.5) For 50 percent of all 2010, 75 percent of all 2011, and 100 percent of all 2012 and subsequent model year vehicles (including 2012 model year medium-duty vehicles with 2011 model year engines certified on an engine dynamometer), before the end of an ignition cycle, the OBD II system shall store confirmed fault codes that are currently causing the MIL to be illuminated in NVRAM as permanent fault codes (as defined in section (g)(4.4.6)).

(2.2.6) A manufacturer may request Executive Officer approval to employ alternate statistical MIL illumination and fault code storage protocols to those specified in these requirements. The Executive Officer shall grant approval upon determining that the manufacturer has provided data and/or engineering evaluation that demonstrate that the alternative protocols can evaluate system performance and detect malfunctions in a manner that is equally effective and timely. Except as otherwise pro-

vided in section (e) for evaporative system malfunctions, strategies requiring on average more than six driving cycles for MIL illumination may not be accepted.

(2.2.7) A manufacturer shall store and erase "freeze frame" conditions (as defined in section (g)(4.3)) present at the time a malfunction is detected. A manufacturer shall store and erase freeze frame conditions in conjunction with storage and erasure of either pending or confirmed fault codes as required elsewhere in section (d)(2.2).

(2.3) Extinguishing the MIL.

Except as otherwise provided in sections (e)(3.4.5), (e)(4.4.2), (e)(6.4.6), (f)(3.4.2)(D), and (f)(4.4.2)(F) for misfire, evaporative system, and fuel system malfunctions, once the MIL has been illuminated it may be extinguished after three subsequent sequential driving cycles during which the monitoring system responsible for illuminating the MIL functions and the previously detected malfunction is no longer present provided no other malfunction has been detected that would independently illuminate the MIL according to the requirements outlined above.

(2.4) Erasing a confirmed fault code. The OBD II system may erase a confirmed fault code if the identified malfunction has not been again detected in at least 40 engine warm-up cycles, and the MIL is presently not illuminated for that malfunction.

(2.5) Erasing a permanent fault code.

(2.5.1) If the OBD II system is commanding the MIL on, the OBD II system shall erase a permanent fault code only if the OBD II system itself determines that the malfunction that caused the permanent fault code to be stored is no longer present and is not commanding the MIL on, pursuant to the requirements of section (d)(2.3) (which for purposes of this section shall apply to all monitors).

(2.5.2) If all fault information in the on-board computer other than the permanent fault code has been cleared (i.e., through the use of a scan tool or battery disconnect) and the OBD II system is not commanding the MIL on:

(A) Except as provided for in sections (d)(2.5.2)(C) through (E), if the monitor of the malfunction that caused the permanent fault code to be stored is subject to the minimum ratio requirements of section (d)(3.2) (e.g., catalyst monitor, comprehensive component input component rationality monitors), the OBD II system shall erase the permanent fault code at the end of a driving cycle if the monitor has run and made one or more determinations during a driving cycle that the malfunction of the component or the system is not present and has not made any determinations within the same driving cycle that the malfunction is present.

(B) Except as provided for in sections (d)(2.5.2)(D) and (E), if the monitor of the malfunction that caused the permanent fault code to be stored is not subject to the minimum ratio requirements of section (d)(3.2) (e.g., gasoline misfire monitor, fuel system monitor, comprehensive component circuit continuity monitors), the OBD II system shall erase the permanent fault code at the end of a driving cycle if:

(i) The monitor has run and made one or more determinations during a driving cycle that the malfunction of the component or the system is not present and has not made any determinations within the same driving cycle that the malfunction is present;

(ii) The monitor has not made any determinations that the malfunction is present subsequent to the most recent driving cycle in which the criteria of section (d)(2.5.2)(B)(i) are met; and

(iii) The following criteria are satisfied on any single driving cycle (which may be a different driving cycle than that in which the criteria of section (d)(2.5.2)(B)(i) are satisfied):

a. Cumulative time since engine start is greater than or equal to 600 seconds;

b. Cumulative vehicle operation at or above 25 miles per hour occurs for greater than or equal to 300 seconds (medium-duty vehicles with diesel engines certified on an engine dynamometer may use cumulative operation at or above 15% calculated load in lieu of at or above 25 miles per hour for purposes of this criteria); and

c. Continuous vehicle operation at idle (i.e., accelerator pedal released by driver and vehicle speed less than or equal to one mile per hour) for greater than or equal to 30 seconds.

(iv) Monitors required to use "similar conditions" as defined in section (c) to store and erase pending and confirmed fault codes may not require that the similar conditions be met prior to erasure of the permanent fault code.

(C) For monitors subject to section (d)(2.5.2)(A), the manufacturer may choose to erase the permanent fault code using the criteria under section (d)(2.5.2)(B) in lieu of the criteria under section (d)(2.5.2)(A).

(D) For 2009 and 2010 model year vehicles meeting the permanent fault code requirements of section (d)(2.2.5), manufacturers may request Executive Officer approval to use alternate criteria to erase the permanent fault code. The Executive Officer shall approve alternate criteria that:

(i) Will not likely require driving conditions that are longer and more difficult to meet than those required under section (d)(2.5.2)(B), and

(ii) Do not require access to enhanced scan tools (i.e., tools that are not generic SAE J1978 scan tools) to determine condi-

tions necessary to erase the permanent; fault code.

(E) If alternate criteria to erase the permanent fault code are approved by the Executive Officer under section (d)(2.5.2)(D), a manufacturer may continue to use the approved alternate criteria for 2011 model year vehicles previously certified in the 2009 or 2010 model year to the alternate criteria and carried over to the 2011 model year.

(3) Monitoring Conditions.

Section (d)(3) sets forth the general monitoring requirements while sections (e) and (f) set forth the specific monitoring requirements as well as identify which of the following general monitoring requirements in section (d)(3) are applicable for each monitored component or system identified in sections (e) and (f).

(3.1) For all 2004 and subsequent model year vehicles:

(3.1.1) As specifically provided for in sections (e) and (f), manufacturers shall define monitoring conditions, subject to Executive Officer approval, for detecting malfunctions identified in sections (e) and (f). The Executive Officer shall approve manufacturer defined monitoring conditions that are determined (based on manufacturer submitted data and/or other engineering documentation) to be: technically necessary to ensure robust detection of malfunctions (e.g., avoid false passes and false indications of malfunctions), designed to ensure monitoring will occur under conditions which may reasonably be expected to be encountered in normal urban vehicle operation and use, and designed to ensure monitoring will occur during the FTP cycle or Unified cycle.

(3.1.2) Monitoring shall occur at least once per driving cycle in which the monitoring conditions are met.

(3.1.3) Manufacturers may request Executive Officer approval to define monitoring conditions that are not encountered during the FTP cycle or Unified cycle as required in section (d)(3.1.1). In evaluating the manufacturer's request, the Executive Officer shall consider the degree to which the requirement to run during the FTP or Unified cycle restricts in-use monitoring, the technical necessity for defining monitoring conditions that are not encountered during the FTP or Unified cycle, data and/or an engineering evaluation submitted by the manufacturer which demonstrate that the component/system does not normally function, or monitoring is otherwise not feasible, during the FTP or Unified cycle, and, where applicable in section (d)(3.2), the ability of the manufacturer to demonstrate the monitoring conditions will satisfy the minimum acceptable in-use monitor performance ratio requirement as defined in section (d)(3.2) (e.g., data which show in-use driving meets the minimum requirements).

(3.2) As specifically provided for in sections (e) and (f), manufacturers shall define monitoring conditions in accordance with the criteria in sections (d)(3.2.1) through (3.2.3). The requirements of section (d)(3.2) shall be phased in as follows: 30 percent of all 2005 model year vehicles, 60 percent of all 2006 model year vehicles, and 100 percent of all 2007 and subsequent model year vehicles. Manufacturers may use an alternate phase-in schedule in lieu of the required phase-in schedule if the alternate phase-in schedule provides for equivalent compliance volume as defined in section (c) with the exception that 100 percent of 2007 and subsequent model year vehicles shall comply with the requirements. Small volume manufacturers shall meet the requirements on 100 percent of 2007 and subsequent model year vehicles but shall not be required to meet the specific phase-in requirements for the 2005 and 2006 model years.

(3.2.1) Manufacturers shall define monitoring conditions that, in addition to meeting the criteria in section (d)(3.1), ensure that the monitor yields an in-use performance ratio (as defined in section (d)(4)) that meets or exceeds the minimum acceptable in-use monitor performance ratio on in-use vehicles. For purposes of this regulation, except as provided below in section (d)(3.2.1)(D), the minimum acceptable in-use monitor performance ratio is:

(A) 0.260 for secondary air system monitors and other cold start related monitors utilizing a denominator incremented in accordance with section (d)(4.3.2)(E);

(B) For evaporative system monitors:

(i) 0.260 for monitors designed to detect malfunctions identified in section (e)(4.2.2)(C) (i.e., 0.020 inch leak detection); and

(ii) 0.520 for monitors designed to detect malfunctions identified in section (e)(4.2.2)(A) and (B) (i.e., purge flow and 0.040 inch leak detection);

(C) 0.336 for catalyst, oxygen sensor, EGR, VVT system, and all other monitors specifically required in sections (e) and (f) to meet the monitoring condition requirements of section (d)(3.2);

(D) For introductory years:

(i) through the 2007 model year, for the first three years a vehicle is certified to the in-use performance ratio monitoring requirements of section (d)(3.2), 0.100 for all monitors specified in section (d)(3.2.1)(A) through (C) above. For example, the 0.100 ratio shall apply to the 2004, 2005, and 2006 model years for vehicles first certified in the 2004 model year and to the 2007, 2008, and 2009 model years for, vehicles first certified in the 2007 model year.

(ii) through the 2014 model year, for fuel system air-fuel ratio cylinder imbalance monitors, 0.100;

(iii) through the 2011 model year, for secondary exhaust gas sensor monitors specified in (e)(7.2.2)(C), 0.100;

(iv) through the 2012 model year, for vehicles subject to the monitoring requirements of section (f), 0.100 for all monitors specified in section (d)(3.2.1)(C) above.

(3.2.2) In addition to meeting the requirements of section (d)(3.2.1), manufacturers shall implement software algorithms in the OBD II system to individually track and report in-use performance of the following monitors in the standardized format specified in section (d)(5):

a. Catalyst (section (e)(1.3) or, where applicable, (f)(1.3));

b. Oxygen/exhaust gas sensor (section (e)(7.3.1)(A) or, where applicable, (f)(5.3.1)(A));

c. Evaporative system (section (e)(4.3.2));

d. EGR system (section (e)(8.3.1)) and VVT system (section (e)(13.3) or, where applicable, (f)(6.3.1)(A), (f)(6.3.2), (f)(6.3.4), and, (f)(13.3));,

e. Secondary air system (section (e)(5.3.2)(B));

f. PM filter (section (f)(9.3));

g. NO[x] adsorber (section (f)(8.3.1)) and NO[x] catalyst (section (f)(2.3.1));

h. Secondary oxygen sensor (section (e)(7.3.2)(A)); and

i. Boost pressure control system (sections (f)(7.3.2) and (f)(7.3.3)).

The OBD II system is not required to track and report in-use performance for monitors other than those specifically identified above.

(3.2.3) Manufacturers may not use the calculated ratio (or any element thereof) or any other indication of monitor frequency as a monitoring condition for any monitor (e.g., using a low ratio to enable more frequent monitoring through diagnostic executive priority or modification of other monitoring conditions, or using a high ratio to enable less frequent monitoring).

(4) In-Use Monitor Performance Ratio Definition.

(4.1) For monitors required to meet the minimum in-use monitor performance ratio in section (d)(3.2.1), the ratio shall be calculated in accordance with the following specifications for the numerator, denominator, and ratio.

(4.2) Numerator Specifications

(4.2.1) Definition: The numerator is defined as a measure of the number of times a vehicle has been operated such that all monitoring conditions necessary for a specific monitor to detect a malfunction have been encountered.

(4.2.2) Specifications for incrementing:

(A) Except as provided for in sections (d)(4.2.2)(E) and (F), the numerator, when incremented, shall be incremented by an integer of one. The numerator may not be incremented more than once per driving cycle.

(B) The numerator for a specific monitor shall be incremented within ten seconds if and only if the following criteria are satisfied on a single driving cycle:

(i) Every monitoring condition necessary for the monitor of the specific component to detect a malfunction and store a pending fault code has been satisfied, including enable criteria, presence or absence of related fault codes, sufficient length of monitoring time, and diagnostic executive priority assignments (e.g., diagnostic "A" must execute prior to diagnostic "B", etc.). For the purpose of incrementing the numerator, satisfying all the monitoring conditions necessary for a monitor to determine the component is passing may not, by itself, be sufficient to meet this criteria;

(ii) For monitors that require multiple stages or events in a single driving cycle to detect a malfunction, every monitoring condition necessary for all events to have completed must be satisfied;

(iii) For monitors that require intrusive operation of components to detect a malfunction, a manufacturer shall request Executive Officer approval of the strategy used to determine that, had a malfunction been present, the monitor would have detected the malfunction. Executive Officer approval of the request shall be based on the equivalence of the strategy to actual intrusive operation and the ability of the strategy to accurately determine if every monitoring condition necessary for the intrusive event to occur was satisfied.

(iv) In addition to the requirements of section (d)(4.2.2)(B)(i) through (iii) above, the secondary air system monitor numerator(s) shall be incremented if and only if the criteria in section (B) above have been satisfied during normal operation of the secondary air system for vehicles that require monitoring during normal operation (sections (e)(5.2.2) through (5.2.4)). Monitoring during intrusive operation of the secondary air system later in the same driving cycle solely for the purpose of monitoring may not, by itself, be sufficient to meet this criteria.

(C) For monitors that can generate results in a "gray zone" or "non-detection zone" (i.e., results that indicate neither a passing system nor a malfunctioning system) or in a "non-decision zone" (e.g., monitors that increment and decrement counters until a pass or fail threshold is reached), the manufacturer shall submit a plan for appropriate incrementing of the numerator to the Executive Officer for review and approval. In general, the Executive Officer shall not approve plans that allow the numerator to be incremented when the monitor indicates a result in the "non-detection zone" or prior to the monitor

reaching a decision. In reviewing the plan for approval, the Executive Officer shall consider data and/or engineering evaluation submitted by the manufacturer demonstrating the expected frequency of results in the "non-detection zone" and the ability of the monitor to accurately determine if a monitor would have detected a malfunction instead of a result in the "non-detection zone" had an actual malfunction been present.

(D) For monitors that run or complete during engine off operation, the numerator shall be incremented within 10 seconds after the monitor has completed during engine off operation or during the first 10 seconds of engine start on the subsequent driving cycle.

(E) Except as specified in section (d)(4.2.2)(F) for exponentially weighted moving averages, manufacturers utilizing alternate statistical MIL illumination protocols as allowed in section (d)(2.2.6) for any of the monitors requiring a numerator shall submit a plan for appropriate incrementing of the numerator to the Executive Officer for review and approval. Executive Officer approval of the plan shall be conditioned upon the manufacturer providing supporting data and/or engineering evaluation for the proposed plan, the equivalence of the incrementing in the manufacturer's plan to the incrementing specified in section (d)(4.2.2) for monitors using the standard MIL illumination protocol, and the overall equivalence of the manufacturer's plan in determining that the minimum acceptable in-use performance ratio in section (d)(3.2.1) is satisfied.

(F) Manufacturers using an exponentially weighted moving average (EWMA) as the alternate statistical MIL illumination protocol approved in accordance with section (d)(2.2.6) shall increment the numerator as follows:

(i) Following a reset or erasure of the EWMA result, the numerator may not be incremented until after the requisite number of decisions necessary for MIL illumination have been fully executed.

(ii) After the number of decisions required in section (d)(4.2.2)(F)(i) above, the numerator, when incremented, shall be incremented by an integer of one and may not be incremented more than once per driving cycle. Incrementing of the numerator shall also be in accordance with sections (d)(4.2.2)(B), (C), and (D).

(4.3) Denominator Specifications

(4.3.1) Definition: The denominator is defined as a measure of the number of times a vehicle has been operated as defined in (d)(4.3.2).

(4.3.2) Specifications for incrementing:

(A) The denominator, when incremented, shall be incremented by an integer of one. The denominator may not be incremented more than once per driving cycle.

(B) The denominator for each monitor shall be incremented within ten seconds if and only if the following criteria are satisfied on a single driving cycle:

(i) Cumulative time since engine start is greater than or equal to 600 seconds while at an elevation of less than 8,000 feet above sea level and at an ambient temperature of greater than or equal to 20 degrees Fahrenheit;

(ii) Cumulative vehicle operation at or above 25 miles per hour occurs for greater than or equal to 300 seconds while at an elevation of less than 8,000 feet above sea level and at an ambient temperature of greater than or equal to 20 degrees Fahrenheit (medium-duty vehicles with diesel engines certified on an engine dynamometer may use cumulative operation at or above 15% calculated load in lieu of at or above 25 miles per hour for purposes of this criteria);

(iii) Continuous vehicle operation at idle (i.e., accelerator pedal released by driver and vehicle speed less than or equal to one mile per hour) for greater than or equal to 30 seconds while at an elevation of less than 8,000 feet above sea level and at an ambient temperature of greater than or equal to 20 degrees Fahrenheit;

(C) In addition to the requirements of section (d)(4.3.2)(B) above, the secondary air system monitor denominator(s) shall be incremented if and only if commanded "on" operation of the secondary air system occurs for a time greater than or equal to ten seconds. For purposes of determining this commanded "on" time, the OBD II system may not include time during intrusive operation of the secondary air system solely for the purposes of monitoring;

(D) In addition to the requirements of section (d)(4.3.2)(B) above, the evaporative system monitor denominator(s) shall be incremented if and only if:

(i) Cumulative time since engine start is greater than or equal to 600 seconds while at an ambient temperature of greater than or equal to 40 degrees Fahrenheit but less than or equal to 95 degrees Fahrenheit; and

(ii) Engine cold start occurs with engine coolant temperature at engine start greater than or equal to 40 degrees Fahrenheit but less than or equal to 95 degrees Fahrenheit and less than or equal to 12 degrees Fahrenheit higher than ambient temperature at engine start.

(E) In addition to the requirements of section (d)(4.3.2)(B) above, the denominator(s) for the following monitors shall be incremented if and only if the component or strategy is commanded "on" for a time greater than or equal to ten seconds:

(i) Heated catalyst (section (e)(2))

(ii) Cold Start Emission Reduction Strategy (sections (e)(11) and (f)(12))

(iii) Components or systems that operate only at engine start-up (e.g., glow plugs, intake air heaters, etc.) and are subject

to monitoring under "other emission control or source devices" (sections (e)(16) and (f)(16)) or comprehensive component output components (sections (e)(15) and (f)(15))

For purposes of determining this commanded "on" time, the OBD II system may not include time during intrusive operation of any of the components or strategies later in the same driving cycle solely for the purposes of monitoring.

(F) In addition to the requirements of section (d)(4.3.2)(B) above, the denominator(s) for the following monitors of output components (except those operated only at engine start-up and subject to the requirements of the previous section (d)(4.3.2)(E)) shall be incremented if and only if the component is commanded to function (e.g., commanded "on", "open", "closed", "locked", etc.) on two or more occasions for greater than two seconds during the driving cycle or for a cumulative time greater than or equal to ten seconds, whichever occurs first:

(i) Air conditioning system (section (e)(12))

(ii) Variable valve timing and/or control system (sections (e)(13) and (f)(13))

(iii) "Other emission control or source device" (sections (e)(16) and (f)(16))

(iv) Comprehensive component output component (sections (e)(15) and (f)(15)) (e.g., turbocharger waste-gates, variable length manifold runners, torque converter clutch lock-up solenoids, etc.)

(G) For the following monitors, the denominator(s) shall be incremented by one if and only if, in addition to meeting the requirements of section (d)(4.3.2)(B) on at least one driving cycle, at least 500 cumulative miles of vehicle operation have been experienced since the last time the denominator was incremented:

(i) Diesel NMHC converting catalyst (section (f)(1))

(ii) Diesel PM filter (section (f)(9))

(H) For monitors of the following components, the manufacturer may request Executive Officer approval to use alternate or additional criteria to that set forth in section (d)(4.3.2)(B) above for incrementing the denominator. Executive Officer approval of the proposed criteria shall be based on the equivalence of the proposed criteria in measuring the frequency of monitor operation relative to the amount of vehicle operation in accordance with the criteria in section (d)(4.3.2)(B) above:

(i) Engine cooling system input components (sections (e)(10) and (f)(11))

(ii) Air conditioning system input components (section (e)(12))

(iii) Direct ozone reduction systems (section (e)(14))

(iv) "Other emission control or source devices" (sections (e)(16) and (f)(16))

(v) Comprehensive component input components that require extended monitoring evaluation (sections (e)(15) and (f)(15)) (e.g., stuck fuel level sensor rationality)

(vi) Comprehensive component input component temperature sensor rationality monitors (sections (e)(15) and (f)(15)) (e.g, intake air temperature sensor, ambient temperature sensor, fuel temperature sensor)

(I) For hybrid vehicles, vehicles that employ alternate engine start hardware or strategies (e.g., integrated starter and generators), or alternate fuel vehicles (e.g., dedicated, bi-fuel, or dual-fuel applications), the manufacturer may request Executive Officer approval to use alternate criteria to that set forth in section (d)(4.3.2)(B) above for incrementing the denominator. In general, the Executive Officer shall not approve alternate criteria for vehicles that only employ engine shut off at or near idle/vehicle stop conditions. Executive Officer approval of the alternate criteria shall be based on the equivalence of the alternate criteria to determine the amount of vehicle operation relative to the measure of conventional vehicle operation in accordance with the criteria in section (d)(4.3.2)(B) above.

(4.4) Ratio Specifications

(4.4.1) Definition: The ratio is defined as the numerator divided by the denominator.

(4.5) Disablement of Numerators and Denominators

(4.5.1) Within ten seconds of a malfunction that disables a monitor required to meet the monitoring conditions in section (d)(3.2.1) being detected (i.e., a pending or confirmed code is stored), the OBD II system shall disable further incrementing of the corresponding numerator and denominator for each monitor that is disabled. When the malfunction is no longer detected (i.e., the pending code is erased through self-clearing or through a scan tool command), incrementing of all corresponding numerators and denominators shall resume within ten seconds.

(4.5.2) Within ten seconds of the start of a PTO (see section (c)) operation that disables a monitor required to meet the monitoring conditions in section (d)(3.2.1), the OBD II system shall disable further incrementing of the corresponding numerator and denominator for each monitor that is disabled. When the PTO operation ends, incrementing of all corresponding numerators and denominators shall resume within ten seconds.

(4.5.3) The OBD II system shall disable further incrementing of all numerators and denominators within ten seconds if a malfunction of any component used to determine if the criteria in sections (d)(4.3.2)(B) through (D) are satisfied (i.e., vehicle speed, ambient temperature, elevation, idle operation, engine cold start, or time of operation) has been detected and the corre-

sponding pending fault code has been stored. Incrementing of all numerators and denominators shall resume within ten seconds when the malfunction is no longer present (e.g., pending code erased through self-clearing or by a scan tool command).

(5) Standardized tracking and reporting of monitor performance.

(5.1) For monitors required to track and report in-use monitor performance in section (d)(3.2.2), the performance data shall be tracked and reported in accordance with the specifications in sections (d)(4), (d)(5), and (g)(5). The OBD II system shall separately report an in-use monitor performance numerator and denominator for each of the following components: catalyst bank 1, catalyst bank 2, primary oxygen/exhaust gas sensor bank 1, primary oxygen/exhaust gas sensor bank 2, evaporative 0.020 inch leak detection system, EGR/VVT system, secondary air system, PM filter, NO[x] aftertreatment (e.g., NO[x] adsorber, NO[x] catalyst), secondary oxygen sensor, and boost pressure control system. The OBD II system shall also report a general denominator and an ignition cycle counter in the standardized format specified in sections (d)(5.5), (d)(5.6) and (g)(5).

(5.2) Numerator

(5.2.1) The OBD II system shall report a separate numerator for each of the components listed in section (d)(5.1).

(5.2.2) For specific components or systems that have multiple monitors that are required to be reported under sections (e) or (f) (e.g., oxygen sensor bank 1 may have multiple monitors for sensor response or other sensor characteristics), the OBD II system shall separately track numerators and denominators for each of the specific monitors and report only the corresponding numerator and denominator for the specific monitor that has the lowest numerical ratio. If two or more specific monitors have identical ratios, the corresponding numerator and denominator for the specific monitor that has the highest denominator shall be reported for the specific component.

(5.2.3) The numerator(s) shall be reported in accordance with the specifications in section (g)(5.2.1).

(5.3) Denominator

(5.3.1) The OBD II system shall report a separate denominator for each of the components listed in section (d)(5.1).

(5.3.2) The denominator(s) shall be reported in accordance with the specifications in section (g)(5.2.1).

(5.4) Ratio

(5.4.1) For purposes of determining which corresponding numerator and denominator to report as required in section (d)(5.2.2), the ratio shall be calculated in accordance with the specifications in section (g)(5.2.2).

(5.5) Ignition cycle counter

(5.5.1) Definition:

(A) The ignition cycle counter is defined as a counter that indicates the number of ignition cycles a vehicle has experienced as defined in section (d)(5.5.2)(B).

(B) The ignition cycle counter shall be reported in accordance with the specifications in section (g)(5.2.1).

(5.5.2) Specifications for incrementing:

(A) The ignition cycle counter, when incremented, shall be incremented by an integer of one. The ignition cycle counter may not be incremented more than once per driving cycle.

(B) The ignition cycle counter shall be incremented within ten seconds if and only if the vehicle meets the engine start definition (see section (c)) for at least two seconds plus or minus one second.

(C) The OBD II system shall disable further incrementing of the ignition cycle counter within ten seconds if a malfunction of any component used to determine if the criteria in section (d)(5.5.2)(B) are satisfied (i.e., engine speed or time of operation) has been detected and the corresponding pending fault code has been stored. The ignition cycle counter may not be disabled from incrementing for any other condition. Incrementing of the ignition cycle counter shall resume within ten seconds when the malfunction is no longer present (e.g., pending code erased through self-clearing or by a scan tool command).

(5.6) General Denominator

(5.6.1) Definition:

(A) The general denominator is defined as a measure of the number of times a vehicle has been operated as defined in section (d)(5.6.2)(B).

(B) The general denominator shall be reported in accordance with the specifications in section (g)(5.2.1).

(5.6.2) Specifications for incrementing:

(A) The general denominator, when incremented, shall be incremented by an integer of one. The general denominator may not be incremented more than once per driving cycle.

(B) The general denominator shall be incremented within ten seconds if and only if the criteria identified in section (d)(4.3.2)(B) are satisfied on a single driving cycle.

(C) The OBD II system shall disable further incrementing of the general denominator within ten seconds if a malfunction of any component used to determine if the criteria in section (d)(4.3.2)(B) are satisfied (i.e., vehicle speed, ambient tempera-

ture, elevation, idle operation, or time of operation) has been detected and the corresponding pending fault code has been stored. The general denominator may not be disabled from incrementing for any other condition (e.g., the disablement criteria in sections (d)(4.5.1) and (d)(4.5.2) may not disable the general denominator). Incrementing of the general denominator shall resume within ten seconds when the malfunction is no longer present (e.g., pending code erased through self-clearing or by a scan tool command).

(6) Malfunction Criteria Determination for Diesel Vehicles.

(6.1) For 2010 and subsequent model year medium-duty vehicles certified to an engine dynamometer exhaust emission standard, in determining the malfunction criteria for diesel engine monitors in section (f) that are required to indicate a malfunction before emissions exceed an emission threshold based on the applicable standard, the manufacturer shall:

(6.1.1) Use the emission test cycle and standard (i.e., FTP or SET) determined by the manufacturer, through use of data and/or engineering analysis, to be more stringent (i.e., to result in higher emissions with the same level of monitored component malfunction) as the "applicable standard".

(6.1.2) Identify in the certification documentation required under section (i) the test cycle and standard determined by the manufacturer to be more stringent for each applicable monitor.

(6.1.3) If the Executive Officer reasonably believes that a manufacturer has incorrectly determined the test cycle and standard that is more stringent, the Executive Officer shall require the manufacturer to provide emission data and/or engineering analysis showing that the other test cycle and standard are less stringent.

(6.2) For 2007 and subsequent model year light-duty and medium-duty vehicles equipped with emission controls that experience infrequent regeneration events (e.g., active PM filter regeneration, NO[x] adsorber desulfation), a manufacturer shall adjust the emission test results that are used to determine the malfunction criterion for monitors that are required to indicate a malfunction before emissions exceed a certain emission threshold. For each monitor on medium-duty vehicles using engines certified on an engine dynamometer, the manufacturer shall adjust the emission result using the procedure described in CFR title 40, part 86.004-28(i) with the component for which the malfunction criteria is being established deteriorated to the malfunction threshold. For light-duty and medium-duty vehicles certified on a chassis dynamometer, the manufacturer shall submit a plan for Executive Officer approval to adjust the emission results using an approach similar to the procedure described in CFR title 40, part 86.004-28(i). Executive Officer approval shall be based on the effectiveness of the proposed plan to quantify the emission impact and frequency of regeneration events. The adjusted emission value shall be used for purposes of determining whether or not the specified emission threshold is exceeded (e.g., a malfunction must be detected before the adjusted emission value exceeds 1.5 times any applicable standard).

(6.2.1) For purposes of section (d)(6.2), "regeneration" means an event during which emission levels change while the emission control performance is being restored by design.

(6.2.2) For purposes of section (d)(6.2), "infrequent" means having an expected frequency of less than once per FTP cycle.

(6.2.3) Except as specified in section (d)(6.2.4) for NMHC catalyst monitoring, for 2007 through 2009 model year vehicles, in lieu of establishing the adjustment factor for each monitor with the component for which the malfunction criteria is being established deteriorated to the malfunction threshold as required in section (d)(6.2), the manufacturer may use the adjustment factor established for certification (e.g., without components deteriorated to the malfunction threshold).

(6.2.4) For NMHC catalyst monitoring (section (f)(1)) on 2008 and subsequent model year vehicles, a manufacturer shall establish the adjustment factor for the NMHC catalyst monitor with the NMHC catalyst deteriorated to the malfunction threshold as required in section (d)(6.2). In lieu of establishing this adjustment factor for 2008 and 2009 model year vehicles, a manufacturer may provide emission data demonstrating that the worst case emission levels from a deteriorated NMHC catalyst are below the malfunction threshold specified in section (f)(1.2.2). The demonstration shall include emission testing with a NMHC catalyst deteriorated to the malfunction threshold or worse and with both the infrequent regeneration event occurring and without it occurring. The manufacturer shall calculate the worst case emission level by applying the frequency factor ("F" as calculated according to CFR, title 40, part 86.004-28(i)) of the infrequent regeneration event used for tailpipe certification to the measured emissions with the infrequent regeneration event occurring and adding that result to the measured emissions without the infrequent regeneration event occurring. This calculated final sum shall be used as the adjusted emission level and compared to the malfunction threshold for purposes of determining compliance with the monitoring requirements. The manufacturer shall submit a test plan for Executive Officer approval describing the emission testing procedure and how the worst case components will be established. The Executive Officer shall approve it upon finding the test procedure and components used will likely generate a worst case emission level.

(6.2.5) For purposes of determining the adjustment factors for each monitor, the manufacturer shall submit engineering data, analysis, and/or emission data to the Executive Officer for approval. The Executive Officer shall approve the factors upon finding the submitted information supports the adjustment factors.

(6.2.6) For purposes of enforcement testing in accordance with section (d)(7) and title 13, CCR section 1968.5, the adjustment factors established for each monitor by the manufacturer according to section (d)(6.2) shall be used when determining

compliance with emission thresholds.

(6.3) For every 2007 through 2012 model year light-duty vehicle test group certified to the higher allowable emission thresholds specified in section (f) (e.g., 5.0 or 3.0 times the applicable standards for NMHC converting catalyst monitoring) for vehicles prior to the 2013 model year:

(6.3.1) The manufacturer shall conduct in-use enforcement testing for compliance with the tailpipe emission standards in accordance with title 13, CCR sections 2136 through 2140. Within six months after OBD II certification of a test group, the manufacturer shall submit a plan for conducting the testing to the Executive Officer for approval. The Executive Officer shall approve the plan upon determining that the testing will be done in accordance with the procedures used by ARB when conducting such testing, that the plan will allow for a valid sample of at least 10 vehicles in the mileage range of 30,000 to 40,000 miles for comparison to the FTP intermediate (e.g., 50,000 mile) useful life standard and at least 10 vehicles in the mileage range of 90,000 to 100,000 miles for comparison to the FTP full useful life standard, and that copies of all records and data collected during the program will be provided to ARB. Manufacturers may also submit testing plans and supporting data for Executive Officer approval that differ from compliance testing under title 13, CCR, sections 2136 through 2140. The Executive Officer shall also approve the plans upon determining that the plan provides equivalent assurance in verifying vehicles are meeting the tailpipe emission standards within the useful life. The Executive Officer may use the submitted data in lieu of or in addition to data collected pursuant to title 13, CCR section 2139 for purposes of the notification and use of test results described in title 13, CCR section 2140; and

(6.3.2) The certification shall be conditioned upon the manufacturer agreeing that, for any test group(s) determined to be noncompliant in accordance with title 13, CCR section 2140 or title 13, CCR section 1968.5, the Executive Officer shall determine the excess emissions caused by the noncompliance and the manufacturer shall fund a program(s) that will offset any such excess emissions.

(7) Enforcement Testing.

(7.1) The procedures used to assure compliance with the requirements of title 13, CCR section 1968.2 are set forth in title 13, CCR section 1968.5.

(7.2) Consistent with the requirements of title 13, CCR section 1968.5(b)(4)(A) for enforcement OBD II emission testing, the manufacturer shall make available upon request by the Executive Officer all test equipment (e.g., malfunction simulators, deteriorated "threshold" components, etc.) necessary to determine the malfunction criteria in sections (e) and (f) for major monitors subject to OBD II emission testing as defined in title 13, CCR section 1968.5. To meet the requirements of this section, the manufacturers shall only be required to make available test equipment necessary to duplicate "threshold" testing performed by the manufacturer. This test equipment shall include, but is not limited to, aged "threshold" catalyst systems and computer equipment used to simulate misfire, oxygen sensor, fuel system, VVT system, and cold start reduction strategy system faults. The manufacturer is not required to make available test equipment for vehicles that exceed the applicable full useful life age (e.g., 10 years for vehicles certified to a full useful life of 10 years and 100,000 miles).

(e) Monitoring Requirements for Gasoline/Spark-Ignited Engines.

(1) Catalyst Monitoring

(1.1) Requirement: The OBD II system shall monitor the catalyst system for proper conversion capability.

(1.2) Malfunction Criteria:

(1.2.1) Low Emission Vehicle I applications: The OBD II system shall detect a catalyst system malfunction when the catalyst system's conversion capability decreases to the point that either of the following occurs:

(A) Non-Methane Organic Gas (NMOG) emissions exceed 1.75 times the FTP full useful life standards to which the vehicle has been certified with NMOG emissions multiplied by the certification reactivity adjustment factor for the vehicle;

(B) The average FTP test Non-Methane Hydrocarbon (NMHC) conversion efficiency of the monitored portion of the catalyst system falls below 50 percent (i.e., the cumulative NMHC emissions measured at the outlet of the monitored catalyst(s) are more than 50 percent of the cumulative engine-out emissions measured at the inlet of the catalyst(s)). With Executive Officer approval, manufacturers may use a conversion efficiency malfunction criteria of less than 50 percent if the catalyst system is designed such that the monitored portion of the catalyst system must be replaced along with an adjacent portion of the catalyst system sufficient to ensure that the total portion replaced will meet the 50 percent conversion efficiency criteria. Executive Officer approval shall be based on data and/or engineering evaluation demonstrating the conversion efficiency of the monitored portion and the total portion designed to be replaced, and the likelihood of the catalyst system design to ensure replacement of the monitored and adjacent portions of the catalyst system.

(1.2.2) Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles:

(A) 2004 model year vehicles.

(i) All LEV II, ULEV II, and MDV SULEV II vehicles shall use the malfunction criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1).

(ii) All PC/LDT SULEV II vehicles shall use the malfunction criteria specified for Low Emission Vehicle I applications in

section (e)(1.2.1) except the malfunction criterion in paragraph (e)(1.2.1)(A) shall be 2.5 times the applicable FTP full useful life NMOG standard.

(B) Except as provided below in section (e)(1.2.4), for 2005 through 2008 model years, the OBD II system shall detect a catalyst system malfunction when the catalyst system's conversion capability decreases to the point that any of the following occurs:

(i) For all vehicles other than PC/LDT SULEV II vehicles.

a. NMOG emissions exceed the criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1)(A).

b. The average FTP test NMHC conversion efficiency is below the criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1)(B).

c. Oxides of nitrogen (NO[x]) emissions exceed 3.5 times the FTP full useful life NO[x] standard to which the vehicle has been certified.

(ii) PC/LDT SULEV II vehicles shall use the same malfunction criteria as 2005 through 2008 model year LEV II, ULEV II, and MDV SULEV II vehicles (section (e)(1.2.2)(B)(i)) except the malfunction criteria in paragraph a. shall be 2.5 times the applicable FTP full useful life NMOG standard.

(C) Except as provided below in section (e)(1.2.5), for 2009 and subsequent model years, the OBD II system shall detect a catalyst system malfunction when the catalyst system's conversion capability decreases to the point that any of the following occurs.

(i) For all vehicles other than PC/LDT SULEV II vehicles.

a. NMOG emissions exceed the criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1)(A).

b. The average FTP test NMHC conversion efficiency is below the criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1)(B).

c. NO[x] emissions exceed 1.75 times the FTP full useful life NO[x] standard to which the vehicle has been certified.

(ii) For PC/LDT SULEV II vehicles.

a. NMOG emissions exceed 2.5 times the applicable FTP full useful life NMOG standard to which the vehicle has been certified.

b. The average FTP test NMHC conversion efficiency is below the criteria specified for Low Emission Vehicle I applications in section (e)(1.2.1)(B).

c. NO[x] emissions exceed 2.5 times the applicable FTP full useful life NO[x] standard to which the vehicle has been certified.

(1.2.3) 2004 through 2008 model year non-Low Emission Vehicle I or II applications: The OBD II system shall detect a catalyst system malfunction when the catalyst system's conversion capability decreases to the point that NMHC emissions increase by more than 1.5 times the applicable FTP full useful life standards over an FTP test performed with a representative 4000 mile catalyst system.

(1.2.4) In lieu of using the malfunction criteria in section (e)(1.2.2)(B) for all 2005 and 2006 model year Low Emission Vehicle II applications, a manufacturer may phase-in the malfunction criteria on a portion of its Low Emission Vehicle II applications as long as that portion of Low Emission Vehicle II applications comprises at least 30 percent of all 2005 model year vehicles and 60 percent of all 2006 model year vehicles. For 2005 and 2006 model year Low Emission Vehicle II applications not included in the phase-in, the malfunction criteria in section (e)(1.2.2)(A) shall be used.

(1.2.5) In lieu of using the malfunction criteria in section (e)(1.2.2)(C) for all 2009 model year vehicles, for the 2009 model year only, a manufacturer may continue to use the malfunction criteria in section (e)(1.2.2)(B) for any vehicles previously certified in the 2005, 2006, 2007, or 2008 model year to the malfunction criteria in section (e)(1.2.2.)(B) and carried over to the 2009 model year.

(1.2.6) For purposes of determining the catalyst system malfunction criteria in sections (e)(1.2.1), (1.2.2)(A), and (1.2.3), the malfunction criteria shall be established by using a catalyst system with all monitored catalysts simultaneously deteriorated to the malfunction criteria while unmonitored catalysts shall be deteriorated to the end of the vehicle's full useful life.

(1.2.7) For purposes of determining the catalyst system malfunction criteria in sections (e)(1.2.2)(B) and (C):

(A) The manufacturer shall use a catalyst system deteriorated to the malfunction criteria using methods established by the manufacturer to represent real world catalyst deterioration under normal and malfunctioning operating conditions.

(B) Except as provided below in section (e)(1.2.7)(C), the malfunction criteria shall be established by using a catalyst system with all monitored and unmonitored (downstream of the sensor utilized for catalyst monitoring) catalysts simultaneously deteriorated to the malfunction criteria.

(C) For vehicles using fuel shutoff to prevent over-fueling during misfire conditions (see section (e)(3.4.1)(D)), the malfunction criteria shall be established by using a catalyst system with all monitored catalysts simultaneously deteriorated to the

malfunction criteria while unmonitored catalysts shall be deteriorated to the end of the vehicle's full useful life.

(1.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(1.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (e)(1.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(1.4) MIL Illumination and Fault Code Storage:

(1.4.1) General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(1.4.2) The monitoring method for the catalyst(s) shall be capable of detecting when a catalyst fault code has been cleared (except OBD II system self-clearing), but the catalyst has not been replaced (e.g., catalyst overtemperature approaches may not be acceptable).

(2) Heated Catalyst Monitoring

(2.1) Requirement:

(2.1.1) The OBD II system shall monitor all heated catalyst systems for proper heating.

(2.1.2) The efficiency of heated catalysts shall be monitored in conjunction with the requirements of section (e)(1).

(2.2) Malfunction Criteria:

(2.2.1) The OBD II system shall detect a catalyst heating system malfunction when the catalyst does not reach its designated heating temperature within a requisite time period after engine starting. The manufacturer shall determine the requisite time period, but the time period may not exceed the time that would cause emissions from a vehicle equipped with the heated catalyst system to exceed 1.75 times any of the applicable FTP full useful life standards.

(2.2.2) Manufacturers may use other monitoring strategies for the heated catalyst but must submit the alternate plan to the Executive Officer for approval. The Executive Officer shall approve alternate strategies for monitoring heated catalyst systems based on comparable reliability and timeliness to these requirements in detecting a catalyst heating malfunction.

(2.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(2.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(2.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(3) Misfire Monitoring

(3.1) Requirement:

(3.1.1) The OBD II system shall monitor the engine for misfire causing catalyst damage and misfire causing excess emissions.

(3.1.2) The OBD II system shall identify the specific cylinder that is experiencing misfire. Manufacturers may request Executive Officer approval to store a general misfire fault code instead of a cylinder specific fault code under certain operating conditions. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that the misfiring cylinder cannot be reliably identified when the conditions occur.

(3.1.3) If more than one cylinder is misfiring, a separate fault code shall be stored indicating that multiple cylinders are misfiring except as allowed below. When identifying multiple cylinder misfire, the manufacturer is not required to also identify each of the misfiring cylinders individually through separate fault codes. For 2005 and subsequent model year vehicles, if more than 90 percent of the detected misfires occur in a single cylinder, the manufacturer may elect to store the appropriate fault code indicating the specific misfiring cylinder in lieu of the multiple cylinder misfire fault code. If, however, two or more cylinders individually have more than 10 percent of the total number of detected misfires, a multiple cylinder fault code must be stored.

(3.2) Malfunction Criteria: The OBD II system shall detect a misfire malfunction pursuant to the following:

(3.2.1) Misfire causing catalyst damage:

(A) Manufacturers shall determine the percentage of misfire evaluated in 200 revolution increments for each engine speed and load condition that would result in a temperature that causes catalyst damage. The manufacturer shall submit documentation to support this percentage of misfire as required in section (i)(2.5). For every engine speed and load condition that this percentage of misfire is determined to be lower than five percent, the manufacturer may set the malfunction criteria at five percent.

(B) Subject to Executive Officer approval, a manufacturer may employ a longer interval than 200 revolutions but only for determining, on a given driving cycle, the first misfire exceedance as provided in section (e)(3.4.1)(A) below. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that catalyst damage would not occur due to unacceptably high catalyst temperatures before the interval has elapsed.

(C) A misfire malfunction shall be detected if the percentage of misfire established in section (e)(3.2.1)(A) is exceeded.

(D) For purposes of establishing the temperature at which catalyst damage occurs as required in section (e)(3.2.1)(A), on 2005 and subsequent model year vehicles, manufacturers may not define catalyst damage at a temperature more severe than what the catalyst system could be operated at for ten consecutive hours and still meet the applicable FTP full useful life standards.

(3.2.2) Misfire causing emissions to exceed 1.5 times the FTP standards:

(A) Manufacturers shall determine the percentage of misfire evaluated in 1000 revolution increments that would cause emissions from an emission durability demonstration vehicle to exceed 1.5 times any of the applicable FTP standards if the percentage of misfire were present from the beginning of the test. To establish this percentage of misfire, the manufacturer shall utilize misfire events occurring at equally spaced, complete engine cycle intervals, across randomly selected cylinders throughout each 1000-revolution increment. If this percentage of misfire is determined to be lower than one percent, the manufacturer may set the malfunction criteria at one percent.

(B) Subject to Executive Officer approval, a manufacturer may employ other revolution increments. The Executive Officer shall grant approval upon determining that the manufacturer has demonstrated that the strategy would be equally effective and timely in detecting misfire.

(C) A malfunction shall be detected if the percentage of misfire established in section (3.2.2)(A) is exceeded regardless of the pattern of misfire events (e.g., random, equally spaced, continuous, etc.).

(3.3) Monitoring Conditions:

(3.3.1) Manufacturers shall continuously monitor for misfire under the following conditions:

(A) From no later than the end of the second crankshaft revolution after engine start,

(B) While under positive torque conditions during the rise time and settling time for engine speed to reach the desired idle engine speed at engine start-up (i.e., "flare-up" and "flare-down"), and

(C) Under all positive torque engine speeds and load conditions except within the following range: the engine operating region bound by the positive torque line (i.e., engine load with the transmission in neutral), and the two following engine operating points: an engine speed of 3000 rpm with the engine load at the positive torque line, and the redline engine speed (defined in section (c)) with the engine's manifold vacuum at four inches of mercury lower than that at the positive torque line.

(3.3.2) If a monitoring system cannot detect all misfire patterns under all required engine speed and load conditions as required in section (e)(3.3.1) above, the manufacturer may request Executive Officer approval to accept the monitoring system. In evaluating the manufacturer's request, the Executive Officer shall consider the following factors: the magnitude of the region(s) in which misfire detection is limited, the degree to which misfire detection is limited in the region(s) (i.e., the probability of detection of misfire events), the frequency with which said region(s) are expected to be encountered in-use, the type of misfire patterns for which misfire detection is troublesome, and demonstration that the monitoring technology employed is not inherently incapable of detecting misfire under required conditions (i.e., compliance can be achieved on other engines). The evaluation shall be based on the following misfire patterns: equally spaced misfire occurring on randomly selected cylinders, single cylinder continuous misfire, and paired cylinder (cylinders firing at the same crank angle) continuous misfire.

(3.3.3) A manufacturer may request Executive Officer approval of a monitoring system that has reduced misfire detection capability during the portion of the first 1000 revolutions after engine start that a cold start emission reduction strategy that reduces engine torque (e.g., spark retard strategies) is active. The Executive Officer shall approve the request upon determining that the manufacturer has demonstrated that the probability of detection is greater than or equal to 75 percent during the worst case condition (i.e., lowest generated torque) for a vehicle operated continuously at idle (park/neutral idle) on a cold start between 50-86 degrees Fahrenheit and that the technology cannot reliably detect a higher percentage of the misfire events during the conditions.

(3.3.4) A manufacturer may request Executive Officer approval to disable misfire monitoring or employ an alternate malfunction criterion when misfire cannot be distinguished from other effects.

(A) Upon determining that the manufacturer has presented documentation that demonstrates the disablement interval or period of use of an alternate malfunction criterion is limited only to that necessary for avoiding false detection, the Executive Officer shall approve the disablement or use of the alternate malfunction criterion for conditions involving:

(i) rough road,

(ii) fuel cut,

(iii) gear changes for manual transmission vehicles,

(iv) traction control or other vehicle stability control activation such as anti-lock braking or other engine torque modifications to enhance vehicle stability,

(v) off-board control or intrusive activation of vehicle components or diagnostics during service or assembly plant testing,

(vi) portions of intrusive evaporative system or EGR diagnostics that can significantly affect engine stability (i.e., while

the purge valve is open during the vacuum pull-down of a evaporative system leak check but not while the purge valve is closed and the evaporative system is sealed or while an EGR diagnostic causes the EGR valve to be intrusively cycled on and off during positive torque conditions), or

(vii) engine speed, load, or torque transients due to throttle movements more rapid than occurs over the US06 cycle for the worst case vehicle within each test group.

(B) Additionally, the Executive Officer will approve a manufacturer's request in accordance with sections (e)(17.3), (17.4), and (17.6) to disable misfire monitoring when fuel level is 15 percent or less of the nominal capacity of the fuel tank, when PTO units are active, or while engine coolant temperature is below 20 degrees Fahrenheit. The Executive Officer will approve a request to continue disablement on engine starts when engine coolant temperature is below 20 degrees Fahrenheit at engine start until engine coolant temperature exceeds 70 degrees Fahrenheit.

(C) In general, for 2005 and subsequent model year vehicles, the Executive Officer shall not approve disablement for conditions involving normal air conditioning compressor cycling from on-to-off or off-to-on, automatic transmission gear shifts (except for shifts occurring during wide open throttle operation), transitions from idle to off-idle, normal engine speed or load changes that occur during the engine speed rise time and settling time (i.e., "flare-up" and "flare-down") immediately after engine starting without any vehicle operator-induced actions (e.g., throttle stabs), or excess acceleration (except for acceleration rates that exceed the maximum acceleration rate obtainable at wide open throttle while the vehicle is in gear due to abnormal conditions such as slipping of a clutch).

(D) The Executive Officer may approve misfire monitoring disablement or use of an alternate malfunction criterion for any other condition on a case by case basis upon determining that the manufacturer has demonstrated that the request is based on an unusual or unforeseen circumstance and that it is applying the best available computer and monitoring technology.

(3.3.5) For engines with more than eight cylinders that cannot meet the requirements of section (e)(3.3.1), a manufacturer may request Executive Officer approval to use alternative misfire monitoring conditions. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation which demonstrate that misfire detection throughout the required operating region cannot be achieved when employing proven monitoring technology (i.e., a technology that provides for compliance with these requirements on other engines) and provided misfire is detected to the fullest extent permitted by the technology. However, the Executive Officer may not grant the request if the misfire detection system is unable to monitor during all positive torque operating conditions encountered during an FTP cycle.

(3.4) MIL Illumination and Fault Code Storage:

(3.4.1) Misfire causing catalyst damage. Upon detection of the percentage of misfire specified in section (e)(3.2.1) above, the following criteria shall apply for MIL illumination and fault code storage:

(A) Pending fault codes

(i) A pending fault code shall be stored immediately if, during a single driving cycle, the specified percentage of misfire is exceeded three times when operating in the positive torque region encountered during an FTP cycle or is exceeded on a single occasion when operating at any other engine speed and load condition in the positive torque region defined in section (e)(3.3.1).

(ii) Immediately after a pending fault code is stored as specified in section (e)(3.4.1)(A)(i) above, the MIL shall blink once per second at all times while misfire is occurring during the driving cycle.

a. The MIL may be extinguished during those times when misfire is not occurring during the driving cycle.

b. If, at the time a misfire malfunction occurs, the MIL is already illuminated for a malfunction other than misfire, the MIL shall blink as previously specified in section (e)(3.4.1)(A)(ii) while misfire is occurring. If misfiring ceases, the MIL shall stop blinking but remain illuminated as required by the other malfunction.

(B) Confirmed fault codes

(i) If a pending fault code for exceeding the percentage of misfire set forth in section (e)(3.2.1) is stored, the OBD II system shall immediately store a confirmed fault code if the percentage of misfire specified in section (e)(3.2.1) is again exceeded one or more times during either: (a) the driving cycle immediately following the storage of the pending fault code, regardless of the conditions encountered during the driving cycle; or (b) on the next driving cycle in which similar conditions (see section (c)) to the engine conditions that occurred when the pending fault code was stored are encountered.

(ii) If a pending fault code for exceeding the percentage of misfire set forth in section (e)(3.2.2) is stored from a previous drive cycle, the OBD II system shall immediately store a confirmed fault code if the percentage of misfire specified in section (e)(3.2.1) is exceeded one or more times regardless of the conditions encountered.

(iii) Upon storage of a confirmed fault code, the MIL shall blink as specified in subparagraph (e)(3.4.1)(A)(ii) above as long as misfire is occurring and the MIL shall remain continuously illuminated if the misfiring ceases.

(C) Erasure of pending fault codes

Pending fault codes shall be erased at the end of the next driving cycle in which similar conditions to the engine condi-

tions that occurred when the pending fault code was stored have been encountered without any exceedance of the specified percentage of misfire. The pending code may also be erased if similar driving conditions are not encountered during the next 80 driving cycles subsequent to the initial detection of a malfunction.

(D) Exemptions for vehicles with fuel shutoff and default fuel control. Notwithstanding sections (e)(3.4.1)(A) and (B) above, in vehicles that provide for fuel shutoff and default fuel control to prevent over fueling during catalyst damage misfire conditions, the MIL need not blink. Instead, the MIL may illuminate continuously in accordance with the requirements for continuous MIL illumination in sections (e)(3.4.1)(B)(iii) above upon detection of misfire, provided that the fuel shutoff and default control are activated as soon as misfire is detected. Fuel shutoff and default fuel control may be deactivated only to permit fueling outside of the misfire range. Manufacturers may also periodically, but not more than once every 30 seconds, deactivate fuel shutoff and default fuel control to determine if the specified percentage of misfire for catalyst damage is still being exceeded. Normal fueling and fuel control may be resumed if the specified percentage of misfire for catalyst damage is no longer being exceeded.

(E) Manufacturers may request Executive Officer approval of strategies that continuously illuminate the MIL in lieu of blinking the MIL during extreme catalyst damage misfire conditions (i.e., catalyst damage misfire occurring at all engine speeds and loads). Executive Officer approval shall be granted upon determining that the manufacturer employs the strategy only when catalyst damage misfire levels cannot be avoided during reasonable driving conditions and the manufacturer has demonstrated that the strategy will encourage operation of the vehicle in conditions that will minimize catalyst damage (e.g., at low engine speeds and loads).

(3.4.2) Misfire causing emissions to exceed 1.5 times the FTP standards. Upon detection of the percentage of misfire specified in section (e)(3.2.2), the following criteria shall apply for MIL illumination and fault code storage:

(A) Misfire within the first 1000 revolutions after engine start.

(i) A pending fault code shall be stored no later than after the first exceedance of the specified percentage of misfire during a single driving cycle if the exceedance occurs within the first 1000 revolutions after engine start (defined in section (c)) during which misfire detection is active.

(ii) If a pending fault code is stored, the OBD II system shall illuminate the MIL and store a confirmed fault code within ten seconds if an exceedance of the specified percentage of misfire is again detected in the first 1000 revolutions during any subsequent driving cycle, regardless of the conditions encountered during the driving cycle.

(iii) The pending fault code shall be erased at the end of the next driving cycle in which similar conditions to the engine conditions that occurred when the pending fault code was stored have been encountered without an exceedance of the specified percentage of misfire. The pending code may also be erased if similar conditions are not encountered during the next 80 driving cycles immediately following the initial detection of the malfunction.

(B) Exceedances after the first 1000 revolutions after engine start.

(i) A pending fault code shall be stored no later than after the fourth exceedance of the percentage of misfire specified in section (e)(3.2.2) during a single driving cycle.

(ii) If a pending fault code is stored, the OBD II system shall illuminate the MIL and store a confirmed fault code within ten seconds if the percentage of misfire specified in section (e)(3.2.2) is again exceeded four times during: (a) the driving cycle immediately following the storage of the pending fault code, regardless of the conditions encountered during the driving cycle; or (b) on the next driving cycle in which similar conditions (see section (c)) to the engine conditions that occurred when the pending fault code was stored are encountered.

(iii) The pending fault code may be erased at the end of the next driving cycle in which similar conditions to the engine conditions that occurred when the pending fault code was stored have been encountered without an exceedance of the specified percentage of misfire. The pending code may also be erased if similar conditions are not encountered during the next 80 driving cycles immediately following initial detection of the malfunction.

(3.4.3) Storage of freeze frame conditions.

(A) A manufacturer shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing and erasing a confirmed fault code.

(B) If freeze frame conditions are stored for a malfunction other than misfire or fuel system malfunction (see section (e)(6)) when a fault code is stored as specified in section (e)(3.4) above, the stored freeze frame information shall be replaced with freeze frame information regarding the misfire malfunction.

(3.4.4) Storage of misfire conditions for similar conditions determination. Upon detection of misfire under sections (e)(3.4.1) or (3.4.2), manufacturers shall store the following engine conditions: engine speed, load, and warm-up status of the first misfire event that resulted in the storage of the pending fault code.

(3.4.5) Extinguishing the MIL. The MIL may be extinguished after three sequential driving cycles in which similar conditions have been encountered without an exceedance of the specified percentage of misfire.

(4) Evaporative System Monitoring

(4.1) Requirement: The OBD II system shall verify purge flow from the evaporative system and shall monitor the complete evaporative system, excluding the tubing and connections between the purge valve and the intake manifold, for vapor leaks to the atmosphere. Individual components of the evaporative system (e.g. valves, sensors, etc.) shall be monitored in accordance with the comprehensive components requirements in section (e)(15) (e.g., for circuit continuity, out of range values, rationality, proper functional response, etc.). Vehicles not required to be equipped with evaporative emission systems shall be exempt from monitoring of the evaporative system.

(4.2) Malfunction Criteria:

(4.2.1) For purposes of section (e)(4), an orifice shall be defined as an O'Keefe Controls Co. precision metal "Type B" orifice with NPT connections with a diameter of the specified dimension (e.g., part number B-20-SS for a stainless steel 0.020 inch diameter orifice).

(4.2.2) The OBD II system shall detect an evaporative system malfunction when any of the following; conditions exist:

(A) No purge flow from the evaporative system to the engine can be detected by the OBD II system;

(B) The complete evaporative system contains a leak or leaks that cumulatively are greater than or equal to a leak caused by a 0.040 inch diameter orifice; or

(C) The complete evaporative system contains a leak or leaks that cumulatively are greater than or equal to a leak caused by a 0.020 inch diameter orifice.

(4.2.3) On vehicles with fuel tank capacity greater than 25.0 gallons, a manufacturer may request the Executive Officer to revise the orifice size in sections (e)(4.2.2)(B) and/or (C) if the most reliable monitoring method available cannot reliably detect a system leak of the magnitudes specified. The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or engineering analysis that demonstrate the need for the request.

(4.2.4) Upon request by the manufacturer and upon determining that the manufacturer has submitted data and/or engineering evaluation which support the request, the Executive Officer shall revise the orifice size in sections (e)(4.2.2)(B) and/or (C) upward to exclude detection of leaks that cannot cause evaporative or running loss emissions to exceed 1.5 times the applicable standards.

(4.2.5) A manufacturer may request Executive Officer approval to revise the orifice size in section (e)(4.2.2)(B) to a 0.090 inch diameter orifice. The Executive Officer shall approve the request upon the manufacturer submitting data and/or engineering analysis and the Executive Officer finding that:

(A) the monitoring strategy for detecting orifices specified in section (e)(4.2.2)(C) meets the monitoring conditions requirements of section (e)(4.3.2); and

(B) the monitoring strategy for detecting 0.090 inch diameter orifices yields an in-use monitor performance ratio (as defined in section (d)(4)) that meets or exceeds 0.620.

(4.2.6) For the 2004 and 2005 model years only, manufacturers that use separate monitors to identify leaks (as specified in (e)(4.2.2.)(B) or (C)) in different portions of the complete evaporative system (e.g., separate monitors for the fuel tank to canister portion and for the canister to purge valve portion of the system) may request Executive Officer approval to revise the malfunction criteria in sections (e)(4.2.2)(B) and (C) to identify a malfunction when the separately monitored portion of the evaporative system (e.g., the fuel tank to canister portion) has a leak (or leaks) that is greater than or equal to the specified size in lieu of when the complete evaporative system has a leak (or leaks) that is greater than or equal to the specified size. The Executive Officer shall approve the request upon determining that the manufacturer utilized the same monitoring strategy (e.g., monitoring portions of the complete system with separate monitors) on vehicles prior to the 2004 model year and that the monitoring strategy provides further isolation of the malfunction for repair technicians by utilizing separate fault codes for each monitored portion of the evaporative system.

(4.2.7) For vehicles that utilize more than one purge flow path (e.g., a turbo-charged engine with a low pressure purge line and a high pressure purge line), the OBD II system shall verify the criteria of (e)(4.2.2)(A) (i.e., purge flow to the engine) for both purge flow paths. If a manufacturer demonstrates that blockage, leakage, or disconnection of one of the purge flow paths cannot cause a measurable emission increase during any reasonable in-use driving conditions, monitoring of that flow path is not required.

(4.3) Monitoring Conditions:

(4.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (e)(4.2.2)(A) and (B) (i.e., purge flow and 0.040 inch leak detection) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(4.3.2) Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(4.2.2)(C) (i.e., 0.020 inch leak detection) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (e)(4.2.2)(C) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(4.3.3) Manufacturers may disable or abort an evaporative system monitor when the fuel tank level is over 85 percent of

nominal tank capacity or during a refueling event.

(4.3.4) Manufacturers may request Executive Officer approval to execute the evaporative system monitor only on driving cycles determined by the manufacturer to be cold starts if the condition is needed to ensure reliable monitoring. The Executive Officer may not approve criteria that exclude engine starts from being considered as cold starts solely on the basis that ambient temperature exceeds (i.e., indicates a higher temperature than) engine coolant temperature at engine start. The Executive Officer shall approve the request upon determining that data and/or an engineering evaluation submitted by the manufacturer demonstrate that a reliable check can only be made on driving cycles when the cold start criteria are satisfied.

(4.3.5) Manufacturers may temporarily disable the evaporative purge system to perform an evaporative system leak check.

(4.4) MIL Illumination and Fault Code Storage:

(4.4.1) Except as provided below for fuel cap leaks and alternate statistical MIL illumination protocols, general requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(4.4.2) If the OBD II system is capable of discerning that a system leak is being caused by a missing or improperly secured fuel cap:

(A) The manufacturer is not required to illuminate the MIL or store a fault code if the vehicle is equipped with an alternative indicator for notifying the vehicle operator of the malfunction. The alternative indicator shall be of sufficient illumination and location to be readily visible under all lighting conditions.

(B) If the vehicle is not equipped with an alternative indicator and the MIL illuminates, the MIL may be extinguished and the corresponding fault codes erased once the OBD II system has verified that the fuel cap has been securely fastened and the MIL has not been illuminated for any other type of malfunction.

(C) The Executive Officer may approve other strategies that provide equivalent assurance that a vehicle operator will be promptly notified of a missing or improperly secured fuel cap and that corrective action will be undertaken.

(4.4.3) Notwithstanding section (d)(2.2.6), manufacturers may request Executive Officer approval to use alternative statistical MIL illumination and fault code storage protocols that require up to twelve driving cycles on average for monitoring strategies designed to detect malfunctions specified by section (e)(4.2.2)(C). Executive Officer approval shall be granted in accordance with the bases identified in section (d)(2.2.6) and upon determination that the manufacturer has submitted data and/or an engineering analysis demonstrating that the most reliable monitoring method available cannot reliably detect a malfunction of the specified size without the additional driving cycles and that the monitoring system will still meet the monitoring conditions requirements specified in sections (d)(3.1) and (3.2).

(5) Secondary Air System Monitoring

(5.1) Requirement: The OBD II system on vehicles equipped with any form of secondary air delivery system shall monitor the proper functioning of the secondary air delivery system including all air switching valve(s). The individual electronic components (e.g., actuators, valves, sensors, etc.) in the secondary air system shall be monitored in accordance with the comprehensive component requirements in section (e)(15).

(5.2) Malfunction Criteria:

(5.2.1) For purposes of section (e)(5), "air flow" is defined as the air flow delivered by the secondary air system to the exhaust system. For vehicles using secondary air systems with multiple air flow paths/distribution points, the air flow to each bank (i.e., a group of cylinders that share a common exhaust manifold, catalyst, and control sensor) shall be monitored in accordance with the malfunction criteria in sections (e)(5.2.3) and (5.2.4) unless complete blocking of air delivery to one bank does not cause a measurable increase in emissions.

(5.2.2) For all Low Emission Vehicle I applications:

(A) Except as provided in sections (e)(5.2.2)(B) and (e)(5.2.4), the OBD II system shall detect a secondary air system malfunction prior to a decrease from the manufacturer's specified air flow that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards.

(B) Manufacturers may request Executive Officer approval to detect a malfunction when no detectable amount of air flow is delivered in lieu of the malfunction criteria in section (e)(5.2.2)(A). The Executive Office shall grant approval upon determining that deterioration of the secondary air system is unlikely based on data and/or engineering evaluation submitted by the manufacturer demonstrating that the materials used for the secondary air system (e.g., air hoses, tubing, valves, connectors, etc.) are inherently resistant to disconnection, corrosion, or other deterioration.

(5.2.3) For all Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles:

(A) For 2004 and 2005 model year vehicles, manufacturers shall use the malfunction criteria specified for Low Emission Vehicle I applications in section (e)(5.2.2).

(B) For 2006 and subsequent model year vehicles, except as provided in sections (e)(5.2.3)(C) and (e)(5.2.4), the OBD II system shall detect a secondary air system malfunction prior to a decrease from the manufacturer's specified air flow during

normal operation that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards. For purposes of sections (e)(5.2) and (5.3), "normal operation" shall be defined as the condition when the secondary air system is activated during catalyst and/or engine warm-up following engine start and may not include the condition when the secondary air system is intrusively turned on solely for the purpose of monitoring.

(C) For 2006 and 2007 model year vehicles only, a manufacturer may request Executive Officer approval to detect a malfunction when no detectable amount of air flow is delivered during normal operation in lieu of the malfunction criteria in section (e)(5.2.3)(B) (e.g., 1.5 times the standard) during normal operation. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering analysis that demonstrate that the monitoring system is capable of detecting malfunctions prior to a decrease from the manufacturer's specified air flow that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards during an intrusive operation of the secondary air system later in the same driving cycle.

(5.2.4) For vehicles in which no deterioration or failure of the secondary air system would result in a vehicle's emissions exceeding 1.5 times any of the applicable standards, the OBD II system shall detect a malfunction when no detectable amount of air flow is delivered. For vehicles subject to the malfunction criteria in section (e)(5.2.3)(B), this monitoring for no detectable amount of air flow shall occur during normal operation of the secondary air system.

(5.3) Monitoring Conditions:

(5.3.1) For all Low Emission Vehicle I applications: Manufacturers shall define the monitoring conditions in accordance with section (d)(3.1).

(5.3.2) For all Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles:

(A) For 2004 and 2005 model year vehicles, manufacturers shall define the monitoring conditions in accordance with section (d)(3.1).

(B) For 2006 and subsequent model year vehicles, manufacturers shall define the monitoring conditions in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (e)(5.2) during normal operation of the secondary air system shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(5.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(6) Fuel System Monitoring

(6.1) Requirement:

(6.1.1) The OBD II system shall monitor the fuel delivery system to determine its ability to provide compliance with emission standards.

(6.2) Malfunction Criteria:

(6.2.1) The OBD II system shall detect a malfunction of the fuel delivery system when:

(A) The fuel delivery system is unable to maintain a vehicle's emissions at or below 1.5 times any of the applicable FTP standards; or

(B) If equipped, the feedback control based on a secondary oxygen or exhaust gas sensor is unable to maintain a vehicle's emissions (except as a result of a malfunction specified in section (e)(6.2.1)(C)) at or below 1.5 times any of the applicable FTP standards; or

(C) Except as required in section (e)(6.2.6), for 25 percent of all 2011 model year vehicles, 50 percent of all 2012 model year vehicles, 75 percent of all 2013 model year vehicles, and 100 percent of all 2014 model year vehicles, an air-fuel ratio cylinder imbalance (e.g., the air-fuel ratio in one or more cylinders is different than the other cylinders due to a cylinder specific malfunction such as an intake manifold leak at a particular cylinder, fuel injector problem, an individual cylinder EGR runner flow delivery problem, an individual variable cam lift malfunction such that an individual cylinder is operating on the wrong cam lift profile, or other similar problems) occurs in one or more cylinders such that the fuel delivery system is unable to maintain a vehicle's emissions at or below: 4.0 times the applicable FTP standards for PC/LDT SULEV II vehicles and 3.0 times the applicable FTP standards for all other vehicles for the 2011 through 2013 model years; and 1.5 times the applicable FTP standards for all 2014 and subsequent model year vehicles. In lieu of using 1.5 times the applicable FTP standards for all 2014 model year applications, for the 2014 model year only, a manufacturer may continue to use 4.0 times the applicable FTP standards for PC/LDT SULEV II vehicles and 3.0 times the applicable FTP standards for other applications previously certified in the 2011, 2012, or 2013 model year to 4.0 times or 3.0 times the applicable FTP standards and carried over to the 2014 model year.

(6.2.2) Except as provided for in section (e)(6.2.3) below, if the vehicle is equipped with adaptive feedback control, the OBD II system shall detect a malfunction when the adaptive feedback control has used up all of the adjustment allowed by the manufacturer.

(6.2.3) If the vehicle is equipped with feedback control that is based on a secondary oxygen (or equivalent) sensor, the OBD II system is not required to detect a malfunction of the fuel system solely when the feedback control based on a secondary oxygen sensor has used up all of the adjustment allowed by the manufacturer. However, if a failure or deterioration results in vehicle emissions that exceed the malfunction criteria in section (e)(6.2.1), the OBD II system is required to detect a malfunction.

(6.2.4) The OBD II system shall detect a malfunction whenever the fuel control system fails to enter closed-loop operation (if employed) within a manufacturer specified time interval.

(6.2.5) Manufacturers may adjust the criteria and/or limit(s) to compensate for changes in altitude, for temporary introduction of large amounts of purge vapor, or for other similar identifiable operating conditions when they occur.

(6.2.6) Notwithstanding the phase-in specified in section (e)(6.2.1)(C), if a vehicle is equipped with separate EGR flow delivery passageways (internal or external) that deliver EGR flow to individual cylinders (e.g., an EGR system with individual delivery pipes to each cylinder), the OBD II system shall monitor the fuel delivery system for malfunctions specified in section (e)(6.2.1)(C) on all 2011 and subsequent model year vehicles so equipped.

(6.3) Monitoring Conditions:

(6.3.1) Except as provided in section (e)(6.3.2), the fuel system shall be monitored continuously for the presence of a malfunction.

(6.3.2) Manufacturers shall define monitoring conditions for malfunctions identified in section (e)(6.2.1)(C) (i.e., air-fuel ratio cylinder imbalance malfunctions) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(6.4) MIL Illumination and Fault Code Storage: For malfunctions described under section (6.2.1)(C) (i.e., air-fuel ratio cylinder imbalance malfunctions), general requirements for MIL illumination and fault code storage are set forth in section (d)(2). For all other fuel system malfunctions, the MIL illumination and fault code storage requirements are set forth in sections (e)(6.4.1) through (6.4.6) below.

(6.4.1) A pending fault code shall be stored immediately upon the fuel system exceeding the malfunction criteria established pursuant to section (e)(6.2).

(6.4.2) Except as provided below, if a pending fault code is stored, the OBD II system shall immediately illuminate the MIL and store a confirmed fault code if a malfunction is again detected during either of the following two events: (a) the driving cycle immediately following the storage of the pending fault code, regardless of the conditions encountered during the driving cycle; or (b) on the next driving cycle in which similar conditions (see section (c)) to those that occurred when the pending fault code was stored are encountered.

(6.4.3) The pending fault code may be erased at the end of the next driving cycle in which similar conditions have been encountered without an exceedance of the specified fuel system malfunction criteria. The pending code may also be erased if similar conditions are not encountered during the 80 driving cycles immediately after the initial detection of a malfunction for which the pending code was set.

(6.4.4) Storage of freeze frame conditions.

(A) The OBD II system shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing and erasing a confirmed fault code.

(B) If freeze frame conditions are stored for a malfunction other than misfire (see section (e)(3)) or fuel system malfunction when a fault code is stored as specified in section (e)(6.4) above, the stored freeze frame information shall be replaced with freeze frame information regarding the fuel system malfunction.

(6.4.5) Storage of fuel system conditions for determining similar conditions of operation.

(A) Upon detection of a fuel system malfunction under section (e)(6.2), the OBD II system shall store the engine speed, load, and warm-up status of the first fuel system malfunction that resulted in the storage of the pending fault code.

(B) For fuel system faults detected using feedback control that is based on a secondary oxygen (or equivalent) sensor, the manufacturer may request Executive Officer approval to use an alternate definition of similar conditions in lieu of the definition specified in section (c). The Executive Officer shall approve the alternate definition upon the manufacturer providing data or analysis demonstrating that the alternate definition provides for equivalent robustness in detection of fuel system faults that vary in severity depending on engine speed, load, and/or warm-up status.

(6.4.6) Extinguishing the MIL. The MIL may be extinguished after three sequential driving cycles in which similar conditions have been encountered without a malfunction of the fuel system.

(7) Exhaust Gas Sensor Monitoring

(7.1) Requirement:

(7.1.1) The OBD II system shall monitor the output voltage, response rate, and any other parameter which can affect emissions of all primary (fuel control) oxygen sensors (conventional switching sensors and wide range or universal sensors) for malfunction.

(7.1.2) The OBD II system shall also monitor all secondary oxygen sensors (those used for fuel trim control or as a monitoring device) for proper output voltage, activity, and/or response rate.

(7.1.3) For vehicles equipped with heated oxygen sensors, the OBD II system shall monitor the heater for proper performance.

(7.1.4) For other types of sensors (e.g., hydrocarbon sensors, NO[x] sensors), the manufacturer shall submit a monitoring plan to the Executive Officer for approval. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and an engineering evaluation that demonstrate that the monitoring plan is as reliable and effective as the monitoring plan required for conventional sensors under section (e)(7).

(7.2) Malfunction Criteria:

(7.2.1) Primary Sensors:

(A) The OBD II system shall detect a malfunction prior to any failure or deterioration of the oxygen sensor voltage, response rate, amplitude, or other characteristic(s) (including drift or bias corrected for by secondary sensors) that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards. For response rate (see section (c)), the OBD II system shall detect asymmetric malfunctions (i.e., malfunctions that primarily affect only the lean-to-rich response rate or only the rich-to-lean response rate) and symmetric malfunctions (i.e., malfunctions that affect both the lean-to-rich and rich-to-lean response rates). As defined in section (c), response rate includes delays in the sensor to initially react to a change in exhaust gas composition as well as delays during the transition from a rich-to-lean (or lean-to-rich) sensor output. For 25 percent of 2010, 50 percent of 2011, and 100 percent of 2012 and subsequent model year vehicles, the manufacturer shall submit data and/or engineering analysis to demonstrate that the calibration method used ensures proper detection of all symmetric and asymmetric response rate malfunctions as part of the certification application.

(B) The OBD II system shall detect malfunctions of the oxygen sensor caused by either a lack of circuit continuity or out-of-range values.

(C) The OBD II system shall detect a malfunction of the oxygen sensor when a sensor failure or deterioration causes the fuel system to stop using that sensor as a feedback input (e.g., causes default or open loop operation) or causes the fuel system to fail to enter closed-loop operation within a manufacturer-specified time interval.

(D) The OBD II system shall detect a malfunction of the oxygen sensor when the sensor output voltage, amplitude, activity, or other characteristics are no longer sufficient for use as an OBD II system monitoring device (e.g., for catalyst monitoring).

(7.2.2) Secondary Sensors:

(A) The OBD II system shall detect a malfunction prior to any failure or deterioration of the oxygen sensor voltage, response rate, amplitude, or other characteristic(s) that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards.

(B) The OBD II system shall detect malfunctions of the oxygen sensor caused by a lack of circuit continuity.

(C) Sufficient sensor performance for other monitors.

(i) The OBD II system shall detect a malfunction of the oxygen sensor when the sensor output voltage, amplitude, activity, or other characteristics are no longer sufficient for use as an OBD II system monitoring device (e.g., for catalyst monitoring). For this requirement, "sufficient" is defined as the capability of the worst performing acceptable sensor to detect the best performing unacceptable other monitored system or component (e.g., catalyst).

(ii) For systems where it is not technically feasible to satisfy the criteria of section (e)(7.2.2)(C)(i) completely, the OBD II system shall, at a minimum, detect a slow rich-to-lean response malfunction during a fuel shut-off event (e.g., deceleration fuel cut event). The rich-to-lean response check shall monitor both the sensor response time from a rich condition (e.g., 0.7 Volts) prior to the start of fuel shut-off to a lean condition (e.g., 0.1 Volts) expected during fuel shut-off conditions and the sensor transition time in the intermediate sensor range (e.g., from 0.55 Volts to 0.3 Volts). Monitoring of the rich-to-lean response shall be phased in on at least 25 percent of the 2009, 50 percent of the 2010, and 100 percent of the 2011 model year vehicles. For purposes of this phase-in, vehicles meeting the criteria of section (e)(7.2.2)(C)(i) shall be counted as vehicles meeting the rich-to-lean response rate monitoring requirement of section (e)(7.2.2)(C)(ii).

(iii) Additionally, for systems where it is not technically feasible to satisfy the criteria in section (e)(7.2.2)(C)(i), prior to certification of 2009 model year vehicles, the manufacturer must submit a comprehensive plan to the Executive Officer demonstrating the manufacturer's efforts to minimize any gap remaining between the worst performing acceptable sensor and a sufficient sensor. The plan should include quantification of the gap and supporting documentation for efforts to close the gap including sensor monitoring improvements, other system component monitor improvements (e.g., changes to make the catalyst monitor less sensitive to oxygen sensor response), and sensor specification changes, if any. The Executive Officer shall approve the plan upon determining the submitted information supports the necessity of the gap and the plan demonstrates that the manufacturer is taking reasonable efforts to minimize or eliminate the gap in a timely manner.

(D) The OBD II system shall detect malfunctions of the oxygen sensor caused by out-of-range values.

(7.2.3) Sensor Heaters:

(A) The OBD II system shall detect a malfunction of the heater performance when the current or voltage drop in the heater circuit is no longer within the manufacturer's specified limits for normal operation (i.e., within the criteria required to be met by the component vendor for heater circuit performance at high mileage). Subject to Executive Officer approval, other malfunction criteria for heater performance malfunctions may be used upon the Executive Officer determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate the monitoring reliability and timeliness to be equivalent to the stated criteria in section (e)(7.2.3)(A).

(B) The OBD II system shall detect malfunctions of the heater circuit including open or short circuits that conflict with the commanded state of the heater (e.g., shorted to 12 Volts when commanded to 0 Volts (ground), etc.).

(7.3) Monitoring Conditions:

(7.3.1) Primary Sensors

(A) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (e)(7.2.1)(A) and (D) (e.g., proper response rate) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (e)(7.2.1)(A) and (D) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(B) Except as provided in section (e)(7.3.1)(C), monitoring for malfunctions identified in sections (e)(7.2.1)(B) and (C) (i.e., circuit continuity, out-of-range, and open-loop malfunctions) shall be:

(i) Conducted in accordance with title 13, CCR section 1968.1 for Low Emission Vehicle I applications and 2004 and 2005 model year Low Emission Vehicle II applications;

(ii) Conducted continuously for all 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles.

(C) A manufacturer may request Executive Officer approval to disable continuous oxygen sensor monitoring when an oxygen sensor malfunction cannot be distinguished from other effects (e.g., disable out-of-range low monitoring during fuel cut conditions). The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning sensor cannot be distinguished from a malfunctioning sensor and that the disablement interval is limited only to that necessary for avoiding false detection.

(7.3.2) Secondary Sensors

(A) Manufacturers shall define monitoring conditions for malfunctions identified in sections (e)(7.2.2)(A) and (C) (e.g., proper sensor activity) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For all 2010 and subsequent model year vehicles meeting the monitoring requirements of section (e)(7.2.2)(C)(i) or (ii), for purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (e)(7.2.2)(A) and (C) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(B) Except as provided in section (e)(7.3.2)(C), monitoring for malfunctions identified in sections (e)(7.2.2)(B) and (D) (i.e., open circuit, out-of-range malfunctions) shall be:

(i) Conducted in accordance with title 13, CCR section 1968.1 for Low Emission Vehicle I applications and 2004 and 2005 model year Low Emission Vehicle II applications;

(ii) Conducted continuously for all 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles.

(C) A manufacturer may request Executive Officer approval to disable continuous oxygen sensor monitoring when an oxygen sensor malfunction cannot be distinguished from other effects (e.g., disable out-of-range low monitoring during fuel cut conditions). The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning sensor cannot be distinguished from a malfunctioning sensor and that the disablement interval is limited only to that necessary for avoiding false detection.

(7.3.3) Sensor Heaters

(A) Manufacturers shall define monitoring conditions for malfunctions identified in section (e) (7.2.3)(A) (e.g., sensor heater performance) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(B) Monitoring for malfunctions identified in section (e)(7.2.3)(B) (e.g., circuit malfunctions) shall be:

(i) Conducted in accordance with title 13, CCR section 1968.1 for 2004 and 2005 model year vehicles;

(ii) Conducted continuously for all 2006 and subsequent model year vehicles.

(7.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(8) Exhaust Gas Recirculation (EGR) System Monitoring

(8.1) Requirement: The OBD II system shall monitor the EGR system on vehicles so-equipped for low and high flow rate

malfunctions. The individual electronic components (e.g., actuators, valves, sensors, etc.) that are used in the EGR system shall be monitored in accordance with the comprehensive component requirements in section (e)(15).

(8.2) Malfunction Criteria:

(8.2.1) The OBD II system shall detect a malfunction of the EGR system prior to an increase or decrease from the manufacturer's specified EGR flow rate that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards.

(8.2.2) For vehicles in which no failure or deterioration of the EGR system could result in a vehicle's emissions exceeding 1.5 times any of the applicable standards, the OBD II system shall detect a malfunction when the system has no detectable amount of EGR flow.

(8.3) Monitoring Conditions:

(8.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(8.2) (e.g., flow rate) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (e)(8.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(8.3.2) Manufacturers may request Executive Officer approval to temporarily disable the EGR system check under specific conditions (e.g., when freezing may affect performance of the system). The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation which demonstrate that a reliable check cannot be made when these conditions exist.

(8.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(9) Positive Crankcase Ventilation (PCV) System Monitoring

(9.1) Requirement:

(9.1.1) On all 2004 and subsequent model year vehicles, manufacturers shall monitor the PCV system on vehicles so-equipped for system integrity. A manufacturer may use an alternate phase-in schedule in lieu of meeting the requirements of section (e)(9) on all 2004 model year vehicles if the alternate phase-in schedule provides for equivalent compliance volume (as defined in section (c)) to the phase-in schedule specified in title 13, CCR section 1968.1(b)(10.1). Vehicles not required to be equipped with PCV systems shall be exempt from monitoring of the PCV system.

(9.2) Malfunction Criteria:

(9.2.1) For the purposes of section (e)(9), "PCV system" is defined as any form of crankcase ventilation system, regardless of whether it utilizes positive pressure. "PCV valve" is defined as any form of valve or orifice used to restrict or control crankcase vapor flow. Further, any additional external PCV system tubing or hoses used to equalize crankcase pressure or to provide a ventilation path between various areas of the engine (e.g., crankcase and valve cover) are considered part of the PCV system "between the crankcase and the PCV valve" and subject to the malfunction criteria in section (e)(9.2.2) below.

(9.2.2) Except as provided below, the OBD II system shall detect a malfunction of the PCV system when a disconnection of the system occurs between either the crankcase and the PCV valve, or between the PCV valve and the intake manifold.

(9.2.3) If the PCV system is designed such that the PCV valve is fastened directly to the crankcase in a manner which makes it significantly more difficult to remove the valve from the crankcase rather than disconnect the line between the valve and the intake manifold (taking aging effects into consideration), the Executive Officer shall exempt the manufacturer from detection of disconnection between the crankcase and the PCV valve.

(9.2.4) Subject to Executive Officer approval, system designs that utilize tubing between the valve and the crankcase shall also be exempted from the portion of the monitoring requirement for detection of disconnection between the crankcase and the PCV valve. The manufacturer shall file a request and submit data and/or engineering evaluation in support of the request. The Executive Officer shall approve the request upon determining that the connections between the valve and the crankcase are: (i) resistant to deterioration or accidental disconnection, (ii) significantly more difficult to disconnect than the line between the valve and the intake manifold, and (iii) not subject to disconnection per manufacturer's repair procedures for non-PCV system repair work.

(9.2.5) Manufacturers are not required to detect disconnections between the PCV valve and the intake manifold if said disconnection (1) causes the vehicle to stall immediately during idle operation; or (2) is unlikely to occur due to a PCV system design that is integral to the induction system (e.g., machined passages rather than tubing or hoses).

(9.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(9.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(9.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2). The stored fault code need not specifically identify the PCV system (e.g., a fault code for idle speed control or fuel system monitoring can be stored) if the manufacturer demonstrates that additional monitoring hardware would

be necessary to make this identification, and provided the manufacturer's diagnostic and repair procedures for the detected malfunction include directions to check the integrity of the PCV system.

(10) Engine Cooling System Monitoring

(10.1) Requirement:

(10.1.1) The OBD II system shall monitor the thermostat on vehicles so-equipped for proper operation.

(10.1.2) The OBD II system shall monitor the engine coolant temperature (ECT) sensor for circuit continuity, out-of-range values, and rationality faults.

(10.2) Malfunction Criteria:

(10.2.1) Thermostat

(A) The OBD II system shall detect a thermostat malfunction if, within an Executive Officer approved time interval after starting the engine, either of the following two conditions occur:

(i) The coolant temperature does not reach the highest temperature required by the OBD II system to enable other diagnostics;

(ii) The coolant temperature does not reach a warmed-up temperature within 20 degrees Fahrenheit of the manufacturer's nominal thermostat regulating temperature. Subject to Executive Officer approval, a manufacturer may utilize lower temperatures for this criterion upon the Executive Officer determining that the manufacturer has demonstrated that the fuel, spark timing, and/or other coolant temperature-based modifications to the engine control strategies would not cause an emission increase of 50 or more percent of any of the applicable standards (e.g., 50 degree Fahrenheit emission test, etc.).

(B) Executive Officer approval of the time interval after engine start shall be granted upon determining that the data and/or engineering evaluation submitted by the manufacturer supports the specified times.

(C) With Executive Officer approval, a manufacturer may use alternate malfunction criteria and/or monitoring conditions (see section (e)(10.3)) that are a function of temperature at engine start on vehicles that do not reach the temperatures specified in the malfunction criteria when the thermostat is functioning properly. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data that demonstrate that a properly operating system does not reach the specified temperatures, that the monitor is capable of meeting the specified malfunction criteria at engine start temperatures greater than 50oF, and that the overall effectiveness of the monitor is comparable to a monitor meeting these thermostat monitoring requirements at lower temperatures.

(D) With Executive Officer approval, manufacturers may omit this monitor. Executive Officer approval shall be granted upon determining that the manufacturer has demonstrated that a malfunctioning thermostat cannot cause a measurable increase in emissions during any reasonable driving condition nor cause any disablement of other monitors.

(10.2.2) ECT Sensor

(A) Circuit Continuity. The OBD II system shall detect a malfunction when a lack of circuit continuity or out-of-range values occur.

(B) Time to Reach Closed-Loop Enable Temperature.

(i) The OBD II system shall detect a malfunction if the ECT sensor does not achieve the stabilized minimum temperature which is needed for the fuel control system to begin closed-loop operation (closed-loop enable temperature) within an Executive Officer approved time interval after starting the engine.

(ii) The time interval shall be a function of starting ECT and/or a function of intake air temperature and, except as provided below in section (e)(10.2.2)(B)(iii), may not exceed:

a. two minutes for engine start temperatures at or above 50 degrees Fahrenheit and five minutes for engine start temperatures at or above 20 degrees Fahrenheit and below 50 degrees Fahrenheit for Low Emission Vehicle I applications and 2004 and 2005 model year Low Emission Vehicle II applications;

b. two minutes for engine start temperatures up to 15 degrees Fahrenheit below the closed-loop enable temperature and five minutes for engine start temperatures between 15 and 35 degrees Fahrenheit below the closed-loop enable temperature for all 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles.

(iii) Executive Officer approval of the time interval shall be granted upon determining that the data and/or engineering evaluation submitted by the manufacturer supports the specified times. The Executive Officer shall allow longer time intervals upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that the vehicle requires a longer time to warm up under normal conditions.

(iv) The Executive Officer shall exempt manufacturers from the requirement of section (e)(10.2.2)(B) if the manufacturer does not utilize ECT to enable closed loop fuel control.

(C) Stuck in Range Below the Highest Minimum Enable Temperature. To the extent feasible when using all available information, the OBD II system shall detect a malfunction if the ECT sensor inappropriately indicates a temperature below the

highest minimum enable temperature required by the OBD II system to enable other diagnostics (e.g., an OBD II system that requires ECT to be greater than 140 degrees Fahrenheit to enable a diagnostic must detect malfunctions that cause the ECT sensor to inappropriately indicate a temperature below 140 degrees Fahrenheit). Manufacturers are exempted from this requirement for temperature regions in which the monitors required under sections (e)(10.2.1) or (e)(10.2.2)(B) will detect ECT sensor malfunctions as defined in section (e)(10.2.2)(C).

(D) Stuck in Range Above the Lowest Maximum Enable Temperature.

(i) To the extent feasible when using all available information, the OBD II system shall detect a malfunction if the ECT sensor inappropriately indicates a temperature above the lowest maximum enable temperature required by the OBD II system to enable other diagnostics (e.g., an OBD II system that requires ECT to be less than 90 degrees Fahrenheit at engine start to enable a diagnostic must detect malfunctions that cause the ECT sensor to inappropriately indicate a temperature above 90 degrees Fahrenheit).

(ii) Manufacturers are exempted from this requirement for temperature regions in which the monitors required under sections (e)(10.2.1), (e)(10.2.2)(B), or (e)(10.2.2)(C) (i.e., ECT sensor or thermostat malfunctions) will detect ECT sensor malfunctions as defined in section (e)(10.2.2)(D) or in which the MIL will be illuminated under the requirements of section (d)(2.2.3) for default mode operation (e.g., overtemperature protection strategies).

(iii) For Low Emission Vehicle I applications and 2004 and 2005 model year Low Emission Vehicle II applications only, manufacturers are also exempted from the requirements of section (e)(10.2.2)(D) for vehicles that have a temperature gauge (not a warning light) on the instrument panel and utilize the same ECT sensor for input to the OBD II system and the temperature gauge.

(iv) For 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles, manufacturers are also exempted from the requirements of section (e)(10.2.2)(D) for temperature regions where the temperature gauge indicates a temperature in the red zone (engine overheating zone) for vehicles that have a temperature gauge (not a warning light) on the instrument panel and utilize the same ECT sensor for input to the OBD II system and the temperature gauge.

(10.3) Monitoring Conditions:

(10.3.1) Thermostat

(A) Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(10.2.1)(A) in accordance with section (d)(3.1) except as provided for in section (e)(10.3.1)(D). Additionally, except as provided for in sections (e)(10.3.1)(B) and (C), monitoring for malfunctions identified in section (e)(10.2.1)(A) shall be conducted once per driving cycle on every driving cycle in which the ECT sensor indicates, at engine start, a temperature lower than the temperature established as the malfunction criteria in section (e)(10.2.1)(A).

(B) Manufacturers may disable thermostat monitoring at ambient temperatures below 20 degrees Fahrenheit.

(C) Manufacturers may request Executive Officer approval to suspend or disable thermostat monitoring if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 percent of the warm-up time, hot restart conditions, etc.). In general, the Executive Officer shall not approve disablement of the monitor on engine starts where the ECT at engine start is more than 35 degrees Fahrenheit lower than the thermostat malfunction threshold temperature determined under section (e)(10.2.1)(A). The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or engineering analysis that demonstrate the need for the request.

(D) With respect to defining enable conditions that are encountered during the FTP or Unified cycle as required in (d)(3.1.1) for malfunctions identified in section (e)(10.2.1)(A), the FTP cycle or Unified cycle shall refer to on-road driving following the FTP or Unified cycle in lieu of testing on a chassis dynamometer.

(10.3.2) ECT Sensor

(A) Except as provided below in section (e)(10.3.2)(E), monitoring for malfunctions identified in section (e)(10.2.2)(A) (i.e., circuit continuity and out-of-range) shall be conducted continuously.

(B) Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(10.2.2)(B) in accordance with section (d)(3.1). Additionally, except as provided for in section (e)(10.3.2)(D), monitoring for malfunctions identified in section (e)(10.2.2)(B) shall be conducted once per driving cycle on every driving cycle in which the ECT sensor indicates a temperature lower than the closed loop enable temperature at engine start (i.e., all engine start temperatures greater than the ECT sensor out of range low temperature and less than the closed loop enable temperature).

(C) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (e)(10.2.2)(C) and (D) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(D) Manufacturers may suspend or delay the time to reach closed loop enable temperature diagnostic if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 to 75 percent of the warm-up time).

(E) A manufacturer may request Executive Officer approval to disable continuous ECT sensor monitoring when an ECT

sensor malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or engineering evaluation that demonstrate a properly functioning sensor cannot be distinguished from a malfunctioning sensor and that the disablement interval is limited only to that necessary for avoiding false detection.

(10.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(11) Cold Start Emission Reduction Strategy Monitoring

(11.1) Requirement:

(11.1.1) For all 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year applications, if a vehicle incorporates a specific engine control strategy to reduce cold start emissions, the OBD II system shall monitor the commanded elements for proper function (e.g., increased engine idle speed, commanded ignition timing retard, etc.), other than secondary air, while the control strategy is active to ensure proper operation of the control strategy. Secondary air systems shall be monitored under the provisions of section (e)(5).

(11.1.2) In lieu of meeting the requirements of section (e)(11) on all 2006 through 2008 model year Low Emission Vehicle II applications, a manufacturer may phase in the requirements on a portion of its Low Emission Vehicle II applications as long as that portion of Low Emission Vehicle II applications comprises at least 30 percent of all 2006 model year vehicles, 60 percent of all 2007 model year vehicles, and 100 percent of all 2008 and subsequent model year vehicles.

(11.2) Malfunction Criteria:

(11.2.1) For vehicles not included in the phase-in specified in section (e)(11.2.2):

(A) The OBD II system shall detect a malfunction prior to any failure or deterioration of the individual components associated with the cold start emission reduction control strategy that would cause a vehicle's emissions to exceed 1.5 times the applicable FTP standards. Manufacturers shall:

(i) Establish the malfunction criteria based on data from one or more representative vehicle(s).

(ii) Provide an engineering evaluation for establishing the malfunction criteria for the remainder of the manufacturer's product line. The Executive Officer shall waive the evaluation requirement each year if, in the judgement of the Executive Officer, technological changes do not affect the previously determined malfunction criteria.

(B) For components where no failure or deterioration of the component used for the cold start emission reduction strategy could result in a vehicle's emissions exceeding 1.5 times the applicable standards, the individual component shall be monitored for proper functional response in accordance with the malfunction criteria in section (e)(15.2) while the control strategy is active.

(11.2.2) For 25 percent of 2010, 50 percent of 2011, and 100 percent of 2012 and subsequent model year vehicles, the OBD II system shall, to the extent feasible, detect a malfunction if either of the following occurs:

(A) Any single commanded element does not properly respond to the commanded action while the cold start strategy is active. For elements involving spark timing (e.g., retarded spark timing), the monitor may verify final commanded spark timing in lieu of verifying actual delivered spark timing. For purposes of this section, "properly respond" is defined as when the element responds:

(i) by a robustly detectable amount; and

(ii) in the direction of the desired command; and

(iii) above and beyond what the element would achieve on start-up without the cold start strategy active (e.g., if the cold start strategy commands a higher idle engine speed, a fault must be detected if there is no detectable amount of engine speed increase above what the system would achieve without the cold start strategy active);

(B) Any failure or deterioration of the cold start emission reduction control strategy that would cause a vehicle's emissions to be equal to or above 1.5 times the applicable FTP standards. For this requirement, the OBD II system shall either monitor elements of the system as a whole (e.g., measuring air flow and modeling overall heat into the exhaust) or the individual elements (e.g., increased engine speed, commanded final spark timing) for failures that cause vehicle emissions to exceed 1.5 times the applicable FTP standards.

(11.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(11.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(11.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(12) Air Conditioning (A/C) System Component Monitoring

(12.1) Requirement: If a vehicle incorporates an engine control strategy that alters off-idle fuel and/or spark control when the A/C system is on, the OBD II system shall monitor all electronic air conditioning system components for malfunctions that cause the system to fail to invoke the alternate control while the A/C system is on or cause the system to invoke the alternate

control while the A/C system is off. Additionally, the OBD II system shall monitor for malfunction all electronic air conditioning system components that are used as part of the diagnostic strategy for any other monitored system or component. The requirements of section (e)(12) shall be phased in as follows: 30 percent of all 2006 model year vehicles, 60 percent of all 2007 model year vehicles, and 100 percent of all 2008 and subsequent model year vehicles.

(12.2) Malfunction Criteria:

(12.2.1) The OBD II system shall detect a malfunction prior to any failure or deterioration of an electronic component of the air conditioning system that would cause a vehicle's emissions to exceed 1.5 times any of the appropriate applicable emission standards or would, through software, effectively disable any other monitored system or component covered by this regulation. For malfunctions that result in the alternate control being erroneously invoked while the A/C system is off, the appropriate emission standards shall be the FTP standards. For malfunctions that result in the alternate control failing to be invoked while the A/C system is on, the appropriate emission standards shall be the SC03 emission standards.

(12.2.2) If no single electronic component failure or deterioration causes emissions to exceed 1.5 times any of the appropriate applicable emission standards as defined above in section (e)(12.2.1) nor is used as part of the diagnostic strategy for any other monitored system or component, manufacturers are not required to monitor any air conditioning system component for purposes of section (e)(12).

(12.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(12.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(12.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(13) Variable Valve Timing and/or Control (VVT) System Monitoring

(13.1) Requirement: On all 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles, the OBD II system shall monitor the VVT system on vehicles so-equipped for target error and slow response malfunctions. The individual electronic components (e.g., actuators, valves, sensors, etc.) that are used in the VVT system shall be monitored in accordance with the comprehensive components requirements in section (e)(15). VVT systems on Low Emission Vehicle I applications and 2004 and 2005 model year Low Emission Vehicle II applications shall be monitored in accordance with the comprehensive components requirements in section (e)(15).

(13.2) Malfunction Criteria:

(13.2.1) Target Error. The OBD II system shall detect a malfunction prior to any failure or deterioration in the capability of the VVT system to achieve the commanded valve timing and/or control within a crank angle and/or lift tolerance that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards.

(13.2.2) Slow Response. The OBD II system shall detect a malfunction prior to any failure or deterioration in the capability of the VVT system to achieve the commanded valve timing and/or control within a time that would cause a vehicle's emissions to exceed 1.5 times any of the applicable FTP standards.

(13.2.3) For vehicles in which no failure or deterioration of the VVT system could result in a vehicle's emissions exceeding 1.5 times any of the applicable standards, the VVT system shall be monitored for proper functional response in accordance with the malfunction criteria in section (e)(15.2).

(13.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for VVT system malfunctions identified in section (e)(13.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2). Additionally, manufacturers shall track and report VVT system monitor performance under section (d)(3.2.2). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (e)(13.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(13.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(14) Direct Ozone Reduction (DOR) System Monitoring

(14.1) Requirement:

(14.1.1) The OBD II system shall monitor the DOR system on vehicles so-equipped for malfunctions that reduce the ozone reduction performance of the system.

(14.1.2) For 2003, 2004, and 2005 model year vehicles subject to the malfunction criteria of section (e)(14.2.1) below, manufacturers may request to be exempted from DOR system monitoring. The Executive Officer shall approve the exemption upon the manufacturer:

(A) Agreeing that the DOR system receive only 50 percent of the NMOG credit assigned to the DOR system as calculated under Air Resources Board (ARB) Manufacturers Advisory Correspondence (MAC) No. 99-06, December 20, 1999, which is

hereby incorporated by reference herein.

(B) Identifying the DOR system component(s) as an emission control device on both the underhood emission control label and a separate label as specified below. The DOR system shall be included in the list of emission control devices on the underhood emission control label and be identified as a "DOR system" or other equivalent term from SAE J1930 "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms - Equivalent to ISO/TR 15031-2:April 30, 2002 (SAE 1930)", incorporated by reference. A separate label shall be located on or near the DOR system component(s) in a location that is visible to repair technicians prior to the removal of any parts necessary to replace the DOR system component(s) and shall identify the components as a "DOR system" or other equivalent SAE J1930 term.

(14.2) Malfunction Criteria:

(14.2.1) For vehicles in which the NMOG credit assigned to the DOR system, as calculated in accordance with ARB MAC No. 99-06, is less than or equal to 50 percent of the applicable FTP NMOG standard, the OBD II system shall detect a malfunction when the DOR system has no detectable amount of ozone reduction.

(14.2.2) For vehicles in which the NMOG credit assigned to the DOR system, as calculated in accordance with ARB MAC No. 99-06, is greater than 50 percent of the applicable FTP NMOG standard, the OBD II system shall detect a malfunction when the ozone reduction performance of the DOR system deteriorates to a point where the difference between the NMOG credit assigned to the properly operating DOR system and the NMOG credit calculated for a DOR system performing at the level of the malfunctioning system exceeds 50 percent of the applicable FTP NMOG standard.

(14.2.3) For vehicles equipped with a DOR system, the manufacturer may modify any of the applicable NMOG malfunction criteria in sections (e)(1)-(3), (e)(5)-(8), (e)(11)-(e)(13), and (e)(16) by adding the NMOG credit received by the DOR system to the required NMOG malfunction criteria (e.g., a malfunction criteria of 1.5 x NMOG standard would be modified to (1.5 x NMOG standard) + DOR system NMOG credit).

(14.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (e)(14.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(14.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(15) Comprehensive Component Monitoring

(15.1) Requirement:

(15.1.1) Except as provided in sections (e)(15.1.3), (e)(15.1.4), and (e)(16), the OBD II system shall monitor for malfunction any electronic powertrain component/system not otherwise described in sections (e)(1) through (e)(14) that either provides input to (directly or indirectly) or receives commands from the on-board computer(s), and: (1) can affect emissions during any reasonable in-use driving condition, or (2) is used as part of the diagnostic strategy for any other monitored system or component.

(A) Input Components: Input components required to be monitored may include the vehicle speed sensor, crank angle sensor, knock sensor, throttle position sensor, cam position sensor, fuel composition sensor (e.g. flexible fuel vehicles), and transmission electronic components such as sensors, modules, and solenoids which provide signals to the powertrain control system.

(B) Output Components/Systems: Output components/systems required to be monitored may include the idle speed control system, automatic transmission solenoids or controls, variable length intake manifold runner systems, supercharger or turbocharger electronic components, heated; fuel preparation systems, and a warm-up catalyst bypass valve.

(15.1.2) For purposes of criteria (1) in section (e)(15.1.1) above, the manufacturer shall determine whether a powertrain input or output component/system can affect emissions. If the Executive Officer reasonably believes that a manufacturer has incorrectly determined that a component/system cannot affect emissions, the Executive Officer shall require the manufacturer to provide emission data showing that the component/system, when malfunctioning and installed in a suitable test vehicle, does not have an emission effect. The Executive Officer may request emission data for any reasonable driving condition.

(15.1.3) Manufacturers shall monitor for malfunction electronic powertrain input or output components/systems associated with an electronic transfer case, electronic power steering system, or other components that are driven by the engine and not related to the control of fueling, air handling, or emissions only if the component or system is used as part of the diagnostic strategy for any other monitored system or component.

(15.1.4) Except as specified for hybrids in section (e)(15.1.5), manufacturers shall monitor for malfunction electronic powertrain input or output components/systems associated with components that only affect emissions by causing additional electrical load to the engine and are not related to the control of fueling, air handling, or emissions only if the component or system is used as part of the diagnostic strategy for any other monitored system or component.

(15.1.5) For hybrids, manufacturers shall submit a plan to the Executive Officer for approval of the hybrid components determined by the manufacturer to be subject to monitoring in section (e)(15.1.1). In general, the Executive Officer shall approve the plan if it includes monitoring of all components/systems used as part of the diagnostic strategy for any other mon-

itored system or component, monitoring of all energy input devices to the electrical propulsion system, monitoring of battery and charging system performance, monitoring of electric motor performance, and monitoring of regenerative braking performance.

(15.2) Malfunction Criteria:

(15.2.1) Input Components:

(A) The OBD II system shall detect malfunctions of input components caused by a lack of circuit continuity, out of range values, and, where feasible, rationality faults. To the extent feasible, the rationality fault diagnostics shall verify that a sensor output is neither inappropriately high nor inappropriately low (e.g., "two-sided" diagnostics).

(B) To the extent feasible on all 2005 and subsequent model year vehicles, rationality faults shall be separately detected and store different fault codes than the respective lack of circuit continuity and out of range diagnostics. Additionally, input component lack of circuit continuity and out of range faults shall be separately detected and store different fault codes for each distinct malfunction (e.g., out-of-range low, out-of-range high, open circuit, etc.). Manufacturers are not required to store separate fault codes for lack of circuit continuity faults that cannot be distinguished from other out-of-range circuit faults.

(C) For vehicles that require precise alignment between the camshaft and the crankshaft, the OBD II system shall monitor the crankshaft position sensor(s) and camshaft position sensor(s) to verify proper alignment between the camshaft and crankshaft in addition to monitoring the sensors for circuit continuity and rationality malfunctions. Proper alignment monitoring between a camshaft and a crankshaft shall only be required in cases where both are equipped with position sensors. For 2006 through 2008 model year Low Emission Vehicle II applications and all 2009 and subsequent model year vehicles equipped with VVT systems and a timing belt or chain, the OBD II system shall detect a malfunction if the alignment between the camshaft and crankshaft is off by one or more cam/crank sprocket cogs (e.g., the timing belt/chain has slipped by one or more teeth/cogs). If a manufacturer demonstrates that a single tooth/cog misalignment cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall detect a malfunction when the minimum number of teeth/cogs misalignment needed to cause a measurable emission increase has occurred. For the 2006 through 2009 model years only, a manufacturer may also request Executive Officer approval to use a larger threshold than one tooth/cog. The Executive Officer shall approve the request upon determining that the manufacturer has demonstrated that hardware modifications are necessary to meet the one tooth/cog threshold and that further software modifications are not able to reduce the larger threshold.

(15.2.2) Output Components/Systems:

(A) The OBD II system shall detect a malfunction of an output component/system when proper functional response of the component and system to computer commands does not occur. If a functional check is not feasible, the OBD II system shall detect malfunctions of output components/systems caused by a lack of circuit continuity or circuit fault (e.g., short to ground or high voltage). For output component lack of circuit continuity faults and circuit faults, manufacturers are not required to store different fault codes for each distinct malfunction (e.g., open circuit, shorted low, etc.). Manufacturers are not required to activate an output component/system when it would not normally be active for the purposes of performing functional monitoring of output components/ systems as required in section (e)(15).

(B) The idle speed control system shall be monitored for proper functional response to computer commands. For strategies based on deviation from target idle speed, a malfunction shall be detected when either of the following conditions occur:

(i) The idle speed control system cannot achieve the target idle speed within 200 revolutions per minute (rpm) above the target speed or 100 rpm below the target speed. The Executive Officer shall allow larger engine speed tolerances upon determining that a manufacturer has submitted data and/or an engineering evaluation which demonstrate that the tolerances can be exceeded without a malfunction being present.

(ii) The idle speed control system cannot achieve the target idle speed within the smallest engine speed tolerance range required by the OBD II system to enable any other monitor.

(15.3) Monitoring Conditions:

(15.3.1) Input Components:

(A) Except as provided in section (e)(15.3.1)(C), input components shall be monitored continuously for proper range of values and circuit continuity.

(B) For rationality monitoring (where applicable):

(i) For 2004 model year vehicles, manufacturers shall define the monitoring conditions for detecting malfunctions in accordance with section (d)(3.1).

(ii) For 2005 and subsequent model year vehicles, manufacturers shall define the monitoring conditions for detecting malfunctions in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that rationality monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2).

(C) A manufacturer may request Executive Officer approval to disable continuous input component proper range of val-

ues or circuit continuity monitoring when a malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning input component cannot be distinguished from a malfunctioning input component and that the disablement interval is limited only to that necessary for avoiding false detection.

(15.3.2) Output Components/Systems:

(A) Except as provided in section (e)(15.3.2)(D), monitoring for circuit continuity and circuit faults shall be conducted continuously.

(B) Except as provided in section (e)(15.3.2)(C), for functional monitoring, manufacturers shall define the monitoring conditions for detecting malfunctions in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(C) For the idle speed control system on all 2005 and subsequent model year vehicles, manufacturers shall define the monitoring conditions for functional monitoring in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that functional monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2).

(D) A manufacturer may request Executive Officer approval to disable continuous output component circuit continuity or circuit fault monitoring when a malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning output component cannot be distinguished from a malfunctioning output component and that the disablement interval is limited only to that necessary for avoiding false detection.

(15.4) MIL Illumination and Fault Code Storage:

(15.4.1) Except as provided in section (e)(15.4.2) below, general requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(15.4.2) Exceptions to general requirements for MIL illumination. MIL illumination is not required in conjunction with storing a confirmed fault code for any comprehensive component if:

(A) the component or system, when malfunctioning, could not cause vehicle emissions to increase by:

(i) 25 percent or more for PC/LDT SULEV II vehicles, or

(ii) 15 percent or more for all other vehicles, and

(B) the component or system is not used as part of the diagnostic strategy for any other monitored system or component.

(15.4.3) For purposes of determining the emission increase in section (e)(15.4.2)(A), the manufacturer shall request Executive Officer approval of the test cycle/vehicle operating conditions for which the emission increase will be determined. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that the testing conditions represent in-use driving conditions where emissions are likely to be most affected by the malfunctioning component. For purposes of determining whether the specified percentages in section (e)(15.4.2)(A) are exceeded, if the approved testing conditions are comprised of an emission test cycle with an emission standard, the measured increase shall be compared to a percentage of the emission standard (e.g., if the increase is equal to or more than 15 percent of the emission standard for that test cycle). If the approved testing conditions are comprised of a test cycle or vehicle operating condition that does not have an emission standard, the measured increase shall be calculated as a percentage of the baseline test (e.g., if the increase from a back-to-back test sequence between normal and malfunctioning condition is equal to or more than 15 percent of the baseline test results from the normal condition).

(16) Other Emission Control or Source System Monitoring

(16.1) Requirement: For other emission control or source systems that are: (1) not identified or addressed in sections (e)(1) through (e)(15) (e.g., hydrocarbon traps, homogeneous charge compression ignition (HCCI) controls, NO[x] storage devices, fuel-fired passenger compartment heaters, etc.), or (2) identified or addressed in section (e)(15) but not corrected or compensated for by the adaptive fuel control system (e.g., swirl control valves), manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions prior to introduction on a production vehicle intended for sale in California. Executive Officer approval shall be based on the effectiveness of the monitoring strategy, the malfunction criteria utilized, the monitoring conditions required by the diagnostic, and, if applicable, the determination that the requirements of section (e)(16.3) below are satisfied.

(16.2) For purposes of section (e)(16), emission source systems are components or devices that emit pollutants subject to vehicle evaporative and exhaust emission standards (e.g., NMOG, CO, NO[x], PM, etc.) and include non-electronic components and non-powertrain components (e.g., fuel-fired passenger compartment heaters, on-board reformers, etc.).

(16.3) Except as provided below in this paragraph, for 2005 and subsequent model year vehicles that utilize emission control systems that alter intake air flow or cylinder charge characteristics by actuating valve(s), flap(s), etc. in the intake air delivery system (e.g., swirl control valve systems), the manufacturers, in addition to meeting the requirements of section (e)(16.1) above, may elect to have the OBD II system monitor the shaft to which all valves in one intake bank are physically attached in lieu of monitoring the intake air flow, cylinder charge, or individual valve(s)/flap(s) for proper functional response. For non-

metal shafts or segmented shafts, the monitor shall verify all shaft segments for proper functional response (e.g., by verifying the segment or portion of the shaft furthest from the actuator properly functions). For systems that have more than one shaft to operate valves in multiple intake banks, manufacturers are not required to add more than one set of detection hardware (e.g., sensor, switch, etc.) per intake bank to meet this requirement. Vehicles utilizing these emission control systems designed and certified for 2004 or earlier model year vehicles and carried over to the 2005 through 2009 model year shall be not be required to meet the provisions of section (e)(16.3) until the engine or intake air delivery system is redesigned.

(17) Exceptions to Monitoring Requirements

(17.1) Except as provided in sections (e)(17.1.1) through (17.1.3) below, upon request of a manufacturer or upon the best engineering judgment of the ARB, the Executive Officer may revise the emission threshold for a malfunction on any diagnostic required in section (e) the most reliable monitoring method developed requires a higher threshold to prevent significant errors of commission in detecting a malfunction.

(17.1.1) For PC/LDT SULEV II vehicles, the Executive Officer shall approve a malfunction criteria of 2.5 times the applicable FTP standards in lieu of 1.5 wherever required in section (e).

(17.1.2) For 2004 model year PC/LDT SULEV II vehicles only, the Executive Officer shall approve monitors with thresholds that exceed 2.5 times the applicable FTP standard if the manufacturer demonstrates that a higher threshold is needed given the state of development of the vehicle and that the malfunction criteria and monitoring approach and technology (e.g., fuel system limits, percent misfire, monitored catalyst volume, etc.) are at least as stringent as comparable ULEV (not ULEV II) vehicles.

(17.1.3) For vehicles certified to Federal Bin 3 or Bin 4 emission standards, manufacturers shall utilize the ULEV II vehicle NMOG and CO malfunction criteria (e.g., 1.5 times the Bin 3 or Bin 4 NMOG and CO standards) and the PC/LDT SULEV II vehicle NO[x] malfunction criteria (e.g., 2.5 times the Bin 3 or Bin 4 NO[x] standards).

(17.1.4) For medium-duty vehicles certified to an engine dynamometer tailpipe emission standard, the manufacturer shall request Executive Officer approval of a malfunction criterion that is equivalent to that proposed for each monitor in section (e). The Executive Officer shall approve the request upon finding that the manufacturer has used good engineering judgment in determining the equivalent malfunction criterion and that the criterion will provide for similar timeliness in detection of malfunctioning components.

(17.2) Whenever the requirements in section (e) of this regulation require a manufacturer to meet a specific phase-in schedule (e.g., (e)(11) cold start emission reduction strategy monitoring requires 30 percent in 2006 model year, 60 percent in 2007 model year, and 100 percent in 2008 model year):

(17.2.1) The phase-in percentages shall be based on the manufacturer's projected sales volume for all vehicles subject to the requirements of title 13, CCR section 1968.2 unless specifically stated otherwise in section (e).

(17.2.2) Manufacturers may use an alternate phase-in schedule in lieu of the required phase-in schedule if the alternate phase-in schedule provides for equivalent compliance volume as defined in section (c) except as specifically noted for the phase in of in-use monitor performance ratio monitoring conditions in section (d)(3.2).

(17.2.3) Small volume manufacturers may use an alternate phase-in schedule in accordance with section (e)(17.2.2) in lieu of the required phase-in schedule or may meet the requirement on all vehicles by the final year of the phase-in in lieu of meeting the specific phase-in requirements for each model year (e.g., in the example in section (e)(17.2), small volume manufacturers are required to meet 100 percent in the 2008 model year for cold start emission reduction strategy monitoring, but not 30 percent in the 2006 model year or 60 percent in the 2007 model year).

(17.3) Manufacturers may request Executive Officer approval to disable an OBD II system monitor at ambient temperatures below twenty degrees Fahrenheit (20°F) (low ambient temperature conditions may be determined based on intake air or engine coolant temperature) or at elevations above 8000 feet above sea level. The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or an engineering evaluation that demonstrate that monitoring during the conditions would be unreliable. A manufacturer may further request, and the Executive Officer shall approve, that an OBD II system monitor be disabled at other ambient temperatures upon determining that the manufacturer has demonstrated with data and/or an engineering evaluation that misdiagnosis would occur at the ambient temperatures because of its effect on the component itself (e.g., component freezing).

(17.4) Manufacturers may request Executive Officer approval to disable monitoring systems that can be affected by low fuel level or running out of fuel (e.g., misfire detection) when the fuel level is 15 percent or less of the nominal capacity of the fuel tank. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring at the fuel levels would be unreliable.

(17.5) Manufacturers may disable monitoring systems that can be affected by vehicle battery or system voltage levels.

(17.5.1) For monitoring systems affected by low vehicle battery or system voltages, manufacturers may disable monitoring systems when the battery or system voltage is below 11.0 Volts. Manufacturers may request Executive Officer approval to utilize a voltage threshold higher than 11.0 Volts to disable system monitoring. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring

at the voltages would be unreliable and that either operation of a vehicle below the disablement criteria for extended periods of time is unlikely or the OBD II system monitors the battery or system voltage and will detect a malfunction at the voltage used to disable other monitors.

(17.5.2) For monitoring systems affected by high vehicle battery or system voltages, manufacturers may request Executive Officer approval to disable monitoring systems when the battery or system voltage exceeds a manufacturer-defined voltage. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring above the manufacturer-defined voltage would be unreliable and that either the electrical charging system/alternator warning light is illuminated (or voltage gauge is in the "red zone") or that the OBD II system monitors the battery or system voltage and will detect a malfunction at the voltage used to disable other monitors.

(17.6) A manufacturer may disable affected monitoring systems in vehicles designed to accommodate the installation of Power Take-Off (PTO) units (as defined in section (c)), provided disablement occurs only while the PTO unit is active, and the OBD II readiness status is cleared by the on-board computer (i.e., all monitors set to indicate "not complete") while the PTO unit is activated (see section (g)(4.1)). If the disablement occurs, the readiness status may be restored to its state prior to PTO activation when the disablement ends.

(17.7) A manufacturer may request Executive Officer approval to disable affected monitoring systems in vehicles equipped with tire pressure monitoring systems that cause a vehicle to enter a default mode of operation (e.g., reduced top speed) when a tire pressure problem is detected. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that the default mode can affect monitoring system performance, that the tire pressure monitoring system will likely result in action by the consumer to correct the problem, and that the disablement will not prevent or hinder effective testing in an Inspection and Maintenance program.

(17.8) Whenever the requirements in section (e) of this regulation require monitoring "to the extent feasible", the manufacturer shall submit its proposed monitor(s) for Executive Officer approval. The Executive Officer shall approve the proposal upon determining that the proposed monitor(s) meets the criteria of "to the extent feasible" by considering the best available monitoring technology to the extent that it is known or should have been known to the manufacturer and given the limitations of the manufacturer's existing hardware, the extent and degree to which the monitoring requirements are met in full, the limitations of monitoring necessary to prevent significant errors of commission and omission, and the extent to which the manufacturer has considered and pursued alternative monitoring concepts to meet the requirements in full. The manufacturer's consideration and pursuit of alternative monitoring concepts shall include evaluation of other modifications to the proposed monitor(s), the monitored components themselves, and other monitors that use the monitored components (e.g., altering other monitors to lessen the sensitivity and reliance on the component or characteristic of the component subject to the proposed monitor(s)).

(17.9) For 2004 model year vehicles certified to run on alternate fuels, manufacturers may request the Executive Officer to waive specific monitoring requirements in section (e) for which monitoring may not be reliable with respect to the use of alternate fuels. The Executive Officer shall grant the request upon determining that the manufacturer has demonstrated that the use of the alternate fuel could cause false illumination of the MIL even when using the best available monitoring technologies.

(17.10) For 2004 model year vehicles only, wherever the requirements of section (e) reflect a substantive change from the requirements of title 13, CCR section 1968.1(b) for 2003 model year vehicles, the manufacturer may request Executive Officer approval to continue to use the requirements of section 1968.1 in lieu of the requirements of section (e). The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that software or hardware changes would be required to comply with the requirements of section (e) and that the system complies with the requirements of section 1968.1(b).

(f) Monitoring Requirements for Diesel/Compression-Ignition Engines.

(1) Non-Methane Hydrocarbon (Nmhc) Converting Catalyst Monitoring

(1.1) Requirement: The OBD II system shall monitor the NMHC converting catalyst(s) for proper NMHC conversion capability. For vehicles equipped with catalyzed PM filters that convert NMHC emissions, the catalyst function of the PM filter shall be monitored in accordance with the PM filter requirements in section (f)(9).

(1.2) Malfunction Criteria:

(1.2.1) For purposes of section (f)(1), each catalyst in a series configuration that converts NMHC shall be monitored either individually or in combination with others.

(1.2.2) Conversion Efficiency:

(A) The OBD II system shall detect an NMHC catalyst malfunction when the catalyst conversion capability decreases to the point that NMHC emissions exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 5.0 times the applicable FTP standards for 2004 through 2009 model year vehicles;

b. 3.0 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

c. 1.75 times the applicable FTP standards for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable standards for 2007 through 2012 model year vehicles; and

b. 2.0 times the applicable standards for 2013 and subsequent model year vehicles.

(B) Except as provided below in section (f)(1.2.2)(C), if no failure or deterioration of the catalyst NMHC conversion capability could result in NMHC emissions exceeding the applicable malfunction criteria of section (f)(1.2.2)(A), the OBD II system shall detect a malfunction when the catalyst has no detectable amount of NMHC conversion capability.

(C) For 2004 through 2009 model year vehicles, a manufacturer may request to be exempted from the requirements for NMHC catalyst conversion efficiency monitoring. The Executive Officer shall approve the request upon determining that the manufacturer has demonstrated, through data and/or engineering evaluation, that the average FTP test NMHC conversion efficiency of the system is less than 30 percent (i.e., the cumulative NMHC emissions measured at the outlet of the catalyst are more than 70 percent of the cumulative engine-out NMHC emissions measured at the inlet of the catalyst(s)).

(1.2.3) Other Aftertreatment Assistance Functions. Additionally, for 2010 and subsequent model year vehicles, the catalyst(s) shall be monitored for other aftertreatment assistance functions:

(A) For catalysts used to generate an exotherm to assist PM filter regeneration, the OBD II system shall detect a malfunction when the catalyst is unable to generate a sufficient exotherm to achieve regeneration of the PM filter.

(B) For catalysts used to generate a feedgas constituency to assist SCR systems (e.g., to increase NO2 concentration upstream of an SCR system), the OBD II system shall detect a malfunction when the catalyst is unable to generate the necessary feedgas constituents for proper SCR system operation.

(C) For catalysts located downstream of a PM filter and used to convert NMHC emissions during PM filter regeneration, the OBD II system shall detect a malfunction when the catalyst has no detectable amount of NMHC conversion capability.

(D) For catalysts located downstream of an SCR system and used to prevent ammonia slip, the OBD II system shall detect a malfunction when the catalyst has no detectable amount of NMHC, CO, NO[x], or PM conversion capability. Monitoring of the catalyst shall not be required if there is no measurable emission impact on the criteria pollutants (i.e., NMHC, CO, NO[x], and PM) during any reasonable driving condition where the catalyst is most likely to affect criteria pollutants (e.g., during conditions most likely to result in ammonia generation or excessive reductant delivery).

(1.2.4) Catalyst System Aging and Monitoring

(A) For purposes of determining the catalyst malfunction criteria in sections (f)(1.2.2) and (1.2.3) for individually monitored catalysts, the manufacturer shall use a catalyst(s) deteriorated to the malfunction criteria using methods established by the manufacturer to represent real world catalyst deterioration under normal and malfunctioning engine operating conditions. If the catalyst system contains catalysts in parallel (e.g., a two bank exhaust system where each bank has its own catalyst), the malfunction criteria shall be determined with the "parallel" catalysts equally deteriorated.

(B) For purposes of determining the catalyst malfunction criteria in sections (f)(1.2.2) and (1.2.3) for catalysts monitored in combination with others, the manufacturer shall submit a catalyst system aging and monitoring plan to the Executive Officer for review and approval. The plan shall include the description, emission control purpose, and location of each component, the monitoring strategy for each component and/or combination of components, and the method for determining the malfunction criteria of sections (f)(1.2.2) and (1.2.3) including the deterioration/aging process. If the catalyst system contains catalysts in parallel (e.g., a two bank exhaust system where each bank has its own catalyst), the malfunction criteria shall be determined with the "parallel" catalysts equally deteriorated. Executive Officer approval of the plan shall be based on the representativeness of the aging to real world catalyst system component deterioration under normal and malfunctioning engine operating conditions, the effectiveness of the method used to determine the malfunction criteria of section (f)(1.2), the ability of the component monitor(s) to pinpoint the likely area of malfunction and ensure the correct components are repaired/replaced in-use, and the ability of the component monitor(s) to accurately verify that each catalyst component is functioning as designed and as required in sections (f)(1.2.2) and (1.2.3).

(1.3) Monitoring Conditions:

(1.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(1.2.2) and (1.2.3) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (f)(1.2.2) and (1.2.3) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(1.4) MIL Illumination and Fault Code Storage:

(1.4.1) General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(1.4.2) The monitoring method for the catalyst(s) shall be capable of detecting all instances, except diagnostic self-clearing, when a catalyst fault code has been cleared but the catalyst has not been replaced (e.g., catalyst overtemperature histogram

approaches are not acceptable).

(2) Oxides of Nitrogen (NO[x]) Converting Catalyst Monitoring

(2.1) Requirement: The OBD II system shall monitor the NO[x] converting catalyst(s) for proper conversion capability. For vehicles equipped with selective catalytic reduction (SCR) systems or other catalyst systems that utilize an active/intrusive reductant injection (e.g., active lean NO[x] catalysts utilizing diesel fuel injection), the OBD II system shall monitor the SCR or active/intrusive reductant injection system for proper performance. The individual electronic components (e.g., actuators, valves, sensors, heaters, pumps) in the SCR or active/intrusive reductant injection system shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(2.2) Malfunction Criteria:

(2.2.1) For purposes of section (f)(2), each catalyst in a series configuration that converts NO[x] shall be monitored either individually or in combination with others.

(2.2.2) Conversion Efficiency:

(A) The OBD II system shall detect a NO[x] catalyst malfunction when the catalyst conversion capability decreases to the point that NO[x] or NMHC emissions exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP standards for 2004 through 2009 model year vehicles;

b. 2.5 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

c. 1.75 times the applicable FTP standards for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. the applicable NO[x] standard by more than 0.5 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.7 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 3.5 times the applicable NMHC standard for 2007 through 2009 model year vehicles;

b. the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.5 times the applicable NMHC standard for 2010 through 2012 model year vehicles; and

c. the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard for 2013 and subsequent model year vehicles.

(B) Except as provided below in section (f)(2.2.2)(C), if no failure or deterioration of the catalyst NO[x] or NMHC conversion capability could result in NO[x] or NMHC emissions exceeding the applicable malfunction criteria of section (f)(2.2.2), the OBD II system shall detect a malfunction when the catalyst has no detectable amount of NO[x] or NMHC conversion capability.

(C) For 2004 through 2009 model year vehicles, a manufacturer may request to be exempted from the requirements for NO[x] catalyst conversion efficiency monitoring. The Executive Officer shall approve the request upon determining that the manufacturer has demonstrated, through data and/or engineering evaluation, that the average FTP test NO[x] conversion efficiency of the system is less than 30 percent (i.e., the cumulative NO[x] emissions measured at the outlet of the catalyst are more than 70 percent of the cumulative engine-out NO[x] emissions measured at the inlet of the catalyst(s)).

(2.2.3) Selective Catalytic Reduction (SCR) or Other Active/Intrusive Reductant Injection System Performance:

(A) Reductant Delivery Performance:

(i) For 2007 and subsequent model year vehicles, the OBD II system shall detect a system malfunction prior to any failure or deterioration of the system to properly regulate reductant delivery (e.g., urea injection, separate injector fuel injection, post injection of fuel, air assisted injection/mixing) that would cause a vehicle's NO[x] or NMHC emissions to exceed the applicable emission levels specified in sections (f)(2.2.2)(A).

(ii) If no failure or deterioration of the reductant delivery system could result in a vehicle's NO[x] or NMHC emissions exceeding the applicable malfunction criteria specified in section (f)(2.2.3)(A)(i), the OBD II system shall detect a malfunction when the system has reached its control limits such that it is no longer able to deliver the desired quantity of reductant.

(B) If the catalyst system uses a reductant other than the fuel used for the engine or uses a reservoir/tank for the reductant that is separate from the fuel tank used for the engine, the OBD II system shall detect a malfunction when there is no longer sufficient reductant available to properly operate the reductant system (e.g., the reductant tank is empty).

(C) If the catalyst system uses a reservoir/tank for the reductant that is separate from the fuel tank used for the vehicle, the OBD II system shall detect a malfunction when an improper reductant is used in the reductant reservoir/tank (e.g., the reductant tank is filled with something other than the reductant).

(D) Feedback control: Except as provided for in section (f)(2.2.3)(E), if the vehicle is equipped with feedback control of

the reductant injection, the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(E) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria specified in section (f)(2.2.3)(D)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(F) In lieu of detecting the malfunctions specified in sections (f)(2.2.3)(D)(i) and (ii) with a reductant injection system-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for reductant injection feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(2.2.3)(D)(i) and (ii).

(2.2.4) Catalyst System Aging and Monitoring

(A) For purposes of determining the catalyst malfunction criteria in section (f)(2.2.2) for individually monitored catalysts, the manufacturer shall use a catalyst deteriorated to the malfunction criteria using methods established by the manufacturer to represent real world catalyst deterioration under normal and malfunctioning engine operating conditions. If the catalyst system contains catalysts in parallel (e.g., a two bank exhaust system where each bank has its own catalyst), the malfunction criteria shall be determined with the "parallel" catalysts equally deteriorated.

(B) For purposes of determining the catalyst malfunction criteria in section (f)(2.2.2) for catalysts monitored in combination with others, the manufacturer shall submit a catalyst system aging and monitoring plan to the Executive Officer for review and approval. The plan shall include the description, emission control purpose, and location of each component, the monitoring strategy for each component and/or combination of components, and the method for determining the malfunction criteria of section (f)(2.2.2) including the deterioration/aging process. If the catalyst system contains catalysts in parallel (e.g., a two bank exhaust system where each bank has its own catalyst), the malfunction criteria shall be determined with the "parallel" catalysts equally deteriorated. Executive Officer approval of the plan shall be based on the representativeness of the aging to real world catalyst system component deterioration under normal and malfunctioning engine operating conditions, the effectiveness of the method used to determine the malfunction criteria of section (f)(2.2.2), the ability of the component monitor(s) to pinpoint the likely area of malfunction and ensure the correct components are repaired/replaced in-use, and the ability of the component monitor(s) to accurately verify that each catalyst component is functioning as designed and as required in section (f)(2.2.2).

(2.3) Monitoring Conditions:

(2.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(2.2.2) (i.e., catalyst efficiency) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(2.2.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(2.3.2) The OBD II system shall monitor continuously for malfunctions identified in section (f)(2.2.3) (e.g., SCR performance).

(2.4) MIL Illumination and Fault Code Storage:

(2.4.1) Except as provided below for reductant faults, general requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(2.4.2) If the OBD II system is capable of discerning that a system fault is being caused by a empty reductant tank:

(A) The manufacturer may request Executive Officer approval to delay illumination of the MIL if the vehicle is equipped with an alternative indicator for notifying the vehicle operator of the malfunction. The Executive Officer shall approve the request upon determining the alternative indicator is of sufficient illumination and location to be readily visible under all lighting conditions and provides equivalent assurance that a vehicle operator will be promptly notified and that corrective action will be undertaken.

(B) If the vehicle is not equipped with an alternative indicator and the MIL illuminates, the MIL may be immediately extinguished and the corresponding fault codes erased once the OBD II system has verified that the reductant tank has been properly refilled and the MIL has not been illuminated for any other type of malfunction.

(C) The Executive Officer may approve other strategies that provide equivalent assurance that a vehicle operator will be promptly notified and that corrective action will be undertaken.

(2.4.3) The monitoring method for the catalyst(s) shall be capable of detecting all instances, except diagnostic self-clearing, when a catalyst fault code has been cleared but the catalyst has not been replaced (e.g., catalyst overtemperature histogram approaches are not acceptable).

(3) Misfire Monitoring

(3.1) Requirement:

(3.1.1) The OBD II system shall monitor the engine for misfire causing excess emissions. The OBD II system shall be capable of detecting misfire occurring in one or more cylinders. To the extent possible without adding hardware for this specific purpose, the OBD II system shall also identify the specific misfiring cylinder.

(3.1.2) If more than one cylinder is misfiring, a separate fault code shall be stored indicating that multiple cylinders are misfiring. When identifying multiple cylinder misfire, the OBD II system is not required to also identify each of the misfiring cylinders individually through separate fault codes.

(3.2) Malfunction Criteria:

(3.2.1) The OBD II system shall detect a misfire malfunction when one or more cylinders are continuously misfiring.

(3.2.2) Additionally, for 2010 and subsequent model year vehicles equipped with sensors that can detect combustion or combustion quality (e.g., for use in homogeneous charge compression ignition (HCCI) control systems):

(A) The OBD II system shall detect a misfire malfunction that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard, 1.5 times any of the applicable FTP standards.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, 2.0 times any of the applicable NMHC, CO, and NO[x] standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test.

(B) Manufacturers shall determine the percentage of misfire evaluated in 1000 revolution increments that would cause NMHC, CO, NO[x], or PM emissions from an emission durability demonstration vehicle to exceed the levels specified in section (f)(3.2.2)(A) if the percentage of misfire were present from the beginning of the test. To establish this percentage of misfire, the manufacturer shall utilize misfire events occurring at equally spaced, complete engine cycle intervals, across randomly selected cylinders throughout each 1000-revolution increment. If this percentage of misfire is determined to be lower than one percent, the manufacturer may set the malfunction criteria at one percent.

(C) Subject to Executive Officer approval, a manufacturer may employ other revolution increments. The Executive Officer shall grant approval upon determining that the manufacturer has demonstrated that the strategy would be equally effective and timely in detecting misfire.

(3.2.3) A malfunction shall be detected if the percentage of misfire established in section (f)(3.2.2)(B) is exceeded regardless of the pattern of misfire events (e.g., random, equally spaced, continuous).

(3.3) Monitoring Conditions:

(3.3.1) The OBD II system shall monitor for misfire during engine idle conditions at least once per driving cycle in which the monitoring conditions for misfire are met. A manufacturer shall submit monitoring conditions to the Executive Officer for approval. The Executive Officer shall approve manufacturer-defined monitoring conditions that are determined (based on manufacturer-submitted data and/or other engineering documentation) to: (i) be technically necessary to ensure robust detection of malfunctions (e.g., avoid false passes and false detection of malfunctions), (ii) require no more than 1000 cumulative engine revolutions, and (iii) do not require any single continuous idle operation of more than 15 seconds to make a determination that a malfunction is present (e.g., a decision can be made with data gathered during several idle operations of 15 seconds or less); or satisfy the requirements of (d)(3.1) with alternative engine operating conditions.

(3.3.2) Manufacturers may request Executive Officer approval to use alternate monitoring conditions (e.g., off-idle). The Executive Officer shall approve alternate monitoring conditions that are determined (based on manufacturer-submitted data and/or other engineering documentation) to ensure equivalent robust detection of malfunctions and equivalent timeliness in detection of malfunctions.

(3.3.3) Additionally, for 2010 and subsequent model year vehicles subject to (f)(3.2.2):

(A) The OBD II system shall continuously monitor for misfire under all positive torque engine speeds and load conditions.

(B) If a monitoring system cannot detect all misfire patterns under all required engine speed and load conditions as required in section (f)(3.3.3)(A), the manufacturer may request Executive Officer approval to accept the monitoring system. In evaluating the manufacturer's request, the Executive Officer shall consider the following factors: the magnitude of the region(s) in which misfire detection is limited, the degree to which misfire detection is limited in the region(s) (i.e., the probability of detection of misfire events), the frequency with which said region(s) are expected to be encountered in-use, the type

of misfire patterns for which misfire detection is troublesome, and demonstration that the monitoring technology employed is not inherently incapable of detecting misfire under required conditions (i.e., compliance can be achieved on other engines). The evaluation shall be based on the following misfire patterns: equally spaced misfire occurring on randomly selected cylinders, single cylinder continuous misfire, and paired cylinder (cylinders firing at the same crank angle) continuous misfire.

(3.4) MIL Illumination and Fault Code Storage:

(3.4.1) General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(3.4.2) Additionally, for 2010 and subsequent model year vehicles subject to (f)(3.2.2):

(A) Upon detection of the percentage of misfire specified in section (f)(3.2.2)(B), the following criteria shall apply for MIL illumination and fault code storage:

(i) A pending fault code shall be stored no later than after the fourth exceedance of the percentage of misfire specified in section (f)(3.2.2)(B) during a single driving cycle.

(ii) If a pending fault code is stored, the OBD II system shall illuminate the MIL and store a confirmed fault code within 10 seconds if the percentage of misfire specified in section (f)(3.2.2)(B) is again exceeded four times during: (a) the driving cycle immediately following the storage of the pending fault code, regardless of the conditions encountered during the driving cycle; or (b) on the next driving cycle in which similar conditions (see section (c)) to the engine conditions that occurred when the pending fault code was stored are encountered.

(iii) The pending fault code may be erased at the end of the next driving cycle in which similar conditions to the engine conditions that occurred when the pending fault code was stored have been encountered without an exceedance of the specified percentage of misfire. The pending code may also be erased if similar conditions are not encountered during the next 80 driving cycles immediately following initial detection of the malfunction.

(B) Storage of freeze frame conditions.

(i) The OBD II system shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing a confirmed fault code and erasing a confirmed fault code.

(ii) If freeze frame conditions are stored for a malfunction other than a misfire malfunction when a fault code is stored as specified in section (f)(3.4.2), the stored freeze frame information shall be replaced with freeze frame information regarding the misfire malfunction.

(C) Storage of misfire conditions for similar conditions determination. Upon detection of misfire under section (f)(3.4.2), the OBD II system shall store the following engine conditions: engine speed, load, and warm-up status of the first misfire event that resulted in the storage of the pending fault code.

(D) Extinguishing the MIL. The MIL may be extinguished after three sequential driving cycles in which similar conditions have been encountered without an exceedance of the specified percentage of misfire.

(4) Fuel System Monitoring

(4.1) Requirement:

The OBD II system shall monitor the fuel delivery system to determine its ability to comply with emission standards. The individual electronic components (e.g., actuators, valves, sensors, pumps) that are used in the fuel system and not specifically addressed in this section shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(4.2) Malfunction Criteria:

(4.2.1) Fuel system pressure control:

(A) The OBD II system shall detect a malfunction of the fuel system pressure control system (e.g., fuel, hydraulic fluid) prior to any failure or deterioration that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP standards for 2004 through 2009 model year vehicles;

b. 2.0 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

c. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 1.5 times any of the applicable NMHC, CO, and NO[x] standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of greater than 0.50 g/bhp-hr NO[x];

b. 2.5 times any of the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x];

and

c. 2.0 times any of the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x];

(B) For vehicles in which no failure or deterioration of the fuel system pressure control could result in a vehicle's emissions exceeding the applicable malfunction criteria specified in section (f)(4.2.1)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that the commanded fuel system pressure cannot be delivered.

(4.2.2) Injection quantity. Additionally, for all 2010 and subsequent model year vehicles, the fuel system shall be monitored for injection quantity:

(A) The OBD II system shall detect a malfunction of the fuel injection system when the system is unable to deliver the commanded quantity of fuel necessary to maintain a vehicle's NMHC, CO, NO[x] and PM emissions at or below:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

b. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, the applicable emission levels specified in sections (f)(4.2.1)(A)(ii).

(B) For vehicles in which no failure or deterioration of the fuel injection quantity could result in a vehicle's emissions exceeding the applicable malfunction criteria specified in section (f)(4.2.2)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that the commanded fuel quantity cannot be delivered.

(4.2.3) Injection Timing. Additionally, for all 2010 and subsequent model year vehicles, the fuel system shall be monitored for injection timing:

(A) The OBD II system shall detect a malfunction of the fuel injection system when the system is unable to deliver fuel at the proper crank angle/timing (e.g., injection timing too advanced or too retarded) necessary to maintain a vehicle's NMHC, CO, NO[x], and PM emissions at or below the applicable emission levels specified in sections (f)(4.2.2)(A).

(B) For vehicles in which no failure or deterioration of the fuel injection timing could result in a vehicle's emissions exceeding the applicable malfunction criteria specified in section (f)(4.2.3)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that the commanded fuel injection timing cannot be achieved.

(4.2.4) Feedback control:

(A) Except as provided for in section (f)(4.2.4)(B), if the vehicle is equipped with feedback control of the fuel system (e.g., feedback control of pressure or pilot injection quantity), the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(B) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria specified in section (f)(4.2.4)(A)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(C) In lieu of detecting the malfunctions specified in sections (f)(4.2.4)(A)(i) and (ii) with a fuel system-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for fuel system feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(4.2.4)(A)(i) and (ii).

(4.3) Monitoring Conditions:

(4.3.1) The OBD II system shall monitor continuously for malfunctions identified in sections (f)(4.2.1) and (f)(4.2.4) (i.e., fuel pressure control and feedback operation).

(4.3.2) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(4.2.2) and (f)(4.2.3) (i.e., injection quantity and timing) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(4.4) MIL Illumination and Fault Code Storage:

(4.4.1) General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(4.4.2) Additionally, for malfunctions identified in section (f)(4.2.1) (i.e., fuel pressure control) on all 2010 and subsequent model year vehicles:

(A) A pending fault code shall be stored immediately upon the fuel system exceeding the malfunction criteria established pursuant to section (f)(4.2.1).

(B) Except as provided below, if a pending fault code is stored, the OBD II system shall immediately illuminate the MIL and store a confirmed fault code if a malfunction is again detected during either of the following two events: (a) the driving cycle immediately following the storage of the pending fault code, regardless of the conditions encountered during the driving cycle; or (b) on the next driving cycle in which similar conditions (see section (c)) to those that occurred when the pending fault code was stored are encountered.

(C) The pending fault code may be erased at the end of the next driving cycle in which similar conditions have been encountered without an exceedance of the specified fuel system malfunction criteria. The pending code may also be erased if similar conditions are not encountered during the 80 driving cycles immediately after the initial detection of a malfunction for which the pending code was set.

(D) Storage of freeze frame conditions.

(i) A manufacturer shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing and erasing a confirmed fault code.

(ii) If freeze frame conditions are stored for a malfunction other than misfire (see section (f)(3)) or fuel system malfunction when a fault code is stored as specified in section (f)(4.4.2) above, the stored freeze frame information shall be replaced with freeze frame information regarding the fuel system malfunction.

(E) Storage of fuel system conditions for determining similar conditions of operation. Upon detection of a fuel system malfunction under section (f)(4.4.2), the OBD II system shall store the engine speed, load, and warm-up status of the first fuel system malfunction that resulted in the storage of the pending, fault code.

(F) Extinguishing the MIL. The MIL may be extinguished after three sequential driving cycles in which similar conditions have been encountered without a malfunction of the fuel system.

(5) Exhaust Gas Sensor Monitoring

(5.1) Requirement:

(5.1.1) The OBD II system shall monitor all exhaust gas sensors (e.g., oxygen, air-fuel ratio, NO[x]) used for emission control system feedback (e.g., EGR control/feedback, SCR control/feedback, NO[x] adsorber control/feedback) or as a monitoring device for proper output signal, activity, response rate, and any other parameter that can affect emissions.

(5.1.2) For vehicles equipped with heated exhaust gas sensors, the OBD II system shall monitor the heater for proper performance.

(5.2) Malfunction Criteria:

(5.2.1) Air-Fuel Ratio Sensors:

(A) For sensors located upstream of the exhaust aftertreatment:

(i) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

a. For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

1. 2.5 times the applicable FTP standards for 2004 through 2009 model year vehicles;

2. 2.0 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

3. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

b. For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

1. 1.5 times the applicable NMHC, CO, and NO[x] standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of greater than 0.50 g/bhp-hr NO[x];

2. 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x]; and

3. 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehi-

cles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x].

(ii) Circuit faults: The OBD II system shall detect malfunctions of the sensor caused by either a lack of circuit continuity or out-of-range values.

(iii) Feedback faults: The OBD II system shall detect a malfunction of the sensor when a sensor failure or deterioration causes an emission control system (e.g., EGR, SCR, or NO[x] adsorber) to stop using that sensor as a feedback input (e.g., causes default or open-loop operation).

(iv) Monitoring capability: To the extent feasible, the OBD II system shall detect a malfunction of the sensor when the sensor output voltage, resistance, impedance, current, amplitude, activity, offset, or other characteristics are no longer sufficient for use as an OBD II system monitoring device (e.g., for catalyst, EGR, SCR, or NO[x] adsorber monitoring).

(B) For sensors located downstream of the exhaust aftertreatment:

(i) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

a. For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

1. 3.5 times the applicable FTP NMHC, CO, or NO[x] standards or 5.0 times the applicable FTP PM standard for 2004 through 2009 model year vehicles;

2. 2.5 times the applicable FTP NMHC, CO, or NO[x] standards or 4.0 times the applicable FTP PM standard for 2010 through 2012 model year vehicles;

3. 1.5 times the applicable FTP NMHC or CO standards, 1.75 times the applicable FTP NO[x] standard, or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

b. For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

1. 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.5 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.7 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2009 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of greater than 0.50 g/bhp-hr NO[x];

2. 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x]; and

3. 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x].

(ii) Circuit faults: The OBD II system shall detect malfunctions of the sensor caused by either a lack of circuit continuity or out-of-range values.

(iii) Feedback faults: The OBD II system shall detect a malfunction of the sensor when a sensor failure or deterioration causes an emission control system (e.g., EGR, SCR, or NO[x] adsorber) to stop using that sensor as a feedback input (e.g., causes default or open-loop operation).

(iv) Monitoring capability: To the extent feasible, the OBD II system shall detect a malfunction of the sensor when the sensor output voltage, resistance, impedance, current, amplitude, activity, offset, or other characteristics are no longer sufficient for use as an OBD II system monitoring device (e.g., for catalyst, EGR, SCR, or NO[x] adsorber monitoring).

(5.2.2) NO[x] and PM sensors:

(A) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause a vehicle's emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

1. 3.5 times the applicable FTP NMHC, CO, or NO[x] standards or 5.0 times the applicable FTP PM standard for 2004 through 2009 model year vehicles;

2. 2.5 times the applicable FTP NMHC, CO, or NO[x] standards, or 4.0 times the applicable FTP PM standard for 2010 through 2012 model year vehicles;

3. 1.5 times the applicable FTP NMHC or CO standards, 1.75 times the applicable FTP NO[x] standard, or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC standards, the applicable NO[x] standard by more than 0.5 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.7 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2009 model year vehicles;

b. 2.5 times the applicable NMHC standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

c. 2.0 times the applicable NMHC standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

(B) Circuit faults: The OBD II system shall detect malfunctions of the sensor caused by either a lack of circuit continuity or out-of-range values.

(C) Feedback faults: The OBD II system shall detect a malfunction of the sensor when a sensor failure or deterioration causes an emission control system (e.g., EGR, SCR, or NO[x] adsorber) to stop using that sensor as a feedback input (e.g., causes default or open-loop operation).

(D) Monitoring capability: To the extent feasible, the OBD II system shall detect a malfunction of the sensor when the sensor output voltage, resistance, impedance, current, amplitude, activity, offset, or other characteristics are no longer sufficient for use as an OBD II system monitoring device (e.g., for catalyst, EGR, PM filter, SCR, or NO[x] adsorber monitoring).

(5.2.3) Other exhaust gas sensors:

(A) For other exhaust gas sensors, the manufacturer shall submit a monitoring plan to the Executive Officer for approval. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and an engineering evaluation that demonstrate that the monitoring plan is as reliable and effective as the monitoring plan required for air-fuel ratio sensors and NO[x] sensors under sections (f)(5.2.1) and (f)(5.2.2).

(5.2.4) Sensor Heaters:

(A) The OBD II system shall detect a malfunction of the heater performance when the current or voltage drop in the heater circuit is no longer within the manufacturer's specified limits for normal operation (i.e., within the criteria required to be met by the component vendor for heater circuit performance at high mileage). Subject to Executive Officer approval, other malfunction criteria for heater performance malfunctions may be used upon the Executive Officer determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate the monitoring reliability and timeliness to be equivalent to the stated criteria in section (f)(5.2.4)(A).

(B) The OBD II system shall detect malfunctions of the heater circuit including open or short circuits that conflict with the commanded state of the heater (e.g., shorted to 12 Volts when commanded to 0 Volts (ground)).

(5.3) Monitoring Conditions:

(5.3.1) Exhaust Gas Sensors

(A) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(5.2.1)(A)(i), (5.2.1)(B)(i), and (5.2.2)(A) (e.g., sensor performance faults) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For all 2010 and subsequent model year vehicles, for purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (f)(5.2.1)(A)(i), (5.2.1)(B)(i), and (5.2.2)(A) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(B) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(5.2.1)(A)(iv), (5.2.1)(B)(iv), and (5.2.2)(D) (e.g., monitoring capability) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements) with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2).

(C) Except as provided in section (f)(5.3.1)(D), monitoring for malfunctions identified in sections (f)(5.2.1)(A)(ii), (5.2.1)(A)(iii), (5.2.1)(B)(ii), (5.2.1)(B)(iii), (5.2.2)(B), and (5.2.2)(C) (i.e., circuit continuity, out-of-range, and open-loop malfunctions) shall be conducted continuously.

(D) A manufacturer may request Executive Officer approval to disable continuous exhaust gas sensor monitoring when an exhaust gas sensor malfunction cannot be distinguished from other effects (e.g., disable out-of-range low monitoring during fuel cut conditions). The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning sensor cannot be distinguished from a malfunctioning sensor and that the disablement interval is limited only to that necessary for avoiding false detection.

(5.3.2) Sensor Heaters

(A) Manufacturers shall define monitoring conditions for malfunctions identified in section (f)(5.2.4)(A) (i.e., sensor heater performance) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(B) Monitoring for malfunctions identified in section (f)(5.2.4)(B) (i.e., circuit malfunctions) shall be conducted continu-

ously.

(5.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(6) Exhaust Gas Recirculation (EGR) System Monitoring

(6.1) Requirement: The OBD II system shall monitor the EGR system on vehicles so-equipped for low flow rate, high flow rate, and slow response malfunctions. For vehicles equipped with EGR coolers (e.g., heat exchangers), the OBD II system shall monitor the cooler for insufficient cooling malfunctions. The individual electronic components (e.g., actuators, valves, sensors) that are used in the EGR system shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(6.2) Malfunction Criteria:

(6.2.1) Low Flow:

(A) The OBD II system shall detect a malfunction of the EGR system at or prior to a decrease from the manufacturer's specified EGR flow rate that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP standards for 2004 through 2009 model year vehicles;

b. 2.5 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

c. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 1.5 times the applicable FTP standards for 2004 through 2006 model year vehicles;

b. 1.5 times the applicable NMHC, CO, and NO[x] standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of greater than 0.50 g/bhp-hr NO[x];

c. 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x]; and

d. 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x].

(B) For vehicles in which no failure or deterioration of the EGR system that causes a decrease in flow could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(6.2.1)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that it cannot increase EGR flow to achieve the commanded flow rate.

(6.2.2) High Flow:

(A) The OBD II system shall detect a malfunction of the EGR system, including a leaking EGR valve (i.e., exhaust gas flowing through the valve when the valve is commanded closed), at or prior to an increase from the manufacturer's specified EGR flow rate that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(6.2.1)(A):

(B) For vehicles in which no failure or deterioration of the EGR system that causes an increase in flow could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(6.2.2)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that it cannot reduce EGR flow to achieve the commanded flow rate.

(6.2.3) Slow Response. Additionally, for 2010 and subsequent model year vehicles, the EGR system shall be monitored for slow response:

(A) The OBD II system shall detect a malfunction of the EGR system at or prior to any failure or deterioration in the capability of the EGR system to achieve the commanded flow rate within a manufacturer-specified time that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(6.2.1)(A).

(B) The OBD II system shall monitor the capability of the EGR system to respond to both a commanded increase in flow and a commanded decrease in flow.

(6.2.4) Feedback control:

(A) Except as provided for in section (f)(6.2.4)(B), if the vehicle is equipped with feedback control of the EGR system

(e.g., feedback control of flow, valve position, pressure differential across the valve via intake throttle or exhaust backpressure), the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(B) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria specified in section (f)(6.2.4)(A)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(C) In lieu of detecting the malfunctions specified in sections (f)(6.2.4)(A)(i) and (ii) with an EGR system-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for EGR system feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(6.2.4)(A)(i) and (ii).

(6.2.5) EGR Cooler Performance:

(A) The OBD II system shall detect a malfunction of the EGR system cooler at or prior to a reduction from the manufacturer's specified cooling performance that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(6.2.1)(A):

(B) For vehicles in which no failure or deterioration of the EGR system cooler could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(6.2.5)(A), the OBD II system shall detect a malfunction when the system has no detectable amount of EGR cooling.

(6.3) Monitoring Conditions:

(6.3.1) For malfunctions identified in sections (f)(6.2.1) and (f)(6.2.2) (i.e., EGR low and high flow), manufacturers shall define monitoring conditions:

(A) For 2004 through 2009 model year vehicles, in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (f)(6.2.1) and (f)(6.2.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2);

(B) Conducted continuously for all 2010 and subsequent model year vehicles.

(6.3.2) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(6.2.3) (i.e., slow response) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(6.2.3) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(6.3.3) The OBD II system shall monitor continuously for malfunctions identified in section (f)(6.2.4) (i.e., EGR feedback control).

(6.3.4) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(6.2.5) (i.e., cooler performance) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(6.2.5) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(6.3.5) Manufacturers may request Executive Officer approval to temporarily disable the EGR system check under specific conditions (e.g., when freezing may affect performance of the system). The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation which demonstrate that a reliable check cannot be made when these conditions exist.

(6.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(7) Boost Pressure Control System Monitoring

(7.1) Requirement: For 2010 and subsequent model year vehicles, the OBD II system shall monitor the boost pressure control system (e.g., turbocharger) on vehicles so-equipped for under and over boost malfunctions. For vehicles equipped with variable geometry turbochargers (VGT), the OBD II system shall monitor the VGT system for slow response malfunctions. For vehicles equipped with charge air cooler systems, the OBD II system shall monitor the charge air cooler system for cooling system performance malfunctions. For 2004 and subsequent model year vehicles, the individual electronic components (e.g.,

actuators, valves, sensors) that are used in the boost pressure control system shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(7.2) Malfunction Criteria:

(7.2.1) Underboost:

(A) The OBD II system shall detect a malfunction of the boost pressure control system at or prior to a decrease from the manufacturer's commanded boost pressure that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 2.0 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

b. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

b. 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

(B) For vehicles in which no failure or deterioration of the boost pressure control system that causes a decrease in boost could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(7.2.1)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that it cannot increase boost to achieve the commanded boost pressure.

(7.2.2) Overboost:

(A) The OBD II system shall detect a malfunction of the boost pressure control system at or prior to an increase from the manufacturer's commanded boost pressure that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(7.2.1)(A).

(B) For vehicles in which no failure or deterioration of the boost pressure control system that causes an increase in boost could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(7.2.2)(A), the OBD II system shall detect a malfunction when the system has reached its control limits such that it cannot decrease boost to achieve the commanded boost pressure.

(7.2.3) VGT slow response:

(A) The OBD II system shall detect a malfunction at or prior to any failure or deterioration in the capability of the VGT system to achieve the commanded turbocharger geometry within a manufacturer-specified time that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(7.2.1)(A).

(B) For vehicles in which no failure or deterioration of the VGT system response could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(7.2.3)(A), the OBD II system shall detect a malfunction of the VGT system when proper functional response of the system to computer commands does not occur.

(7.2.4) Charge Air Undercooling:

(A) The OBD II system shall detect a malfunction of the charge air cooling system at or prior to a decrease from the manufacturer's specified cooling rate that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed the applicable emission levels specified in sections (f)(7.2.1)(A).

(B) For vehicles in which no failure or deterioration of the charge air cooling system that causes a decrease in cooling performance could result in a vehicle's emissions exceeding the malfunction criteria specified in section (f)(7.2.4)(A), the OBD II system shall detect a malfunction when the system has no detectable amount of charge air cooling.

(7.2.5) Feedback control:

(A) Except as provided for in section (f)(7.2.5)(B), if the vehicle is equipped with feedback control of the boost pressure system (e.g., control of VGT position, turbine speed, manifold pressure) the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(B) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria

specified in section (f)(7.2.5)(A)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(C) In lieu of detecting the malfunctions specified in sections (f)(7.2.5)(A)(i) and (ii) with a boost pressure system-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for boost pressure system feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(7.2.5)(A)(i) and (ii).

(7.3) Monitoring Conditions:

(7.3.1) The OBD II system shall monitor continuously for malfunctions identified in sections (f)(7.2.1), (7.2.2), and (7.2.5) (i.e., over and under boost, feedback control).

(7.3.2) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(7.2.3) (i.e., VGT slow response) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2). For all 2010 and subsequent model year vehicles, for purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(7.2.3) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(7.3.3) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(7.2.4) (i.e., charge air cooler performance) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(7.2.4) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(7.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(8) NO[x] Adsorber Monitoring

(8.1) Requirement: The OBD II system shall monitor the NO[x] adsorber on vehicles so-equipped for proper performance. For vehicles equipped with active/intrusive injection (e.g., in-exhaust fuel and/or air injection) to achieve desorption of the NO[x] adsorber, the OBD II system shall monitor the active/intrusive injection system for proper performance. The individual electronic components (e.g., injectors, valves, sensors) that are used in the active/intrusive injection system shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(8.2) Malfunction Criteria:

(8.2.1) NO[x] adsorber capability:

(A) The OBD II system shall detect a NO[x] adsorber system malfunction when the NO[x] adsorber capability decreases to the point that would cause a vehicle's NO[x] or NMHC emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP standards for 2004 through 2009 model year vehicles;

b. 2.5 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

c. 1.75 times the applicable FTP standards for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. the applicable NO[x] standard by more than 0.5 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.7 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 3.5 times the applicable NMHC standard for 2007 through 2009 model year vehicles;

b. the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.5 times the applicable NMHC standard for 2010 through 2012 model year vehicles; and

c. the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard for 2013 and subsequent model year vehicles.

(B) If no failure or deterioration of the NO[x] adsorber capability could result in a vehicle's NO[x] emissions exceeding the applicable malfunction criteria specified in section (f)(8.2.1)(A), the OBD II system shall detect a malfunction when the system has no detectable amount of NO[x] adsorber capability.

(8.2.2) For systems that utilize active/intrusive injection (e.g., in-cylinder post fuel injection, in-exhaust air-assisted fuel injection) to achieve desorption of the NO[x] adsorber, the OBD II system shall detect a malfunction if any failure or deterioration of the injection system's ability to properly regulate injection causes the system to be unable to achieve desorption of the

NO[x] adsorber.

(8.2.3) Feedback control:

(A) Except as provided for in section (f)(8.2.3)(B), if the vehicle is equipped with feedback control of the NO[x] adsorber or active/intrusive injection system (e.g., feedback control of injection quantity, time), the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(B) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria specified in section (f)(8.2.3)(A)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(C) In lieu of detecting the malfunctions specified in sections (f)(8.2.3)(A)(i) and (ii) with a NO[x] adsorber-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for NO[x] adsorber or active/intrusive injection system feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(8.2.3)(A)(i) and (ii).

(8.3) Monitoring Conditions:

(8.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(8.2.1) (i.e., adsorber capability) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (f)(8.2.1) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(8.3.2) The OBD II system shall monitor continuously for malfunctions identified in sections (f)(8.2.2) and (8.2.3) (e.g., injection function, feedback control).

(8.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(9) Particulate Matter (PM) Filter Monitoring

(9.1) Requirement: The OBD II system shall monitor the PM filter on vehicles so-equipped for proper performance. For vehicles equipped with active regeneration systems that utilize an active/intrusive injection (e.g., in-exhaust fuel injection, in-exhaust fuel/air burner), the OBD II system shall monitor the active/intrusive injection system for proper performance. The individual electronic components (e.g., injectors, valves, sensors) that are used in the active/intrusive injection system shall be monitored in accordance with the comprehensive component requirements in section (f)(15).

(9.2) Malfunction Criteria:

(9.2.1) Filtering Performance:

(A) The OBD II system shall detect a malfunction prior to a decrease in the filtering capability of the PM filter that would cause a vehicle's PM emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 5.0 times the applicable FTP standard for 2004 through 2009 model year vehicles;

b. 4.0 times the applicable FTP standard for 2010 through 2012 model year vehicles; and

c. 1.75 times the applicable FTP standard for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 0.09 g/bhp-hr PM as measured from an applicable cycle emission test for 2004 through 2009 model year vehicles;

b. 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

c. 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

(B) If no failure or deterioration of the PM filtering performance could result in a vehicle's PM emissions exceeding the applicable malfunction criteria specified in section (f)(9.2.1)(A), the OBD II system shall detect a malfunction when no detectable amount of PM filtering occurs.

(9.2.2) Frequent Regeneration:

(A) For 2010 and subsequent model year vehicles, the OBD II system shall detect a malfunction when PM filter regeneration occurs more frequently than (i.e., occurs more often than) the manufacturer's specified regeneration frequency such that it

would cause a vehicle's emissions to exceed:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

a. 3.0 times the applicable FTP NMHC, CO, or NO[x] standards for 2010 through 2012 model year vehicles; and

b. 1.5 times the applicable FTP NMHC, CO, or NO[x] standards for 2013 and subsequent model year vehicles.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC standards or the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

b. 2.0 times the applicable NMHC standards or the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

(B) If no failure or deterioration causes an increase in the PM filter regeneration frequency that could result in a vehicle's NMHC, CO, or NO[x] emissions exceeding the applicable malfunction criteria specified in section (f)(9.2.2)(A), the OBD II system shall detect a malfunction when the PM filter regeneration frequency exceeds the manufacturer's specified design limits for allowable regeneration frequency.

(9.2.3) Incomplete regeneration: For 2010 and subsequent model year vehicles, the OBD II system shall detect a regeneration malfunction when the PM filter does not properly regenerate under manufacturer-defined conditions where regeneration is designed to occur.

(9.2.4) NMHC conversion: For 2010 and subsequent model year vehicles with catalyzed PM filters that convert NMHC emissions, the OBD II system shall monitor the catalyst function of the PM filter and detect a malfunction when the NMHC conversion capability decreases to the point that NMHC emissions exceed the applicable emission levels specified in section (f)(9.2.2)(A). If no failure or deterioration of the NMHC conversion capability could result in a vehicle's NMHC emissions exceeding these emission levels, the OBD II system shall detect a malfunction when the system has no detectable amount of NMHC conversion capability.

(9.2.5) Missing substrate: The OBD II system shall detect a malfunction if either the PM filter substrate is completely destroyed, removed, or missing, or if the PM filter assembly is replaced with a muffler or straight pipe.

(9.2.6) Active/Intrusive Injection: For systems that utilize active/intrusive injection (e.g., in-cylinder post fuel injection, in-exhaust air-assisted fuel injection) to achieve regeneration of the PM filter, the OBD II system shall detect a malfunction if any failure or deterioration of the injection system's ability to properly regulate injection causes the system to be unable to achieve regeneration of the PM filter.

(9.2.7) Feedback Control:

(A) Except as provided for in section (f)(9.2.7)(B), if the vehicle is equipped with feedback control of the PM filter regeneration (e.g., feedback control of oxidation catalyst inlet temperature, PM filter inlet or outlet temperature, in-cylinder or in-exhaust fuel injection), the OBD II system shall detect a malfunction:

(i) If the system fails to begin feedback control within a manufacturer specified time interval;

(ii) If a failure or deterioration causes open loop or default operation; or

(iii) If feedback control has used up all of the adjustment allowed by the manufacturer and cannot achieve the feedback target.

(B) A manufacturer may request Executive Officer approval to temporarily disable monitoring for the malfunction criteria specified in section (f)(9.2.7)(A)(iii) during conditions that a manufacturer cannot robustly distinguish between a malfunctioning system and a properly operating system. The Executive Officer shall approve the disablement upon the manufacturer submitting data and/or analysis demonstrating that the control system, when operating as designed on a vehicle with all emission controls working properly, routinely operates during these conditions with all of the adjustment allowed by the manufacturer used up.

(C) In lieu of detecting the malfunctions specified in sections (f)(9.2.7)(A)(i) and (ii) with a PM filter-specific monitor, the OBD II system may monitor the individual parameters or components that are used as inputs for PM filter regeneration feedback control provided that the monitors detect all malfunctions that meet the criteria in sections (f)(9.2.7)(A)(i) and (ii).

(9.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(9.2.1) through (9.2.7) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2). For all 2010 and subsequent model year vehicles, for purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(9.2.1) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(9.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set

forth in section (d)(2).

(10) Crankcase Ventilation (CV) System Monitoring

(10.1) Requirement: Manufacturers shall monitor the CV system on vehicles so-equipped for system integrity. Vehicles not subject to crankcase emission control requirements shall be exempt from monitoring of the CV system.

(10.2) Malfunction Criteria:

(10.2.1) For the purposes of section (f)(10), "CV system" is defined as any form of crankcase ventilation system, regardless of whether it utilizes positive pressure or whether it vents to the atmosphere, the intake, or the exhaust. "CV valve" is defined as any form of valve, orifice, or filter/separator used to restrict, control, or alter the composition (e.g., remove oil vapor or particulate matter) of the crankcase vapor flow. Further, any additional external CV system tubing or hoses used to equalize crankcase pressure or to provide a ventilation path between various areas of the engine (e.g., crankcase and valve cover) are considered part of the CV system "between the crankcase and the CV valve" and subject to the malfunction criteria in section (f)(10.2.2) below.

(10.2.2) Except as provided below, the OBD II system shall detect a malfunction of the CV system when a disconnection of the system occurs between either the crankcase and the CV valve, or between the CV valve and the intake ducting.

(10.2.3) If disconnection in the system results in a rapid loss of oil or other overt indication of a CV system malfunction such that the vehicle operator is certain to respond and have the vehicle repaired, the Executive Officer shall exempt the manufacturer from detection of that disconnection.

(10.2.4) Detection of a disconnection is not required if the disconnection cannot be made without first disconnecting a monitored portion of the system (e.g., the CV system is designed such that the CV valve is fastened directly to the crankcase in a manner which makes it significantly more difficult to remove the valve from the crankcase before disconnecting the line between the valve and the intake ducting (taking aging effects into consideration) and the line between the valve and the intake ducting is monitored for disconnection).

(10.2.5) Subject to Executive Officer approval, system designs that utilize tubing between the valve and the crankcase shall also be exempted from the monitoring requirement for detection of disconnection between the crankcase and the CV valve. The manufacturer shall file a request and submit data and/or engineering evaluation in support of the request. The Executive Officer shall approve the request upon determining that the connections between the valve and the crankcase are: (i) resistant to deterioration or accidental disconnection, (ii) significantly more difficult to disconnect than the line between the valve and the intake ducting, and (iii) not subject to disconnection per manufacturer's maintenance, service, and/or repair procedures for non-CV system repair work.

(10.2.6) Manufacturers are not required to detect disconnections that are unlikely to occur due to a CV system design that is integral to the induction system (e.g., internal machined passages rather than tubing or hoses).

(10.2.7) For medium-duty vehicles with engines certified on an engine dynamometer having an open CV system (i.e., a system that releases crankcase emissions to the atmosphere without routing them to the intake ducting or to the exhaust upstream of the aftertreatment), the manufacturer shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions prior to OBD certification. Executive Officer approval shall be based on the effectiveness of the monitoring strategy to (i) monitor the performance of the CV system to the extent feasible with respect to the malfunction criteria in section (f)(10.2.1) through (f)(10.2.4) and the monitoring conditions required by the diagnostic, and (ii) monitor the ability of the CV system to control crankcase vapor emitted to the atmosphere relative to the manufacturer's design and performance specifications for a properly functioning system (e.g., if the system is equipped with a filter to reduce crankcase emissions to the atmosphere, the OBD II system shall monitor the integrity of the filter).

(10.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(10.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(10.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2). The stored fault code need not specifically identify the CV system (e.g., a fault code for EGR or intake air mass flow rationality monitoring can be stored) if the manufacturer demonstrates that additional monitoring hardware would be necessary to make this identification and provided that the manufacturer's diagnostic and repair procedures for the detected malfunction include directions to check the integrity of the CV system.

(11) Engine Cooling System Monitoring

(11.1) Requirement:

(11.1.1) The OBD II system shall monitor the thermostat on vehicles so-equipped for proper operation.

(11.1.2) The OBD II system shall monitor the engine coolant temperature (ECT) sensor for circuit continuity, out-of-range values, and rationality faults.

(11.2) Malfunction Criteria:

(11.2.1) Thermostat

(A) The OBD II system shall detect a thermostat malfunction (e.g., leaking or early-to-open thermostat) if, within an Executive Officer approved time interval after starting the engine, either of the following two conditions occur:

(i) The coolant temperature does not reach the highest temperature required by the OBD II system to enable other diagnostics;

(ii) The coolant temperature does not reach a warmed-up temperature within 20 degrees Fahrenheit of the manufacturer's nominal thermostat regulating temperature. Subject to Executive Officer approval, a manufacturer may utilize lower temperatures for this criterion upon the Executive Officer determining that the manufacturer has demonstrated that the fuel, injection timing, and/or other coolant temperature-based modifications to the engine control strategies would not cause an emission increase of 50 or more percent of any of the applicable standards.

(B) Executive Officer approval of the time interval after engine start shall be granted upon determining that the data and/or engineering evaluation submitted by the manufacturer supports the specified times.

(C) With Executive Officer approval, a manufacturer may use alternate malfunction criteria and/or monitoring conditions (see section (f)(11.3)) that are a function of temperature at engine start on vehicles that do not reach the temperatures specified in the malfunction criteria when the thermostat is functioning properly. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data that demonstrate that a properly operating system does not reach the specified temperatures, that the monitor is capable of meeting the specified malfunction criteria at engine start temperatures greater than 50 degrees Fahrenheit, and that the overall effectiveness of the monitor is comparable to a monitor meeting these thermostat monitoring requirements at lower temperatures.

(D) With Executive Officer approval, manufacturers may omit this monitor. Executive Officer approval shall be granted upon determining that the manufacturer has demonstrated that a malfunctioning thermostat cannot cause a measurable increase in emissions during any reasonable driving condition nor cause any disablement of other monitors.

(11.2.2) ECT Sensor

(A) Circuit Continuity. The OBD II system shall detect a malfunction when a lack of circuit continuity or out-of-range value occurs.

(B) Time to Reach Closed-Loop Enable Temperature.

(i) The OBD II system shall detect a malfunction if the ECT sensor does not achieve the stabilized minimum temperature which is needed to begin closed-loop or feedback operation of emission-related engine controls (e.g., feedback control of fuel pressure, EGR flow, boost pressure) within an Executive Officer approved time interval after starting the engine. The time interval shall be a function of starting ECT and/or a function of intake or ambient temperature.

(ii) Executive Officer approval of the time interval shall be granted upon determining that the data and/or engineering evaluation submitted by the manufacturer supports the specified times.

(iii) The Executive Officer shall exempt manufacturers from the requirement of section (f)(11.2.2)(B) if the manufacturer does not utilize ECT to enable closed loop or feedback operation of emission-related engine controls.

(C) Stuck in Range Below the Highest Minimum Enable Temperature. To the extent feasible when using all available information, the OBD II system shall detect a malfunction if the ECT sensor inappropriately indicates a temperature below the highest minimum enable temperature required by the OBD II system to enable other diagnostics (e.g., an OBD II system that requires ECT to be greater than 140 degrees Fahrenheit to enable a diagnostic must detect malfunctions that cause the ECT sensor to inappropriately indicate a temperature below 140 degrees Fahrenheit). Manufacturers are exempted from this requirement for temperature regions in which the monitors required under sections (f)(11.2.1) or (f)(11.2.2)(B) will detect ECT sensor malfunctions as defined in section (f)(11.2.2)(C).

(D) Stuck in Range Above the Lowest Maximum Enable Temperature.

(i) To the extent feasible when using all available information, the OBD II system shall detect a malfunction if the ECT sensor inappropriately indicates a temperature above the lowest maximum enable temperature required by the OBD II system to enable other diagnostics (e.g., an OBD II system that requires ECT to be less than 90 degrees Fahrenheit at engine start to enable a diagnostic must detect malfunctions that cause the ECT sensor to inappropriately indicate a temperature above 90 degrees Fahrenheit).

(ii) Manufacturers are exempted from this requirement for temperature regions in which the monitors required under sections (f)(11.2.1), (f)(11.2.2)(B), or (f)(11.2.2)(C) (i.e., ECT sensor or thermostat malfunctions) will detect ECT sensor malfunctions as defined in section (f)(11.2.2)(D) or in which the MIL will be illuminated under the requirements of section (d)(2.2.3) for default mode operation (e.g., overtemperature protection strategies).

(iii) For 2006 and subsequent model year applications, manufacturers are also exempted from the requirements of section (f)(11.2.2)(D) for temperature regions where the temperature gauge indicates a temperature in the red zone (engine overheating zone) or an overtemperature warning light is illuminated for vehicles that have a temperature gauge or warning light on the instrument panel and utilize the same ECT sensor for input to the OBD II system and the temperature gauge/warning light.

(11.3) Monitoring Conditions:

(11.3.1) Thermostat

(A) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(11.2.1)(A) in accordance with section (d)(3.1) except as provided for in section (f)(11.3.1)(D). Additionally, except as provided for in sections (f)(11.3.1)(B) and (C), monitoring for malfunctions identified in section (f)(11.2.1)(A) shall be conducted once per driving cycle on every driving cycle in which the ECT sensor indicates, at engine start, a temperature lower than the temperature established as the malfunction criteria in section (f)(11.2.1)(A).

(B) Manufacturers may disable thermostat monitoring at ambient temperatures below 20 degrees Fahrenheit.

(C) Manufacturers may request Executive Officer approval to suspend or disable thermostat monitoring if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 percent of the warm-up time, hot restart conditions, etc.). In general, the Executive Officer shall not approve disablement of the monitor on engine starts where the ECT at engine start is more than 35 degrees Fahrenheit lower than the thermostat malfunction threshold temperature determined under section (f)(11.2.1)(A). The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or engineering analysis that demonstrate the need for the request.

(D) With respect to defining enable conditions that are encountered during the FTP or Unified cycle as required in (d)(3.1.1) for malfunctions identified in section (f)(11.2.1)(A), the FTP cycle shall refer to on-road driving following the FTP cycle in lieu of testing on a chassis or engine dynamometer.

(11.3.2) ECT Sensor

(A) Except as provided below in section (f)(11.3.2)(E), monitoring for malfunctions identified in section (f)(11.2.2)(A) (i.e., circuit continuity and out-of-range) shall be conducted continuously.

(B) Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(11.2.2)(B) in accordance with section (d)(3.1). Additionally, except as provided for in section (f)(11.3.2)(D), monitoring for malfunctions identified in section (f)(11.2.2)(B) shall be conducted once per driving cycle on every driving cycle in which the ECT sensor indicates a temperature lower than the closed-loop enable temperature at engine start (i.e., all engine start temperatures greater than the ECT sensor out-of-range low temperature and less than the closed-loop enable temperature).

(C) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(11.2.2)(C) and (D) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(D) Manufacturers may suspend or delay the time to reach closed-loop enable temperature diagnostic if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 to 75 percent of the warm-up time).

(E) A manufacturer may request Executive Officer approval to disable continuous ECT sensor monitoring when an ECT sensor malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or engineering evaluation that demonstrate a properly functioning sensor cannot be distinguished from a malfunctioning sensor and that the disablement interval is limited only to that necessary for avoiding false detection.

(11.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(12) Cold Start Emission Reduction Strategy Monitoring

(12.1) Requirement:

(12.1.1) For all 2010 and subsequent model year vehicles, if a vehicle incorporates a specific engine control strategy to reduce cold start emissions, the OBD II system shall monitor the commanded elements for proper function (e.g., injection timing, increased engine idle speed, increased engine load via intake or exhaust throttle activation) while the control strategy is active to ensure proper operation of the control strategy.

(12.2) Malfunction Criteria: The OBD II system shall, to the extent feasible, detect a malfunction if either of the following occurs:

(12.2.1) Any single commanded element does not properly respond to the commanded action while the cold start strategy is active. For purposes of this section, "properly respond" is defined as when the element responds:

(A) by a robustly detectable amount by the monitor; and

(B) in the direction of the desired command; and

(C) above and beyond what the element would achieve on start-up without the cold start strategy active (e.g., if the cold start strategy commands a higher idle engine speed, a fault must be detected if no detectable amount of engine speed increase above what the system would achieve without the cold start strategy active);

(12.2.2) Any failure or deterioration of the cold start emission reduction control strategy that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(A) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

(i) 2.5 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

(ii) 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(B) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

(i) 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

(12.2.3) For section (f)(12.2.2), the OBD II system shall either monitor the combined effect of the elements of the system as a whole or the individual elements (e.g., increased engine speed, increased engine load from restricting an exhaust throttle) for failures that cause emissions to exceed the applicable emission levels specified in section (f)(12.2.2).

(12.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for malfunctions identified in section (f)(12.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(12.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(13) Variable Valve Timing And/Or Control (VVT) System Monitoring

(13.1) Requirement: On all 2006 and subsequent model year applications, the OBD II system shall monitor the VVT system on vehicles so-equipped for target error and slow response malfunctions. The individual electronic components (e.g., actuators, valves, sensors, etc.) that are used in the VVT system shall be monitored in accordance with the comprehensive components requirements in section (f)(15).

(13.2) Malfunction Criteria:

(13.2.1) Target Error: The OBD II system shall detect a malfunction prior to any failure or deterioration in the capability of the VVT system to achieve the commanded valve timing and/or control within a crank angle or lift tolerance that would cause a vehicle's NMHC, CO, NO[x], or PM emissions to exceed:

(A) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard:

(i) 3.0 times the applicable FTP standards for 2006 through 2009 model year vehicles;

(ii) 2.5 times the applicable FTP standards for 2010 through 2012 model year vehicles; and

(iii) 1.5 times the applicable FTP NMHC, CO, or NO[x] standards or 2.0 times the applicable FTP PM standard for 2013 and subsequent model year vehicles.

(B) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

(i) 1.5 times the applicable NMHC, CO, and NO[x] standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2006 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of greater than 0.50 g/bhp-hr NO[x];

(ii) 2.5 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.3 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.5 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2006 through 2012 model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x]; and

(iii) 2.0 times the applicable NMHC or CO standards, the applicable NO[x] standard by more than 0.2 g/bhp-hr (e.g., cause NO[x] emissions to exceed 0.4 g/bhp-hr if the emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NO[x] emission standard of less than or equal to 0.50 g/bhp-hr NO[x].

(13.2.2) Slow Response: The OBD II system shall detect a malfunction prior to any failure or deterioration in the capability of the VVT system to achieve the commanded valve timing and/or control within a time that would cause a vehicle's emissions to exceed the applicable emission levels specified in sections (f)(13.2.1).

(13.2.3) For vehicles in which no failure or deterioration of the VVT system could result in a vehicle's emissions exceeding the levels specified in sections (f)(13.2.1), the VVT system shall be monitored for proper functional response in accordance with the malfunction criteria in section (f)(15.2).

(13.3) Monitoring Conditions: Manufacturers shall define the monitoring conditions for VVT system malfunctions identified in section (f)(13.2) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2). Additionally, manufacturers shall track and report VVT system monitor performance under section (d)(3.2.2). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(13.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(13.4) MIL Illumination and Fault Code Storage: General requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(14) [Reserved]

(15) Comprehensive Component Monitoring

(15.1) Requirement:

(15.1.1) Except as provided in sections (f)(15.1.3), (f)(15.1.4), and (f)(16), the OBD II system shall monitor for malfunction any electronic powertrain component/system not otherwise described in sections (f)(1) through (f)(14) that either provides input to (directly or indirectly) or receives commands from the on-board computer(s), and: (1) can affect emissions during any reasonable in-use driving condition, or (2) is used as part of the diagnostic strategy for any other monitored system or component.

(A) Input Components: Input components required to be monitored may include the vehicle speed sensor, crank angle sensor, pedal position sensor, mass air flow sensor, cam position sensor, fuel pressure sensor, intake air temperature sensor, exhaust temperature sensor, and transmission electronic components such as sensors, modules, and solenoids which provide signals to the powertrain control system.

(B) Output Components/Systems: Output components/systems required to be monitored may include the idle governor, fuel injectors, automatic transmission solenoids or controls, turbocharger electronic components, the wait-to-start lamp, and cold start aids (e.g., glow plugs, intake air heaters).

(15.1.2) For purposes of criteria (1) in section (f)(15.1.1) above, the manufacturer shall determine whether a powertrain input or output component/system can affect emissions. If the Executive Officer reasonably believes that a manufacturer has incorrectly determined that a component/system cannot affect emissions, the Executive Officer shall require the manufacturer to provide emission data showing that the component/system, when malfunctioning and installed in a suitable test vehicle, does not have an emission effect. The Executive Officer may request emission data for any reasonable driving condition.

(15.1.3) Manufacturers shall monitor for malfunction electronic powertrain input or output components/systems associated with an electronic transfer case, electronic power steering system, two speed axle, or other components that are driven by the engine and not related to the control of fueling, air handling, or emissions only if the component or system is used as part of the diagnostic strategy for any other monitored system or component.

(15.1.4) Except as specified for hybrids in section (f)(15.1.5), manufacturers shall monitor for malfunction electronic powertrain input or output components/systems associated with components that only affect emissions by causing additional electrical load to the engine and are not related to the control of fueling, air handling, or emissions only if the component or system is used as part of the diagnostic strategy for any other monitored system or component.

(15.1.5) For hybrids, manufacturers shall submit a plan to the Executive Officer for approval of the hybrid components determined by the manufacturer to be subject to monitoring in section (f)(15.1.1). In general, the Executive Officer shall approve the plan if it includes monitoring of all components/systems used as part of the diagnostic strategy for any other monitored system or component, monitoring of all energy input devices to the electrical propulsion system, monitoring of battery and charging system performance, monitoring of electric motor performance, and monitoring of regenerative braking performance.

(15.2) Malfunction Criteria:

(15.2.1) Input Components:

(A) The OBD II system shall detect malfunctions of input components caused by a lack of circuit continuity, out-of-range values, and, where feasible, rationality faults. To the extent feasible, the rationality fault diagnostics shall verify that a sensor output is neither inappropriately high nor inappropriately low (e.g., “two-sided” diagnostics).

(B) To the extent feasible, rationality faults shall be separately detected and store different fault codes than the respective lack of circuit continuity and out of range diagnostics. Additionally, input component lack of circuit continuity and out of range faults shall be separately detected and store different fault codes for each distinct malfunction (e.g., out-of-range low, out-of-range high, open circuit, etc.). Manufacturers are not required to store separate fault codes for lack of circuit continuity faults that, cannot be distinguished from other out-of-range circuit faults.

(15.2.2) Output Components/Systems:

(A) The OBD II system shall detect a malfunction of an output component/system when proper functional response of the component and system to computer commands does not occur. If a functional check is not feasible, the OBD II system shall detect malfunctions of output components/systems caused by a lack of circuit continuity or circuit fault (e.g., short to ground or high voltage). For output component lack of circuit continuity faults and circuit faults, manufacturers are not required to store different fault codes for each distinct malfunction (e.g., open circuit, shorted low, etc.). Manufacturers are not required to activate an output component/system when it would not normally be active for the purposes of performing functional monitoring of output components/systems as required in section (f)(15).

(B) The idle fuel control system shall be monitored for proper functional response to computer commands. A malfunction

shall be detected when either of the following conditions occur:

(i) The idle fuel control system cannot achieve the target idle speed or fuel injection quantity within +/- 30 percent of the manufacturer-specified fuel quantity and engine speed tolerances.

(ii) The idle fuel control system cannot achieve the target idle speed or fuel injection quantity within the smallest engine speed or fueling quantity tolerance range required by the OBD II system to enable any other monitor.

(C) Glow plugs/intake air heaters shall be monitored for proper functional response to computer commands. The glow plug/intake air heater circuit(s) shall be monitored for proper current and voltage drop. The Executive Officer shall approve other monitoring strategies based on manufacturer's data and/or engineering analysis demonstrating equally reliable and timely detection of malfunctions. If a manufacturer demonstrates that a single glow plug failure cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall detect a malfunction for the minimum number of glow plugs needed to cause an emission increase. Further, to the extent feasible on existing engine designs (without adding additional hardware for this purpose) and on all new design engines, the stored fault code shall identify the specific malfunctioning glow plug(s). For 2010 and subsequent model year vehicles, manufacturers shall detect a malfunction when a single glow plug/intake air heater no longer operates within the manufacturer's specified limits for normal operation (e.g., within specifications established by the manufacturer with the part supplier for acceptable part performance at high mileage).

(D) The wait-to-start lamp circuit shall be monitored for malfunctions that cause the lamp to fail to illuminate when commanded on (e.g., burned out bulb).

(E) For 2013 and subsequent model year vehicles that utilize fuel control system components (e.g., injectors, fuel pump) that have tolerance compensation features implemented in hardware or software during production or repair procedures (e.g., individually coded injectors for flow characteristics that are programmed into an electronic control unit to compensate for injector to injector tolerances, fuel pumps that use in-line resistors to correct for differences in fuel pump volume output), the components shall be monitored to ensure the proper compensation is being used. The system shall detect a fault if the compensation being used by the control system does not match the compensation designated for the installed component (e.g., the flow characteristic coding designated on a specific injector does not match the compensation being used by the fuel control system for that injector). If a manufacturer demonstrates that a single component (e.g., injector) using the wrong compensation cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall detect a malfunction for the minimum number of components using the wrong compensation needed to cause an emission increase. Further, the stored fault code shall identify the specific component that does not match the compensation.

(15.3) Monitoring Conditions:

(15.3.1) Input Components:

(A) Except as provided in section (f)(15.3.1)(C), input components shall be monitored continuously for proper range of values and circuit continuity.

(B) For rationality monitoring (where applicable), manufacturers shall define the monitoring conditions for detecting malfunctions in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that rationality monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2).:

(C) A manufacturer may request Executive Officer approval to disable continuous input component proper range of values or circuit continuity monitoring when a malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning input component cannot be distinguished from a malfunctioning input component and that the disablement interval is limited only to that necessary for avoiding false detection.

(15.3.2) Output Components/Systems:

(A) Except as provided in section (f)(15.3.2)(D), monitoring for circuit continuity and circuit faults shall be conducted continuously.

(B) Except as provided in section (f)(15.3.2)(C), for functional monitoring, manufacturers shall define the monitoring conditions for detecting malfunctions in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements).

(C) For the idle fuel control system, manufacturers shall define the monitoring conditions for functional monitoring in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements), with the exception that functional monitoring shall occur every time the monitoring conditions are met during the driving cycle in lieu of once per driving cycle as required in section (d)(3.1.2).

(D) A manufacturer may request Executive Officer approval to disable continuous output component circuit continuity or circuit fault monitoring when a malfunction cannot be distinguished from other effects. The Executive Officer shall approve the disablement upon determining that the manufacturer has submitted test data and/or documentation that demonstrate a properly functioning output component cannot be distinguished from a malfunctioning output component and that the disablement interval is limited only to that necessary for avoiding false detection.

(15.4) MIL Illumination and Fault Code Storage:

(15.4.1) Except as provided in section (f)(15.4.2) below, general requirements for MIL illumination and fault code storage are set forth in section (d)(2).

(15.4.2) Exceptions to general requirements for MIL illumination. MIL illumination is not required in conjunction with storing a confirmed fault code for any comprehensive component if:

(A) the component or system, when malfunctioning, could not cause vehicle emissions to increase by:

(i) 25 percent or more for PC/LDT SULEV II vehicles, or

(ii) 15 percent or more for all other vehicles, and

(B) the component or system is not used as part of the diagnostic strategy for any other monitored system or component.

(15.4.3) For purposes of determining the emission increase in section (f)(15.4.2)(A), the manufacturer shall request Executive Officer approval of the test cycle/vehicle operating conditions for which the emission increase will be determined. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that the testing conditions represent in-use driving conditions where emissions are likely to be most affected by the malfunctioning component. For purposes of determining whether the specified percentages in section (f)(15.4.2)(A) are exceeded, if the approved testing conditions are comprised of an emission test cycle with an emission standard, the measured increase shall be compared to a percentage of the emission standard (e.g., if the increase is equal to or more than 15 percent of the emission standard for that test cycle). If the approved testing conditions are comprised of a test cycle or vehicle operating condition that does not have an emission standard, the measured increase shall be calculated as a percentage of the baseline test (e.g., if the increase from a back-to-back test sequence between normal and malfunctioning condition is equal to or more than 15 percent of the baseline test results from the normal condition).

(16) Other Emission Control or Source System Monitoring

(16.1) Requirement: For other emission control or source systems that are not identified or addressed in sections (f)(1) through (f)(15) (e.g., homogeneous charge compression ignition (HCCI) controls, hydrocarbon traps, fuel-fired passenger compartment heaters), manufacturers shall submit a plan for Executive Officer approval of the monitoring strategy, malfunction criteria, and monitoring conditions prior to introduction on a production vehicle intended for sale in California. Executive Officer approval shall be based on the effectiveness of the monitoring strategy, the malfunction criteria utilized, and the monitoring conditions required by the diagnostic.

(16.2) For purposes of section (f)(16), emission source systems are components or devices that emit pollutants subject to vehicle evaporative and exhaust emission standards (e.g., NMOG, CO, NO[x], PM) and include non-electronic components and non-powertrain components (e.g., fuel-fired passenger compartment heaters, on-board reformers).

(16.3) Except as provided below in this paragraph, for 2005 and subsequent model year vehicles that utilize emission control systems that alter intake air flow or cylinder charge characteristics by actuating valve(s), flap(s), etc. in the intake air delivery system (e.g., swirl control valve systems), the manufacturers, in addition to meeting the requirements of section (f)(16.1) above, may elect to have the OBD II system monitor the shaft to which all valves in one intake bank are physically attached in lieu of monitoring the intake air flow, cylinder charge, or individual valve(s)/flap(s) for proper functional response. For non-metal shafts or segmented shafts, the monitor shall verify all shaft segments for proper functional response (e.g., by verifying the segment or portion of the shaft furthest from the actuator properly functions). For systems that have more than one shaft to operate valves in multiple intake banks, manufacturers are not required to add more than one set of detection hardware (e.g., sensor, switch, etc.) per intake bank to meet this requirement. Vehicles utilizing these emission control systems designed and certified for 2004 or earlier model year vehicles and carried over to the 2005 through 2009 model year shall not be required to meet the provisions of section (f)(16.3) until the engine or intake air delivery system is redesigned.

(17) Exceptions to Monitoring Requirements

(17.1) Except as provided in sections (f)(17.1.1) through (17.1.4) below, upon request of a manufacturer or upon the best engineering judgment of the ARB, the Executive Officer may revise the emission threshold for a malfunction on any diagnostic required in section (f) for medium-duty vehicles if the most reliable monitoring method developed requires a higher threshold to prevent significant errors of commission in detecting a malfunction. Additionally, for 2007 through 2009 model year light-duty vehicles and 2007 through 2012 model year medium-duty vehicles, the Executive Officer may revise the PM filter malfunction criteria of section (f)(9.2.1) to exclude detection of specific failure modes (e.g.,; combined failure of partially melted and partially cracked substrates) if the most reliable monitoring method developed requires the exclusion of specific failure modes to prevent significant errors of commission in detecting a malfunction.

(17.1.1) For PC/LDT SULEV II vehicles, the Executive Officer shall approve a malfunction criterion of 2.5 times the applicable FTP standards in lieu of 1.5 or 1.75 wherever required in section (f).

(17.1.2) For vehicles certified to Federal Bin 3 or Bin 4 emission standards, manufacturers shall utilize the ULEV II vehicle NMOG and CO malfunction criteria (e.g., 1.5 times the Bin 3 or Bin 4 NMOG and CO standards) and the PC/LDT SULEV II vehicle NO[x] malfunction criteria (e.g., 2.5 times the Bin 3 or Bin 4 NO[x] standards).

(17.1.3) For medium-duty diesel vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, the Executive Officer shall approve a malfunction criteria of "the applicable PM standard plus 0.02 g/bhp-hr PM (e.g., unable to maintain PM emissions at or below 0.03 g/bhp-hr if the emission standard is 0.01 g/bhp-hr) as measured from an applicable cycle emission test" in lieu of "0.03 g/bhp-hr PM as measured from an applicable cycle emission test" wherever required in section (f). The Executive Officer shall also approve a malfunction criteria of "the applicable PM standard plus 0.04 g/bhp-hr PM (e.g., unable to maintain PM emissions at or below 0.05 g/bhp-hr if the emission standard is 0.01 g/bhp-hr) as measured from an applicable cycle emission test" in lieu of "0.05 g/bhp-hr PM as measured from an applicable cycle emission test" wherever required in section (f).

(17.1.4) For 2007 through 2009 medium-duty diesel vehicles (including MDPVs) certified to an engine dynamometer FTP tailpipe PM emission standard of greater than or equal 0.08 g/bhp-hr, the Executive Officer shall approve a malfunction of criteria of 1.5 times the applicable PM standard in lieu of the applicable PM malfunction criteria required for any monitor in section (f).

(17.1.5) For medium-duty diesel vehicles (except MDPVs) certified to a chassis dynamometer tailpipe emission standard, the monitoring requirements and malfunction criteria in section (f) applicable to medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard shall apply. However, the manufacturer shall request Executive Officer approval of manufacturer-proposed medium-duty chassis dynamometer-based malfunction criteria in lieu of the engine dynamometer-based malfunction criteria required for each monitor in section (f). The Executive Officer shall approve the request upon finding that:

(A) the manufacturer has used good engineering judgment in determining the malfunction criteria,

(B) the malfunction criteria will provide for similar timeliness in detection of malfunctioning components with respect to detection of malfunctions on medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard,

(C) the malfunction criteria are set as stringently as technologically feasible with respect to indicating a malfunction at the lowest possible tailpipe emission levels (but not lower than 1.5 times the chassis dynamometer tailpipe emission standard the vehicle is certified to), considering the best available monitoring technology to the extent that it is known or should have been known to the manufacturer,

(D) the malfunction criteria will prevent detection of a malfunction when the monitored component is within the performance specifications for components aged to the end of the full useful life, and

(E) the manufacturer has provided emission data showing the emission levels at which the malfunctions are detected.

(17.2) Whenever the requirements in section (f) of this regulation require a manufacturer to meet a specific phase-in schedule:

(17.2.1) The phase-in percentages shall be based on the manufacturer's projected sales volume for all vehicles subject to the requirements of title 13, CCR section 1968.2 unless specifically stated otherwise in section (f).

(17.2.2) Manufacturers may use an alternate phase-in schedule in lieu of the required phase-in schedule if the alternate phase-in schedule provides for equivalent compliance volume as defined in section (c) except as specifically noted for the phase in of in-use monitor performance ratio monitoring conditions in section (d)(3.2).

(17.2.3) Small volume manufacturers may use an alternate phase-in schedule in accordance with section (f)(17.2.2) in lieu of the required phase-in; schedule or may meet the requirement on all vehicles by the final year of the phase-in in lieu of meeting the specific phase-in requirements for each model year.

(17.3) Manufacturers may request Executive Officer approval to disable an OBD II system monitor at ambient temperatures below twenty degrees Fahrenheit (20?F) (low ambient temperature conditions may be determined based on intake air or engine coolant temperature) or at elevations above 8000 feet above sea level. The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or an engineering evaluation that demonstrate that monitoring during the conditions would be unreliable. A manufacturer may further request, and the Executive Officer shall approve, that an OBD II system monitor be disabled at other ambient temperatures upon determining that the manufacturer has demonstrated with data and/or an engineering evaluation that misdiagnosis would occur at the ambient temperatures because of its effect on the component itself (e.g., component freezing).

(17.4) Manufacturers may request Executive Officer approval to disable monitoring systems that can be affected by low fuel level or running out of fuel (e.g., misfire detection) when the fuel level is 15 percent or less of the nominal capacity of the fuel tank. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring at the fuel levels would be unreliable.

(17.5) Manufacturers may disable monitoring systems that can be affected by vehicle battery or system voltage levels.

(17.5.1) For monitoring systems affected by low vehicle battery or system voltages, manufacturers may disable monitoring systems when the battery or system voltage is below 11.0 Volts. Manufacturers may request Executive Officer approval to utilize a voltage threshold higher than 11.0 Volts to disable system monitoring. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring

at the voltages would be unreliable and that either operation of a vehicle below the; disablement criteria for extended periods of time is unlikely or the OBD II system monitors the battery or system voltage and will detect a malfunction at the voltage used to disable other monitors.

(17.5.2) For monitoring systems affected by high vehicle battery or system voltages, manufacturers may request Executive Officer approval to disable monitoring systems when the battery or system voltage exceeds a manufacturer-defined voltage. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that monitoring above the manufacturer-defined voltage would be unreliable and that either the electrical charging system/alternator warning light is illuminated (or voltage gauge is in the "red zone") or that the OBD II system monitors the battery or system voltage and will detect a malfunction at the voltage used to disable other monitors.

(17.6) A manufacturer may disable affected monitoring systems in vehicles designed to accommodate the installation of Power Take-Off (PTO) units (as defined in section (c)), provided disablement occurs only while the PTO unit is active, and the OBD II readiness status is cleared by the on-board computer (i.e., all monitors set to indicate "not complete") while the PTO unit is activated (see section (g)(4.1) below). If the disablement occurs, the readiness status may be restored to its state prior to PTO activation when the disablement ends.

(17.7) Whenever the requirements in section (f) of this regulation require monitoring "to the extent feasible", the manufacturer shall submit its proposed monitor(s) for Executive Officer approval. The Executive Officer shall approve the proposal upon determining that the proposed monitor(s) meets the criteria of "to the extent feasible" by considering the best available monitoring technology to the extent that it is known or should have been known to the manufacturer and given the limitations of the manufacturer's existing hardware, the extent and degree to which the monitoring requirements are met in full, the limitations of the monitoring necessary to prevent significant errors of commission and omission, and the extent to which the manufacturer has considered and pursued alternative monitoring concepts to meet the requirements in full. The manufacturer's consideration and pursuit of alternative monitoring concepts shall include evaluation of other modifications to the proposed monitor(s), the monitored components themselves, and other monitors that use the monitored components (e.g., altering other monitors to lessen the sensitivity and reliance on the component or characteristic of the component subject to the proposed monitor(s)).

(g) Standardization Requirements

(1) Reference Documents:

The following Society of Automotive Engineers (SAE) and International Organization for Standardization (ISO) documents are incorporated by reference into this regulation:

(1.1) SAE J1930 "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms - Equivalent to ISO/TR 15031-2:April 30, 2002", April 2002 (SAE J1930).

(1.2) SAE J1962 "Diagnostic Connector - Equivalent to ISO/DIS 15031-3:December 14, 2001", April 2002 (SAE J1962).

(1.3) SAE J1978 "OBD II Scan Tool - Equivalent to ISO/DIS 15031-4:December 14, 2001", April 2002 (SAE J1978).

(1.4) SAE J1979 "E/E Diagnostic Test Modes", May 2007 (SAE J1979).

(1.5) SAE J1850 "Class B Data Communications Network Interface", May 2001 (SAE 1850).

(1.6) SAE J2012 "Diagnostic Trouble Code Definitions - Equivalent to ISO/DIS 15031-6:April 30, 2002", April 2002 (SAE J2012).

(1.7) ISO 9141-2:1994 "Road Vehicles-Diagnostic Systems-CARB Requirements for Interchange of Digital Information", February 1994 (ISO 9141-2).

(1.8) ISO 14230-4:2000 "Road Vehicles-Diagnostic Systems-KWP 2000 Requirements for Emission-related Systems", June 2000 (ISO 14230-4).

(1.9) ISO 15765-4:2005 "Road Vehicles-Diagnostics on Controller Area Network (CAN) - Part 4: Requirements for emissions-related systems", January 2005 (ISO 15765-4).

(1.10) SAE J1939 March 2005- "Recommended Practice for a Serial Control and Communications Vehicle Network" and the associated subparts included in SAE HS-1939, "Truck and Bus Control and Communications Network Standards Manual", 2005 Edition (SAE J1939).

(1.10.1) SAE J1939-73 "Application Layer - Diagnostics", September 2006.

(1.11) SAE J1699-3 - "OBD II Compliance Test Cases", May 2006 (SAE J1699-3).

(1.12) SAE J2534-1 - "Recommended Practice for Pass-Thru Vehicle Programming", December 2004 (SAE J2534-1).

(2) Diagnostic Connector:

A standard data link connector conforming to SAE J1962 specifications (except as specified in section (g)(2.3)) shall be incorporated in each vehicle.

(2.1) The connector shall be; located in the driver's side foot-well region of the vehicle interior in the area bound by the driver's side of the vehicle and the driver's side edge of the center console (or the vehicle centerline if the vehicle does not have a center console) and at a location no higher than the bottom of the steering wheel when in the lowest adjustable position. The connector may not be located on or in the center console (i.e., neither on the horizontal faces near the floor-mounted gear selector, parking brake lever, or cup-holders nor on the vertical faces near the car stereo, climate system, or navigation system controls). The location of the connector shall be capable of being easily identified by a "crouched" technician entering the vehicle from the driver's side.

(2.2) If the connector is covered, the cover must be removable by hand without the use of any tools and be labeled to aid technicians in identifying the location of the connector. Access to the diagnostic connector may not require opening or the removal of any storage accessory (e.g., ashtray, coinbox, etc.). The label shall be submitted to the Executive Officer for review and approval, at or before the time the manufacturer submits its certification application. The Executive Officer shall approve the label upon determining that it clearly identifies that the connector is located behind the cover and is consistent with language and/or symbols commonly used in the automotive industry.

(2.3) Any pins in the connector that provide electrical power shall be properly fused to protect the integrity and usefulness of the connector for diagnostic purposes and may not exceed 20.0 Volts DC regardless of the nominal vehicle system or battery voltage (e.g., 12V, 24V, 42V, etc.).

(3) Communications to a Scan Tool:

Manufacturers shall use one of the following standardized protocols for communication of all required emission related messages from on-board to off-board network communications to a scan tool meeting SAE J1978 specifications:

(3.1) SAE J1850. All required emission related messages using this protocol shall use the Cyclic Redundancy Check and the three byte header, may not use inter-byte separation or checksums, and may not require a minimum delay of 100 ms between SAE J1978 scan tool requests. This protocol may not be used on any 2008 or subsequent model year vehicle.

(3.2) ISO 9141-2. This protocol may not be used on any 2008 or subsequent model year vehicle.

(3.3) ISO 14230-4. This protocol may not be used on any 2008 or subsequent model year vehicle.

(3.4) ISO 15765-4. This protocol shall be allowed on any 2003 and subsequent model year vehicle and required on all 2008 and subsequent model year vehicles. All required emission-related messages using this protocol shall use a 500 kbps baud rate.

(4) Required Emission Related Functions: The following standardized functions shall be implemented in accordance with the specifications in SAE J1979 to allow for access to the required information by a scan tool meeting SAE J1978 specifications:

(4.1) Readiness Status: In accordance with SAE J1979 specifications, the OBD II system shall indicate "complete" or "not complete" since the fault memory was last cleared for each of the installed monitored components and systems identified in sections (e)(1) through (e)(8), (e)(15), (f)(1) through (f)(4), (f)(6), (f)(8), and (f)(15). All 2010 and subsequent model year diesel vehicles shall additionally indicate the appropriate readiness status for monitors identified in sections (f)(5), (f)(7), and (f)(9). All 2010 subsequent model year vehicles equipped with VVT system monitoring and subject to the test results requirements specified in section (g)(4.5.4)(C) shall additionally indicate the appropriate readiness status for VVT system monitors identified in sections (e)(13) and (f)(13). All components or systems that are monitored continuously shall always indicate "complete". Those components or systems that are not subject to continuous monitoring shall immediately indicate "complete" upon the respective diagnostic(s) being fully executed and determining that the component or system is not malfunctioning. A component or system shall also indicate "complete" if after the requisite number of decisions necessary for determining MIL status have been fully executed, the monitor indicates a malfunction for the component or system. The status for each of the monitored components or systems shall indicate "not complete" whenever fault memory has been cleared or erased by a means other than that allowed in section (d)(2). Normal vehicle shut down (i.e., key off, engine off) may not cause the status to indicate "not complete".

(4.1.1) Subject to Executive Officer approval, if monitoring is disabled for a multiple number of driving cycles due to the continued presence of extreme operating conditions (e.g., cold ambient temperatures, high altitudes, etc), readiness status for the subject monitoring system may be set to indicate "complete" without monitoring having been completed. Executive Officer approval shall be based on the conditions for monitoring system disablement and the number of driving cycles specified without completion of monitoring before readiness is indicated as "complete".

(4.1.2) For the evaporative system monitor:

(A) Except as provided below in section (g)(4.1.2)(B), the readiness status shall be set in accordance with section (g)(4.1) when both the functional check of the purge valve and the leak detection monitor of the orifice size specified in either section (e)(4.2.2)(B) or (C) (e.g., 0.040 inch or 0.020 inch) indicate that they are complete.

(B) For vehicles that utilize a 0.090 inch (in lieu of 0.040 inch) leak detection monitor in accordance with section (e)(4.2.5), the readiness status shall be set in accordance with section (g)(4.1) when both the functional check of the purge valve and the leak detection monitor of the orifice size specified in section (e)(4.2.2)(C) (e.g., 0.020 inch) indicate that they are

complete.

(4.1.3) If the manufacturer elects to additionally indicate readiness status through the MIL in the key on, engine off position as provided for in section (d)(2.1.3), the readiness status shall be indicated in the following manner: If the readiness status for all monitored components or systems is "complete", the MIL shall remain continuously illuminated in the key on, engine off position for at least 15-20 seconds. If the readiness status for one or more of the monitored components or systems is "not complete", after 15-20 seconds of operation in the key on, engine off position with the MIL illuminated continuously, the MIL shall blink once per second for 5-10 seconds. The data stream value for MIL status (section (g)(4.2)) shall indicate "commanded off" during this sequence unless the MIL has also been "commanded on" for a detected fault.

(4.2) Data Stream: The following signals shall be made available on demand through the standardized data link connector in accordance with SAE J1979 specifications. The actual signal value shall always be used instead of a default or limp home value.

(4.2.1) For all vehicles: calculated load value, number of stored confirmed fault codes, engine coolant temperature, engine speed, absolute throttle position (if equipped with a throttle), vehicle speed, OBD requirements to which the engine is certified (e.g., California OBD II, EPA OBD, European OBD, non-OBD) and MIL status (i.e., commanded-on or commanded-off).

(4.2.2) For all vehicles so equipped: fuel control system status (e.g., open loop, closed loop, etc.), fuel trim, fuel pressure, ignition timing advance, intake; air temperature, manifold absolute pressure, air flow rate from mass air flow sensor, secondary air status (upstream, downstream, or atmosphere), oxygen sensor output, air/fuel ratio sensor output.

(4.2.3) For all 2005 and subsequent model year vehicles using the ISO 15765-4 protocol for the standardized functions required in section (g), the following signals shall also be made available: absolute load, fuel level (if used to enable or disable any other diagnostics),; relative throttle position (if equipped with a throttle), barometric pressure (directly measured or estimated), engine control module system voltage, commanded equivalence ratio, catalyst temperature (if directly measured or estimated for purposes of enabling the catalyst monitor(s)), monitor status (i.e., disabled for the rest of this driving cycle, complete this driving cycle, or not complete this driving cycle) since last engine shut-off for each monitor used for readiness status, time elapsed since engine start, distance traveled while MIL activated, distance traveled since fault memory last cleared, and number of warm-up cycles since fault memory last cleared.

(4.2.4) For all 2005 and subsequent model year vehicles so equipped and using the ISO 15765-4 protocol for the standardized functions required in section (g): ambient air temperature, evaporative system vapor pressure, commanded purge valve duty cycle/position, commanded EGR valve duty cycle/position, EGR error between actual and commanded, PTO status (active or not active), redundant absolute throttle position (for electronic throttle or other systems that utilize two or more sensors), absolute pedal position, redundant absolute pedal position, and commanded throttle motor position.

(4.2.5) Additionally, for all 2010 and subsequent model year vehicles with a diesel engine:

(A) Calculated load (engine torque as a percentage of maximum torque available at the current engine speed), driver's demand engine torque (as a percentage of maximum engine torque), actual engine torque (as a percentage of maximum engine torque), engine oil temperature (if used for emission control or any OBD diagnostics), time elapsed since engine start; and

(B) Fuel level (if used to enable or disable any other diagnostics), barometric pressure (directly measured or estimated), engine control module system voltage; and

(C) Monitor status (i.e., disabled for the rest of this driving cycle, complete this driving cycle, or not complete this driving cycle) since last engine shut-off for each monitor used for readiness status, distance traveled (or engine run time for engines not utilizing vehicle speed information) while MIL activated, distance traveled (or engine run time for engines not utilizing vehicle speed information) since fault memory last cleared, and number of warm-up cycles since fault memory last cleared; and

(D) For all engines so equipped: absolute throttle position, relative throttle position, fuel injection timing, intake manifold temperature, intercooler temperature, ambient air temperature, commanded EGR valve duty cycle/position, actual EGR valve duty cycle/position, EGR error between actual and commanded, PTO status (active or not active), absolute pedal position, redundant absolute pedal position, commanded throttle motor position, fuel rate, boost pressure, commanded/target boost pressure, turbo inlet air temperature, fuel rail pressure, commanded fuel rail pressure, PM filter inlet pressure, PM filter inlet temperature, PM filter outlet pressure, PM filter outlet temperature, PM filter delta pressure, exhaust pressure sensor output, exhaust gas temperature sensor output, injection control pressure, commanded injection control pressure, turbocharger/turbine speed, variable geometry turbo position, commanded variable geometry turbo position, turbocharger compressor inlet temperature, turbocharger compressor inlet pressure, turbocharger turbine inlet temperature, turbocharger turbine outlet temperature, wastegate valve position, glow plug lamp status, PM sensor output, and NO[x] sensor output;

(E) Additionally, for all 2010 and subsequent model year medium-duty vehicles with a diesel engine certified on an engine dynamometer: NO[x] NTE control area status (i.e., inside control area, outside control area, inside manufacturer-specific NO[x] NTE carve-out area, or NTE deficiency for NO[x] active area) and PM NTE control area status (i.e., inside control area, outside control area, inside manufacturer-specific PM NTE carve-out area, or NTE deficiency for PM active area).

(4.3) Freeze Frame.

(4.3.1) "Freeze frame" information required to be stored pursuant to sections (d)(2.2.7), (e)(3.4.3), (e)(6.4.4), (f)(3.4.2)(B), and (f)(4.4.2)(D) shall be made available on demand through the standardized data link connector in accordance with SAE J1979 specifications.

(4.3.2) "Freeze frame" conditions must include the fault code which caused the data to be stored and all of the signals required in section (g)(4.2.1) except number of stored confirmed fault codes, OBD requirements to which the engine is certified, MIL status, and absolute throttle position in accordance with (g)(4.3.3). Freeze frame conditions shall also include all of the signals required on the vehicle in sections (g)(4.2.2) through (g)(4.2.5)(D) that are used for diagnostic or control purposes in the specific diagnostic or emission-critical powertrain control unit that stored the fault code except: oxygen sensor output, air/fuel ratio sensor output, catalyst temperature, evaporative system vapor pressure, glow plug lamp status, PM sensor output, NO[x] sensor output, monitor status since last engine shut off, distance traveled while MIL activated, distance traveled since fault memory last cleared, and number of warm-up cycles since fault memory last cleared.

(4.3.3) In lieu of including the absolute throttle position data specified in (g)(4.2.1) in the freeze frame data, diagnostic or emission-critical powertrain control units that do not use the absolute throttle position data may include the relative throttle position data specified in (g)(4.2.3) or pedal position data specified in (g)(4.2.4).

(4.3.4) Only one frame of data is required to be recorded. Manufacturers may choose to store additional frames provided that at least the required frame can be read by a scan tool meeting SAE J1978 specifications.

(4.4) Fault Codes

(4.4.1) For all monitored components and systems, stored pending, confirmed, and permanent fault codes shall be made available through the diagnostic connector in accordance with SAE J1979 specifications. Standardized fault codes conforming to SAE J2012 shall be employed.

(4.4.2) The stored fault code shall, to the fullest extent possible, pinpoint the likely cause of the malfunction. To the extent feasible on all 2005 and subsequent model year vehicles, manufacturers shall use separate fault codes for every diagnostic where the diagnostic and repair procedure or likely cause of the failure is different. In general, rationality and functional diagnostics shall use different fault codes than the respective circuit continuity diagnostics. Additionally, input component circuit continuity diagnostics shall use different fault codes for distinct malfunctions (e.g., out-of-range low, out-of-range high, open circuit, etc.).

(4.4.3) Manufacturers shall use appropriate SAE-defined fault codes of SAE J2012 (e.g., P0xxx, P2xxx) whenever possible. With Executive Officer approval, manufacturers may use manufacturer-defined fault codes in accordance with SAE J2012 specifications (e.g., P1xxx). Factors to be considered by the Executive Officer for approval shall include the lack of available SAE-defined fault codes, uniqueness of the diagnostic or monitored component, expected future usage of the diagnostic or component, and estimated usefulness in providing additional diagnostic and repair information to service technicians. Manufacturer-defined fault codes shall be used consistently (i.e., the same fault code may not be used to represent two different failure modes) across a manufacturer's entire product line.

(4.4.4) A fault code (pending and/or confirmed, as required in sections (d) (e), and (f)) shall be stored and available to an SAE J1978 scan tool within 10 seconds after a diagnostic has determined that a malfunction has occurred. A permanent fault code shall be stored and available to an SAE J1978 scan tool no later than the end of an ignition cycle (including electronic control unit shutdown) in which the corresponding confirmed fault code causing the MIL to be illuminated has been stored.

(4.4.5) Pending fault codes:

(A) On all 2005 and subsequent model year vehicles, pending fault codes for all components and systems (including continuously and non-continuously monitored components) shall be made available through the diagnostic connector in accordance with SAE J1979 specifications (e.g., Mode/Service $ 07).

(B) On all 2005 and subsequent model year vehicles, a pending fault code(s) shall be stored and available through the diagnostic connector for all currently malfunctioning monitored component(s) or system(s), regardless of the MIL illumination status or confirmed fault code status (e.g., even after a pending fault has matured to a confirmed fault code and the MIL is illuminated, a pending fault code shall be stored and available if the most recent monitoring event indicates the component is malfunctioning).

(C) Manufacturers using alternate statistical protocols for MIL illumination as allowed in section (d)(2.2.6) shall submit to the Executive Officer a protocol for setting pending fault codes. The Executive Officer shall approve the proposed protocol upon determining that, overall, it is equivalent to the requirements in sections (g)(4.4.5)(A) and (B) and that it effectively provides service technicians with a quick and accurate indication of a pending failure.

(4.4.6) Permanent fault codes:

(A) Permanent fault codes for all components and systems shall be made available through the diagnostic connector in a standardized format that distinguishes permanent fault codes from both pending fault codes and confirmed fault codes.

(B) A confirmed fault code shall be stored as a permanent fault code no later than the end of the ignition cycle and subsequently at all times that the confirmed fault code is commanding the MIL on (e.g., for currently failing systems but not during

the 40 warm-up cycle self-healing process described in section (d)(2.4)).

(C) Permanent fault codes shall be stored in NVRAM and may not be erasable by any scan tool command (generic or enhanced) or by disconnecting power to the on-board computer.

(D) Permanent fault codes may not be erased when the control module containing the permanent fault codes is reprogrammed unless the readiness status (refer to section (g)(4.1)) for all monitored components and systems is set to "not complete" in conjunction with the reprogramming event.

(E) The OBD system shall have the ability to store a minimum of four current confirmed fault codes as permanent fault codes in NVRAM. If the number of confirmed fault codes currently commanding the MIL on exceeds the maximum number of permanent fault codes that can be stored, the OBD system shall store the earliest detected confirmed fault codes as permanent fault codes. If additional confirmed fault codes are stored when the maximum number of permanent fault codes is already stored in NVRAM, the OBD system may not replace any existing permanent fault code with the additional confirmed fault codes.

(4.5) Test Results

(4.5.1) For all monitored components and systems for gasoline engine vehicles identified in sections (e)(1) through (e)(8) except misfire detection, fuel system monitoring, and oxygen sensor circuit and out-of-range monitoring, and for all monitored components and systems for diesel engine vehicles identified in sections (f)(1) through (f)(9) except those required to be monitored continuously, results of the most recent monitoring of the components and systems and the test limits established for monitoring the respective components and systems shall be stored and available through the data link in accordance with SAE J1979 specifications.

(4.5.2) The test results shall be reported such that properly functioning components and systems (e.g., "passing" systems) do not store test values outside of the established test limits.

(4.5.3) The test results shall be stored until updated by a more recent valid test result or the fault memory of the OBD II system computer is cleared. Upon fault memory being cleared, test results reported for monitors that have not yet completed since the last time the fault memory was cleared shall report values that do not indicate a failure (i.e., a test value which is outside of the test limits).

(4.5.4) Additionally, for vehicles using ISO 15765-4 (see section (g)(3.4)) as the communication protocol:

(A) The test results and limits shall be made available in the standardized format specified in SAE J1979 for the ISO 15765-4 protocol. Test results using vehicle manufacturer-defined monitor identifications (i.e., SAE J1979 OBDMIDs in the range of $ E1-$ FF) may not be used.

(B) Test limits shall include both minimum and maximum acceptable values and shall be reported for all test results required in section (g)(4.5.1). The test limits shall be defined so that a test result equal to either test limit is a "passing" value, not a "failing" value.

(C) For 2005 and subsequent model year vehicles, misfire monitoring test results shall be calculated and reported in the standardized format specified in SAE J1979. For 25 percent of 2009, 50 percent of 2010, and 100 percent of 2011 and subsequent model year vehicles equipped with VVT systems, VVT monitoring test results and limits shall be stored and available in the standardized format specified in SAE J1979.

(D) Monitors that have not yet completed since the last time the fault memory was cleared shall report values of zero for the test result and test limits.

(E) All test results and test limits shall always be reported and the test results shall be stored until updated by a more recent valid test result or the fault memory of the OBD II system computer is cleared. For monitors with multiple pass/fail criteria (e.g., a purge flow diagnostic that can pass upon seeing a rich shift, lean shift, or engine speed change), on 25 percent of 2009, 50 percent of 2010, and 100 percent of 2011 and subsequent model year vehicles, only the test results used in the most recent decision shall be reported with valid results and limits while test results not used in the most recent decision shall report values of zero for the test results and limits (e.g., a purge flow monitoring event that passed based on seeing a rich shift shall report the results and the limits of the rich shift test and shall report values of zero for the results and limits of the lean shift and engine speed change tests).

(F) The OBD II system shall store and report unique test results for each separate diagnostic (e.g., an OBD II system with individual evaporative system diagnostics for 0.040 inch and 0.020 inch leaks shall separately report 0.040 inch and 0.020 inch test results).

(4.6) Software Calibration Identification

(4.6.1) On all vehicles, a software calibration identification number (CAL ID) for the diagnostic or emission critical powertrain control unit(s) shall be made available through the standardized data link connector in accordance with the SAE J1979 specifications. Except as provided for in section (g)(4.6.3), for 2009 and subsequent model year vehicles, the OBD II system shall use a single software calibration identification number (CAL ID) for each diagnostic or emission critical powertrain control unit(s) that replies to a generic scan tool with a unique module address.

(4.6.2) A unique CAL ID shall be used for every emission-related calibration and/or software set having at least one bit of different data from any other emission-related calibration and/or software set. Control units coded with multiple emission or diagnostic calibrations and/or software sets shall indicate a unique CAL ID for each variant in a manner that enables an off-board device to determine which variant is being used by the vehicle. Control units that utilize a strategy that will result in MIL illumination if the incorrect variant is used (e.g., control units that contain variants for manual and automatic transmissions but will illuminate the MIL if the variant selected does not match the type of transmission on the vehicle) are not required to use unique CAL IDs.

(4.6.3) For 2009 and subsequent model year vehicles, manufacturers may request Executive Officer approval to respond with more than one CAL ID per diagnostic or emission critical powertrain control unit. Executive Officer approval of the request shall be based on the method used by the manufacturer to ensure each control unit will respond to a SAE J1978 scan tool with the CAL IDs in order of highest to lowest priority with regards to areas of the software most critical to emission and OBD II system performance.

(4.7) Software Calibration Verification Number

(4.7.1) All 20052 and subsequent model year vehicles shall use an algorithm to calculate a calibration verification number (CVN) that verifies the on-board computer software integrity in diagnostic or emission critical electronically reprogrammable powertrain control units. The CVN shall be made available through the standardized data link connector in accordance with the SAE J1979 specifications. The CVN shall be capable of being used to determine if the emission-related software and/or calibration data are valid and applicable for that vehicle and CAL ID. For 50 percent of 2010 and 100 percent of 2011 and subsequent model year vehicles, one CVN shall be made available for each CAL ID made available and each CVN shall be output to a generic scan tool in the same order as the CAL IDs are output to the scan tool to allow the scan tool to match each CVN to the corresponding CAL ID.

(4.7.2) Manufacturers shall request Executive Officer approval of the algorithm used to calculate the CVN. Executive Officer approval of the algorithm shall be based on the complexity of the algorithm and the difficulty in achieving the same CVN with modified calibration values.

(4.7.3) The CVN shall be calculated at least once per driving cycle and stored until the CVN is subsequently updated. Except for immediately after a reprogramming event or a non-volatile memory clear or for the first 30 seconds of engine operation after a volatile memory clear or battery disconnect, the stored value shall be made available through the data link connector to a generic scan tool in accordance with SAE J1979 specifications. The stored CVN value may not be erased when fault memory is erased by a generic scan tool in accordance with SAE J1979 specifications or during normal vehicle shut down (i.e., key off, engine off).

(4.7.4) For purposes of Inspection and Maintenance (I/M) testing, manufacturers shall make the CVN and CAL ID combination information available for all 2008 and subsequent model year vehicles in a standardized electronic format that allows for off-board verification that the CVN is valid and appropriate for a specific vehicle and CAL ID. The standardized electronic format is detailed in Attachment E: CAL ID and CVN Data of ARB Mail-Out #MSC 06-23, December 21, 2006, incorporated by reference. Manufacturers shall submit the CVN and CAL ID information to the Executive Officer not more than 25 days after the close of a calendar quarter.

(4.8) Vehicle Identification Number:

(4.8.1) All 2005 and subsequent model year vehicles shall have the vehicle identification number (VIN) available in a standardized format through the standardized data link connector in accordance with SAE J1979 specifications. Only one electronic control unit per vehicle shall report the VIN to an SAE J1978 scan tool.

(4.8.2) For 2012 and subsequent model year vehicles, if the VIN is reprogrammable, all emission-related diagnostic information (i.e., all information required to be erased in accordance with SAE J1979 specifications when a Mode/Service $ 04 clear/reset emission-related diagnostic information command is received) shall be erased in conjunction with the reprogramming of the VIN.

(4.9) ECU Name: The name of each electronic control unit that responds to an SAE J1978 scan tool with a unique address or identifier shall be communicated in a standardized format in accordance with SAE J1979 (i.e., ECUNAME in Service/Mode $ 09, InfoType $ 0A). Except as specified for vehicles with more than one engine control unit, communication of the ECU name in a standardized format is required on 50 percent of 2010, 75 percent of 2011, and 100 percent of 2012 and subsequent model year vehicles. For vehicles with more than one engine control unit (e.g., a 12 cylinder engine with two engine control units, each of which controls six cylinders), communication of the ECU name is required on all 2010 and subsequent model year vehicles.

(5) In-use Performance Ratio Tracking Requirements:

(5.1) For each monitor required in section (e) to separately report an in-use performance ratio, manufacturers shall implement software algorithms to report a numerator and denominator in the standardized format specified below and in accordance with the SAE J1979 specifications.

(5.2) Numerical Value Specifications:

(5.2.1) For the numerator, denominator, general denominator, and ignition cycle counter:

(A) Each number shall have a minimum value of zero and a maximum value of 65,535 with a resolution of one.

(B) Each number shall be reset to zero only when a non-volatile memory reset occurs (e.g., reprogramming event, etc.) or, if the numbers are stored in keep-alive memory (KAM), when KAM is lost due to an interruption in electrical power to the control module (e.g., battery disconnect, etc.). Numbers may not be reset to zero under any other circumstances including when a scan tool command to clear fault codes or reset KAM is received.

(C) If either the numerator or denominator for a specific component reaches the maximum value of 65,535 +2, both numbers shall be divided by two before either is incremented again to avoid overflow problems.

(D) If the ignition cycle counter reaches the maximum value of 65,535 +2, the ignition cycle counter shall rollover and increment to zero on the next ignition cycle to avoid overflow problems.

(E) If the general denominator reaches the maximum value of 65,535 +2, the general denominator shall rollover and increment to zero on the next driving cycle that meets the general denominator definition to avoid overflow problems.

(F) If a vehicle is not equipped with a component (e.g., oxygen sensor bank 2, secondary air system), the corresponding numerator and denominator for that specific component shall always be reported as zero.

(5.2.2) For the ratio:

(A) The ratio shall have a minimum value of zero and a maximum value of 7.99527 with a resolution of 0.000122.

(B) A ratio for a specific component shall be considered to be zero whenever the corresponding numerator is equal to zero and the corresponding denominator is not zero.

(C) A ratio for a specific component shall be considered to be the maximum value of 7.99527 if the corresponding denominator is zero or if the actual value of the numerator divided by the denominator exceeds the maximum value of 7.99527.

(6) Engine Run Time Tracking Requirements:

(6.1) For all 2010 and subsequent model year medium-duty vehicles equipped with diesel engines, manufacturers shall implement software algorithms to individually track and report in a standardized format the engine run time while being operated in the following conditions:

(6.1.1) Total engine run time;

(6.1.2) Total idle run time (with "idle" defined as accelerator pedal released by driver, vehicle speed less than or equal to one mile per hour, and PTO not active);

(6.1.3) Total run time with PTO active.

(6.1.4) Total run time with EI-AECD #1active;

(6.1.5) Total run time with EI-AECD #2 active; and so on up to

(6.1.6) Total run time with EI-AECD #n active.

(6.2) For all 2010 and subsequent model year light-duty vehicles equipped with diesel engines, manufacturers shall implement software algorithms to individually track and report in a standardized format the engine run time while being operated in the following conditions:

(6.2.1) Total engine run time;

(6.2.2) Total run time with EI-AECD #1active;

(6.2.3) Total run time with EI-AECD #2 active; and so on up to

(6.2.4) Total run time with EI-AECD #n active.

(6.3) Numerical Value Specifications:

(6.3.1) For each counter specified in section (g)(6):

(A) Each number shall conform to the standardized format specified in SAE J1979.

(B) Each number shall be reset to zero only when a non-volatile memory reset occurs (e.g., reprogramming event). Numbers may not be reset to zero under any other circumstances including when a scan tool (generic or enhanced) command to clear fault codes or reset KAM is received.

(C) If any of the individual counters reach the maximum value, all counters shall be divided by two before any are incremented again to avoid overflow problems.

(6.4) Separation of EI-AECDs

(6.4.1) Each EI-AECD shall be tracked individually and increment the counters at all times the conditions necessary to activate the EI-AECD are present.

(6.4.2) For EI-AECDs that have variable actions or degrees of action (e.g., derate EGR more aggressively as engine oil temperature continues to increase), the EI-AECD shall be tracked as two separate EI-AECDs and increment two counters.

(A) The first of the two counters shall be incremented whenever the EI-AECD is commanding some amount of reduced emission control effectiveness up to but not including 75 percent of the maximum reduced emission control effectiveness that the EI-AECD is capable of commanding during in-use vehicle or engine operation. For example, an overheat protection strategy that progressively derates EGR and eventually shuts off EGR as oil temperature increases would accumulate time for the first counter from the time derating of EGR begins up to the time that EGR is derated 75 percent. As a second example, an overheat protection strategy that advances fuel injection timing progressively up to a maximum advance of 15 degrees crank angle as the engine coolant temperature increases would accumulate time for the first counter from the time advance is applied up to the time that advance reaches 11.25 degrees (75 percent of the maximum 15 degrees).

(B) The second of the two counters shall be incremented whenever the EI-AECD is commanding 75 percent or more of the maximum reduced emission control effectiveness that the EI-AECD is capable of commanding during in-use vehicle or engine operation. For example, the second counter for the first example EI-AECD identified in section (g)(6.4.2.)(A) would accumulate time from the time that EGR is derated 75 percent up to and including when EGR is completely shut off. For the second example EI-AECD identified in section (g)(6.4.2)(A), the second counter would accumulate time from the time fuel injection timing advance is at 11.25 degrees up to and including the maximum advance of 15 degrees.

(6.4.3) If more than one EI-AECD is currently active, the counters for both EI-AECDs shall accumulate time, regardless if there is overlap or redundancy in the commanded action (e.g., two different EI-AECDs independently but simultaneously commanding EGR off shall both accumulate time in their respective counters).

(7) Exceptions to Standardization Requirements.

(7.1) For medium-duty vehicles equipped with a diesel engine certified on an engine dynamometer, a manufacturer may request Executive Officer approval to use both: (1) an alternate diagnostic connector, and emission-related message structure and format in lieu of the standardization requirements in sections (g)(2) and (4) that refer to SAE J1962, SAE J1978, and SAE J1979, and (2) an alternate communication protocol in lieu of the identified protocols in section (g)(3). The Executive Officer shall approve the request if the alternate diagnostic connector, communication protocol, and emission-related message format and structure requested by the manufacturer meet the standardization requirements in title 13, CCR section 1971.1 applicable for 2013 and subsequent model year heavy-duty diesel engines and the information required to be made available in section (g)(4.1) through (g)(6) (e.g., readiness status, data stream parameters, permanent fault codes, engine run time tracking data) is available in a standardized format through the alternate emission-related message format.

(7.2) For 2004 model year vehicles only, wherever the requirements of sections (g)(2) and (g)(4) reflect a substantive change from the requirements of title 13, CCR sections 1968.1(e), (f), (k), or (l) for the 2003 model year vehicles, the manufacturer may request Executive Officer approval to continue to use the requirements of section 1968.1 in lieu of the requirements of sections (g)(2) and (g)(4). The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that software or hardware changes would be required to comply with the requirements of sections (g)(2) and (g)(4) and that the system complies with the requirements of sections 1968.1(e), (f), (k), and (l).

(h) Monitoring System Demonstration Requirements For Certification

(1) General.

(1.1) Certification requires that manufacturers submit emission test data from one or more durability demonstration test vehicles (test vehicles). For applications certified on engine dynamometers, engines may be used instead of vehicles.

(1.2) The Executive Officer may approve other demonstration protocols if the manufacturer can provide comparable assurance that the malfunction criteria are chosen based on meeting emission requirements and that the timeliness of malfunction detection is within the constraints of the applicable monitoring requirements.

(1.3) For flexible fuel vehicles capable of operating on more than one fuel or fuel combinations, the manufacturer shall submit a plan for providing emission test data to the Executive Officer for approval. The Executive Officer shall approve the plan if it is determined to be representative of expected in-use fuel or fuel combinations and provides accurate and timely evaluation of the monitored systems.

(2) Selection of Test Vehicles:

(2.1) Prior to submitting any applications for certification for a model year, a manufacturer shall notify the Executive Officer of the test groups planned for that model year. The Executive Officer will then select the test group(s) that the manufacturer shall use as demonstration test vehicles to provide emission test data. The selection of test vehicles for production vehicle evaluation, as specified in section (j), may take place during this selection process.

(2.2) A manufacturer certifying one to five test groups in a model year shall provide emission test data from a test vehicle from one test group. A manufacturer certifying six to fifteen test groups in a model year shall provide emission test data from test vehicles from two test groups. A manufacturer certifying sixteen or more test groups in a model year shall provide emission test data from test vehicles from three test groups. The Executive Officer may waive the requirement for submittal of data from one or more of the test groups if data have been previously submitted for all of the test groups.

(2.3) For the test vehicle(s), a manufacturer shall use a certification emission durability test vehicle(s), a representative

high mileage vehicle(s), or a vehicle(s) aged to the end of the full useful life using an ARB-approved alternative durability procedure (ADP).

(3) Required Testing for Gasoline/Spark-ignited vehicles:

Except as provided below, the manufacturer shall perform single-fault testing based on the applicable FTP test with the following components/systems set at their malfunction criteria limits as determined by the manufacturer for meeting the requirements of section (e):

(3.1) Exhaust Gas Sensors:

(3.1.1) The manufacturer shall perform a test with all primary oxygen sensors (conventional switching sensors and wide range or universal sensors) used for fuel control simultaneously possessing a response rate deteriorated to the malfunction criteria limit. Manufacturers shall also perform a test for any other oxygen sensor parameter that can cause vehicle emissions to exceed the malfunction threshold (e.g., 1.5 times the applicable standards due to a shift in air/fuel ratio at which oxygen sensor switches, decreased amplitude, etc.). When performing additional test(s), all primary and secondary (if applicable) oxygen sensors used for fuel control shall be operating at the malfunction criteria limit for the applicable parameter only. All other primary and secondary oxygen sensor parameters shall be with normal characteristics.

(3.1.2) For vehicles utilizing sensors other than oxygen sensors for primary fuel control (e.g., hydrocarbon sensors, etc.), the manufacturer shall submit, for Executive Officer approval, a demonstration test plan for performing testing of all of the sensor parameters that can cause vehicle emissions to exceed the malfunction threshold (e.g., 1.5 times the applicable standards). The Executive Officer shall approve the plan if it is determined that it will provide data that will assure proper performance of the diagnostics of the sensors, consistent with the intent of section (h).

(3.2) EGR System: The manufacturer shall perform a test at the low flow limit.

(3.3) VVT System: For 2006 through 2008 model year Low Emission II applications and all 2009 and subsequent model year vehicles, the manufacturer shall perform a test at each target error limit and slow response limit calibrated to the malfunction criteria (e.g., 1.5 times the FTP standard) in sections (e)(13.2.1) and (13.2.2). In conducting the VVT system demonstration tests, the manufacturer may use computer modifications to cause the VVT system to operate at the malfunction limit if the manufacturer can demonstrate that the computer modifications produce test results equivalent to an induced hardware malfunction.

(3.4) Fuel System:

(3.4.1) For vehicles with adaptive feedback based on the primary fuel control sensor(s), the manufacturer shall perform a test with the adaptive feedback based on the primary fuel control sensor(s) at the rich limit(s) and a test at the lean limit(s) established by the manufacturer in section (e)(6.2.1) to detect a malfunction before emissions exceed the malfunction threshold (e.g., 1.5 times the applicable standards).

(3.4.2) For vehicles with feedback based on a secondary fuel control sensor(s) and subject to the malfunction criteria in section (e)(6.2.1), the manufacturer shall perform a test with the feedback based on the secondary fuel control sensor(s) at the rich limit(s) and a test at the lean limit(s) established by the manufacturer in section (e)(6.2.1) to detect a malfunction before emissions exceed the malfunction threshold (e.g., 1.5 times the applicable standards).

(3.4.3) For other fuel metering or control systems, the manufacturer shall perform a test at the criteria limit(s).

(3.4.4) For purposes of fuel system testing, the fault(s) induced may result in a uniform distribution of fuel and air among the cylinders. Non-uniform distribution of fuel and air used to induce a fault may not cause misfire. In conducting the fuel system demonstration tests, the manufacturer may use computer modifications to cause the fuel system to operate at the malfunction limit if the manufacturer can demonstrate that the computer modifications produce test results equivalent to an induced hardware malfunction.

(3.5) Misfire: The manufacturer shall perform a test at the malfunction criteria limit specified in section (e)(3.2.2). The testing is not required for diesel applications.

(3.6) Secondary Air System: The manufacturer shall perform a test at the low flow limit. Manufacturers performing only a functional check in accordance with the provisions of section (e)(5.2.2)(B) or (e)(5.2.4) shall perform a test at the functional check flow malfunction criteria.

(3.7) Catalyst System: The manufacturer shall perform a test using a catalyst system deteriorated to the malfunction criteria using methods established by the manufacturer in accordance with sections (e)(1.2.6) and (1.2.7).

(3.8) Heated Catalyst Systems: The manufacturer shall perform a test at the malfunction criteria limit established by the manufacturer in section (e)(2.2).

(3.9) Other systems: The manufacturer shall conduct demonstration tests for all other emission control components designed and calibrated to an emission threshold malfunction criteria (e.g., 1.5 times any of the applicable emission standards) (e.g., hydrocarbon traps, adsorbers, etc.) under the provisions of section (e)(16).

(3.10) The manufacturer may electronically simulate deteriorated components but may not make any vehicle control unit

modifications (unless otherwise excepted above) when performing demonstration tests. All equipment necessary to duplicate the demonstration test must be made available to the ARB upon request.

(4) Required Testing for Diesel/Compression-ignition vehicles:

Except as provided below, the manufacturer shall perform single-fault testing based on the applicable test with the following components/systems set at their malfunction criteria limits as determined by the manufacturer for meeting the requirements of section (f).

(4.1) NMHC Catalyst: The manufacturer shall perform a separate test for each monitored NMHC catalyst(s) (e.g., oxidation catalyst). The catalyst(s) being evaluated shall be deteriorated to the applicable malfunction criteria established by the manufacturer in section (f)(1.2.2) using methods established by the manufacturer in accordance with section (f)(1.2.4). For each monitored NMHC catalyst(s), the manufacturer shall also demonstrate that the OBD II system will detect a catalyst malfunction with the catalyst at its maximum level of deterioration (i.e., the substrate(s) completely removed from the catalyst container or "empty" can). Emission data are not required for the empty can demonstration.

(4.2) NO[x] Catalyst: The manufacturer shall perform a separate test for each monitored NO[x] catalyst(s) (e.g., SCR catalyst). The catalyst(s) being evaluated shall be deteriorated to the applicable malfunction criteria established by the manufacturer in sections (f)(2.2.2)(A) and (f)(2.2.3)(A) using methods established by the manufacturer in accordance with section (f)(2.2.4). For each monitored NO[x] catalyst(s), the manufacturer shall also demonstrate that the OBD II system will detect a catalyst malfunction with the catalyst at its maximum level of deterioration (i.e., the substrate(s) completely removed from the catalyst container or "empty" can). Emission data are not required for the empty can demonstration.

(4.3) Misfire Monitoring: For 2010 and subsequent model year vehicles subject to section (f)(3.2.2), the manufacturer shall perform a test at the malfunction criteria limit specified in section (f)(3.2.2). A misfire monitor demonstration test is not required for vehicles not subject to section (f)(3.2.2).

(4.4) Fuel System: The manufacturer shall perform a separate test for each applicable malfunction limit established by the manufacturer for the fuel system parameters (e.g., fuel pressure, injection timing, injection quantity) specified in sections (f)(4.2.1) through (f)(4.2.3). When performing a test for a specific parameter, the fuel system shall be operating at the malfunction criteria limit for the applicable parameter only. All other parameters shall be with normal characteristics. In conducting the fuel system demonstration tests, the manufacturer may use computer modifications to cause the fuel system to operate at the malfunction limit if the manufacturer can demonstrate to the Executive Officer that the computer modifications produce test results equivalent to an induced hardware malfunction.

(4.5) Exhaust Gas Sensor: The manufacturer shall perform a test for each exhaust gas sensor parameter calibrated to the malfunction criteria in sections (f)(5.2.1)(A)(i), (f)(5.2.1)(B)(i), and (f)(5.2.2)(A). When performing a test, all exhaust gas sensors used for the same purpose (e.g., for the same feedback control loop, for the same control feature on parallel exhaust banks) shall be operating at the malfunction criteria limit for the applicable parameter only. All other exhaust gas sensor parameters shall be with normal characteristics.

(4.6) EGR System: The manufacturer shall perform a test at each flow, slow response, and cooling limit calibrated to the malfunction criteria in sections (f)(6.2.1) through (f)(6.2.3) and (f)(6.2.5). In conducting the EGR system slow response demonstration tests, the manufacturer may use computer modifications to cause the EGR system to operate at the malfunction limit if the manufacturer can demonstrate to the Executive Officer that the computer modifications produce test results equivalent to an induced hardware malfunction.

(4.7) Boost Pressure Control System: The manufacturer shall perform a test at each boost, response, and cooling limit calibrated to the malfunction criteria in sections (f)(7.2.1) through (f)(7.2.4).

(4.8) NO[x] Adsorber: The manufacturer shall perform a test using a NO[x] adsorber(s) deteriorated to the malfunction criteria in section (f)(8.2.1). The manufacturer shall also demonstrate that the OBD II system will detect a NO[x] adsorber malfunction with the NO[x] adsorber at its maximum level of deterioration (i.e., the substrate(s) completely removed from the container or "empty" can). Emission data are not required for the empty can demonstration.

(4.9) PM Filter: The manufacturer shall perform a test using a PM filter(s) deteriorated to each applicable malfunction criteria in sections (f)(9.2.1), (f)(9.2.2), and (f)(9.2.4). The manufacturer shall also demonstrate that the OBD II system will detect a PM filter malfunction with the filter at its maximum level of deterioration (i.e., the filter(s) completely removed from the filter container or "empty" can). Emission data are not required for the empty can demonstration.

(4.10) VVT System: The manufacturer shall perform a test at each target error limit and slow response limit calibrated to the malfunction criteria in sections (f)(13.2.1) and (f)(13.2.2). In conducting the VVT system demonstration tests, the manufacturer may use computer modifications to cause the VVT system to operate at the malfunction limit if the manufacturer can demonstrate to the Executive Officer that the computer modifications produce test results equivalent to an induced hardware malfunction.

(4.11) For each of the testing requirements of section (h)(4), if the manufacturer has established that only a functional check is required because no failure or deterioration of the specific tested system could result in an engine's emissions exceeding the emission malfunction criteria, the manufacturer is not required to perform a demonstration test; however the manufac-

turer is required to provide the data and/or engineering analysis used to determine that only a functional test of the system(s) is required.

(5) Testing Protocol:

(5.1) Preconditioning: The manufacturer shall use an applicable cycle (FTP, SET, or Unified Cycle) for preconditioning test vehicles prior to conducting each of the above emission tests. Upon determining that a manufacturer has provided data and/or an engineering evaluation that demonstrate that additional preconditioning is necessary to stabilize the emission control system, the Executive Officer shall allow the manufacturer to perform a single additional preconditioning cycle, identical to the initial preconditioning cycle, or a Federal Highway Fuel Economy Driving Cycle, following a ten minute (20 minutes for medium duty engines certified on an engine dynamometer) hot soak after the initial preconditioning cycle. The manufacturer may not require the test vehicle to be cold soaked prior to conducting preconditioning cycles in order for the monitoring system testing to be successful.

(5.2) Test Sequence:

(5.2.1) The manufacturer shall set the system or component on the test vehicle for which detection is to be tested at the criteria limit(s) prior to conducting the applicable preconditioning cycle(s). If a second preconditioning cycle is permitted in accordance with section (h)(5.1) above, the manufacturer may adjust the system or component to be tested before conducting the second preconditioning cycle. The manufacturer may not replace, modify, or adjust the system or component after the last preconditioning cycle has taken place.

(5.2.2) After preconditioning, the test vehicle shall be operated over the applicable cycle to allow for the initial detection of the tested system or component malfunction. This test cycle may be omitted from, the testing protocol if it is unnecessary. If required by the designated monitoring strategy, a cold soak may be performed prior to conducting this driving cycle.

(5.2.3) The test vehicle shall then be operated over the applicable exhaust emission test. If monitoring is designed to run during the Unified Cycle, a second Unified Cycle may be conducted prior to the exhaust emission test.

(5.3) A manufacturer required to test more than one test vehicle (section (h)(2.2)) may utilize internal calibration sign-off test procedures (e.g., forced cool downs, less frequently calibrated emission analyzers, etc.) instead of official exhaust emission test procedures to obtain the emission test data required in section (h) for all but one of the required test vehicles. The manufacturer may elect this option if the data from the alternative test procedure are representative of official exhaust emission test results. Manufacturers using this option are still responsible for meeting the malfunction criteria specified in sections (e) and (f) when emission tests are performed in accordance with official exhaust emission test procedures.

(5.4) For medium-duty vehicles certified to an engine dynamometer exhaust emission standard, a manufacturer may request Executive Officer approval to utilize an alternate testing protocol for demonstration of MIL illumination if the engine dynamometer emission test cycle does not allow all of a monitor's enable conditions to be satisfied. A manufacturer may request the use of an alternate engine dynamometer test cycle or the use of chassis testing to demonstrate proper MIL illumination. In evaluating the manufacturer's request, the Executive Officer shall consider the technical necessity for using an alternate test cycle and the degree to which the alternate test cycle demonstrates that in-use operation with the malfunctioning component will properly result in MIL illumination.

(6) Evaluation Protocol:

(6.1) For all tests conducted under section (h), the MIL shall be illuminated upon detection of the tested system or component malfunction before the end of the first engine start portion of the exhaust emission test (or before the hot start portion of the last Unified Cycle, if applicable) in accordance with requirements of sections (e) and (f).

(6.2) For all tests conducted under section (h), manufacturers may use Non-Methane Hydrocarbon (NMHC) emission results in lieu of Non-Methane Organic Gas (NMOG) emission results for comparison to the applicable standards or malfunction criteria (e.g., 1.5 times the FTP standards). If NMHC emission results are used in lieu of NMOG, the emission result shall be multiplied by 1.04 to generate an equivalent NMOG result before comparison to the applicable standards.

(6.3) If the MIL illuminates prior to emissions exceeding the applicable malfunction criteria specified in sections (e) and (f), no further demonstration is required. With respect to the misfire monitor demonstration test, if a manufacturer has elected to use the minimum misfire malfunction criteria of one percent as allowed in sections (e)(3.2.2)(A) and (f)(3.2.2)(B), no further demonstration is required if the MIL illuminates with misfire implanted at the malfunction criteria limit.

(6.4) If the MIL does not illuminate when the systems or components are set at their limit(s), the criteria limit or the OBD II system is not acceptable.

(6.4.1) Except for testing of the catalyst (i.e., components monitored under (e)(1), (f)(2) or (f)(8)) or PM filter system, if the MIL first illuminates after emissions exceed the applicable malfunction criteria specified in sections (e) and (f), the test vehicle shall be retested with the tested system or component adjusted so that the MIL will illuminate before emissions exceed the applicable malfunction criteria specified in sections (e) and (f). If the component cannot be adjusted to meet this criterion because a default fuel or emission control strategy is used when a malfunction is detected (e.g., open loop fuel control used after an O2 sensor malfunction is determined, etc.), the test vehicle shall be retested with the component adjusted to the worst acceptable limit (i.e., the applicable monitor indicates the component is performing at or slightly better than the malfunction

criteria). For the OBD II system to be approved, the MIL must not illuminate during this test and the vehicle emissions must be below the applicable malfunction criteria specified in sections (e) and (f).

(6.4.2) In testing the catalyst (i.e., components monitored under (e)(1), (f)(2) or (f)(8)) or PM filter system, if the MIL first illuminates after emissions exceed the applicable emission threshold(s) specified in sections (e) and (f), the tested vehicle shall be retested with a less deteriorated catalyst or PM filter system (i.e., more of the applicable engine out pollutants are converted or trapped). For the OBD II system to be approved, testing shall be continued until either of the following conditions are satisfied:

(A) The MIL is illuminated and emissions do not exceed the thresholds specified in sections (e) and (f); or

(B) The manufacturer demonstrates that the MIL illuminates within acceptable upper and lower limits of the threshold specified in sections (e) and (f) for MIL illumination. The manufacturer shall demonstrate acceptable limits by continuing testing until the test results show:

(i) The MIL is illuminated and emissions exceed the thresholds specified in sections (e) and (f) by 25 percent or less of the applicable standard (e.g., emissions are less than 2.0 times the applicable standard for a malfunction criterion of 1.75 times the standard); and

(ii) The MIL is not illuminated and emissions are below the thresholds specified in sections (e) and (f) by no more than 25 percent of the standard (e.g., emissions are between 1.55 and 1.75 times the applicable standard for a malfunction criterion of 1.75 times the standard).

(6.5) If an OBD II system is determined unacceptable by the above criteria, the manufacturer may recalibrate and retest the system on the same test vehicle. In such a case, the manufacturer must confirm, by retesting, that all systems and components that were tested prior to recalibration and are affected by the recalibration function properly under the OBD II system as recalibrated.

(6.6) Where applicable for diesel vehicles, the emission test results shall be adjusted as required under section (d)(6.2).

(7) Confirmatory Testing:

(7.1) The ARB may perform confirmatory testing to verify the emission test data submitted by the manufacturer under the requirements of section (h) comply with the requirements of section (h) and the malfunction criteria identified in sections (e) and (f). This confirmatory testing is limited to the vehicle configuration represented by the demonstration vehicle(s). For purposes of section (h)(7), vehicle configuration shall have the same meaning as the term used in 40 CFR 86.082-2.

(7.2) The ARB or its designee may install appropriately deteriorated or malfunctioning components in an otherwise properly functioning test vehicle of a test group represented by the demonstration test vehicle(s) (or simulate a deteriorated or malfunctioning component) in order to test any of the components or systems required to be tested in section (h). Upon request by the Executive Officer, the manufacturer shall make available a vehicle and all test equipment (e.g., malfunction simulators, deteriorated components, etc.) necessary to duplicate the manufacturer's testing. The Executive Officer shall make the request within six months of reviewing and approving the demonstration test vehicle data submitted by the manufacturer for the specific test group.

(7.3) Vehicles with OBD II systems represented by the demonstration vehicle(s) may be recalled for corrective action if a representative sample of vehicles uniformly fails to meet the requirements of section (h).

(i) Certification Documentation

(1) When submitting an application for certification of a test group, the manufacturer shall submit the following documentation. If any of the items listed below are standardized for all of a manufacturer's test groups, the manufacturer may, for each model year, submit one set of documents covering the standardized items for all of its test groups.

(1.1) For the required documentation not standardized across all test groups, the manufacturer may propose to the Executive Officer that documentation covering a specified combination of test groups be used. These combinations shall be known as "OBD II groups". Executive Officer approval shall be granted for those groupings that include test groups using the same OBD II strategies and similar calibrations. If approved by the Executive Officer, the manufacturer may submit one set of documentation from one or more representative test group(s) that are a part of the OBD II group. The Executive Officer shall determine whether a selected test group(s) is representative of the OBD II group as a whole. To be approved as representative, the test group(s) must possess the most stringent emission standards and OBD II monitoring requirements and cover all of the emission control devices within the OBD II group.

(1.2) With Executive Officer approval, one or more of the documentation requirements of section (i) may be waived or modified if the information required would be redundant or unnecessarily burdensome to generate.

(1.3) To the extent possible, the certification documentation shall use SAE J1930 terms, abbreviations, and acronyms.

(2) The following information shall be submitted as "Part 1" of the certification application. Except as provided below for demonstration data, the Executive Officer will not issue an Executive Order certifying the covered vehicles without the information having been provided. The information must include:

(2.1) A description of the functional operation of the OBD II system including a complete written description for each monitoring strategy that outlines every step in the decision making process of the monitor. Algorithms, diagrams, samples of data, and/or other graphical representations of the monitoring strategy shall be included where necessary to adequately describe the information.

(2.2) A table, in the standardized format detailed in Attachment A of ARB Mail-Out #95-20, May 22, 1995, incorporated by reference.

(2.2.1) The table must include the following information for each monitored component or system (either computer-sensed or -controlled) of the emission control system:

(A) corresponding fault code

(B) monitoring method or procedure for malfunction detection

(C) primary malfunction detection parameter and its type of output signal

(D) fault criteria limits used to evaluate output signal of primary parameter

(E) other monitored secondary parameters and conditions (in engineering units) necessary for malfunction detection

(F) monitoring time length and frequency of checks

(G) criteria for storing fault code

(H) criteria for illuminating malfunction indicator light

(I) criteria used for determining out of range values and input component rationality checks

(2.2.2) Wherever possible, the table shall use the following engineering units:

(A) Degrees Celsius (oC) for all temperature criteria

(B) KiloPascals (KPa) for all pressure criteria related to manifold or atmospheric pressure

(C) Grams (g) for all intake air mass criteria

(D) Pascals (Pa) for all pressure criteria related to evaporative system vapor pressure

(E) Miles per hour (mph) for all vehicle speed criteria

(F) Relative percent (%) for all relative throttle position criteria (as defined in SAE J1979)

(G) Voltage (V) for all absolute throttle position criteria (as defined in SAE J1979)

(H) Per crankshaft revolution (/rev) for all changes per ignition event based criteria (e.g., g/rev instead of g/stroke or g/firing)

(I) Per second (/sec) for all changes per time based criteria (e.g., g/sec)

(J) Percent of nominal tank volume (%) for all fuel tank level criteria

(2.3) A logic flowchart describing the step by step evaluation of the enable criteria and malfunction criteria for each monitored emission-related component or system.

(2.4) Emission test data, a description of the testing sequence (e.g., the number and types of preconditioning cycles), approximate time (in seconds) of MIL illumination during the test, fault code(s) and freeze frame information stored at the time of detection, corresponding SAE J1979 test results (e.g. Mode/Service $ 06) stored during the test, and a description of the modified or deteriorated components used for fault simulation with respect to the demonstration tests specified in section (h). The Executive Officer may approve conditional certification of a test group prior to the submittal of this data for ARB review and approval. Factors to be considered by the Executive Officer in approving the late submission of information identified in section (i)(2.4) shall include the reason for the delay in the data collection, the length of time until data will be available, and the demonstrated previous success of the manufacturer in submitting the data prior to certification.

(2.5) For gasoline vehicles, data supporting the misfire monitor, including:

(2.5.1) The established percentage of misfire that can be tolerated without damaging the catalyst over the full range of engine speed and load conditions.

(2.5.2) Data demonstrating the probability of detection of misfire events of the misfire monitoring system over the full engine speed and load operating range for the following misfire patterns: random cylinders misfiring at the malfunction criteria established in section (e)(3.2.2), one cylinder continuously misfiring, and paired cylinders continuously misfiring.

(2.5.3) Data identifying all disablement of misfire monitoring that occurs during the FTP and US06 cycles. For every disablement that occurs during the cycles, the data should identify: when the disablement occurred relative to the driver's trace, the number of engine revolutions that each disablement was present for, and which disable condition documented in the certification application caused the disablement. The data shall be submitted in the standardized format detailed in Attachment A: Misfire Disablement and Detection Chart of ARB Mail-Out #06-23, December 21, 2006, incorporated by reference.

(2.5.4) Manufacturers are not required to use the durability demonstration vehicle to collect the misfire data for sections

(i)(2.5.1) though (2.5.3).

(2.6) Data supporting the limit for the time between engine starting and attaining the designated heating temperature for after-start heated catalyst systems.

(2.7) For diesel vehicle monitors in section (f) that are required to indicate a malfunction before emissions exceed an emission threshold based on any applicable standard (e.g., 1.5 times any of the applicable standards), the test cycle and standard determined by the manufacturer to be the most stringent for each applicable monitor in accordance with section (d)(6.1)

(2.8) A listing of all electronic powertrain input and output signals (including those not monitored by the OBD II system) that identifies which signals are monitored by the OBD II system.

(2.9) A written description of all parameters and conditions necessary to begin closed loop operation.

(2.10) A summary table identifying every test group and each of the OBD II phase-in requirements that apply to each test group.

(2.11) A written identification of the communication protocol utilized by each test group for communication with an SAE J1978 scan tool.

(2.12) A pictorial representation or written description of the diagnostic connector location including any covers or labels.

(2.13) A written description of the method used by the manufacturer to meet the requirements of sections (e)(9) and (f)(10) for PCV and CV system monitoring including diagrams or pictures of valve and/or hose connections.

(2.14) A cover letter identifying all concerns and deficiencies applicable to the equivalent previous model year test group and the changes and/or resolution of each concern or deficiency for the current model year test group.

(2.15) For diesel engine vehicles, a written description of each AECD utilized by the manufacturer including the identification of each EI-AECD relative to the data required to be tracked and reported in the standardized format specified in section (g)(6) (e.g., EI-AECD #1 is "engine overheat protection as determined by coolant temperature greater than..."), the sensor signals and/or calculated values used to invoke each AECD, the engineering data and/or analysis demonstrating the need for such an AECD, the actions taken when each AECD is activated, the expected in-use frequency of operation of each AECD, and the expected emission impact from each AECD activation.

(2.16) A checklist of all the malfunction criteria in sections (e) or (f) and the corresponding diagnostic noted by fault code for each malfunction criterion. The formats of the checklists are detailed in Attachments F and G of ARB Mail-Out #MSC 06-23, December 21, 2006, incorporated by reference.

(2.17) Any other information determined by the Executive Officer to be necessary to demonstrate compliance with the requirements of this regulation.

(3) "Part 2". The following information shall be submitted by January 1st of the applicable model year:

(3.1) A listing and block diagram of the input parameters used to calculate or determine calculated load values and the input parameters used to calculate or determine fuel trim values.

(3.2) A scale drawing of the MIL and the fuel cap indicator light, if present, which specifies location in the instrument panel, wording, color, and intensity.

(4) "Part 3". The following information shall be submitted upon request of the Executive Officer:

(4.1) Data supporting the criteria used to detect a malfunction when catalyst deterioration causes emissions to exceed the applicable malfunction criteria specified in sections (e) and (f).

(4.2) Data supporting the criteria used to detect evaporative system leaks.

(4.3) Any other information determined by the Executive Officer to be necessary to demonstrate compliance with the requirements of this regulation.

(j) Production Vehicle Evaluation Testing.

(1) Verification of Standardized Requirements.

(1.1) Requirement: For 2005 and subsequent model year vehicles, manufacturers shall perform testing to verify that all vehicles meet the requirements of section (g)(3) and (g)(4) relevant to proper communication of required emission-related messages to an SAE J1978 scan tool.

(1.2) Selection of Test Vehicles: Manufacturers, shall perform this testing every model year on one production vehicle from every unique calibration within two months of the start of normal production for that calibration. Manufacturers may request Executive Officer approval to group multiple calibrations together and test one representative calibration per group. The Executive Officer shall approve the request upon finding that the software designed to comply with the standardization requirements of section (g) in the representative calibration vehicle is identical (e.g., communication protocol message timing, number of supported data stream parameters, etc.) to all others in the group and that any differences in the calibrations are not relevant with respect to meeting the criteria in section (j)(1.4).

(1.3) Test Equipment: For the testing required in section (j)(1), manufacturers shall utilize an off-board device to conduct

the testing. Prior to conducting testing, manufacturers are required to request and receive Executive Officer approval of the off-board device that the manufacturer will use to perform the testing. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data, specifications, and/or engineering analysis that demonstrate that the off-board device meets the minimum requirements to conduct testing according to SAE J1699-3 using the software developed and maintained for the SAE J1699-3 committee and available through www.sourceforge.net and SAE J2534 compliant hardware configured specifically for SAE J1699-3 testing.

(1.4) Required Testing (i.e., "static" testing portion of SAE J1699-3):

(1.4.1) The testing shall verify that the vehicle can properly establish communications between all emission-related on-board computers and any SAE J1978 scan tool designed to adhere strictly to the communication protocols allowed in section (g)(3);

(1.4.2) The testing shall further verify that the vehicle can properly communicate to any SAE J1978 scan tool:

(A) The current readiness status from all on-board computers required to support readiness status in accordance with SAE J1979 and section (g)(4.1) while the engine is running;

(B) The MIL command status while the MIL is commanded off and while the MIL is commanded on in accordance with SAE J1979 and section (g)(4.2) while the engine is running, and in accordance with SAE J1979 and sections (d)(2.1.2) during the MIL functional check and, if applicable, (g)(4.1.3) during the MIL readiness status check while the engine is off;

(C) All data stream parameters required in section (g)(4.2) in accordance with SAE J1979 including the identification of each data stream parameter as supported in SAE J1979 (e.g., Mode/Service $ 01, PID $ 00);

(D) The CAL ID, CVN, and VIN (if applicable) in accordance with SAE J1979 and sections (g)(4.6) through (4.8);

(E) An emission-related fault code (permanent, confirmed, and pending) in accordance with SAE J1979 (including correctly indicating the number of stored fault codes (e.g., Mode/Service $ 01, PID $ 01, Data A)) and section (g)(4.4);

(1.4.3) The testing shall also verify that the vehicle can properly respond to any SAE J1978 scan tool request to clear emission-related fault codes and reset readiness status.

(1.5) Reporting of Results:

(1.5.1) The manufacturer shall notify the Executive Officer within one month of identifying any vehicle that does not meet the requirements of section (j)(1.4). The manufacturer shall submit a written report of the problem(s) identified and propose corrective action (if any) to remedy the problem(s) to the Executive Officer for approval. Factors to be considered by the Executive Officer in approving the proposed corrective action shall include the severity of the problem(s), the ability of the vehicle to be tested in an I/M program, the ability of service technicians to access the required diagnostic information, the impact on equipment and tool manufacturers, and the amount of time prior to implementation of the proposed corrective action.

(1.5.2) Within three months of any passing testing conducted pursuant to section (j)(1), a manufacturer shall submit a report of the results to the Executive Officer for review.

(1.5.3) In accordance with section (k)(6), manufacturers may request Executive Officer approval for a retroactive deficiency to be granted for items identified during this testing.

(2) Verification of Monitoring Requirements.

(2.1) For 2004 and subsequent model year vehicles, within the first six months after normal production begins, manufacturers shall conduct a complete evaluation of the OBD II system of one or more production vehicles (test vehicles) and submit the results of the evaluation to the Executive Officer.

(2.2) Selection of test vehicles:

(2.2.1) Prior to submitting any applications for certification for a model year, a manufacturer shall notify the Executive Officer of the test groups planned for that model year. The Executive Officer will then select the test group(s), in accordance with sections (j)(2.2.2) and (j)(2.2.3) below, that the manufacturer shall use as test vehicles to provide evaluation test results. This selection process may take place during durability demonstration test vehicle selection specified in section (h).

(2.2.2) A manufacturer shall evaluate one production vehicle per test group selected for monitoring system demonstration in section (h).

(2.2.3) In addition to the vehicles selected in section (j)(2.2.2) above, a manufacturer shall evaluate vehicles chosen from test groups that are not selected for monitoring system demonstration testing under section (h). The number of additional vehicles to be tested shall be equal to the number of vehicles selected for monitoring system demonstration in section (h).

(2.2.4) The Executive Officer may waive the requirements for submittal of evaluation results from one or more of the test groups if data has been previously submitted for all of the test groups.

(2.3) Evaluation requirements:

(2.3.1) The evaluation shall demonstrate the ability of the OBD II system on the selected production vehicle to detect a

malfunction, illuminate the MIL, and store a confirmed fault code when a malfunction is present and the monitoring conditions have been satisfied for each individual diagnostic required by title 13, CCR section 1968.2.

(2.3.2) The evaluation shall verify that malfunctions detected by non-MIL illuminating diagnostics of components used to enable any other OBD II system diagnostic (e.g., fuel level sensor) will not inhibit the ability of other OBD II system diagnostics to properly detect malfunctions.

(2.3.3) On vehicles so equipped, the evaluation shall verify that the software used; to track the numerator and denominator for purposes of determining in-use monitoring frequency correctly increments as required in section (d)(4) (i.e., the "dynamic" testing portion of SAE J1699-3).

(2.3.4) Malfunctions may be mechanically implanted or electronically simulated but internal on-board computer hardware or software changes may not be used to simulate malfunctions. Emission testing to confirm that the malfunction is detected before the appropriate emission standards are exceeded is not required.

(2.3.5) Manufacturers shall submit a proposed test plan for Executive Officer approval prior to evaluation testing being performed. The test plan shall identify the method used to induce a malfunction in each diagnostic. If the Executive Officer determines that the requirements of section (j)(2) are satisfied, the proposed test plan shall be approved.

(2.3.6) Subject to Executive Officer approval, manufacturers may omit demonstration of specific diagnostics. The Executive Officer shall approve a manufacturer's request if the demonstration cannot be reasonably performed without causing physical damage to the vehicle (e.g., on-board computer internal circuit faults).

(2.3.7) For evaluation of test vehicles selected in accordance with section (j)(2.2.2), manufacturers are not required to demonstrate diagnostics that were previously demonstrated prior to certification as required in section (h).

(2.4) Manufacturers shall submit a report of the results of all testing conducted pursuant to section (j)(2) to the Executive Officer for review. This report shall identify the method used to induce a malfunction in each diagnostic, the MIL illumination status, and the confirmed fault code(s) stored.

(2.5) In accordance with section (k)(6), manufacturers may request Executive Officer approval for a retroactive deficiency to be granted for items identified during this testing.

(3) Verification and Reporting of In-use Monitoring Performance.

(3.1) Manufacturers are required to collect and report in-use monitoring performance data representative of every test group certified by the manufacturer and equipped with in-use monitoring performance tracking software in accordance with section (d)(4) to the ARB within twelve months from either the time vehicles in the test group were first introduced into commerce or the start of normal production for such vehicles, whichever is later. The manufacturer may propose to the Executive Officer that multiple test groups be combined to collect representative data. Executive Officer approval shall be granted upon determining that the proposed groupings include test groups using the same OBD II strategies and similar calibrations and that are expected to have similar in-use monitoring performance. If approved by the Executive Officer, the manufacturer may submit one set of data for each of the approved groupings.

(3.2) For each test group or combination of test groups, the data must include all of the in-use performance tracking data reported through SAE J1979 (i.e., all numerators, denominators, and the ignition cycle counter), the date the data was collected, the odometer reading, the vehicle VIN, and the ECM software calibration identification number and be in the standardized format detailed in Attachment D: Rate Based Data of ARB Mail-Out #06-23, December 21, 2006, incorporated by reference.

(3.3) Manufacturers shall submit a plan to the Executive Officer for review and, approval of the sampling method, number of vehicles to be sampled, time line to collect the data, and reporting format. The Executive Officer shall approve the plan upon determining that it provides for effective collection of data from a representative sample of vehicles that, at a minimum, is fifteen vehicles, will likely result in the collection and submittal of data within the required twelve month time frame, will generate data that are representative of California drivers and temperatures, and does not, by design, exclude or include specific vehicles in an attempt to collect data only from vehicles with the highest in-use performance ratios.

(3.2) For each test group or combination of test groups, the data must include all of the in-use performance tracking data reported through SAE J1979 (i.e., all numerators, denominators, and the ignition cycle counter), the date the data was collected, the odometer reading, the vehicle VIN, and the ECM software calibration identification number and be in the standardized format detailed in Attachment D: Rate Based Data of ARB Mail-Out #06-23, December 21, 2006, incorporated by reference.

(3.3) Manufacturers shall submit a plan to the Executive Officer for review and approval of the sampling method, number of vehicles to be sampled, time line to collect the data, and reporting format. The Executive Officer shall approve the plan upon determining that it provides for effective collection of data from a representative sample of vehicles that, at a minimum, is fifteen vehicles, will likely result in the collection and submittal of data within the required twelve month time frame, will generate data that are representative of California drivers and temperatures, and does not, by design, exclude or include specific vehicles in an attempt to collect data only from vehicles with the highest in-use performance ratios.

(3.4) Upon request of the manufacturer, the Executive Officer may reduce the minimum sample size of fifteen vehicles set forth in section (j)(3.3) for test groups with low sales volume. In granting approval of a sampling plan with a reduced minimum sample size, the Executive Officer shall consider, among other things, information submitted by the manufacturer to justify the smaller sample size, sales volume of the test group(s), and the sampling mechanism utilized by the manufacturer to procure vehicles. In lieu of defining a fixed minimum sample size for low sales volume test groups, sampling plans approved for collection of data on higher sales volume test groups under section (j)(3.3) shall also be approved by the Executive Officer for low sales test groups if they use the identical sampling mechanism to procure vehicles from the low sales volume test groups.

(k) Deficiencies.

(1) For 2004 and subsequent model year vehicles, the Executive Officer, upon receipt of an application from the manufacturer, may certify vehicles even though said vehicles may not comply with one or more of the requirements of title 13, CCR section 1968.2. In granting the certification, the Executive Officer shall consider the following factors: the extent to which the requirements of section 1968.2 are satisfied overall based on a review of the vehicle applications in question, the relative performance of the resultant OBD II system compared to systems fully compliant with the requirements of title 13, CCR section 1968.2, and a demonstrated good-faith effort on the part of the manufacturer to: (1) meet the requirements in full by evaluating and considering the best available monitoring technology; and (2) come into compliance as expeditiously as possible. The Executive Officer may not grant certification to a vehicle in which the reported noncompliance for which a deficiency is sought would be subject to ordered recall pursuant to section 1968.5 (c)(3)(A).

(2) Manufacturers of non-complying systems are subject to fines pursuant to section 43016 of the California Health and Safety Code. Except as allowed in section (k)(7) for light-duty diesel vehicles, the specified fines apply to the third and subsequently identified deficiencies, with the exception that fines shall apply to all monitoring system deficiencies wherein a required monitoring strategy is completely absent from the OBD system.

(3) The fines are in the amount of $ 50 per deficiency per vehicle for non-compliance with any of the monitoring requirements specified in sections (e)(1) through (e)(8), (e)(11), (e)(13)(e)(14), (e)(16), (f)(1) through (f)(9), (f)(13), and (f)(16) and $ 25 per deficiency per vehicle for non-compliance with any other requirement of section 1968.2. In determining the identified order of deficiencies, deficiencies subject to a $ 50 fine are identified first. Total fines per vehicle under section (k) may not exceed $ 500 per vehicle and are payable to the State Treasurer for deposit in the Air Pollution Control Fund.

(4) Manufacturers must re-apply for Executive Officer approval of a deficiency each model year. In considering the request to carry-over a deficiency, the Executive Officer shall consider the factors identified in section (k)(1) including the manufacturer's progress towards correcting the deficiency. The Executive Officer may not allow manufacturers to carry over monitoring system deficiencies for more than two model years unless it can be demonstrated that substantial vehicle hardware modifications and additional lead time beyond two years would be necessary to correct the deficiency, in which case the Executive Officer shall allow the deficiency to be carried over for three model years.

(5) Except as allowed in section (k)(6), deficiencies may not be retroactively granted after certification.

(6) Request for retroactive deficiencies

(6.1) Manufacturers may request that the Executive Officer grant a deficiency and amend a vehicle's certification to conform to the granting of the deficiencies during the first 6 months after commencement of normal production for each aspect of the monitoring system: (a) identified by the manufacturer (during testing required by section (j)(2) or any other testing) to be functioning different than the certified system or otherwise not meeting the requirements of any aspect of section 1968.2; and (b) reported to the Executive Officer. If the Executive Officer grants the deficiencies and amended certification, their approval would be retroactive to the start of production.

(6.2) Executive Officer approval of the request for a retroactive deficiency shall be granted provided that the conditions necessary for a pre-certification deficiency determination are satisfied (see section (k)(1)) and the manufacturer could not have reasonably anticipated the identified problem before commencement of production.

(6.3) In granting the amended certification, the Executive Officer shall include any approved post-production deficiencies together with all previously approved deficiencies in computing fines in accordance with section (k)(2).

(7) For 2007 through 2009 model year light-duty and 2007 through 2012 model year medium-duty diesel vehicles, in cases where one or more of the deficiencies is for the aftertreatment monitoring requirements of sections (f)(1), (2), (8), or (9) and the deficient monitor is properly able to detect all malfunctions prior to emissions exceeding twice the required monitor threshold (e.g., before emissions exceed 10 times the standard for NMHC if the threshold is 5.0 times the standard for NMHC), the specified fines shall apply to the fourth and subsequently identified deficiencies in lieu of the third and subsequently identified deficiencies. If none of the deficiencies are for the requirements of sections (f)(1), (2), (8), or (9) or if the deficient aftertreatment monitor exceeds twice the required monitor threshold, the specified fines shall apply to the third and subsequently identified deficiencies. In all cases, the exception that fines shall apply to all monitoring system deficiencies wherein a required monitoring strategy is completely absent from the OBD system still applies.

(8) Any OBD II system installed on a production vehicle that fails to conform with the certified OBD II system for that

vehicle or otherwise fails to meet the requirements of section 1968.2 and has not been granted a deficiency pursuant to the provisions of section (k)(1) through (k)(7) are considered non-compliant. The vehicles are subject to enforcement pursuant to applicable provisions of the Health and Safety Code and title 13, CCR section 1968.5.

13 C.C.R. § 1968.5. Enforcement of Malfunction and Diagnostic System Requirements for 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines

(a) General

(1) Applicability.

(A) These procedures shall be used to assure compliance with the requirements of title 13, California Code of Regulations (CCR) section 1968.2 for all 2004 and subsequent model year passenger cars, light-duty trucks, medium-duty vehicles, and engines certified on an engine dynamometer for use in medium-duty vehicles (the classifications of which shall jointly be referred to for purposes of this regulation as vehicles) equipped with OBD II systems that have been certified for sale in California.

(B) Vehicles manufactured prior to the 2004 model year are covered by the general enforcement and penalty provisions of the Health and Safety Code, and the specific provisions of title 13, CCR sections 1968.1 and 2111 through 2149.

(2) Purpose.

The purpose of this section is to establish the enforcement protocol that shall be used by the ARB to assure that vehicles certified for sale in California are equipped with OBD II systems that properly function and meet the purposes and requirements of title 13, CCR section 1968.2.

(3) Definitions.

The definitions applicable to these rules include those set forth in Health and Safety Code section 39010 et seq. and in title 13, CCR sections 1900(b) and 1968.2(c), which are incorporated by reference herein. The following definitions are specifically applicable to section 1968.5 and take precedence over any contrary definitions.

"Days", when computing any period of time, unless otherwise noted, means normal working days that a manufacturer is open for business.

"Executive Officer" means the Executive Officer of the Air Resources Board or his or her authorized representative.

"Influenced OBD II-Related Recall" means an inspection, repair, adjustment, or modification program initiated and conducted by a manufacturer as a result of enforcement testing conducted by the ARB or any other information for the purpose of correcting any nonconforming OBD II system for which direct notification of vehicle owners is necessary.

"Major Monitor" means those monitors covered by the requirements set forth in title 13, CCR sections 1968.2(e)(1.0) through (e)(8.0), (e)(11.0) through (e)(14.0), (e)(16.0), (f)(1.0) through (f)(9), (f)(12), (f)(13), and (f)(16).

"Motor Vehicle Class" means a group or set of vehicles subject to enforcement testing that have been determined by the Executive Officer to share common or similar hardware, software, OBD II monitoring strategy, or emission control strategy.

"Motor Vehicle Manufacturer" means the manufacturer granted certification to sell motor vehicles in the State of California.

"Nonconforming OBD II System" means an OBD II system on a production vehicle that has been determined not to comply with the requirements of title 13, CCR section 1968.2. For purposes of section 1968.5, a motor vehicle class shall be considered nonconforming irrespective of whether vehicles in the motor vehicle class, on average, meet applicable tailpipe or evaporative emission standards.

"OBD II Emission Testing" refers to testing conducted to determine compliance with the malfunction criteria in title 13, CCR sections 1968.2(e) and (f) that are based on a multiple of, or an additive to, a tailpipe emission standard or an absolute measurement from an applicable emission test cycle (e.g., 1.5 times the applicable FTP emission standards, PM standard plus 0.02 g/bhp-hr, PM level of 0.03 g/bhp-hr as measured from an applicable emission test cycle).

"OBD II Ratio Testing" refers to testing conducted to determine compliance with the required in-use monitor performance ratio in title 13, CCR section 1968.2(d)(3.2.1).

"Ordered OBD II-Related Recall" means an inspection, repair, adjustment, or modification program required by the ARB to be conducted by the manufacturer to correct any nonconforming OBD II system for which direct notification of vehicle owners is necessary.

"Quarterly Reports" refer to the following calendar periods: January 1 - March 31; April 1 - June 30; July 1 - September 30; October 1 - December 31.

"Test Sample Group" means a group of production vehicles in a designated motor vehicle class that are equipped with OBD II systems and are selected and tested as part of the ARB enforcement testing program set forth in section (b).

"Voluntary OBD II-Related Recall" means an inspection, repair, adjustment, or modification program voluntarily initiated

and conducted by a manufacturer to correct any nonconforming OBD II system for which direct notification of vehicle owners is necessary.

(b) Testing Procedures

(1) Purpose.

To assure that OBD II systems on production motor vehicles comply with the requirements of title 13, CCR section 1968.2, the ARB may periodically evaluate vehicles from a motor vehicle class.

(2) Preliminary Testing and Evaluation.

(A) As part of his or her evaluation of vehicles to determine compliance with the requirements of title 13, CCR section 1968.2, the Executive Officer may routinely conduct testing on any production vehicles that have been certified for sale in California.

(B) Based upon such testing or any other information, including data from California or other State Inspection and Maintenance (I/M) stations, warranty information reports, and field information reports, the Executive Officer may conduct enforcement testing pursuant to sections (b)(3) through (5) below.

(3) Vehicle Selection for Enforcement Testing.

(A) Determining the Motor Vehicle Class.

(i) Upon deciding to conduct enforcement testing, the Executive Officer shall determine the motor vehicle class to be tested. In determining the scope of the motor vehicle class to be tested, the Executive Officer shall consider the similarities and differences in the OBD II systems of potentially affected vehicles. Among other things, the Executive Officer shall consider whether vehicles share similar computer hardware and software, calibrations, or OBD II monitoring and emission control strategies.

(ii) The default motor vehicle class is the test group or OBD II group used by the manufacturer to certify the vehicles to be tested. However, upon concluding that a subgroup of vehicles differs from other vehicles in the identified test group or OBD II group and that a reasonable basis exists to believe that the differences may directly impact the type of testing that will be performed, the Executive Officer may determine that a subgroup of the test group or OBD II group is the appropriate motor vehicle class for testing.

(iii) Similarly, upon concluding that vehicles from several OBD II groups (which may include OBD II groups from different model years) share such common characteristics that a reasonable basis exists to believe that results of enforcement testing may be applicable to a motor vehicle class larger than a specific test group or OBD II group, the Executive Officer may determine that the appropriate motor vehicle class includes more than one test group or OBD II group.

(iv) Except for testing to determine if an OBD II system has been designed to deactivate based on age and/or mileage (title 13, CCR section 1968.2 (d)(1.3)), the Executive Officer may not conduct testing of a motor vehicle class whose vehicles, on average, exceed the defined full useful life of the motor vehicle class. For purposes of the determination of this average, the Executive Officer shall use the accrual rates appropriate for vehicles in the motor vehicle class as defined in EMFAC2000 "Public Meeting to Consider Approval of Revisions to the State's On-Road Motor Vehicle Emissions Inventory: Technical Support Document, Section 7.1, 'Estimation of Average Mileage Accrual Rates from Smog Check Data,'" May 2000, incorporated by reference.

(B) Size of Test Sample Group. After determining the motor vehicle class to be tested, the Executive Officer shall determine the appropriate number of vehicles to include in the test sample group for enforcement testing in accordance with the following guidelines:

(i) For OBD II emission testing, the Executive Officer shall follow the provisions of title 13, CCR section 2137 regarding test sample size. In accordance with section 2137, the Executive Officer shall test 10 vehicles that have been procured following the protocol of section (b)(3)(C) below and meet the selection criteria of section (b)(3)(D)(i) below to determine the emissions characteristics of the motor vehicle class being tested.

(ii) For OBD II ratio testing, the Executive Officer shall collect data from a test sample group of 30 vehicles that have been procured following the protocol of section (b)(3)(C) below and meet the selection criteria of section (b)(3)(D)(ii) below to determine the in-use OBD II monitoring performance of the motor vehicle class being tested.

(iii) In determining compliance with any other requirements of title 13, CCR section 1968.2 (e.g., diagnostic connector location, communication protocol standards, MIL illumination protocol, evaporative system diagnostics, etc.), the Executive Officer shall determine, on a case by case basis, the number of vehicles meeting the selection criteria of section (b)(3)(D)(iii) needed to assure that the results of such testing may be reasonably inferred to the motor vehicle class. The Executive Officer's determination shall be based upon the nature of the noncompliance and the scope of the motor vehicle class. The test sample group could be as few as two test vehicles.

(C) Protocol for Procuring Vehicles for Test Sample Group.

(i) For OBD II emission and ratio testing, the Executive Officer shall procure vehicles consistent with the procurement

process followed by the Executive Officer under title 13, CCR section 2137 (e.g., obtaining lists of all vehicles in the motor vehicle class within a specified geographical area, mailing postcards soliciting participation of vehicles within the specified area, selecting vehicles from those that responded to the solicitation, inspecting selected vehicles to determine whether appropriate to include in sample group, etc.). In selecting vehicles for OBD II emission testing, the Executive Officer shall include only vehicles meeting the criteria set forth in section (b)(3)(D)(i) below. For OBD II ratio testing, the Executive Officer shall include only vehicles meeting the criteria set forth in section (b)(3)(D)(ii) below.

(ii) For all other testing, the Executive Officer shall, on a case by case basis, determine the appropriate manner for procuring vehicles. In making his or her determination, the Executive Officer shall consider the nature of the noncompliance and the scope of the motor vehicle class. If the Executive Officer concludes that a reasonable basis exists to believe that a vehicle operator's driving or maintenance habits would not substantially impact test results to determine noncompliance, he or she may procure vehicle(s) by any means that assures effective collection and testing of vehicles (e.g., rental car agencies, fleet vehicles, etc.). In all cases, however, the selection process must ensure proper selection of vehicles in accord with section (b)(3)(D)(iii) below.

(D) Vehicles to be included in a Test Sample Group.

(i) In selecting vehicles to be included in a test sample group for enforcement OBD II emission testing, the Executive Officer shall include only vehicles that:

a. Are certified to the requirements of title 13, CCR section 1968.2 and California exhaust emission standards.

b. Are registered for operation in California.

c. Have mileage that is equal to or less than 75 percent of the certified full useful life mileage and have an age of less than the certified full useful life age for the subject vehicles.

d. Have not been tampered with or equipped with add-on or modified parts that would cause the OBD II system not to comply with the requirements of title 13, CCR section 1968.2 or would have a permanent effect on exhaust emission performance.

e. Have not been subjected to abuse (e.g., racing, overloading, misfueling) neglect, improper maintenance, or other factors that would cause the OBD II system not to comply with the requirements of title 13, CCR section 1968.2 or would have a permanent effect on exhaust emission performance.

f. Have no detected or known malfunction(s) that would affect the performance of the OBD II system and are unrelated to the monitor or system being evaluated. At its discretion, the ARB may elect to repair a vehicle with a detected or known malfunction and then include the vehicle in the test sample group.

g. Have had no major repair to the engine or major repair of the vehicle resulting from a collision.

h. Have no problem that might jeopardize the safety of laboratory personnel.

(ii) In selecting vehicles to be included in a test sample group for enforcement OBD II ratio testing, the Executive Officer shall include only vehicles that:

a. Are certified to the requirements of title 13, CCR section 1968.2.

b. Have collected sufficient vehicle operation data for the monitor to be tested. For monitors required to meet the in-use monitor performance ratio and to track and report ratio data pursuant to title 13, CCR section 1968.2(d)(3.2), sufficient vehicle operation data shall mean the denominator meets the criteria set forth in sections (b)(3)(D)(ii)1. through 3. below. For monitors required to meet the in-use monitor performance ratio but not required to track and report ratio data pursuant to title 13, CCR section 1968.2(d)(3.2), sufficient vehicle operation data shall mean that vehicles that have a denominator that meets the criteria set forth in sections (b)(3)(D)(ii)1. through 3. below after undergoing testing as set forth in section (b)(4)(C)(ii) below. Specifically, the denominator, as defined in title 13, CCR section 1968.2(d)(4.3), for the monitor to be tested must have a value equal to or greater than:

1. 150 for evaporative system monitors, secondary air system monitors, and monitors utilizing a denominator incremented in accordance with title 13, CCR sections 1968.2(d)(4.3.2)(E) or (F) (e.g., cold start monitors, air conditioning system monitors, etc.), or

2. 50 for PM filter monitors and oxidation catalyst monitors utilizing a denominator incremented in accordance with title 13, CCR section 1968.2(d)(4.3.2)(G), or

3. 300 for catalyst, oxygen sensor, EGR, VVT, and all other component monitors.

c. Have not been tampered with or equipped with add-on or modified parts that would cause the OBD II system not to comply with the requirements of title 13, CCR section 1968.2.

d. Have mileage and age that are less than or equal to the certified full useful life mileage and age for the subject vehicles.

(iii) In selecting vehicles to be included in a test sample group for enforcement testing of any other requirement of title 13, CCR section 1968.2 (not covered by sections (b)(3)(D)(i) or (ii) above), the Executive Officer shall include only vehicles that:

a. Are certified to the requirements of title 13, CCR section 1968.2.

b. Have not been tampered with or equipped with add-on or modified parts that would cause the OBD II system not to comply with the requirements of title 13, CCR section 1968.2.

c. Have no detected or known malfunction(s) that would affect the performance of the OBD II system and are unrelated to the monitor or system being evaluated. At its discretion, the ARB may elect to repair a vehicle with a detected or known malfunction and then include the vehicle in the test sample group.

d. Have mileage and age that are less than or equal to the certified full useful life mileage and age for the subject vehicles.

(iv) If the Executive Officer discovers, by either evidence presented by the manufacturer as provided in section (b)(7) or on his or her own, that a vehicle fails to meet one or more of the applicable criteria of section (b)(3)(D)(i) through (iii), the Executive Officer shall remove the vehicle from the test sample group. The Executive Officer may replace any vehicle removed with an additional vehicle selected in accordance with sections (b)(3)(C) and (D) above. Test results relying on data from the removed vehicle shall be recalculated without using the data from the removed vehicle.

(4) Enforcement Testing Procedures.

(A) Prior to conducting any testing under section (b)(4), the Executive Officer may replace components monitored by the OBD II system with components that are sufficiently deteriorated or simulated to cause malfunctions that exceed the malfunction criteria established pursuant to title 13, CCR sections 1968.2(e) and (f) in a properly operating system. The Executive Officer may not use components deteriorated or simulated to represent failure modes that could not have been foreseen to occur by the manufacturer (e.g., the use of leaded gasoline in an unleaded vehicle, etc.). Upon request by the Executive Officer, the manufacturer shall make available all test equipment (e.g., malfunction simulators, deteriorated "threshold" components, etc.) necessary to duplicate testing done by the manufacturer to determine the malfunction criteria used for major monitors subject to OBD II emission testing.

(B) OBD II Emission Testing. After the test sample group has been selected and procured, the Executive Officer may perform one or more of the following tests:

(i) Emission testing with the test procedures used by the Executive Officer for in-use testing of compliance with exhaust emission standards in accordance with title 13, CCR sections 2138 and 2139.

(ii) On-road or dynamometer testing with the vehicle being driven in a manner that reasonably ensures that all of the monitoring conditions disclosed in the manufacturer's certification application for the tested monitor are encountered.

(C) OBD II Ratio Testing.

(i) For OBD II ratio testing of monitors required to meet the in-use monitor performance ratio and to track and report ratio data pursuant to title 13, CCR section 1968.2(d)(3.2), after the test sample group has been selected and procured, the Executive Officer shall download the data from monitors required to track and report such data.

(ii) For OBD II ratio testing of monitors required to meet the in-use monitor performance ratio but not required to track and report ratio data pursuant to title 13, CCR section 1968.2(d)(3.2), after the test sample group has been selected and procured, the Executive Officer shall collect data by installing instrumentation or data-logging equipment on the vehicles. After installation of the equipment, the vehicles shall be returned to the vehicle owner/operator to continue to operate the vehicle until the minimum denominator criteria (see section (b)(3)(D)(ii)b.) are satisfied. The Executive Officer shall then calculate the ratio from the data collected in a manner that will allow the Executive Officer to effectively determine the in-use monitor performance ratio in accordance with the requirements of title 13, CCR section 1968.2(d)(3.2).

(D) Testing for compliance with any other requirement of title 13, CCR section 1968.2. After the test sample group has been selected and procured, the Executive Officer may perform one or more of the following tests:

(i) Emission testing on the applicable FTP cycle or other applicable emission test cycle used for measuring exhaust or evaporative emissions.

(ii) On-road or dynamometer testing with the vehicle being driven in a manner that reasonably ensures that all of the monitoring conditions disclosed in the manufacturer's certification application for the tested monitor are encountered.

(iii) Any other testing determined to be necessary by the Executive Officer. This may include, but is not limited to, the use of special test equipment to verify compliance with standardization requirements.

(5) Additional Testing.

(A) Based upon testing of the motor vehicle class in section (b)(4) above and after review of all evidence available at the conclusion of such testing, the Executive Officer may elect to conduct further testing of a subgroup of vehicles from the motor vehicle class if the Executive Officer has determined that:

(i) a subgroup of tested vehicles differs sufficiently enough from other vehicles in the tested motor vehicle class, and

(ii) a reasonable basis exists to believe that the identified differences may indicate that the subgroup may be nonconforming whereas the tested motor vehicle class as a whole is not.

(B) Hereinafter all references to motor vehicle class shall be applicable to the subgroup meeting the conditions of section (b)(5)(A) above.

(C) In any testing of a subgroup of vehicles under section (b)(5), the Executive Officer shall follow the vehicle selection and testing procedures set forth in sections (b)(3) and (4) above.

(6) Finding of Nonconformance after Enforcement Testing.

After conducting enforcement testing pursuant to section (b)(4) above, the Executive Officer shall make a finding of nonconformance of the OBD II system in the identified motor vehicle class if:

(A) OBD II Emission Testing.

(i) Intermediate In-Use Gasoline Thresholds. For 2004 through 2008 model year vehicles subject to gasoline/spark ignited monitoring requirements in title 13, CCR section 1968.2(e), the results of the OBD II emission tests indicate that 50 percent or more of the vehicles in the test sample do not properly illuminate the MIL when emissions exceed:

a. 2.0 times the FTP standards for malfunction criteria defined in title 13, CCR section 1968.2(e) that require MIL illumination at 1.5 or 1.75 times the FTP standards;

b. 3.5 times the FTP standards for malfunction criteria defined in title 13, CCR section 1968.2(e) that require MIL illumination at 2.5 times the FTP standards; or

c. 4.5 times the FTP standards for malfunction criteria defined in title 13, CCR section 1968.2(e) that require MIL illumination at 3.5 times the FTP standards.

(ii) Intermediate In-Use Diesel Thresholds.

a. For 2007 through 2012 model year vehicles subject to diesel/compression-ignition monitoring requirements in title 13, CCR section 1968.2(f), the results of the OBD II emission tests indicate that 50 percent or more of the vehicles in the test sample do not properly illuminate the MIL when emissions exceed:

1. an additional 1.0 times the applicable standards above the malfunction criteria for malfunction criteria defined in title 13, CCR section 1968.2(f) that require MIL illumination at less than 3.5 times the applicable standards (e.g., 3.5 times the applicable standards for a malfunction criteria of 2.5 times the applicable standards); or

2. an additional 1.5 times the applicable standards above the malfunction criteria for malfunction criteria defined in title 13, CCR section 1968.2(f) that require MIL illumination at greater than or equal to 3.5 times the applicable standards (e.g., 6.5 times the applicable standards for a malfunction criteria of 5.0 times the applicable standards); or

3. an additional 1.0 times the applicable standards above the malfunction criteria for malfunction criteria defined in title 13, CCR section 1968.2(f) that require MIL illumination at an additive threshold of less than or equal to 0.3 g/bhp-hr NO[x], an additive threshold of less than or equal to 0.02 g/bhp-hr PM, or an absolute threshold of less than or equal to 0.03 g/bhp-hr (e.g., 0.07 g/bhp-hr PM for an additive malfunction criteria of 0.03 g/bhp-hr with a standard of 0.02 g/bhp-hr); or

4. an additional 1.5 times the applicable standards above the malfunction criteria for malfunction criteria defined in title 13, CCR section 1968.2(f) that require MIL illumination at an additive threshold of greater than 0.3 g/bhp-hr NO[x], an additive threshold of greater than 0.02 g/bhp-hr PM, or an absolute threshold of greater than 0.03 g/bhp-hr PM (e.g., 1.0 g/bhp-hr NO[x] for an additive malfunction criteria of 0.5 g/bhp-hr with a standard of 0.2 g/bhp-hr).

b. For 2010 through 2012 model year medium-duty vehicles certified to an engine dynamometer standard, the "applicable standards" used in section (b)(6)(A)(ii) shall be limited to the emission test cycle and standard (i.e., FTP or SET) determined by the manufacturer to be more stringent and documented as such in the certification application in accordance with title 13, CCR section 1968.2(d)(6.1).

c. For 2007 through 2009 model year vehicles subject to adjustment for infrequent regeneration events in accordance with title 13, CCR section 1968.2(d)(6.2), OBD II emission enforcement testing for monitors using the provisions of title 13, CCR section 1968.2(d)(6.2.3) (baseline-derived adjustment factors instead of malfunction threshold component-specific adjustment factors) shall be limited to using emission test results without the infrequent regeneration event occurring and applying the same baseline-derived adjustment factors used by the manufacturer at the time of certification.

(iii) Final In-Use Thresholds. For 2009 and subsequent model year vehicles subject to the gasoline/spark-ignited requirements of title 13, CCR section 1968.2(e) and 2013 and subsequent model year vehicles subject to the diesel/compression-ignition requirements of title 13, CCR section 1968.2(f), the results of the OBD II emission tests indicate that 50 percent or more of the vehicles in the test sample do not properly illuminate the MIL when the emission malfunction criteria defined in title 13, CCR sections 1968.2(e) or (f) are exceeded.

(B) OBD II Ratio Testing.

(i) For monitors specified in sections (b)(6)(B)(i)a. through e. below, the data collected from the vehicles in the test sample indicate either that the average in-use monitor performance ratio for one or more of the monitors in the test sample group is less than 0.100 or that 66.0 percent or more of the vehicles in the test sample group have an in-use monitor performance ratio of less than 0.100 for the same monitor:

a. monitors on 2004 through 2014 model year vehicles certified to a ratio of 0.100 in accordance with title 13, CCR section 1968.2(d)(3.2.1) (D),

b. monitors specified in title 13, CCR section 1968.2(e) on 2007 through 2012 model year vehicles for the first three model years the monitor is certified to the in-use performance ratio monitoring requirements of title 13, CCR sections 1968.2(d)(3.2.1)(A) through (C),

c. the fuel system air-fuel ratio cylinder imbalance monitor specified in title 13, CCR section 1968.2(e)(6.2.1)(C) on 2015 through 2017 model year vehicles,

d. the secondary exhaust gas sensor monitor specified in title 13, CCR section 1968.2(e)(7.2.2)(C) on 2012 through 2014 model year vehicles, and

e. monitors specified in title 13, CCR section 1968.2(f) on 2013 through 2015 model year vehicles.

(ii) For monitors that are certified to the ratios in title 13, CCR sections 1968.2(d)(3.2.1)(A) through (C) and are not described in sections (b)(6)(B)(i)b. through e. above, the data collected from the vehicles in the test sample indicate either that 66.0 percent or more of the vehicles in the test sample group have an in-use monitor performance ratio of less than the required minimum ratio defined in title 13, CCR section 1968.2(d)(3.2.1) for the same monitor or that the average in-use monitor performance ratio for one or more of the monitors in the motor vehicle class is less than the required minimum ratio defined in title 13, CCR section 1968.2(d)(3.2.1) as defined by determining the average in-use monitor performance ratio for one or more of the monitors in the test sample group is less than:

a. 0.230 for secondary air system monitors and other cold start related monitors utilizing a denominator incremented in accordance with title 13, CCR section 1968.2(d)(4.3.2)(E) (e.g., cold start strategy monitors, etc.);

b. For evaporative system monitors:

1. 0.230 for monitors designed to detect malfunctions identified in title 13, CCR section 1968.2(e)(4.2.2)(C) (i.e., 0.020 inch leak detection);

2. 0.460 for monitors designed to detect malfunctions identified in title 13, CCR section 1968.2(e)(4.2.2)(A) and (B) (i.e., purge flow and 0.040 inch leak detection);

c. 0.297 for catalyst, oxygen sensor, EGR, VVT system, and all other monitors specifically required in section title 13, CCR sections 1968.2(e) and (f) to meet the monitoring condition requirements of title 13, CCR section 1968.2(d)(3.2).

(C) All Other OBD II Testing.

(i) The results of the testing indicate that at least 30 percent of the vehicles in the test sample do not comply with the same requirement of title 13, CCR section 1968.2.

(ii) The results of the testing indicate that at least 30 percent of the vehicles in the test sample do not comply with one or more of the requirements of title 13, CCR section 1968.2 while the engine is running and while in the key on, engine off position such that Inspection and Maintenance or scan tool equipment designed to access the following parameters via the standards referenced in title 13, CCR section 1968.2 cannot obtain valid and correct data for the following parameters:

a. The current readiness status from all on-board computers required to support readiness status in accordance with Society of Automotive Engineers J1979 (SAE J1979) as incorporated by reference in title 13, CCR section 1968.2(g)(1) and section 1968.2(g)(4.1);

b. The current MIL command status while the MIL is commanded off and while the MIL is commanded on in accordance with SAE J1979 and title 13, CCR section 1968.2(g)(4.2), and in accordance with SAE J1979 and title 13, CCR sections 1968.2(d)(2.1.2) during the MIL functional check and, if applicable, title 13, CCR 1968.2(g)(4.1.3) during the MIL readiness status check;

c. The current permanent fault code(s) in accordance with SAE J1979 and section title 13, CCR 1968.2(g)(4.4);

d. The data stream parameters (Mode/Service $ 01) for: engine speed (PID $ 0C) and OBD requirements to which the vehicle or engine is certified (PID $ 1C); and for 2008 and subsequent model year vehicles using the ISO 15765-4 protocol that have not implemented permanent fault codes subject to (b)(6)(C)(ii)c., number of warm-up cycles since codes cleared (PID $ 30), distance since codes cleared (PID $ 31), and engine run time since codes cleared (PID $ 4E); as required in title 13, CCR section 1968.2(g)(4.2) and in accordance with SAE J1979;

e. The CAL ID, CVN, and VIN (Mode $ 09 PIDs $ 01 through $ 06) as required in title 13, CCR sections 1968.2(g)(4.6), (g)(4.7.1), (g)(4.7.3), and (g)(4.8) and in accordance with SAE J1979;

f. The proper identification of all data identified in (b)(6)(C)(ii)a. through (b)(6)(C)(ii)e. as supported or unsupported as required in title 13, CCR section 1968.2(g)(4) and in accordance with SAE J1979 (e.g., Mode/Service $ 01, PIDs $ 00, $ 20, $ 40; Mode/Service $ 09, PID $ 00, etc.); or

g. For vehicles using an alternate connector and communication protocol (e.g., SAE J1939) as provided for in title 13, CCR section 1968.2(g)(7.1), the parameters and data identified in sections (b)(6)(C)(ii)a. through f. in accordance with title 13, CCR section 1968.2(g)(4) and with the specified alternate connector and communication protocol in lieu of in accordance with SAE J1979.

(iii) If the finding of nonconformance under section (b)(6)(C)(i) above concerns vehicles that do not comply with the

requirements of title 13, CCR section 1968.2(d)(4) or (5) (e.g., numerators or denominators are not properly being incremented), it shall be presumed that the nonconformance would result in an OBD II ratio enforcement test result that would be subject to an ordered OBD II-related recall in accord with the criterion in section (c)(3)(A)(i). The manufacturer may rebut such a presumption by presenting evidence in accord with section (b)(7)(C)(iii) below that demonstrates to the satisfaction of the Executive Officer that the identified nonconformance would not result in an ordered OBD II-related recall under section (c)(3)(A)(i).

(7) Executive Officer Notification to the Manufacturer Regarding Determination of Nonconformance.

(A) Upon making the determination of nonconformance in section (b)(6) above, the Executive Officer shall notify the manufacturer in writing.

(B) The Executive Officer shall include in the notice:

(i) a description of each group or set of vehicles in the motor vehicle class covered by the determination;

(ii) the factual basis for the determination, including a summary of the test results relied upon for the determination;

(iii) a statement that the Executive Officer shall provide to the manufacturer, upon request and consistent with the California Public Records Act, Government Code section 6250 et seq., all records material to the Executive Officer's determination;

(iv) a provision allowing the manufacturer no less than 90 days from the date of issuance of the notice to provide the Executive Officer with any information contesting the findings set forth in the notice; and

(v) a statement that if a final determination is made that the motor vehicle class is equipped with a nonconforming OBD II system, the manufacturer may be subject to appropriate remedial action, including recall and monetary penalties.

(C) Within the time period set by the Executive Officer in section (b)(7)(B)(iv) and any extensions of time granted under section (b)(7)(H), the manufacturer shall provide the Executive Officer, consistent with paragraphs (i) through (iii) below, with any test results, data, or other information derived from vehicle testing that may rebut or mitigate the results of the ARB testing, including any evidence that a motor vehicle class, if determined to be nonconforming, should be exempted from mandatory recall. (See section (c)(3)(B) below.).

(i) For OBD II emission testing and OBD II ratio testing:

a. The manufacturer may submit evidence to demonstrate that vehicles in the test sample group used by the Executive Officer were inappropriately selected, procured, or tested in support of a request to have vehicles excluded from the test sample group in accordance with section (b)(3)(D)(iv).

b. If the manufacturer elects to conduct additional testing of vehicles in the motor vehicle class and submit the results of such testing to the Executive Officer, the manufacturer shall:

1. Present evidence that it has followed the vehicle procurement and test procedures set forth in sections (b)(3) and (4) above, or

2. If the manufacturer elects to use different procurement and testing procedures, submit a detailed description of the procedures used and evidence that such procedures provide an equivalent level of assurance that the results are representative of the motor vehicle class.

(ii) If the manufacturer objects to the size of the test sample group or the method used to procure vehicles in the test sample group used by the Executive Officer pursuant to section (b)(3)(B)(iii) or (b)(3)(C)(ii), the manufacturer shall set forth what it considers to be the appropriate size and procurement method, the reasons therefore, and test data from vehicles that confirm the manufacturer's position.

(iii) If the manufacturer elects to present evidence to overcome the presumption of nonconformance in section (b)(6)(C)(ii) above, the manufacturer shall demonstrate that the vehicles in the motor vehicle class comply with in-use monitor performance ratio requirements of title 13, CCR section 1968.2(d)(3.2) by presenting:

a. Evidence in accord with the procurement and testing requirements of sections (b)(3) and (4).

b. Any other evidence that provides an equivalent level of proof that vehicles operated in California comply with the in-use monitor performance ratio requirements.

(D) The Executive Officer may, but is not required to, accept any information submitted by a manufacturer pursuant to section (b)(7)(C) above after the time established for submission of such information has passed unless the manufacturer could not have reasonably foreseen the need for providing the information within the time period provided. In determining whether to accept late information, the Executive Officer will consider the lateness of the submission, the manufacturer's reasons for why such information was not timely presented, the materiality of the information to the Executive Officer's final determination, and what effect any delay may have on effective enforcement and the health and welfare of the State.

(E) The requirements of section (b)(7) shall not be construed to abridge the manufacturer's right to assert any privilege or right provided under California law.

(F) After receipt of any information submitted by the manufacturer pursuant to section (b)(7)(C) above, the Executive Officer shall consider all information submitted by the manufacturer and may conduct any additional testing that he or she

believes is necessary.

(G) Final Determination.

(i) Within 60 days after completing any additional testing that the Executive Officer deemed necessary under section (b)(7)(F) above, the Executive Officer shall notify the manufacturer of his or her final determination regarding the finding of nonconformity of the OBD II system in the motor vehicle class. The determination shall be made after considering all of the information collected and received, including all information that has been received from the manufacturer.

(ii) The notice must include a description of each test group(s), OBD II group(s), or subgroups thereof, that has been determined to have a nonconforming OBD II system and set forth the factual bases for the determination.

(H) Extensions. The Executive Officer may for good cause extend the time requirements set forth in section (b)(7). In granting additional time to a manufacturer, the Executive Officer shall consider, among other things, any documentation submitted by the manufacturer regarding the time that it reasonably believes is necessary to conduct its own testing, why such information could not have been more expeditiously presented, and what effect any delay caused by granting the extension may have on effective enforcement and the health and welfare of the State. The Executive Officer shall grant a manufacturer a reasonable extension of time upon the manufacturer demonstrating that despite the exercise of reasonable diligence, the manufacturer has been unable to produce relevant evidence in the time initially provided.

(c) Remedial Action

(1) Voluntary OBD II-Related Recalls. If a manufacturer initiates a voluntary OBD II-related recall campaign, the manufacturer shall notify the Executive Officer of the recall at least 45 days before owner notification is to begin. The manufacturer shall also submit a voluntary OBD II-related recall plan for approval, as prescribed under section (d)(1) below. A voluntary recall plan shall be deemed approved unless disapproved by the Executive Officer within 30 days after receipt of the recall plan.

(2) Influenced OBD II-Related Recalls.

(A) Upon being notified by the Executive Officer, pursuant to section (b)(7)(G), that a motor vehicle class is equipped with a nonconforming OBD II system, the manufacturer may, within 45 days from the date of service of such notification, elect to conduct an influenced OBD II-related recall of all vehicles within the motor vehicle class for the purpose of correcting the nonconforming OBD II systems. Upon such an election, the manufacturer shall submit an influenced OBD II-related recall plan for approval, as prescribed under section (d)(1) below.

(B) If a manufacturer does not elect to conduct an influenced OBD II-related recall under section (c)(2)(A) above, the Executive Officer may order the manufacturer to undertake appropriate remedial action, up to and including the recall and repair of the nonconforming OBD II systems.

(3) Ordered Remedial Action-Mandatory Recall.

(A) Except as provided in sections (c)(3)(B) below, the Executive Officer shall order the recall and repair of all vehicles in a motor vehicle class that have been determined to be equipped with a nonconforming OBD II system if enforcement testing conducted pursuant to section (b) above or information received from the manufacturer indicates that:

(i) For monitors on 2007 and subsequent model year vehicles certified to the ratios in title 13, CCR sections 1968.2 (d)(3.2.1)(A) through (C), the average in-use monitor performance ratio for one or more of the major monitors in the test sample group is less than or equal to 33.0 percent of the applicable required minimum ratio established in title 13, CCR section 1968.2(d)(3.2.1) (e.g., if the required ratio is 0.336, less than or equal to a ratio of 0.111) or 66.0 percent or more of the vehicles in the test sample group have an in-use monitor performance ratio of less than or equal to 33.0 percent of the applicable required minimum ratio established in title 13, CCR section 1968.2(d)(3.2.1) for the same major monitor. For monitors on 2004 through 2014 model year vehicles certified to the 0.100 ratio in title 13, CCR section 1968.2(d)(3.2.1)(D), the Executive Officer shall determine the remedial action for nonconformances regarding the in-use monitor performance ratio in accordance with section (c)(4) below.

(ii) When the vehicle is tested on-road and driven so as to reasonably encounter all monitoring conditions disclosed in the manufacturer's certification application, the OBD II system is unable to detect and illuminate the MIL for a malfunction of a component/system monitored by a major monitor (other than the monitors for misfire causing catalyst damage and the evaporative system) prior to emissions exceeding two times the malfunction criteria of title 13, CCR sections 1968.2(e) and (f) (e.g., if the malfunction criteria is 1.75 times the applicable FTP standard, recall would be required when emissions exceed 3.5 times the applicable FTP standard or if the malfunction criteria is the PM standard plus 0.02 g/bhp-hr and the PM standard is 0.01 g/bhp-hr, recall would be required when emissions exceed 0.06 g/bhp-hr). Additionally, for the first two years that a new major monitor is required in title 13, CCR section 1968.2(e) (e.g., 2006 and 2007 model year for cold start strategy monitoring in title 13, CCR section 1968.2(e)(11)), the Executive Officer shall use three times the malfunction criteria in lieu of two times the malfunction criteria (e.g., if the malfunction criterion is 1.5 times the applicable FTP standard, recall would be required when emissions exceed 4.5 times the applicable FTP standard). Additionally, for major monitors on 2007 through 2009 model year vehicles certified to the monitoring requirements in title 13, CCR section 1968.2(f), the Executive Officer shall determine the remedial action for nonconformances regarding emission exceedance in accordance with section (c)(4) below in lieu of the cri-

teria in section (c)(3)(ii). For purposes of the emission exceedance determination, carbon monoxide (CO) emissions are not considered.

(iii) The monitor for misfire causing catalyst damage is unable to properly detect and illuminate the MIL for misfire rates that are more than 20 percentage points greater than the misfire rates disclosed by the manufacturer in its certification application as causing catalyst damage (e.g., if the disclosed misfire rate is 12 percent, recall would be required if the misfire rate, is greater than 32 percent without proper detection).

(iv) When the vehicle is tested on-road and driven so as to reasonably encounter all monitoring conditions disclosed in the manufacturer's certification application, the evaporative system monitor is unable to detect and illuminate the MIL for a cumulative leak or leaks in the evaporative system equivalent to that caused by an orifice with a diameter of at least 1.5 times the diameter of the required orifice in title 13, CCR section 1968.2(e)(4.2.2)(C).

(v) When the vehicle is tested on-road and driven so as to reasonably encounter all monitoring conditions disclosed in the manufacturer's certification application, the OBD II system cannot detect and illuminate the MIL for a malfunction of a component that effectively disables a major monitor and the major monitor, by being disabled, meets the criteria for recall identified in sections (c)(3)(A)(ii) or (iv) above (e.g. is unable to detect and illuminate the MIL for malfunctions that cause FTP emissions to exceed two times the malfunction criteria).

(vi) The motor vehicle class cannot be tested so as to obtain valid test results in accordance with the criteria identified in section (b)(6)(C)(ii) due to the nonconforming OBD II system.

(B) A motor vehicle class shall not be subject to mandatory recall if the Executive Officer determines that, even though a monitor meets a criterion set forth in section (c)(3)(A)(i)-(vi) for mandatory recall:

(i) The OBD II system can still detect and illuminate the MIL for all malfunctions monitored by the nonconforming monitor (e.g., monitor "A" is non-functional but monitor "B" is able to detect all malfunctions of the component(s) monitored by monitor "A").

(ii) The monitor meets the criterion solely due to a failure or deterioration mode of a monitored component or system that could not have been reasonably foreseen to occur by the manufacturer.

(iii) The failure or deterioration of the monitored component or system that cannot be properly detected causes the vehicle to be undriveable (e.g., vehicle stalls continuously or the transmission will not shift out of first gear, etc.) or causes an overt indication such that the driver is certain to respond and have the problem corrected (e.g., illumination of an over-temperature warning light or charging system light that uncorrected will result in an undriveable vehicle, etc.).

(C) A motor vehicle class that is not subject to mandatory recall pursuant to paragraph (B) above may still be subject to remedial action pursuant to section (c)(4) below.

(4) Other Ordered Remedial Action.

(A) If the Executive Officer has determined based upon enforcement testing conducted pursuant to section (b) above or information received from the manufacturer that a motor vehicle class is equipped with a nonconforming OBD II system and the nonconformance does not fall within the provisions of section (c)(3)(A) above, he or she may require the manufacturer to undertake remedial action up to and including recall of the affected motor vehicle class.

(B) In making his or her findings regarding remedial action, the Executive Officer shall consider the capability of the OBD II system to properly function. This determination shall be based upon consideration of all relevant circumstances including, but not limited to, those set forth below.

(i) Whether the manufacturer identified and informed the ARB about the nonconformance(s) or whether the ARB identified the nonconformance(s) prior to being informed by the manufacturer.

(ii) The number of nonconformances.

(iii) If the identified nonconformance(s) is with a major monitor(s), the nature and extent of the nonconformance(s), including:

a. the degree to which the in-use monitor performance ratio(s) is below the required ratio(s) specified in title 13, CCR section 1968.2(d)(3.2.1), and

b. the amount of the emission exceedance(s) over the established malfunction criteria set forth in title 13, CCR sections 1968.2(e) and (f) before a malfunction is detected and the MIL is illuminated.

(iv) If the identified nonconformance(s) is with a non-major monitor the nature and extent of the nonconformance(s), including:

a. the degree to which the in-use monitor performance ratio(s) (where applicable) is below the required ratio(s) specified in title 13, CCR section 1968.2(d)(3.2.1),

b. the degree to which the monitored component must be malfunctioning or exceed the established malfunction criteria set forth in title 13, CCR sections 1968.2(e) and (f) before a malfunction is detected and the MIL is illuminated, and

c. the effect that the nonconformance(s) has on the operation of a major monitor(s).

(v) The impact of the nonconformance on vehicle owners (e.g., cost of future repairs, driveability, etc.) and the ability of the service and repair industry to make effective repairs (e.g., difficulty in accessing fault information, diagnosing the root cause of a failure, etc.).

(vi) The degree to which the identified nonconformance(s) complicates, interferes with, disrupts, or hampers a service technician's ability to follow California I/M testing protocol when performing a California I/M inspection.

(vii) The failure of the data link connector of the motor vehicle class to meet the requirements of title 13, CCR section 1968.2(g)(2).

(viii) The failure of the crankcase ventilation system in a motor vehicle class to comply with the requirements of title 13, CCR sections 1968.2(e)(9) or (f)(10).

(ix) The failure of the cooling system monitor in a motor vehicle class to properly verify that the cooling system reaches the highest enable temperature used for any other monitor when the vehicle is operated in the monitoring conditions disclosed in the manufacturer's certification application, or failure to comply with any requirement in title 13, CCR sections 1968.2(e)(10) or (f)(11).

(x) The estimated frequency that a monitor detects a malfunction and illuminates the MIL when no component malfunction is present (i.e., false MILs).

(xi) The estimated frequency that a monitor fails to detect a malfunction and illuminate the MIL when the monitoring conditions, as set forth in the manufacturer's approved certification application, have been satisfied and a faulty or deteriorated monitored component is present (i.e., false passes).

(xii) Whether the manufacturer submitted false, inaccurate, or incomplete documentation regarding the identified nonconformance at the time of certification pursuant to title 13, CCR section 1968.2(i) and the extent to which the false, inaccurate, or incomplete documentation was material to the granting of certification.

(C) In making the determination, the average tailpipe and evaporative emissions of vehicles within the affected motor vehicle class shall not be considered.

(5) Assessment of Monetary Penalties. The Executive Officer may seek penalties pursuant to the applicable provisions of the Health and Safety Code for violations of the requirements of title 13, CCR section 1968.2 or for production vehicles otherwise failing to be equipped with OBD II systems that have been certified by the ARB. In determining the penalty amounts that the ARB may seek, the Executive Officer shall consider all relevant circumstances including the factors set forth below:

(A) Whether the manufacturer self-reported the nonconformity or the ARB discovered the nonconformity independent of the manufacturer.

(B) The nature and degree of the nonconformity and whether the manufacturer should reasonably have discovered the nonconformity and taken corrective action by voluntary OBD II-related recall or running changes during the production year.

(C) The economic benefits, if any, gained by the manufacturer from not complying with the provisions of title 13, CCR section 1968.2.

(D) The manufacturer's history of compliance with the OBD II requirements.

(E) The preventative efforts taken by the manufacturer to avoid noncompliance, including any programs followed by the manufacturer to ensure compliance.

(F) The manufacturer's efforts to correct the nonconformity once it was identified.

(G) The innovative nature and magnitude of effort, including the cost of any other proposed remedial action, necessary to correct the nonconformity.

(H) The deterrent effect of the penalty.

(I) Whether the manufacturer has failed to provide complete and accurate information required to be submitted at the time of certification pursuant to title 13, CCR section 1968.2(i).

(J) The nature and degree that OBD II systems on production vehicles differ from the systems that have been certified by the ARB.

(6) Notice to Manufacturer for an Ordered Remedial Action.

(A) The Executive Officer shall immediately notify the manufacturer upon the Executive Officer determining the type of remedial action to be taken.

(B) For remedial actions other than the assessment of monetary penalties, the notice must:

(i) specifically set forth the remedial action that is being ordered,

(ii) include a description of the test group(s), OBD II group(s), or subgroup(s) thereof, that has been determined to have a nonconforming OBD II system,

(iii) set forth the factual bases for the determination, and

(iv) designate a date at least 45 days from the date of receipt of such notice by which the manufacturer shall submit a plan, pursuant to section (d)(1) below, outlining the remedial action to be undertaken consistent with the Executive Officer's order. Except as provided in section (c)(7)(C) below, all plans shall be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, California 91731, within the time limit specified in the notice. The Executive Officer may grant the manufacturer an extension of time for good cause.

(C) For cases in which the ARB elects to seek monetary penalties pursuant to authority granted under the Health and Safety Code, the Executive Officer shall issue a notice to the manufacturer that he or she will be filing a complaint in the appropriate administrative or civil court forum seeking penalties against the manufacturer for violations of title 13, CCR section 1968.2. The notice must include a description of the test group(s), OBD II group(s), or subgroup(s) thereof, that have been determined to have a nonconforming OBD II system and set forth the factual bases for the determination.

(7) Availability of Public Hearing to Contest Remedial Actions Other than Determination to Seek Monetary Penalties.

(A) Within 45 days from the date of receipt of the notice that is required under section (c)(6) above, the manufacturer may request a public hearing pursuant to the; procedures set forth in title 17, CCR section 60055.1, et seq., to contest the findings of nonconformity, the necessity for, or the scope of any ordered remedial action. Pursuant to those procedures, the Executive Officer has the initial burden of presenting evidence that those parts of the Executive Officer's determination specifically challenged are supported by the facts and applicable law. (Title 17, CCR section 60055.32(d)(1).) Each issue of controversy shall be decided based upon the preponderance of the evidence presented at the hearing. (Title 17, CCR section 60055.32(h).)

(B) Notwithstanding the provisions of title 17, CCR section 60055.17(a)(1), administrative hearings conducted pursuant to a request filed under section (c)(7)(A) above shall be referred to the Office of Administrative Hearings, which shall otherwise follow the procedures established in title 17, CCR section 60055.1 et seq.

(C) If a manufacturer requests a public hearing pursuant to section (c)(7)(A) above and if the Executive Officer's determination of nonconformity is confirmed at the hearing, the manufacturer shall submit the required remedial action plan in accordance with section (d)(1) below within 30 days after receipt of the Board's decision.

(d) Requirements for Implementing Remedial Actions

(1) Remedial Action Plans.

(A) A manufacturer initiating a remedial action (voluntary, influenced, or ordered), other than payment of monetary penalties, shall develop a remedial action plan that contains the following information, unless otherwise specified:

(i) A description of each test group, OBD II group, or subgroup thereof covered by the remedial action, including the number of vehicles, the engine families, test groups, or subgroups within the identified class(es), the make(s), model(s), and model years of the covered vehicles, and such other information as may be required to identify the covered vehicles.

(ii) A description of the nonconforming OBD II system and, in the case of a recall (whether voluntary, influenced, or ordered), the specific modifications, alterations, repairs, adjustments, or other changes to correct the nonconforming OBD II system, including data and/or engineering evaluation supporting the specific corrections.

(iii) A description of the method that the manufacturer will use to determine the names and addresses of vehicle owners and the manufacturer's method and schedule for notifying the service facilities and vehicle owners of the remedial action.

(iv) A copy of all instructions that the manufacturer will use to notify service facilities about the required remedial action and the specific corrections, if any, that will be required to be made to the nonconforming OBD II systems.

(v) A description of the procedure to be followed by vehicle owners to obtain remedial action for the nonconforming OBD II system. This must include the date, on or after which the owner can have required remedial action performed, the time reasonably necessary to perform the labor to remedy the nonconformity, and the designation of facilities at which the nonconformity can be remedied.

(vi) If some or all of the nonconforming OBD II systems are to be remedied by persons other than dealers or authorized warranty agents of the manufacturer, a description of such class of service agents and what steps, including a copy of all instructions mailed to such service agents, the manufacturer will take to assure that such agents are prepared and equipped to perform the proposed remedial action.

(vii) A copy of the letter of notification to be sent to vehicle owners.

(viii) A proposed schedule for implementing the remedial action, including identified increments of progress towards full implementation.

(ix) A description of the method that the manufacturer will use to assure that an adequate supply of parts will be available to initiate the remedial action campaign on the date set by the manufacturer and that an adequate supply of parts will continue to be available throughout the campaign.

(x) A description and test data of the emission impact, if any, that the proposed remedial action may cause to a representative vehicle from the motor vehicle class to be remedied.

(xi) A description of the impact, if any, and supporting data and/or engineering evaluation, that the proposed remedial

action will have on fuel economy, driveability, performance, and safety of the motor vehicle class covered by the remedial action.

(xii) Any other information, reports, or data which the Executive Officer may reasonably determine to be necessary to evaluate the remedial action plan.

(B) Approval and Implementation of Remedial Action Plans.

(i) If the Executive Officer finds that the remedial action plan is designed effectively to address the required remedial action and complies with the provisions in section (d)(1)(A) above, he or she shall notify the manufacturer in writing within 30 days of receipt of the plan that the plan has been approved.

(ii) The Executive Officer shall approve a voluntary, influenced, or ordered remedial action plan if the plan contains the information specified in section (d)(1)(A) above and is designed to notify the vehicle owner and implement the remedial action in an expeditious manner.

(iii) In disapproving an ordered remedial action plan, the Executive Officer shall notify the manufacturer in writing of the disapproval and the reasons for the determination. The manufacturer shall resubmit a revised remedial action plan that fully addresses the reasons for the Executive Officer's disapproval within 10 days of receipt of the disapproval notice.

(iv) Upon receipt of the approval notice of the ordered remedial action plan from the Executive Officer, the manufacturer shall, within 45 days of receipt of the notice, begin to notify vehicle owners and implement the remedial action campaign.

(v) If the Executive Officer disapproves a voluntary or influenced remedial action plan, the manufacturer shall either accept the proposed modifications to the plan as suggested by the Executive Officer, resubmit a revised remedial action plan that fully addresses the reasons for the Executive Officer's disapproval within 30 days, or be subject to an Executive Officer order that the manufacturer undertake appropriate remedial action pursuant to section (c)(2)(B) above.

(vi) Upon receipt of the voluntary or influenced remedial action approval notice from the Executive Officer, the manufacturer shall begin to notify vehicle owners and implement the remedial action campaign according to the schedule indicated in the remedial action plan.

(2) Eligibility for Remedial Action.

(A) The manufacturer may not condition a vehicle owner's eligibility for remedial action required under section 1968.5 on the proper maintenance or use of the vehicle.

(B) The manufacturer shall not be obligated to repair a component which has been modified or altered such that the remedial action cannot be performed without additional cost.

(3) Notice to Owners.

(A) The manufacturer shall notify owners of vehicles in the motor vehicle class covered by the remedial order. The notice must be made by first-class mail or by such other means as approved by the Executive Officer. When necessary, the Executive Officer may require the use of certified mail for ordered remedial actions to assure effective notification.

(B) The manufacturer shall use all reasonable means necessary to locate vehicle owners, including motor vehicle registration lists available from the California Department of Motor Vehicles and commercial sources such as R.L. Polk & Co.

(C) The notice must contain the following:

(i) For ordered remedial actions, a statement: "The California Air Resources Board has determined that your (vehicle or engine) (is or may be) equipped with an improperly functioning on-board emission-related diagnostic system that violates established standards and regulations that were adopted to protect your health and welfare from the dangers of air pollution."

(ii) For voluntary and influenced remedial actions, a statement: "Your (vehicle or engine) (is or may be) equipped with an improperly functioning on-board emission-related diagnostic system that violates (California or California and Federal) standards and regulations" if applicable as determined by the Executive Officer.

(iii) A statement that the nonconformity of any such vehicles will be remedied at the expense of the manufacturer.

(iv) A statement that eligibility for remedial action may not be denied solely on the basis that the vehicle owner used parts not manufactured by the original equipment vehicle manufacturer, or had repairs performed by outlets other than the vehicle manufacturer's franchised dealers.

(v) Instructions to the vehicle owners on how to obtain remedial action, including instructions on whom to contact (i.e., a description of the facilities where the vehicles should be taken for the remedial action), the first date that a vehicle may be brought in for remedial action, and the time that it will reasonably take to correct the nonconformity.

(vi) The statement: "In order to assure your full protection under the emission warranty provisions, it is recommended that you have your (vehicle or engine) serviced as soon as possible. Failure to do so could be determined as lack of proper maintenance of your (vehicle or engine)."

(vii) A telephone number for vehicle owners to call to report difficulty in obtaining remedial action.

(viii) A card to be used by a vehicle owner in the event the vehicle to be recalled has been sold. Such card should be

addressed to the manufacturer, have postage paid, and shall provide a space in which the owner may indicate the name and address of the person to whom the vehicle was sold or transferred.

(ix) If the remedial action involves recall, the notice must also provide:

a. A clear description of the components that will be affected by the remedial action and a general statement of the measures to be taken to correct the nonconformity.

b. A statement that such nonconformity, if not corrected, may cause the vehicle to fail an emission inspection or I/M smog check test.

c. A statement describing the adverse effects, if any, of an uncorrected nonconforming OBD II system on the performance, fuel economy, or durability of the vehicle.

d. A statement that after remedial action has been taken, the manufacturer will have the service facility issue a certificate showing that a vehicle has been corrected under the recall program, and that such a certificate will be required to be provided to the Department of Motor Vehicles as a condition for vehicle registration.

(D) A notice sent pursuant to this section or any other communication sent to vehicle owners or dealers may not contain any statement, expressed or implied, that the OBD II system is compliant or that the OBD II system will not degrade air quality.

(E) The Executive Officer shall inform the manufacturer of any other requirements pertaining to the notification under section (d)(3) which the Executive Officer has determined as reasonable and necessary to assure the effectiveness of the recall campaign.

(4) Label Indicating that Recall Repairs Have Been Performed.

(A) If the required remedial action involves recall of a test group(s), OBD II group(s), or subgroup(s) thereof, the manufacturer shall require those who perform inspections and/or recall repairs to affix a label to each vehicle that has been inspected and/or repaired.

(B) The label must be placed in a location approved by the Executive Officer and must be fabricated of a material suitable for such location in which it is installed and which is not readily removable.

(C) The label must contain the remedial action campaign number and a code designating the facility at which the remedial action or inspection to determine the need for remedial action was performed.

(5) Proof of Performance of Remedial Action Certificate. If the required remedial action involves a recall, the manufacturer shall provide, through its service agents, to owners of vehicles that have had the remedial action performed a certificate that confirms that the vehicle has been recalled and that required inspection and/or repairs have been performed. The certificate must be in a format prescribed by the Executive Officer, however, the Executive Officer may not require a format different in any way from the format of the certificate required in title 13, CCR sections 2117 and 2129.

(6) Record Keeping and Reporting Requirements.

(A) The manufacturer shall maintain sufficient records to enable the Executive Officer to conduct an analysis of the adequacy of the remedial action.

(B) Unless otherwise specified by the Executive Officer, the manufacturer shall report on the progress of the remedial action campaign by submitting reports for eight consecutive quarters commencing with the quarter immediately after the recall campaign begins. The reports shall be submitted no later than 25 days after the close of each calendar quarter to: Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, California 91731. For each recall campaign, the quarterly report must contain the following:

(i) The test group and the remedial action campaign number designated by the manufacturer and a brief description of the nature of the campaign.

(ii) The date owner notifications began and date completed.

(iii) The number of vehicles involved in the remedial action campaign.

(iv) The number of vehicles known or estimated to be equipped with the nonconforming OBD II system and an explanation of the means by which this number was determined.

(v) The number of vehicles inspected during the campaign since its inception.

(vi) The number of vehicles found to be affected by the nonconformity during the campaign since its inception.

(vii) The number of vehicles receiving remedial action during the campaign since its inception.

(viii) The number of vehicles determined to be unavailable for inspection or remedial action, during the campaign since its inception, due to exportation, theft, scrapping, or other reasons (specify).

(ix) The number of vehicles, during the campaign since its inception, determined to be ineligible for remedial action under section (d)(2)(B).

(x) An initial list, using the following data elements and designated positions, indicating all vehicles subject to recall that

the manufacturer has not been invoiced for, or a subsequent list indicating all vehicles subject to the recall that the manufacturer has been invoiced for since the previous report. The list must be supplied in a standardized computer format to be specified by the Executive Officer. The data elements must be written in "ASCII" code without a comma separating each element. For example: XTY32A71234E-9456123408-25-91A. The add flag (see below) should reflect the vehicles for which the manufacturer has not been invoiced and the delete flag should reflect changes since the previous report. The Executive Officer may change the frequency of this submittal depending on the needs of enforcement. The Executive Officer may not, however, require a frequency or format for this submittal that is different in any way from the frequency or format determined by the Executive Officer as required for reporting of data in title 13, CCR sections 2119(a)(10) and 2133(a)(10).

Data Elements	**Positions**
File Code (designated by DMV)	1
License Plate Number	2-8
Last three VIN positions	9-11
Recall ID Number	12-17
Mfg. ID Number	18-22
(Mfg. Occupational License Number)	
Recall Start Date (mmddyyyy)	23-30
Add or Delete Flag (A/D)	31
Complete VIN if personalized license plate	32-48
(File Code "L" or "S")	

(xi) A copy of any service bulletins issued during the reporting period by the manufacturer to franchised dealerships or other service agents that relate to the nonconforming OBD II system and the remedial action and have not previously been reported to the Executive Officer.

(xii) A copy of all communications transmitted to vehicle owners that relate to the nonconforming OBD II systems and the required remedial action and have not been previously reported to the Executive Officer.

(C) If the manufacturer determines that any of the information submitted to the Executive Officer pursuant to section (d) has changed or is incorrect, the manufacturer shall submit the revised information, with an explanation.

(D) The manufacturer shall maintain in a form suitable for inspection, such as computer information, storage devices, or card files, and shall make available to the Executive Officer or his or her authorized representative upon request, the names and addresses of vehicle owners:

(i) To whom notification was sent;

(ii) Whose vehicles were repaired or inspected under the recall campaign;

(iii) Whose vehicles were determined not to be eligible for remedial action because the vehicles were modified, altered, or unavailable due to exportation, theft, scrapping, or other reason specified in the answer to sections (d)(6)(B)(viii) and (ix).

(E) The information gathered by the manufacturer to compile the reports required by these procedures must be retained for no less than one year beyond the useful life of the vehicles and must be made available to authorized personnel of the ARB upon request.

(F) The filing of any report under the provisions of these procedures must not affect the manufacturer's responsibility to file reports or applications, obtain approval, or give notice under any other provisions of law.

(7) Extension of Time.

Upon request of the manufacturer, the Executive Officer may extend any deadline set forth in section 1968.5(d) upon finding that the manufacturer has demonstrated good cause for the requested extension.

(e) Penalties for Failing to Comply with the Requirements of Section (d).

(1) In addition to the penalties that may be assessed by the Executive Officer pursuant to section (c) because of a manufacturer's failure to comply with the requirements of title 13, CCR section 1968.2, a manufacturer may be subject to penalties pursuant to section 43016, Health and Safety Code for failing to comply with the requirements of section (d).

(2) If a manufacturer fails to comply with a voluntary or influenced remedial action plan, the Executive Officer may order remedial action pursuant to section (c) above.

13 C.C.R. § 1976. Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions

(a) Fuel evaporative emissions from 1970 through 1977 model passenger cars and light-duty trucks are set forth in Title 40, Code of Federal Regulations, Part 86, Subparts A and C, as it existed on June 20, 1973. These standards are enforced in

California pursuant to section 43008 of the Health and Safety Code.

(b)(1) Evaporative emissions for 1978 and subsequent model gasoline-fueled, 1983 and subsequent model liquefied petroleum gas-fueled, and 1993 and subsequent model alcohol-fueled motor vehicles and hybrid electric vehicles subject to exhaust emission standards under this article, except petroleum-fueled diesel vehicles, compressed natural gas-fueled vehicles, hybrid electric vehicles that have sealed fuel systems which can be demonstrated to have no evaporative emissions, and motorcycles, shall not exceed the following standards.

(A) For vehicles identified below, tested in accordance with the test procedure based on the Sealed Housing for Evaporative Determination as set forth in Title 40, Code of Federal Regulations, sections 86.130-78 through 86.143-90 as they existed July 1, 1989, the evaporative emission standards are:

Vehicle Type	**Model Year**	**Hydrocarbons n1 Diurnal + Hot Soak (grams/test) 50K miles**
Passenger cars	1978 and 1979	6.0
Light-duty trucks		6.0
Medium-duty vehicles		6.0
Heavy-duty vehicles		6.0
Passenger cars	1980-1994 n2	2.0
Light-duty trucks		2.0
Medium-duty vehicles		2.0
Heavy-duty vehicles		2.0

n1 Organic Material Hydrocarbon Equivalent, for alcohol-fueled vehicles.

n2 Other than hybrid electric vehicles.

(B) For the vehicles identified below, tested in accordance with the test procedure which includes the running loss test, the hot soak test, and the 72 hour diurnal test, the evaporative emission standards are:

Vehicle Type	**Model Year**	**Hydrocarbons n1 Three-Day Diurnal + Hot Soak (grams/test) Useful Life n2**	**Running Loss (grams/mile) Useful Life n2**
Passenger cars	1995 through	2.0	0.05
Light-duty trucks	2005 n3	2.0	0.05
Medium-duty vehicles (6,001-8,500 lbs. GVWR)			
with fuel tanks < 30 gallons		2.0	0.05
with fuel tanks >/= 30 gallons		2.5	0.05
(8,501-14,000 lbs. GVWR) n4		3.0	0.05
Heavy-duty vehicles (over 14,000 lbs. GVWR)		2.0	0.05
Hybrid electric passenger cars	1993 through 2005 n5	2.0	0.05
Hybrid electric light-duty trucks		2.0	0.05
Hybrid electric medium-duty vehicles		2.0	0.05

n1 Organic Material Hydrocarbon Equivalent, for alcohol-fueled vehicles.

n2 For purposes of this paragraph, "useful life" shall have the same meaning as provided in section 2112, Title 13, California Code of Regulations. Approval of vehicles which are not exhaust emission tested using a chassis dynamometer pursuant to section 1960.1 or 1961, Title 13, California Code of Regulations shall be based on an engineering evaluation of the system and data submitted by the applicant.

n3 The running loss and useful life three-day diurnal plus hot soak evaporative emission standards (hereinafter "running loss and useful life standards") shall be phased in beginning with the 1995 model year. Each manufacturer, except ultra-small volume and small volume manufacturers, shall certify the specified percent (a) of passenger cars and (b) of light-duty trucks, medium-duty vehicles and heavy-duty vehicles to the running loss and useful life standards according to the following schedule:

Model Year	**Minimum Percentage of Vehicles Certified to Running Loss and Useful Life Standards***
1995	10 percent
1996	30 percent
1997	50 percent

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*The minimum percentage of motor vehicles of each vehicle type required to be certified to the running loss and useful life standards shall be based on the manufacturer's projected California model-year sales (a) of passenger cars and (b) of light-duty trucks, medium-duty vehicles and heavy-duty vehicles. Optionally, the percentage of motor vehicles can also be based on the manufacturer's projected California model-year sales (a) of passenger cars and light-duty trucks and (b) of medium-duty vehicles and heavy-duty vehicles.

Beginning with the 1998 model year, all motor vehicles subject to the running loss and useful life standards, except those produced by ultra-small volume manufacturers, shall be certified to the specified standards. In the 1999 through 2005 model years, all motor vehicles subject to the running loss and useful life standards, including those produced by ultra-small volume manufacturers, shall be certified to the specified standards.

All 1995 through 1998 model-year motor vehicles which are not subject to running loss and useful life standards pursuant to the phase-in schedule shall comply with the 50,000-mile standards in effect for 1980 through 1994 model-year vehicles.

n4 For the 1995 model year only, the evaporative emission standards for complete vehicles in this weight range shall be 2.0 grams/test and compliance with the evaporative emission standards shall be based on the SHED conducted in accordance with the procedures set forth in Title 40, Code of Federal Regulations, sections 86.130-78 through 86.143-90 as they existed July 1, 1989. For the 1995 through 2005 model years, the evaporative emission standards for incomplete vehicles in this weight range shall be 2.0 grams/test and compliance with the evaporative emission standards shall be based on the test procedures specified in paragraph 4.g. of the "California Evaporative Emission Standards and Test Procedures for 1978 and Subsequent Model Motor Vehicles."

n5 The running loss and useful life standards for all hybrid electric vehicles shall be effective beginning in the 1993 model year.

(C) For vehicles identified below, tested in accordance with the test procedure which includes the hot soak test and the 48 hour diurnal test, the evaporative emission standards are:

Vehicle Type	**Model Year**	**Hydrocarbons n1 Two-Day Diurnal + Hot Soak (grams/test) Useful Life n2**
Passenger cars	1996 through	2.5
Light-duty trucks	2005 n3	2.5
Medium-duty vehicles (6.001 - 8,500 lbs. GVWR)		
with fuel tanks < 30 gallons		2.5
with fuel tanks >/= 30 gallons		3.0
(8,501 - 14,000 lbs. GVWR)		3.5
Heavy-duty vehicles (over 14,000 lbs. GVWR)		4.5
Hybrid electric passenger cars	1996 through	2.5
Hybrid electric light-duty trucks	2005 n3	2.5

Hybrid electric medium-duty vehicles	2.5

n1 Organic Material Hydrocarbon Equivalent for alcohol-fueled vehicles.

n2 For purposes of this paragraph, "useful life" shall have the same meaning as provided in section 2112, Title 13, California Code of Regulations. Approval of vehicles which are not exhaust emission tested using a chassis dynamometer pursuant to section 1960.1 or 1961, Title 13, California Code of Regulations shall be based on an engineering evaluation of the system and data submitted by the applicant.

n3 The two-day diurnal plus hot soak evaporative emission standards (hereinafter "supplemental standards") shall be phased-in beginning with the 1996 model year. Those vehicles certified under the running loss and useful life standards for the 1996 through 2005 model years must also be certified under the supplemental standards.

(D) Zero-emission vehicles shall produce zero fuel evaporative emissions under any and all possible operational modes and conditions.

(E) The optional zero-fuel evaporative emission standards for the three-day and two-day diurnal-plus-hot-soak tests are 0.35 grams per test for passenger cars, 0.50 grams per test for light-duty trucks 6,000 lbs. GVWR and under, and 0.75 grams per test for light-duty trucks from 6,001 to 8,500 lbs. GVWR, to account for vehicle non-fuel evaporative emissions (resulting from paints, upholstery, tires, and other vehicle sources). Vehicles demonstrating compliance with these evaporative emission standards shall also have zero (0.0) grams of fuel evaporative emissions per test for the three-day and two-day diurnal-plus-hot-soak tests. The "useful life" shall be 15 years or 150,000 miles, whichever occurs first. In lieu of demonstrating compliance with the zero (0.0) grams of fuel evaporative emissions per test over the three-day and two-day diurnal-plus-hot-soak tests, the manufacturer may submit for advance Executive Officer approval a test plan to demonstrate that the vehicle has zero (0.0) grams of fuel evaporative emissions throughout its useful life.

Additionally, in the case of a SULEV vehicle for which a manufacturer is seeking a partial ZEV credit, the manufacturer may prior to certification elect to have measured fuel evaporative emissions reduced by a specified value in all certification and in-use testing of the vehicle as long as measured mass exhaust emissions of NMOG for the vehicle are increased in all certification and in-use testing. The measured fuel evaporative emissions shall be reduced in increments of 0.1 gram per test, and the measured mass exhaust emissions of NMOG from the vehicle shall be increased by a gram per mile factor, to be determined by the Executive Officer, for every 0.1 gram per test by which the measured fuel evaporative emissions are reduced. For the purpose of this calculation, the evaporative emissions shall be measured, in grams per test, to a minimum of three significant figures.

(F) For the 2004 and subsequent model motor vehicles identified below, tested in accordance with the test procedures described in Title 40, Code of Federal Regulations, sections 86.130-78 through 86.143-90 as they existed July 1, 1989 and as modified by the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles" incorporated by reference in section 1976(c), the evaporative emission standards are:

Vehicle Type	**Running Loss (grams per mile)**	**Hydrocarbon n1 Standards n2 n3 n4**	
		Three Day Diurnal + Hot Soak (grams per test)	**Two-Day Diurnal + Hot Soak (grams per test)**
Passenger cars	0.05	0.50	0.65
Light-duty trucks (under 8,501 lbs. GVWR)			
6,000 lbs. GVWR and under	0.05	0.65	0.85
6,001 - 8,500 lbs. GVWR	0.05	0.90	1.15
Medium-duty vehicles (8,501 - 14,000 lbs. GVWR)	0.05	1.00	1.25
Heavy-duty vehicles (over 14,000 lbs. GVWR)	0.05	1.00	1.25

n1 Organic Material Hydrocarbon Equivalent for alcohol-fueled vehicles.

n2 For all vehicles certified to these standards, the "useful life" shall be 15 years or 150,000 miles, whichever first occurs. Approval of vehicles which are not exhaust emission tested using a chassis dynamometer pursuant to section 1960.1 or 1961, title 13, California Code of Regulations shall be based on an engineering evaluation of the system and data submitted by the applicant.

n3 (a) These evaporative emission standards shall be phased-in beginning with the 2004 model year. Each manufacturer, except small volume manufacturers, shall certify at a minimum the specified percentage of its vehicle fleet to the evaporative emission standards in this table or the optional zero-evaporative emission standards in section 1976(b)(1)(E) according to the schedule set forth below. For purposes of this paragraph (a), each manufacturer's vehicle fleet consists of the total projected California sales of the manufacturer's gasoline-fueled, liquefied petroleum-fueled and alcohol-fueled passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles.

Model Year	**Minimum Percentage of Vehicles Certified to the Standards in 1976(b)(1)(F) and (b)(1)(E)**
2004	40
2005	80
2006 and subsequent	100

A small volume manufacturer shall certify 100 percent of its 2006 and subsequent model vehicle fleet to the evaporative emission standards in the table or the optional zero-evaporative emission standards in section 1976(b)(1)(E).

All 2004 through 2005 model-year motor vehicles which are not subject to these standards or the standards in section 1976(b)(1)(E) pursuant to the phase-in schedule shall comply with the requirements of sections 1976(b)(1)(B) and (C).

(b) A manufacturer may use an "Alternative or Equivalent Phase-in Schedule" to comply with the phase-in requirements. An "Alternative Phase-in" is one that achieves at least equivalent emission reductions by the end of the last model year of the scheduled phase-in. Model-year emission reductions shall be calculated by multiplying the percent of vehicles (based on the manufacturer's projected California sales volume of the applicable vehicle fleet) meeting the new requirements per model year by the number of model years implemented prior to and including the last model year of the scheduled phase-in. The "cumulative total" is the summation of the model-year emission reductions (e.g., the three model-year 40/80/100 percent phase-in schedule would be calculated as: (40%*3 years) + (80%*2 years) + (100%*1 year) =380). The required cumulative total for the phase-in of these standards is 380 emission reductions. Any alternative phase-in that results in an equal or larger cumulative total than the required cumulative total by the end of the last model year of the scheduled phase-in shall be considered acceptable by the Executive Officer only if all vehicles subject to the phase-in comply with the respective requirements in the last model year of the required phase-in schedule. A manufacturer shall be allowed to include vehicles introduced before the first model year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as: (10%*4 years)=40) and added to the cumulative total.

(c) These evaporative emission standards do not apply to zero-emission vehicles.

4 In-use compliance whole vehicle testing shall not begin until the motor vehicle is at least one year from the production; date and has accumulated a minimum of 10,000 miles. For vehicles introduced prior to the 2007 model year, in-use compliance standards of 1.75 times the "Three-Day Diurnal + Hot-Soak" and "Two-Day Diurnal + Hot-Soak" gram per test standards shall apply for only the first three model years of an evaporative family certified to a new standard.

(b)(2) Evaporative emissions for gasoline-fueled motorcycles subject to exhaust emission standards under this article shall not exceed:

Motorcycle Class	**Model Year**	**Hydrocarbons (grams per test)**
Class I and II (50-279cc)	1983 and 1984	6.0
	1985 and subsequent	2.0
Class III (280cc and larger)	1984 and 1985	6.0
	1986 and subsequent	2.0

Class III (280cc and larger)

(Optional Standard for Small-Volume Motorcycle Manufacturers)	1986-1988	6.0

(c) The test procedures for determining compliance with the standards in subsection (b) above applicable to 1978 through 2000 model year vehicles are set forth in "California Evaporative Emission Standards and Test Procedures for 1978-2000 Model Motor Vehicles," adopted by the state board on April 16, 1975, as last amended August 5, 1999, which is incorporated herein by reference. The test procedures for determining compliance with standards applicable to 2001 and subsequent model year vehicles are set forth in the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted by the state board on August 5, 1999, and as last amended October 17, 2007, which is incorporated herein by reference.

(d) Motorcycle engine families certified to 0.2 grams per test or more below the applicable standards shall be exempted from the state board's "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks" pursuant to section 2235, Title 13, California Code of Regulations.

(e) Small volume motorcycle manufacturers electing to certify 1986, 1987, or 1988 model-year Class III motorcycles in accordance with the optional 6.0 grams per test evaporative emission standard shall submit, with the certification application, a list of the motorcycle models for which it intends to seek California certification and estimated sales data for such models. In addition, each such manufacturer shall, on or before July 1 of each year in which it certifies motorcycles under the optional standard, submit a report describing its efforts and progress toward meeting the more stringent evaporative emission standards. The report shall also contain a description of the manufacturer's current hydrocarbon evaporative emission control development status, along with supporting test data, and shall summarize future planned development work.

(f)(1) For purposes of this section, "small volume motorcycle manufacturer" means a manufacturer which sells less than 5,000 new motorcycles per year in California.

(2) For the purposes of this section, "ultra-small volume manufacturer" means any vehicle manufacturer with California sales less than or equal to 300 new vehicles per model year based on the average number of vehicles sold by the manufacturer in the previous three consecutive model years, and "small volume manufacturer" means, for 1978 through 2000 model years, any vehicle manufacturer with California sales less than or equal to 3000 new vehicles per model year based on the average number of vehicles sold by the manufacturer in the previous three consecutive model years. For 2001 and subsequent model motor vehicles, "small volume manufacturer" has the meaning set forth in section 1900(a).

13 C.C.R. § 1978. Standards and Test Procedures for Vehicle Refueling Emissions

(a)(1) Vehicle refueling emissions for 1998 and subsequent model gasoline-fueled, alcohol-fueled, diesel-fueled, liquefied petroleum gas-fueled, fuel-flexible, and hybrid electric passenger cars, light-duty trucks, and medium-duty vehicles with a gross vehicle weight rating less than 8501 pounds, shall not exceed the following standards. Natural gas-fueled vehicles are exempt from meeting these refueling standards, but the refueling receptacles on natural gas-fueled vehicles must comply with the receptacle provisions of the American National Standards Institute/American Gas Association Standard for Compressed Natural Gas Vehicle Fueling Connection Devices, ANSI/AGA NGV1 standard-1994, which is incorporated herein by reference. The standards apply equally to certification and in-use vehicles.

Hydrocarbons (for gasoline-fueled, diesel-fueled, and hybrid electric vehicles): 0.20 grams per gallon of fuel dispensed.

Organic Material Hydrocarbon Equivalent (for alcohol-fueled, fuel-flexible, and hybrid electric vehicles): 0.20 grams per gallon of fuel dispensed.

Hydrocarbons (for liquefied petroleum gas-fueled vehicles): 0.15 gram per gallon of fuel dispensed.

(2) Vehicles powered by diesel fuel are not required to conduct testing to demonstrate compliance with the refueling emission standards set forth above, provided that all of the following provisions are met:

(A) The manufacturer can attest to the following evaluation: "Due to the low vapor pressure of diesel fuel and the vehicle tank temperatures, hydrocarbon vapor concentrations are low and the vehicle meets the 0.20 grams/gallon refueling emission standard without a control system."

(B) The certification requirement described in paragraph (A) is provided in writing and applies for the full useful life of the vehicle, as defined in section 2112.

In addition to the above provisions, the ARB reserves the authority to require testing to enforce compliance and to prevent noncompliance with the refueling emission standard.

Vehicles certified to the refueling emission standard under this provision shall not be counted in the phase-in sales percentage compliance determinations.

(3) The manufacturer shall adhere to the following phase-in schedule, as determined by projected vehicle sales throughout

the United States, with the exception of small volume manufacturers.

ORVR Model Year Phase-In Schedule

Class of Vehicle	40% Fleet	80% Fleet	100% Fleet
Passenger Cars	1998	1999	2000
Light-Duty Trucks 0-6,000 lbs. GVWR	2001	2002	2003
Light-Duty Trucks/ Medium-Duty Vehicles (6,001-8,500 lbs. GVWR)	2004	2005	2006

(A) Prior to the 2001 model year, small volume manufacturers are defined for purposes of this section as any vehicle manufacturer with California actual sales less than or equal to 3000 new vehicles per model year based on the average number of vehicles sold by the manufacturer in the previous three consecutive years.

(B) Small volume manufacturers of passenger cars, as defined in subsection (a)(3)(A), are exempt from the implementation schedule in subsection (a)(3) for model year 1998 and 1999. For small volume manufacturers of passenger cars, the standards of subsection (a)(1), and the associated test procedures, shall not apply until model year 2000, when 100 percent compliance with the standards of this section is required. Small volume manufacturers of light-duty trucks and medium-duty vehicles are not exempt from the implementation schedule in subsection (a)(3).

(b) The test procedures for determining compliance with standards applicable to 1998 through 2000 gasoline, alcohol, diesel, and hybrid electric passenger cars, light-duty trucks, and medium-duty vehicles are set forth in the "California Refueling Emission Standards and Test Procedures for 1998-2000 Model Year Motor Vehicles," as amended August 5, 1999, which is incorporated herein by reference. The test procedures for determining compliance with standards applicable to 2001 and subsequent gasoline, alcohol, diesel, and hybrid electric passenger cars, light-duty trucks, and medium-duty vehicles are set forth in the "California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," adopted August 5, 1999, and last amended October 17, 2007, which is incorporated herein by reference.

13 C.C.R. § 2035. Purpose, Applicability, and Definitions

(a) Purpose.

The purpose of this article is to interpret and make specific the statutory emissions warranty set forth in Health and Safety Code sections 43205, and 43205.5 by clarifying the rights and responsibilities of individual motor vehicle and motor vehicle engine owners, motor vehicle and motor vehicle engine manufacturers, and the service industry.

(b) Applicability.

This article shall apply to:

(1) California-certified 1979 and subsequent model motorcycles, passenger cars, light-duty trucks, medium-duty vehicles, and heavy-duty vehicles, registered in California, regardless of their original point of registration; and

(2) California certified motor vehicle engines used in such vehicles.

(c) Definitions.

For the purposes of this article, the following definitions shall apply:

(1) "Warrantable condition" means any condition of a vehicle or engine which triggers the responsibility of the manufacturer to take corrective action pursuant to sections 2036, 2037, or 2038.

(2) "Warranted Part" means:

(A) in the case of 1979 through 1989 model year passenger cars, light-duty trucks, and medium-duty vehicles, 1979 and later model year motorcycles and heavy-duty vehicles, and 1990 and subsequent model year passenger cars, light-duty trucks, and medium duty vehicles produced before January 24, 1991, any emission-related part installed on a motor vehicle or motor vehicle engine by the vehicle or engine manufacturer, or installed in a warranty repair, which is included on the "Emissions Warranty Parts List" required by section 2036(f) and approved for the vehicle or engine by the Executive Officer; and

(B) in the case of 1990 and subsequent model year passenger cars, light-duty trucks, and medium-duty vehicles other than those identified in subparagraph (A) of this definition, any part installed on a motor vehicle or motor vehicle engine by the vehicle or engine manufacturer, or installed in a warranty repair, which affects any regulated emission from a motor vehicle or engine which is subject to California emission standards.

(3) "Warranty period" means the period of time and mileage that the vehicle, engine, or part are covered by the warranty provisions.

(4) "Warranty station" means a service facility authorized by the vehicle or engine manufacturer to perform warranty repairs. This shall include all of the manufacturer's dealerships which are franchised to service the subject vehicles or engines.

(5) "Vehicle or engine manufacturer" means the manufacturer granted certification for a motor vehicle or motor vehicle engine. In the case of motor vehicles for which certification of the exhaust and evaporative emissions control systems is granted to different manufacturers, the warranty responsibility shall be assigned accordingly.

13 C.C.R. § 2037. Defects Warranty Requirements for 1990 and Subsequent Model Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles, and Motor Vehicle Engines Used in Such Vehicles

(a) Applicability.

This section shall apply to 1990 and subsequent model passenger cars, light-duty trucks, medium-duty vehicles, and motor vehicle engines used in such vehicles. The warranty period shall begin on the date the vehicle is delivered to an ultimate purchaser, or if the vehicle is first placed in service as a "demonstrator" or "company" car prior to delivery, on the date it is first placed in service.

(b) General Emissions Warranty Coverage.

The manufacturer of each motor vehicle or motor vehicle engine shall warrant to the ultimate purchaser and each subsequent purchaser that the vehicle or engine is:

(1) Designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board pursuant to its authority in chapters 1 and 2, part 5, division 26 of the Health and Safety Code; and

(2) Free from defects in materials and workmanship which cause the failure of a warranted part to be identical in all material respects to the part as described in the vehicle or engine manufacturer's application for certification, including any defect in materials or workmanship which would cause the vehicle's on-board diagnostic malfunction indicator light to illuminate, for a period of three years or 50,000 miles, whichever first occurs; and

(3) Free from defects in materials and workmanship which cause the failure of a warranted part described in section (c) below for seven years or 70,000 miles, whichever first occurs.

(c) "High-Priced" Warranted Parts.

(1) Each manufacturer shall identify in its application for certification the "high-priced" warranted parts which are:

(A) For 1990 through 2007 model year vehicles: [i] included on the Board's "Emissions Warranty Parts List" as last amended February 22, 1985, incorporated herein by reference, and; [ii] have an individual replacement cost at the time of certification exceeding the cost limit defined in section (c)(3);

(B) For 2008 and subsequent model year vehicles: [i] subject to coverage as a warranted part in section (b)(2) above, and; [ii] have an individual replacement cost at the time of certification exceeding the cost limit defined in section (c)(3).

(2) The replacement cost shall be the retail cost to a vehicle owner and include the cost of the part, labor, and standard diagnosis. The costs shall be those of the highest-cost metropolitan area of California.

(3) The cost limit shall be calculated using the following equation:

Cost limit[eta] = $ 300 x (CPI[[eta]-2] / 118.3)
where:
Cost limit[eta] is the cost limit for the applicable model year of the vehicle rounded to the nearest ten dollars.
[eta] is the model year of the new vehicles.
[eta]-2 is the calendar year two years prior to the model year of the new vehicles.
CPI is the annual average nationwide urban consumer price index published by the United States Bureau of Labor Statistics.

(4) The cost limit shall be revised annually by the Executive Officer. The highest-cost metropolitan area in California shall be identified by the Executive Officer for use in this section. If a manufacturer seeks certification of a vehicle before the applicable annual average CPI is available, the cost limit shall be calculated using the average of the monthly nationwide urban CPI figures for the most recent twelve month period for which figures have been published by the United States Bureau of Labor Statistics.

(5) Each manufacturer shall submit to the Executive Officer the documentation used to identify the "high-priced" warranted parts required in this section. The documentation shall include the estimated retail parts costs, labor rates in dollars per hour, and the labor hours necessary to diagnose and replace the parts. The documentation is not required for vehicles certified

before January 24, 1991.

(6) The Executive Officer may reject or require modification of the manufacturer's list of "high-priced" warranted parts to ensure that such list includes all emission-related parts whose replacement cost exceeds the cost limit defined in section (c)(3)

(d) Subject to the conditions and exclusions of section (i), the warranty on emission-related parts shall be interpreted as follows:

(1) Any warranted part which is not scheduled for replacement as required maintenance in the written instructions required by section (e) shall be warranted for the applicable warranty period defined in section (b)(2) or (3). If any such part fails during the period of warranty coverage, it shall be repaired or replaced by the vehicle or engine manufacturer according to section (d)(4) below. Any such part repaired or replaced under the warranty shall be warranted for the remaining warranty period.

(2) Any warranted part which is scheduled only for regular inspection in the written instructions required by section (e) shall be warranted for the applicable warranty period defined in section (b)(2) or (3). A statement in such written instructions to the effect of "repair or replace as necessary" shall not reduce the period of warranty coverage. Any such part required or replaced under warranty shall be warranted for the remaining warranty period.

(3) Any warranted part which is scheduled for replacement as required maintenance in the written instructions required by section (e) shall be warranted for the period of time or mileage, whichever first occurs, prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by the vehicle or engine manufacturer according to section (d)(4) below. Any such part required or replaced under warranty shall be warranted for the remainder of the period prior to the first scheduled replacement point for the part.

(4) Repair or replacement of any warranted part under the warranty provisions of this article shall be performed at no charge to the vehicle or engine owner at a warranty station, except in the case of an emergency when a warranted part or a warranty station is not reasonably available to the vehicle or engine owner. In an emergency, repairs may be performed at any available service establishment, or by the owner, using any replacement part. The manufacturer shall reimburse the owner for his or her expenses including diagnostic charges for such emergency repair or replacement, not to exceed the manufacturer's suggested retail price for all warranted parts replaced and labor charges based on the manufacturer's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate. A vehicle or engine owner may reasonably be required to keep receipts and failed parts in order to receive compensation for warranted repairs reimbursable due to an emergency, provided the manufacturer's written instructions required by section (e) advise the owner of this obligation.

(5) Notwithstanding the provisions of subsection (d)(4) above, warranty services or repairs shall be provided at all of a manufacturer's dealerships which are franchised to service the subject vehicles or engines.

(6) The vehicle or engine owner shall not be charged for diagnostic labor which leads to the determination that a warranted part is defective, provided that such diagnostic work is performed at a warranty station.

(7) The vehicle or engine manufacturer shall be liable for damages to other vehicle components proximately caused by a failure under warranty of any warranted part.

(8) Throughout the vehicle or engine's warranty period defined in section (b)(2) and (b)(3), the vehicle or engine manufacturer shall maintain a supply of warranted parts sufficient to meet the expected demand for such parts. The lack of availability of such parts or the incompleteness of repairs within a reasonable time period, not to exceed 30 days from the time the vehicle or engine is initially presented to the warranty station for repair, shall constitute an emergency for purposes of section (d)(4) above.

(9) Any replacement part may be used in the performance of any maintenance or repairs. Any replacement part designated by a manufacturer may be used in warranty repairs provided without charge to the vehicle owner. Such use shall not reduce the warranty obligations of the vehicle or engine manufacturer, except that the vehicle or engine manufacturer shall not be liable under this article for repair or replacement of any replacement part which is not a warranted part (except as provided under section (d)(7) above).

(10) Any add-on or modified part exempted by the Air Resources Board from the prohibitions of Vehicle Code section 27156 may be used on a vehicle or engine. Such use, in and of itself, shall not be grounds for disallowing a warranty claim made in accordance with this article. The vehicle or engine manufacturer shall not be liable under this article to warrant failures of warranted parts caused by the use of such an add-on or modified part.

(11) The Executive Officer may request and, in such case, the vehicle or engine manufacture shall provide, any documents which describe the manufacturer's warranty procedures or policies.

(e) Each manufacturer shall furnish with each new vehicle or engine, written instructions for the maintenance and use of the vehicle or engine by the owner, and the instructions shall be consistent with this article and applicable regulations in article 2 of this subchapter.

(f) Each manufacturer shall furnish with each new vehicle or engine a list of the "high-priced" warranted parts established by section (c).

(g) Prior to the 2001 model year, each manufacturer shall submit the documents required by sections (c)(5), (e), and (f) with the manufacturer's preliminary application for new vehicle or engine certification for approval by the Executive Officer. For 2001 and subsequent model years, each manufacturer shall submit the documents required by section (c)(5), (e), and (f) with the Part 2 Application for Certification pursuant to the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in title 13, CCR section 1961(d). The Executive Officer may reject or require modification of any of the documents required by sections (c), (e), and (f) for, among other reasons, incompleteness and lack of clarity. Approval by the Executive Officer of the documents required by sections (c), (e), and (f) shall be a condition of certification. The Executive Officer shall approve or disapprove the documents required by sections (c), (e), and (f) within 90 days of the date such documents are received from the manufacturer. Any disapproval shall be accompanied by a statement of the reasons thereof. In the event of disapproval, the manufacturer may petition the Board to review the decision of the Executive Officer.

(h) Vehicle Inspection Program.

(1) This section applies to 1990 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles which fail to pass a smog check inspection pursuant to Health and Safety Code section 44012 after the warranty period of three years or 50,000 miles, whichever occurs first, has expired, but before the warranty period of seven years or 70,000 miles, whichever occurs first, has expired. The provisions of this section shall be contained in the warranty statement required pursuant to title 13, CCR section 2039.

(2) The owner of a vehicle which fails an inspection during the period described in section (h)(1) may choose to have the vehicle repaired at a warranty station.

(A) If the warranty station identifies that the inspection failure was caused by the failure or malfunction of a "high-priced" part defined in section (c), then the vehicle manufacturer shall be liable for expenses involved in detecting and correcting the part failure or malfunction, unless the warranty station demonstrates that the part failure or malfunction was caused by abuse, neglect, or improper maintenance as specified in section (i).

(B) If the warranty station demonstrates that the inspection failure was caused by one or more conditions excluded from warranty coverage pursuant to section (i), the vehicle owner shall be liable for all diagnostic and repair expenses. Such expenses shall not exceed the maximum repair costs permissible under the inspection program.

(C) If the warranty station determines that the inspection failure was caused by one or more defects covered under warranty pursuant to these regulations and in combination with one or more conditions excluded from warranty coverage pursuant to section (i), then the vehicle owner shall not be charged for the diagnostic and repair costs related to detecting and repairing the warrantable defects.

(3) In the alternative, the owner of a vehicle which fails the inspection may choose to have the vehicle repaired at other than a warranty station. If a warrantable defect is found, the vehicle owner may deliver the vehicle to a warranty station and have the defect corrected free of charge. The vehicle manufacturer shall not be liable for any expenses incurred at a service establishment not authorized to perform warranty repairs, except in the case of an emergency as defined in section (d)(4). If the vehicle owner chooses to have a warrantable defect repaired at other than a warranty station, the upper cost limit pursuant to Health and Safety Code section 44017 shall not apply to the repair.

(i) Exclusions.

The repair or replacement of any warranted part otherwise eligible for warranty coverage under sections (d) and (h) shall be excluded from such warranty coverage if the vehicle or engine manufacturer demonstrates that the vehicle or engine has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for the repair or replacement of the part.

13 C.C.R. § 2038. Performance Warranty Requirements for 1990 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, and Motor Vehicle Engines Used in Such Vehicles

(a) Applicability.

This section shall apply to 1990 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles, and motor vehicle engines used in such vehicles required to be inspected under any California statutorily authorized motor vehicle emissions inspection and maintenance program. The warranty period shall begin on the date the vehicle is delivered to an ultimate purchaser, or if the vehicle is first placed in service as a "demonstrator" or "company" car prior to delivery, on the date it is first placed in service.

(b) General Emissions Warranty Coverage.

The manufacturer of each passenger car, light-duty truck, and medium-duty vehicle shall warrant to the ultimate purchaser and each subsequent purchaser that the vehicle or engine:

(1) Is designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board pursuant to its authority in chapters 1 and 2, part 5, division 26 of the Health and Safety Code; and

(2) Will, for a period of three years or 50,000 miles, whichever first occurs, pass an inspection established under section 44012 of the Health and Safety Code ("inspection").

(c) Written Instructions.

(1) Each vehicle or engine manufacturer shall furnish with each new vehicle or engine, written instructions for the required maintenance and use of this vehicle or engine by the vehicle owner (written instructions), and the written instructions shall be consistent with this article and applicable regulations in article 2 of this subchapter.

(2) Prior to the 2001 model year, each vehicle or engine manufacturer shall submit the documents required by section (c)(1) with the vehicle or engine manufacturer's preliminary application for new vehicle or engine certification for approval by the Executive Officer.

(3) For 2001 and subsequent model years, each vehicle or engine manufacturer shall submit the documents required by section (c)(1) with the Part 2 Application for Certification pursuant to the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," incorporated by reference in title 13, CCR section 1961(d).

(4) The Executive Officer may reject or require modification of written instructions for, among other reasons, incompleteness or lack of clarity. Approval by the Executive Officer of the written instructions shall be a condition of certification. The Executive Officer shall approve or disapprove the written instructions within 90 days of the date such documents are received from the vehicle or engine manufacturer. Any disapproval shall be accompanied by a statement of the reasons therefore. In the event of disapproval, the engine or vehicle manufacturer may petition the Board to review the decision of the Executive Officer.

(d) Proper Use and Maintenance.

(1) An emission performance warranty claim may be denied if the vehicle or engine manufacturer demonstrates that the vehicle or engine's failure of the inspection was directly caused by abuse, neglect, or improper maintenance as reflected by a failure to maintain or use the vehicle or engine in accordance with the written instructions.

(2) Except as provided in section (d)(5), a vehicle or engine manufacturer may deny an emission performance warranty claim on the basis of noncompliance with the written instructions only if:

(A) An owner is not able to comply with a request by a manufacturer for evidence pursuant to section (d)(4); or

(B) Notwithstanding the evidence presented pursuant to section (d)(4), the vehicle or engine manufacturer is able to prove that the vehicle failed an inspection because the vehicle was abused, the required maintenance and use was performed in a manner resulting in a component being improperly installed or a component or related parameter being adjusted substantially outside of the vehicle or engine manufacturer's specifications, or maintenance was performed on a vehicle which resulted in the removing or rendering inoperative of any component affecting the vehicle's emissions.

(3) When determining whether an owner has complied with the written instructions, a vehicle or engine manufacturer may require a owner to submit evidence of compliance only with those written instructions for which the vehicle or engine manufacturer has an objective reason for believing:

(A) Were not performed, and;

(B) If not performed, could be the cause of the particular vehicle's failed inspection.

(4) Evidence of compliance with a maintenance instruction may consist of:

(A) A maintenance log book which has been validated at the approximate time or mileage intervals specified in the written instructions by someone who regularly engages in the business of servicing automobiles for the relevant maintenance; or

(B) A repair order, sales receipt, or similar evidence showing that the vehicle has been submitted for scheduled maintenance at the approximate time or mileage intervals specified in the written instructions to someone who regularly engages in the business of servicing automobiles for the purpose of performing the relevant maintenance; or

(C) A statement by the vehicle owner that the maintenance was performed at the approximate time or mileage interval specified in the written instructions using proper replacement parts.

(5) In no case may a vehicle or engine manufacturer deny an emission performance warranty claim on the basis of:

(A) Warranty work or predelivery service performed by any facility authorized by the vehicle or engine manufacturer to perform such work or service; or

(B) Work performed in an emergency situation to rectify an unsafe condition, including an unsafe driveability condition, attributable to the vehicle or engine manufacturer, provided the vehicle owner has taken steps to put the vehicle back in a conforming condition in a timely manner; or

(C) Any cause attributable to the vehicle or engine manufacturer; or

(D) The use of any fuel which is commonly available in the geographical area in which the vehicle or engine is located, unless the written instructions specify that the use of that fuel would adversely affect the emission control devices and systems

of the vehicle, and there is commonly available information for the vehicle owner to identify the proper fuel to be used.

(6) The vehicle owner may perform maintenance or have maintenance performed more frequently than required in the written instructions.

(7) Except as specified in section (d)(2)(B) above, failure of the vehicle or engine owner to ensure the performance of such scheduled maintenance or to keep maintenance records shall not, per se, be grounds for disallowing a warranty claim.

(e) Repair, adjustment, or replacement of any part under the warranty provisions of this article shall be performed at no charge to the vehicle or engine owner at a warranty station, except where a warranted part is not available to the vehicle or engine owner within a reasonable time (in no case more than 30 days) after the vehicle or engine is initially presented to the warranty station for repair. In case of such unavailability, repairs may be performed at any available service establishment, or by the owner, using any replacement part. The manufacturer shall reimburse the owner for his or her expenses including diagnostic charges for such repair or replacement, not to exceed the manufacturer's suggested retail price for all warranted parts replaced and labor charges based on the manufacturer's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate. A vehicle or engine owner may reasonably be required to keep receipts and failed parts in order to receive reimbursement due to such unavailability, provided the manufacturer's written instructions advise the owner of this obligation.

(f) The vehicle or engine manufacturer shall be liable for damages to other vehicle components proximately caused by a failure under warranty of any warranted part.

(g) Any replacement part may be used in the performance of any maintenance or repairs. Any replacement part designated by a vehicle or engine manufacturer may be used in warranty repairs provided without charge to the vehicle owner. Such use shall not reduce the warranty obligations of the vehicle or engine manufacturer, except that the vehicle or engine manufacturer shall not be liable under this article for repair or replacement of any replacement part which is not a warranted part (except as provided under section (d) above).

(h) Any add-on or modified part exempted by the Air Resources Board from the prohibitions of Vehicle Code section 27156 may be used on a vehicle or engine. Such use, in and of itself, shall not be grounds for disallowing a warranty claim made in accordance with this article. The vehicle or engine manufacturer shall not be liable under this article to warrant failures of warranted parts caused by the use of such an add-on or modified part.

(i) Warranty Claim Procedures.

(1) A warranty claim may be submitted by bringing a vehicle to any repair facility authorized by the vehicle or engine manufacturer to service that vehicle.

(2) The manufacturer of each vehicle or engine to which the warranty is applicable shall establish procedures as to the manner in which a claim under the emission performance warranty is to be processed. The procedures shall provide for a final decision and repair of a warrantable condition by the vehicle or engine manufacturer within a reasonable time, not to exceed 30 days from the time at which the vehicle is initially presented for repair, or unless a delay:

(A) is requested by the vehicle owner, or

(B) is caused by an event not attributable to the vehicle or engine manufacturer or the warranty station.

(3) Within the time period specified in section (i)(2), the manufacturer shall provide the owner, in writing, with an explanation as to why the claim is being denied.

(4) Failure to notify a vehicle owner that a warrantable condition does not exist within the required time period of section (i)(2), for reasons other than those provided for in sections (i)(2)(A) and (B), shall result in the vehicle or engine manufacturer being responsible for repairing the vehicle free of charge to the vehicle owner.

(5) The vehicle or engine manufacturer shall incur all costs associated with a determination that an emission performance warranty claim is valid.

(j) Warranty services or repairs shall be provided at all of a vehicle or engine manufacturer's dealerships which are franchised to service the subject vehicles or engines.

(k) The vehicle owner shall not be charged for diagnostic labor which leads to the determination of a warrantable condition provided that such diagnostic work is performed at a warranty station.

(l) Throughout the vehicle or engine's warranty period defined in section (b), the vehicle or engine manufacturer shall maintain a supply of warranted parts sufficient to meet the expected demand for such parts. The lack of availability of such parts or the incompleteness of the repairs within a reasonable time period, not to exceed 30 days from the time the vehicle or engine is initially presented to the warranty station for repair, shall constitute an unavailability of parts for purposes of section (e).

(m) The Executive Officer may request and, in such case, the vehicle or engine manufacturer shall provide, any documents which describe the vehicle or engine manufacturer's warranty procedures or policies.

13 C.C.R. § 2039. Emissions Control System Warranty Statement

(a) Each manufacturer shall furnish a copy of the following statement with each new 1991 and subsequent model vehicle or engine produced after January 24, 1991, using those portions of the statement applicable to the vehicle or engine. This statement shall be included with and preceded the manufacturer's warranty statement required in subsection (b), unless otherwise authorized by the Executive Officer.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board (and manufacturer's name, optional) is pleased to explain the emission control system warranty on your (year) (vehicle, truck, or motorcycle). In California, new motor vehicles must be designated, built and equipped to meet the State's stringent anti-smog standards. (manufacturer's name) must warrant the emission control system on your (vehicle, truck, or motorcycle) for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your (vehicle, truck, or motorcycle).

Your emission control system may include parts such as the carburetor or fuel-injection system, the ignition system, catalytic converter, and engine computer. Also included may be hoses, belts, connectors and other emission-related assemblies. Where a warrantable condition exists, (manufacturer's name) will repair your (vehicle, truck, or motorcycle) at no cost to you including diagnosis, parts and labor.

manufacturer's WARRANTY COVERAGE:

[For 1990 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles.]

- For 3 years or 50,000 miles (or a longer period of time or mileage, optional) (whichever first occurs);

1) If your (vehicle or truck) fails a Smog Check inspection, all necessary repairs and adjustments will be made by (manufacturer's name) to ensure that your emission control system PERFORMANCE WARRANTY.

2) If any emission-related part on your (vehicle or truck) is defective, the part will be repaired or replaced by (manufacturer's name). This is your short-term emission control system DEFECTS WARRANTY.

- For 7 years or 70,000 miles (or a longer period of time or mileage, optional) (Whichever first occurs);

1) If an emission-related part listed in this warranty booklet specially noted with coverage for 7 years or 70,000 miles is defective, the part will be repaired or replaced by (manufacturer's name). This is your long-term emission control system DEFECTS WARRANTY.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the (vehicle, truck, or motorcycle) owner, you are responsible for the performance of the required maintenance listed in your owner's manual. (manufacturer's name) recommends that you retain all receipts covering maintenance on your (car, truck, or motorcycle), but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

- You are responsible for presenting your (vehicle, truck, or motorcycle) to a (manufacturer's name) dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

- As the (vehicle, truck, or motorcycle) owner, you should also be aware that (manufacturer's name) may deny you warranty coverage if your (vehicle, truck, or motorcycle) or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

If you have any questions regarding your warranty rights and responsibilities, you should contact (Insert chosen manufacturer's contact) at 1-XXX-XXXX or the California Air Resource Board at 9528 Telstar Avenue, El Monte, CA 91731.

(b) Commencing with 1980 models sold on or after September 1, 1979, each manufacturer shall furnish with each new vehicle or engine a warranty statement which generally describes the obligations and rights of vehicle or engine manufacturers and owners under this article.

(c) Each manufacturer shall submit the documents required by subsections (a) and (b) with the manufacturer's preliminary application for new vehicle or engine certification for approval by the Executive Officer. The Executive Officer may reject or require modification of the documents to the extent the submitted documents do not satisfy the requirements of subsections (a) and (b). Approval by the Executive Officer of the documents required by subsections (a) and (b) shall be a condition of certification. The Executive Officer shall approve or disapprove the documents required by subsections (a) and (b) within 90 days of the date such documents are received from the manufacturer. Any disapproval shall be accompanied by a statement of the reasons therefore. In the event of disapproval, the manufacturer may petition the Board to review the decision of the Executive Officer.

13 C.C.R. § 2040. Vehicle Owner Obligations

(a) The owner of any vehicle or engine warranted pursuant to this article shall be responsible for the performance of all required scheduled maintenance specified in the written instructions furnished to the owner pursuant to subsections 2036 (e), 2037(e), and 2038(c)(1). Such maintenance may be performed by the owner, at a service establishment of the owner's choosing, or by a person or persons of the owner's choosing.

(b) Except as specified in subsections 2036(j)(1), 2037(i), and 2038(c), failure of the vehicle or engine owner to ensure the performance of such scheduled maintenance or to keep maintenance records shall not, per se, be grounds for disallowing a warranty claim.

13 C.C.R. § 2046. Defective Catalyst

Any oxidation catalyst for which service or replacement is scheduled or recommended by the vehicle manufacturer prior to the accumulation of 5 years or 50,000 miles, whichever occurs first, is defective in design, materials, and workmanship within the meaning of Health and Safety Code Sections 39156 and 39157. Any such service or replacement shall be performed free of charge to the vehicle owner.

13 C.C.R. § 2109. New Vehicle Recall Provisions

(a) When this section is invoked pursuant to other sections of this article or Health and Safety Code Section 43105, the executive officer shall require the manufacturer to submit a plan within 30 calendar days of receipt of the invocation order to bring all vehicles into compliance. The executive officer shall order execution of the plan with such changes and additions as he/she determines to be necessary. The plan may include measures to identify the cause of vehicle noncompliance and to correct noncomplying conditions, correction of vehicles under manufacture, correction of vehicles in the possession or control of the manufacturer and dealers, and correction of vehicles in the possession of consumers (by correction upon service whether or not by warranty, by correction following notification of recall by mail, or by correction following efforts actively to locate and correct all such vehicles). The plan may include the temporary cessation of sales to dealers by the manufacturer and efforts by the manufacturer to prevent the sale of vehicles in possession or control of dealers, until the vehicles are corrected. The executive officer may order any one or more of the foregoing actions, or any other action reasonably necessary to bring all vehicles into compliance.

(b) The plan shall specify the percentage of vehicles subject to recall which must actually be corrected.

If, after good faith efforts, the manufacturer cannot correct the percentage of vehicles specified in the plan by the applicable deadlines, the manufacturer may request the executive officer to modify the percentage of vehicles specified in the plan, setting out in full the good faith efforts of the manufacturer to comply with the original plan, and the reasons it has been unable to comply. The executive officer shall, on the basis of this request, modify the percentage of vehicles which must actually be corrected if he/she finds in writing that the manufacturer has made a good faith effort and has shown good cause for the modification. If the manufacturer so requests, the plan shall specify the maximum incentives (such as a tune-up or specified quantity of gasoline), if any, the manufacturer must offer to vehicle owners to induce them to present their vehicles for repair, as a condition of showing that the manufacturer has made a good faith effort to repair the percentage of vehicles specified in the plan. The plan shall also include a schedule for implementing actions to be taken, including identified increments of progress towards implementation and deadlines for completing each such increment.

(c) If a vehicle is recalled pursuant to this section, the manufacturer shall make all necessary corrections specified in the plan without charge to the registered owner of the vehicle or, at the manufacturer's election, shall reimburse the registered owner for all costs (except incidental and consequential damages) of making such necessary corrections.

The term "all costs" shall not include incidental or consequential damages, except that the manufacturer shall reimburse the registered owner for any damage to the vehicle's emissions control system proximately caused by a defect subject to a recall action under this subsection or an action by a manufacturer taken pursuant to a plan under this subsection.

(d) If the plan ordered by the executive officer pursuant to this subsection includes a recall, the manufacturer may, within 20 calendar days of its receipt of the plan ordered by the executive officer, notify the executive officer of its desire to contest the necessity for or scope of that order. Any such notification shall specify the basis of the manufacturer's objections. Upon receipt of such notification, the executive officer shall stay the recall until the state board affords the manufacturer the opportunity, at a public hearing to be scheduled no less than 30 calendar days and no more than 60 calendar days after receipt of such notification, to present evidence in support of its objections.

A stay of a recall shall not, unless otherwise ordered, stay any other portion of a plan required herein or any other order issued pursuant to this article.

The manufacturer may, within 20 calendar days of its receipt of the plan ordered by the executive officer, request a public hearing of the state board on the necessity for or scope of any other corrective action ordered by the executive officer. Such a hearing shall be held by the state board not less than 30 and no more than 60 calendar days after receipt of the manufacturer's

request for such a hearing. The plan ordered by the executive officer shall remain in effect pending such hearing, unless otherwise ordered by the executive officer.

(e) Failure by a manufacturer to carry out all corrective actions or recall actions ordered by the executive officer pursuant to Section 2106 or to subsection (a) of this section according to the schedule included in the plan ordered by the executive officer shall constitute a violation of that order and of Health and Safety Code Section 43105. The executive officer shall extend any deadline in the plan if he/she finds in writing that a manufacturer has shown good cause for such extension.

If the manufacturer fails to correct the percentage of vehicles subject to recall specified in the recall plan issued by the executive officer (including any modifications made by him/her), by the deadline(s) included in that plan, each vehicle included in the number of vehicles by which the manufacturer falls short of such percentage shall constitute a separate violation of the order and of Health and Safety Code Section 43016.

The state board may hold a public hearing to consider whether approval of such vehicles shall be suspended or conditioned. The state board shall hold such a hearing if requested to do so by either the affected manufacturer or the executive officer.

After the hearing, the state board may suspend or condition approval if it finds that the corrective action ordered by the executive officer was reasonable and that the manufacturer failed to comply or to comply within the specified time period.

13 C.C.R. § 2111. Applicability

(a) These procedures shall apply to:

(1) California-certified 1982 through the 2009 model-year passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, motorcycles, and California-certified 1997 and subsequent model-year off-road motorcycles and all-terrain vehicles, and 2007 and subsequent model-year off-road sport vehicles, off-road utility vehicles, and sand cars, including those federally certified vehicles which are sold in California pursuant to Health and Safety Code section 43102,

(2) California-certified motor vehicle engines used in such vehicles,

(3) California-certified 2000 and subsequent model-year off-road compression-ignition engines, and

(4) California-certified 2009 and subsequent model-year spark-ignition inboard and sterndrive marine engines complying with the Option 1 requirements in Section 2442(b)(1) and California-certified 2008 and subsequent model-year spark-ignition inboard and sterndrive marine engines complying with the Option 2 requirements in Section 2442(b)(1).

(b) These procedures shall not apply to zero emission vehicles and those vehicles certified under Health and Safety Code section 44201.

(c) The Executive Officer may waive any or all of the requirements of these procedures if he or she determines that the requirement constitutes an unwarranted burden on the manufacturer without a corresponding emission reduction.

13 C.C.R. § 2114. Voluntary and Influenced Recall Plans

(a) The recall plan for both voluntary and influenced recalls shall contain the following information unless otherwise specified:

(1) A description of each class or category of vehicle or engine subject to recall including the number of vehicles or engines to be recalled, the engine family, test group or a subgroup thereof, the model year, the make, the model, and such other information as may be required to identify the vehicles or engines to be recalled.

(2) A description of the nonconformity and the specific modifications, alterations, repairs, adjustments, or other changes to be made to correct the vehicles or engines.

(3) A description of the method by which the manufacturer will determine the names and addresses of vehicle or engine owners and the manufacturer's method and schedule for notifying the service facilities and vehicle or engine owners of the recall.

(4) A description of the procedure to be followed by vehicle or engine owners to obtain correction of the nonconformity. This shall include the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor to remedy the nonconformity, and the designation of facilities at which the nonconformity can be remedied.

(5) If some or all of the nonconforming vehicles or engines are to be remedied by persons other than dealers or authorized warranty agents of the manufacturer, a description of such class of persons.

(6) A copy of the letter of notification to be sent to vehicle or engine owners.

(7) A description of the system by which the manufacturer will assure that an adequate supply of parts will be available to perform the repair under the recall plan, including the date by which an adequate supply of parts will be available to initiate the repair campaign, and the method to be used to assure the supply remains both adequate and responsive to owner demand.

(8) A copy of all necessary instructions to be sent to those persons who are to perform the repair.

(9) A description of the impact of the proposed repairs or adjustments on fuel economy, driveability, performance and safety of each class or category of vehicles or engines to be recalled and a brief summary of the data, technical studies, or engineering evaluations which support these descriptions.

(10) Under an influenced recall, an estimate of the capture rate from the proposed recall derived from actual data and/or manufacturer experience. A 60 percent capture rate shall be assigned for recalls based exclusively on noncompliance as defined in Section 2112(h)(1), above.

(11) Under an influenced recall based on noncompliance as defined in Section 2112(h)(2), above, a description of the impact of the proposed changes on the average emissions from the vehicles or engines to be recalled. The description shall contain the following:

(A) Average noncompliance emission levels.

(B) Average emission reduction per pollutant resulting from the recall repair. These averages shall be verified by the manufacturer by applying the proposed recall repairs to two or more in-use vehicles or engines representing the average noncompliance emission levels. Only those vehicles or engines with baseline-emission levels within 25 percent of the average emission levels of noncomplying pollutant(s) established under the in-use enforcement test program may be used by manufacturers to verify proposed recall repairs. The Executive Officer may allow the use of vehicles or engines exceeding these limits if none which meet the limits can be reasonably procured. In the case of heavy-duty engines, the average emission levels may be verified using laboratory engines, subject to approval by the Executive Officer.

(C) An estimate of the average emission level per pollutant for the class or category of vehicles or engines after repair as corrected by the estimated capture rate. The estimated average emission level shall comply with the applicable emission standard. The Executive Officer may waive the requirement for average emission compliance with the standards provided the emission level per vehicle repaired is reduced to its new-vehicle certification emission level at a minimum capture rate of 60 percent.

13 C.C.R. § 2115. Eligibility for Repair

The manufacturer shall not condition eligibility for repair on the proper maintenance or use of the vehicle except for strong and compelling reasons and with the approval of the Executive Officer; however, the manufacturer shall not be obligated to repair a component which has been removed or altered so that the remedial action cannot be performed without additional cost.

13 C.C.R. § 2116. Repair Label

(a) The manufacturer shall require those who perform the repair to affix a label to each vehicle or engine repaired, or, when required, inspected, under the voluntary or influenced recall plan.

(b) The label shall be placed in a location approved by the Executive Officer and shall be fabricated of a material suitable for such location in which it is installed and which is not readily removable.

(c) The label shall contain the recall campaign number and a code designating the campaign facility at which the repair, or inspection for repair, was performed.

13 C.C.R. § 2117. Proof of Correction Certificate

The manufacturer shall require those who perform the repair to provide the owner for each vehicle or engine repaired with a certificate, in a format prescribed by the Executive Officer, which indicates that the noncomplying vehicle or engine has been corrected under the recall program. This requirement shall become effective and applicable upon the effective date of a recall enforcement program adopted by the Department of Motor Vehicles or another state agency which requires presentation of proof of correction of a recalled vehicle prior to issuance of a smog certificate, registration renewal, or other entitlement to use.

13 C.C.R. § 2118. Notification

The notification of vehicle or engine owners shall contain the following:

(a) The statement: "Your (vehicle or engine) (is or may be) releasing air pollutants which exceed (California or California and federal) standards," if applicable as determined by the Executive Officer.

(b) A statement that the nonconformity of any such vehicles or engines will be remedied at the expense of the manufacturer.

(c) A statement that such nonconformity if not repaired may cause the vehicle or engine to fail a vehicle inspection or Smog Check test when such tests are required under state law.

(d) A statement describing the adverse effect, if any, of the uncorrected nonconformity on the performance, fuel economy,

or durability of the vehicle or engine.

(e) After the effective date of the recall enforcement program referred to in Section 2117, a statement that a certificate showing that the vehicle has been repaired under the recall program shall be issued by the service facilities, and that such a certificate will be required as a condition of vehicle registration or operation, as appropriate.

(f) A card to be used by a vehicle or engine owner in the event the vehicle or engine to be recalled has been sold. Such card should be addressed to the manufacturer, have postage paid, and shall provide a space in which the owner may indicate the name and address of the person to whom the vehicle or engine was sold or transferred.

(g) The statement: "In order to ensure your full protection under the emission warranty provisions, it is recommended that you have your (vehicle or engine) serviced as soon as possible. Failure to do so could be determined as lack of proper maintenance of your (vehicle or engine)." This statement is not required for off-road motorcycles or all-terrain vehicles.

(h) A telephone number provided by the manufacturer, which may be used to report difficulty in obtaining recall repairs.

13 C.C.R. § 2119. Recordkeeping and Reporting Requirements

(a) Unless otherwise specified by the Executive Officer, the manufacturer shall report on the progress of the recall campaign by submitting subsequent reports for six consecutive quarters commencing with the quarter after the recall campaign begins. Such reports shall be submitted no later than 25 days after the close of each calendar quarter to: Chief, Mobile Source Operations Division, 9528 Telestar, El Monte, CA 91731. For each class or category of vehicle or engine subject to the emission recall campaign, the quarterly report shall contain the following:

(1) Engine family or test group and emission recall campaign number designated by the manufacturer.

(2) Date owner notification was begun, and date completed.

(3) Number of vehicles or engines involved in the voluntary or influenced emission recall campaign.

(4) Number of vehicles or engines known or estimated to be affected by the nonconformity and an explanation of the means by which this number was determined.

(5) Number of vehicles or engines inspected pursuant to the voluntary or influenced emission recall plan.

(6) Number of inspected vehicles or engines found to be affected by the nonconformity.

(7) Number of vehicles or engines receiving repair under the recall plan.

(8) Number of vehicles or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(9) Number of vehicles or engines determined to be ineligible for recall action due to removed or altered components.

(10) A listing of the identification numbers of vehicles or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer. The frequency of this submittal may be changed by the Executive Officer depending on the needs of recall enforcement.

(11) A copy of any service bulletins transmitted to dealers or other authorized repair facilities which relate to the nonconformity to be corrected and which have not previously been reported.

(12) A copy of all communications transmitted to vehicle or engine owners which relate to the nonconformity and which have not previously been submitted.

(b) If the manufacturer determines that any of the information submitted to the Executive Officer pursuant to (a) above has changed or was incorrect, revised information and an explanatory note shall be submitted. Responses to subsections (a)(5), (6), (7), (8), and (9) above shall be cumulative totals.

(c) The manufacturer shall maintain in a form suitable for inspection, such as computer information storage devices or card files, and shall make available to the Executive Officer or his or her authorized representative upon request, the names and addresses of vehicle or engine owners:

(1) To whom notification was given;

(2) Whose vehicles were repaired or inspected under the recall plan; and

(3) Who were determined not to qualify for such recall action due to removed or altered components.

(d) The information gathered by the manufacturer to compile the reports required by these procedures shall be retained for not less than one year beyond the useful life of the vehicles or engines and shall be made available to authorized personnel of the Air Resources Board upon request.

13 C.C.R. § 2120. Other Requirements Not Waived

The filing of any report under the provisions of these procedures shall not affect a manufacturer's responsibility to file reports or applications, obtain approval, or give notice under any other provisions of law.

13 C.C.R. § 2122. General Provisions

The provisions regarding applicability of the ordered recall procedures and the definitions shall be the same as those set forth in Title 13, California Code of Regulations, Sections 2111 and 2112. The provisions of this Article shall apply to the vehicles and engines specified in section 2111 manufactured up to and including the 2009 model year, plus their useful lives. This Article shall not apply to vehicles and engines manufactured for the 2010 model year and thereafter.

13 C.C.R. § 2123. Initiation and Notification of Ordered Emission-Related Recalls

(a) A manufacturer shall be notified whenever the Executive Officer has determined, based on warranty information reports, field information reports, enforcement testing results, or any other information, that a substantial number of a class or category of vehicles or engines produced by that manufacturer, although properly maintained and used, contain a failure in an emission-related component which, if uncorrected, may result in the vehicles' or engines' failure to meet applicable standards over their useful lives; or whenever a class or category of vehicles or engines within their useful lives, on average, do not conform to the standards prescribed pursuant to Section 43101 of the Health and Safety Code as applicable to the model year of such vehicles.

(b) It shall be presumed for purposes of this section that an emission-related failure will result in the exceedance of emission standards unless the manufacturer presents evidence in accordance with the procedures set forth in Title 13, California Code of Regulations, Section 2147 which demonstrates to the satisfaction of the Executive Officer that the failure will not result in exceedance of emission standards over the useful life of the vehicle or engine.

(c) The notification shall include a description of each class or category of vehicles or engines encompassed by the determination of nonconformity, shall set forth the factual basis for the determination and shall designate a date at least 45 days from the date of receipt of such notification by which the manufacturer shall submit a plan to remedy the nonconformity

13 C.C.R. § 2124. Availability of Public Hearing

(a) The manufacturer may request a public hearing pursuant to the procedures set forth in Sections 60040 to 60053, Title 17, California Code of Regulations to contest the finding of nonconformity and the necessity for or the scope of any ordered corrective action.

(b) If a manufacturer requests a public hearing pursuant to subsection (a) above, and if the Executive Officer's determination of nonconformity is confirmed at the hearing, the manufacturer shall submit the recall plan required by Section 2125 within 30 days after receipt of the Board's decision.

13 C.C.R. § 2125. Ordered Recall Plan

(a) Unless a public hearing is requested by the manufacturer, a recall plan shall be submitted to the Chief, Mobile Source Division, 9528 Telstar Avenue, El Monte, CA 91731, within the time limit specified in the notification. The Executive Officer may grant the manufacturer an extension upon good cause shown.

(b) The recall plan shall contain the following:

(1) A description of each class or category of vehicle or engine to be recalled, including the engine family or sub-group thereof, the model-year, the make, the model, and such other information as may be required to identify the vehicles or engines to be recalled.

(2) A description of the nonconformity and the specific modifications, alterations, repairs, corrections, adjustments or other changes to be made to bring the vehicles or engines into conformity including a brief summary of the data and technical studies which support the manufacturer's decision regarding the specific corrections to be made.

(3) A description of the method by which the manufacturer will determine the names and addresses of vehicle or engine owners and the method by which they will be notified.

(4) A description of the procedure to be followed by vehicle or engine owners to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to perform the labor required to correct the nonconformity, and the designation of facilities at which the nonconformity can be remedied. The repair shall be completed within a reasonable time designated by the Executive Officer from the date the owner delivers the vehicle or engine for repair. This requirement becomes applicable on the date designated by the manufacturer as the date on or after which the owner can have the nonconformity remedied.

(5) If some or all of the nonconforming vehicles or engines are to be remedied by persons other than dealers or authorized warranty agents of the manufacturer, a description of such class of persons and a statement indicating that the participating members of the class will be properly equipped to perform such remedial action.

(6) The capture rate required for each class or category of vehicle or engine to be recalled. Under recalls based on exceedance of emission standards, the capture rate shall be calculated using the following formula:

$$R = \frac{(Ef - Es) \times 100\%}{\Delta}$$

where: R = capture rate (see section 2112(a), above, for definition).

D = average reduction per vehicle resulting from the recall repair (see subsection (b)(12)(B), below, for determination).

Ef = average noncompliance emission level determined from in-use enforcement testing and other sources.

Es = emission standard for a particular pollutant.

An 80 percent capture rate shall be required for recalls based exclusively on noncompliance as defined in section 2112(h)(1), above.

(7) The plan may specify the maximum incentives (such as a tune-up or specified quantity of gasoline), if any, the manufacturer will offer to induce vehicle or engine owners to present their vehicles for repair, as evidence that the manufacturer has made a good faith effort to repair the percentage of vehicles or engines specified in the plan. The plan shall include a schedule for implementing actions to be taken including identified increments of progress towards implementation and deadlines for completing each such increment.

(8) A copy of the letter of notification to be sent to vehicle or engine owners.

(9) A description of the system by which the manufacturer will assure that an adequate supply of parts will be available to perform the repair under the recall plan including the date by which an adequate supply of parts will be available to initiate the repair campaign, and the method to be used to assure the supply remains both adequate and responsive to owner demand.

(10) A copy of all necessary instructions to be sent to those persons who are to perform the repair under the recall plan.

(11) A description of the impact of the proposed changes on fuel economy, driveability, performance and safety of each class or category of vehicles or engines to be recalled and a brief summary of the data, technical studies, or engineering evaluations which support these descriptions.

(12) A description of the impact of the proposed changes on the average emissions of the vehicles or engines to be recalled based on noncompliance as defined in section 2112(h)(2), above. The description shall contain the following:

(A) Average noncompliance emission levels.

(B) Average emission reduction or increase per pollutant resulting from the recall repair. These averages shall be verified by the manufacturer by applying the proposed recall repairs to two or more in-use vehicles or engines representing the average noncompliance emission levels. Only those vehicles or engines with baseline emission levels within 25 percent of the average emission levels of noncomplying pollutant(s) established under the in-use enforcement test program may be used by manufacturers to verify proposed recall repairs. The Executive Officer may allow the use of vehicles or engines exceeding these limits if none which meet the limits can be reasonably procured. In the case of heavy-duty engines, the average emission levels may be verified by using laboratory engines, subject to approval by the Executive Officer.

(C) An estimate of the average emission level per pollutant for a class or category of vehicles or engines after repair as corrected by the required capture rate. The estimated average emission level shall comply with the applicable emission standards. If the average emissions levels achieved by applying the average emission reduction per vehicle or engine after repair and the estimated capture rate, do not achieve compliance with the emissions standards, a manufacturer shall propose other measures to achieve average emissions compliance.

(13) Any other information, reports, or data which the Executive Officer may reasonably determine to be necessary to evaluate the recall plan.

13 C.C.R. § 2126. Approval and Implementation of Recall Plan

(a) If the Executive Officer finds that the recall plan is designed effectively to correct the nonconformity and complies with the provisions of Section 2125, he or she will so notify the manufacturer in writing. Upon receipt of the approval notice from the Executive Officer, the manufacturer shall commence implementation of the approved plan. Notification of vehicle or engine owners and the implementation of recall repairs shall commence within 45 days of the receipt of notice unless the manufacturer can show good cause for the Executive Officer to extend the deadline.

(b) If the Executive Officer does not approve the recall plan or the mitigation measures provided in Section 2130 as submitted, the Executive Officer shall order modification of the plan or mitigation measures with such changes and additions as he or she determines to be necessary. The Executive Officer shall notify the manufacturer in writing of the disapproval and the reasons for the disapproval.

(c) The manufacturer may contest the Executive Officer's disapproval by requesting a public hearing pursuant to the procedures set forth in Sections 60040 to 60053, Title 17, California Code of Regulations. As a result of the hearing, the Board may affirm, overturn or modify the Executive Officer's action. In its decision, affirming or modifying, the Board shall specify the date by which the manufacturer shall commence notifying vehicle or engine owners and implementing the required recall repairs.

(d) If no public hearing is requested in accordance with (c) above, the manufacturer shall incorporate the changes and additions required by the Executive Officer and shall commence notifying vehicle or engine owners and implementing the required recall repairs within 60 days of the manufacturer's receipt of the Executive Officer's disapproval.

13 C.C.R. § 2127. Notification of Owners

(a) Notification to vehicle or engine owners shall be made by first class mail or by such other means as approved by the Executive Officer provided, that for good cause, the Executive Officer may require the use of certified mail to ensure an effective notification.

(b) The manufacturer shall use all reasonable means necessary to locate vehicle or engine owners provided, that for good cause, the Executive Officer may require the manufacturer to use motor vehicle registration lists available from State or commercial sources to obtain the names and addresses of vehicle or engine owners to ensure effective notification.

(c) The Executive Officer may require subsequent notification by the manufacturer to vehicle or engine owners by first class mail or other reasonable means provided, that for good cause, the Executive Officer may require the use of certified mail to ensure effective notification.

(d) The notification of vehicle or engine owners shall contain the following:

(1) The statement: "the California Air Resources Board has determined that your (vehicle or engine) (is or may be) releasing air pollutants which exceed (California or California and Federal) standards. These standards were established to protect your health and welfare from the dangers of air pollution."

(2) A statement that the nonconformity of any such vehicles or engines will be remedied at the expense of the manufacturer.

(3) A statement that eligibility may not be denied solely on the basis that the vehicle or engine owner used parts not manufactured by the original equipment vehicle manufacturer, or had repairs performed by outlets other than the vehicle or engine manufacturer's franchised dealers.

(4) A clear description of the components which will be affected by the recall action and a general statement of the measures to be taken to correct the nonconformity.

(5) A statement that such nonconformity, if not repaired, may cause the vehicle or engine to fail an emission inspection or Smog Check test when such tests are required under State law.

(6) A description of the adverse effects, if any, that an uncorrected nonconformity would have on the performance, fuel economy, or driveability of the vehicle or engine or to the function of other engine components.

(7) A description of the procedure which the vehicle or engine owner should follow to obtain correction of the nonconformity including the date on or after which the owner can have the nonconformity remedied, the time reasonably necessary to correct the nonconformity, and a designation of the facilities at which the nonconformity can be remedied.

(8) After the effective date of the recall enforcement program referred to in Section 2117, above, a statement that a certificate showing that the vehicle has been repaired under the recall program shall be issued by the service facilities and that such a certificate may be required as a condition of vehicle registration or operation, as applicable.

(9) A card to be used by a vehicle or engine owner in the event the vehicle or engine to be recalled has been sold. Such card should be addressed to the manufacturer, have postage paid, and shall provide a space in which the owner may indicate the name and address of the person to whom the vehicle or engine was sold.

(10) The statement: "In order to ensure your full protection under the emission warranty made applicable to your (vehicle or engine) by State or Federal law, and your right to participate in future recalls, it is recommended that you have your (vehicle or engine) serviced as soon as possible. Failure to do so could be determined to be a lack of proper maintenance of your (vehicle or engine)." This statement is not required for off-road motorcycles or all-terrain vehicles.

(11) A telephone number provided by the manufacturer, which may be used to report difficulty in obtaining recall repairs.

(e) The manufacturer shall not condition eligibility for repair on the proper maintenance or use of the vehicle except for strong or compelling reasons and with approval of the Executive Officer; however, the manufacturer shall not be obligated to

repair a component which has been removed or altered so that the recall action cannot be performed without additional cost.

(f) No notice sent pursuant to Section 2125(b)(8), above, nor any other communication sent to vehicle or engine owners or dealers shall contain any statement, express or implied, that the nonconformity does not exist or will not degrade air quality.

(g) The manufacturer shall be informed of any other requirements pertaining to the notification under this section which the Executive Officer has determined are reasonable and necessary to ensure the effectiveness of the recall campaign.

13 C.C.R. § 2128. Repair Label

(a) The manufacturer shall require those who perform the repair under the recall plan to affix a label to each vehicle or engine repaired or, when required, inspected under the recall plan.

(b) The label shall be placed in a location as approved by the Executive Officer and shall be fabricated of a material suitable for such location and which is not readily removable.

(c) The label shall contain the recall campaign number and a code designating the facility at which the repair, inspection for repair, was performed.

13 C.C.R. § 2129. Proof of Correction Certificate

The manufacturer shall require those who perform the recall repair to provide the owner of each vehicle or engine repaired with a certificate, through a protocol and in a format prescribed by the Executive Officer, which indicates that the noncomplying vehicle or engine has been corrected under the recall program. This requirement shall become effective and applicable upon the effective date of the recall enforcement program referred to in Section 2117, above.

13 C.C.R. § 2130. Capture Rates and Alternative Measures

The manufacturer shall comply with the capture rate specified in the recall plan as determined pursuant to Section 2125(b)(6), above, within six consecutive quarters beginning with the quarter in which the notification of vehicle or engine owners was initiated. If, after good faith efforts, the manufacturer cannot correct the percentage of vehicles specified in the plan by the applicable deadlines and cannot take other measures to bring the engine family or test group into compliance with the standards, the manufacturer shall propose mitigation measures to offset the emissions of the unrepaired vehicles within 45 days from the last report filed pursuant to Section 2133(c), below. The Executive Officer shall approve such measures provided that:

(a) the emission reductions from the recalled and repaired vehicles or engines and the mitigation measures are equivalent to achieving the capture rate; and

(b) the emission reductions from the mitigation measures are real and verifiable; and

(c) the mitigation measures are implemented in a timely manner.

13 C.C.R. § 2131. Preliminary Tests

The Executive Officer may require the manufacturer to conduct tests on components and vehicles or engines incorporating a proposed correction, repair, or modification reasonably designed and necessary to demonstrate the effectiveness of the correction, repair, or modification.

13 C.C.R. § 2132. Communication with Repair Personnel

The manufacturer shall provide to the Executive Officer a copy of all communications which relate to the recall plan directed to dealers and other persons who are to perform the repair. Such copies shall be mailed to the Executive Officer contemporaneously with their transmission to dealers and other persons who are to perform the repair under the recall plan.

13 C.C.R. § 2133. Recordkeeping and Reporting Requirements

(a) The manufacturer shall maintain sufficient records to enable the Executive Officer to conduct an analysis of the adequacy of the recall campaign. The records shall include, for each class or category of vehicle or engine, but need not be limited to, the following:

(1) Engine family involved and recall campaign number as designated by the manufacturer.

(2) Date owner notification was begun, and date completed.

(3) Number of vehicles or engines involved in the recall campaign.

(4) Number of vehicles or engines known or estimated to be affected by the nonconformity.

(5) Number of vehicles or engines inspected pursuant to the recall plan and found to be affected by the nonconformity.

(6) Number of inspected vehicles or engines.

(7) Number of vehicles or engines receiving repair under the recall plan.

(8) Number of vehicles or engines determined to be unavailable for inspection or repair under the recall plan due to exportation, theft, scrapping, or for other reasons (specify).

(9) Number of vehicles or engines determined to be ineligible for recall action due to removed or altered components.

(10) A listing of the identification numbers of vehicles or engines subject to recall but for whose repair the manufacturer has not been invoiced. This listing shall be supplied in a standardized computer data storage device to be specified by the Executive Officer. The frequency of this submittal, as specified in subsection (c) below, may be changed by the Executive Officer depending on the needs of recall enforcement.

(11) Any service bulletins transmitted to dealers which relate to the nonconformity and which have not previously been submitted.

(12) All communications transmitted to vehicle or engine owners which relate to the nonconformity and which have not previously been submitted.

(b) If the manufacturer determines that the original responses to subsections (a)(3) and (4) of these procedures are incorrect, revised figures and an explanatory note shall be submitted. Responses to subsections (a)(5), (6), (7), (8), and (9) shall be cumulative totals.

(c) Unless otherwise directed by the Executive Officer, the information specified in subsection (a) of these procedures shall be included in six quarterly reports, beginning with the quarter in which the notification of owners was initiated, or until all nonconforming vehicles or engines involved in the campaign have been remedied, whichever occurs sooner. Such reports shall be submitted no later than 25 days after the close of each calendar quarter.

(d) The manufacturer shall maintain in a form suitable for inspection, such as computer information storage devices or card files, and shall make available to the Executive Officer or his or her authorized representative upon request, lists of the names and addresses of vehicle or engine owners:

(1) To whom notification was given;

(2) Who received remedial repair or inspection under the recall plan; and

(3) Who were denied eligibility for repair due to removed or altered components.

(e) The records and reports required by these procedures shall be retained for not less than one year beyond the useful life of the vehicles or engines involved, or one year beyond the reporting time frame specified in subsection (c) above, whichever is later.

13 C.C.R. § 2135. Extension of Time

The Executive Officer may extend any deadline in the plan if he or she finds in writing that a manufacturer has shown good cause for such extension.

13 C.C.R. § 2141. General Provisions

(a) The provisions regarding applicability of the failure reporting procedures and the definitions shall be the same as those set forth in Title 13, California Code of Regulations, Sections 2111 and 2112, except that this Section 2141 does not apply to off-road compression-ignition engines, as defined in Section 2421. The provisions of this Article shall apply to the vehicles and engines specified in section 2111 manufactured up to and including the 2009 model year, plus their useful lives. This Article shall not apply to vehicles and engines manufactured for the 2010 model year and thereafter.

(b) The requirement to file emission warranty information reports and field information reports for a given class or category of vehicles or engines shall be applicable for the warranty period but not to exceed the useful-life period of the vehicles or engines beginning with the 1990 model-year vehicles or engines.

(c) The requirement to file an emissions information report for a given class or category of vehicles or engines shall be applicable for the useful-life period of the vehicles or engines.

(d) In the case of motor vehicles or engines for which certification of the exhaust and evaporative emission control systems is granted to different manufacturers, the information reporting responsibility in subsections (b) and (c) above shall be assigned to the certifying manufacturer.

13 C.C.R. § 2142. Alternative Procedures

(a) A vehicle manufacturer may use an alternative procedure to those specified in Sections 2144(a) and 2145(a), provided

the Executive Officer has determined that the alternative procedure will produce substantially equivalent results. In making such a determination, the Executive Officer shall consider the capacity of the alternative procedure to:

(1) ensure early detection of failing components within the useful life of the vehicles or engines;

(2) track failing components by engine family;

(3) assure prompt notification of the Executive Officer when a systematically failing component is indicated;

(4) provide objective, complete and easily monitored data; and

(5) be audited by the Executive Officer.

(b) If, in order to comply with the requirements of Section 2142(a), 2144(a) or 2145(a), a manufacturer elects to develop a system based upon a sampling of representative California dealerships, such plan must be reviewed and approved by the Executive Officer prior to its implementation.

13 C.C.R. § 2143. Failure Levels Triggering Recall

An engine family, test group or a subgroup shall be subject to a recall when the number of failures of a specific emission-related component exceeds the failure level set forth below, unless the Executive Officer determines from the emission information report that a recall is unnecessary pursuant to the criteria set forth in Section 2148(a) and (b). Vehicles or engines in an engine family or test group are subject to recall at the following failure levels: 4 percent or 50 (whichever is greater) for 1990 through 1991 model year vehicles or engines; 3 percent or 50 (whichever is greater) for 1992 through 1993 model-year vehicles or engines; and 2 percent or 50 (whichever is greater) for 1994 and subsequent model-year vehicles or engines. The Executive Officer may extend the applicability of the 4 or 3 percent failure levels if he/she determines that proceeding to the next lower level will create an excessive administrative burden on the ARB or the vehicle manufacturers without a corresponding benefit in the reduction of emissions.

13 C.C.R. § 2144. Emission Warranty Information Report

(a) A manufacturer shall:

(1) Review warranty claim records for each engine family or test group on a quarterly basis to determine and compile by cumulative total the number of claims made for emission-related components. The data compiled shall be based on all warranty claims, without any prescreening of data as to the validity of the claims. In the case of heavy-duty vehicles or engines, a manufacturer may use nationwide data for monitoring warranty claims of a California-certified engine family or test group which is also certified by the United States Environmental Protection Agency.

(2) Categorize warranty claims for each engine family or test group by the specific emission control component replaced or repaired.

(3) On the basis of data obtained subsequent to the effective date of these regulations, file an emission warranty information report for each quarter when the cumulative number of unscreened warranty claims for a specific emission-related component or repair represent at least one percent or twenty five (whichever is greater) of the vehicles or engines of a California-certified engine family or test group.

(b) The emission warranty information report shall contain the following information in substantially the format outlined below:

(1) The manufacturer's corporate name.

(2) A description of each class or category of California-certified vehicles or engines affected by a warranty replacement or warranty repair of a specific emission-related component, including model year and engine family or test group.

(3) The number and percentage of vehicles or engines in each engine family or test group for which a warranty replacement or warranty repair of a specific emission-related component was identified.

(4) A short description of the specific emission-related component that was replaced or repaired under warranty.

(c) Emission warranty information reports shall be submitted not more than 25 days after the close of a calendar quarter. Subsequent to the filing of an emission warranty information report, a manufacturer shall submit quarterly reports updating the number and percentage of emission-related warranty claims with the most recent information, unless a recall has been implemented. Emission warranty information reports and updates shall be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731.

(d) The records described in Section 2144(a)(1) of these procedures and the records used under the alternative procedure described in Section 2142(a) of these procedures shall be made available to the Executive Officer upon request.

13 C.C.R. § 2145. Field Information Report

(a) On the basis of data obtained and reported pursuant to Section 2144 of these procedures, a manufacturer shall file a

field information report not more than 45 days after an emission warranty information report indicates that a cumulative total of unscreened warranty claims for a specific emission-related component is found to exist in excess of the percentage of vehicles specified, in Section 2143, unless the manufacturer has committed to perform a recall by notifying the ARB of its intent in writing within the 45-day period. A recall plan must be submitted within 45 days of; that notice.

(b) All field information reports shall be submitted to the Chief, Mobile Source Operations Division, 9528 Telstar Avenue, El Monte, CA 91731, and shall contain the following information in substantially the format outlined below:

(1) The manufacturer's corporate name.

(2) A field information report number assigned by the manufacturer which shall be used in all related correspondence.

(3) A description of each class or category of California-certified vehicles or engines affected including make, model, model-year, engine family or test group and such other information as may be required to identify the vehicles or engines affected. The description shall include those engine families or test groups related to the affected engine family or test group through common certification test data allowed under Title 40, Code of Federal Regulations, Section 86.085-24(f), as amended December 10, 1984 or Title 40 Code of Federal Regulations, Section 86.1839-01, as adopted May 4, 1999 ("carry-over" and "carry-across" engine families).

(4) A description of the emission-related component that failed or was replaced or repaired under warranty, the failure and the probable cause of the failure.

(5) The number and percentage of vehicles or engines in each engine family or test group for which a failure of a specific emission-related component was identified.

(6) The total number and percentage of unscreened warranty claims and failures of a specific emission-related component projected to occur during the engine family's or test group's useful life and a description of the method used to project this number.

(7) An estimated date when the failure of a specific emission-related component will reach the levels specified in Section 2143 of these procedures.

13 C.C.R. § 2148. Evaluation of Need for Recall

(a) Once the emission information report is filed, the Executive Officer shall evaluate the failure to determine whether a recall is necessary. Factors to be considered shall include but are not limited to the following:

(1) the validity of the data;

(2) the emission impact of the failure on individual vehicles or engines;

(3) the possibility of induced tampering due to driveability problems resulting from the failure;

(4) the effects of the failure on performance, fuel economy, and safety;

(5) the failure rates and the timing and extent of a remedy if no recall is required; and

(6) other factors specific to the failure.

(b) Notwithstanding subsection (a) above, a recall shall not be required if the manufacturer submits information with the emissions information report which demonstrates to the satisfaction of the Executive Officer that the failure:

(1) is limited to an emission-related component on a less-than-substantial percentage of vehicles and does not represent a pervasive defect in design, application, or execution which is likely to affect a substantial number of such emission-related components during the useful life of the vehicle or engines, and

(2) is likely to be corrected under the warranty program or other in-use maintenance procedure shortly after the inception of the problem.

(c) If a manufacturer can identify a subgroup of an engine family or test group which is subject to a failure, a recall may be limited to that subgroup with Executive Officer approval.

13 C.C.R. § 2149. Notification and Subsequent Action

(a) The Executive Officer shall notify the manufacturer of the evaluation results. If the Executive Officer deems a non-compliance exists, a manufacturer shall have 15 days upon receipt of ARB notification to notify the ARB in writing of its intent to perform a recall. A manufacturer may initiate one of the following recalls:

(1) A voluntary recall if the emissions information report submitted was required pursuant to Section 2146(a)(1) or (a)(3) of these procedures;

(2) An influenced recall if the emissions information report submitted was required pursuant to Section 2146(a)(2) of these procedures.

(b) If no notification to perform a voluntary or influenced recall is submitted by the manufacturer within the 15-day period

specified in subsection (a) above, the ARB may initiate further investigation which could lead, respectively, to an influenced or ordered recall of the subject vehicles or engines.

(c) Following notification of noncompliance by the ARB, a manufacturer shall submit within 45 days a recall plan in accordance with Section 2113(a) or (b), Title 13, California Code of Regulations.

13 C.C.R. § 2235. Requirements

New 1977 and subsequent model-year gasoline-fueled motor vehicles and 1993 and subsequent model-year methanol-fueled passenger cars, light-duty trucks, medium-duty vehicles and heavy-duty vehicles shall not be sold, offered for sale or registered in California unless such vehicles comply with the Air Resources Board's "Specifications for Fill Pipes and Openings of Motor Vehicle Fuel Tanks," dated March 19, 1976 as last amended January 22, 1990 or, in the case of motorcycles, are exempted pursuant to Chapter 1, Article 2, Section 1976(b).