

94-12-2
12/8/94

**Comments of the
American Automobile Manufacturers Association
on the California Air Resources Board (CARB)
Notice of Public Hearing
to Consider Technical Status and Proposed Revisions
to Malfunction and Diagnostic System Requirements
for 1994 Model-Year Passenger Cars, Light-Duty Trucks,
and Medium Duty Vehicles and Engines (OBD II)**

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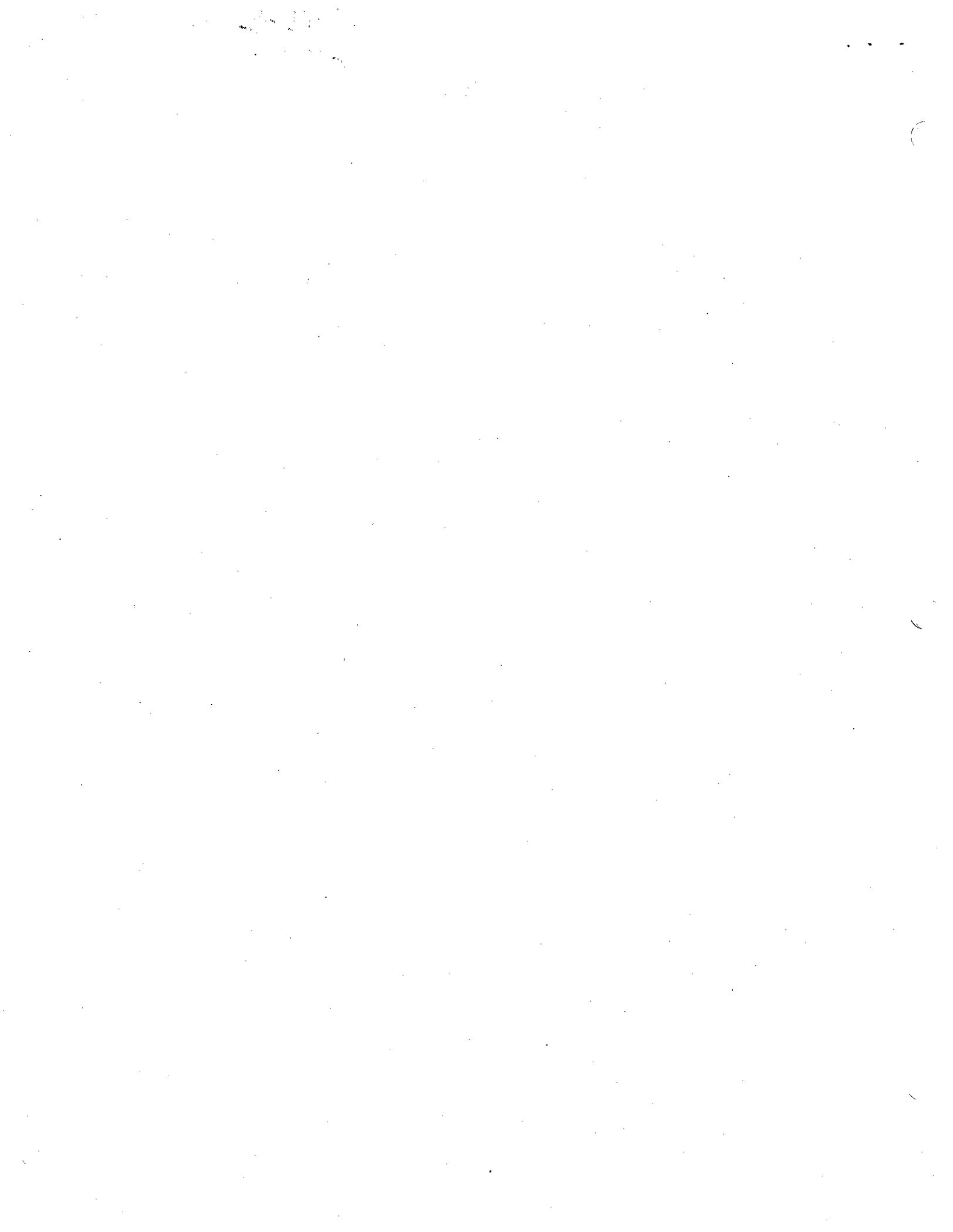
The following are the comments of the American Automobile Manufacturers Association (AAMA) regarding proposed revisions to existing OBD II regulations as outlined in Mail-Out #94-38, which will be considered at the December 8, 1994 hearing. AAMA appreciates CARB staff members' (hereafter "Staff") acknowledgement of the technology-forcing nature of this rulemaking and their willingness to amend OBD II requirements in the light of manufacturers' serious technical concerns. AAMA is grateful that many of the major concerns raised by manufacturers have been addressed in this proposal and appreciates this opportunity to explain the few outstanding concerns that our members have regarding this regulation as currently proposed.

Low Emission Vehicle (LEV) Catalyst Monitoring

AAMA appreciates the Staff's willingness to revise the LEV catalyst monitoring requirements from an efficiency monitor to one that associates the malfunction with the applicable emissions standard, as well as the allowance for a three-year phase-in. Although it is not clear at this time whether it will be feasible for manufacturers to meet this stringent requirement, member companies have begun designing methods of isolating small front catalyst volumes to facilitate monitoring. In some cases, this involves making major changes to existing catalyst and exhaust configurations. AAMA supports a phase-in approach, which mitigates the cost and burden of compliance by spreading it over several years. However, AAMA recommends that slightly lower phase-in percentages of 30%, 60%, and 100% be specified for this requirement over the same three year period. The lower interim phase-in percentages may eliminate the need for member companies to modify existing designs, while still achieving 100% compliance by the target date.

The monitoring of small volumes of the front catalyst and inferring total catalyst system efficiency with a malfunction threshold of 1.5 times the LEV HC standard presents a major challenge for manufacturers. It is uncertain whether manufacturers will be able to adequately balance parameters, such as monitored catalyst volume, washcoat, location, and algorithm, that affect both emissions performance and catalyst monitoring. Having previously been considered primarily in terms of emissions performance, these parameters must now be considered in terms of oxygen storage for catalyst monitoring. This will entail an iterative process involving inherent trade-offs between optimal emissions performance and optimal oxygen storage capability.

Other open issues could also undermine the viability of this approach. The ability of small volume catalysts with new washcoat technology to retain sufficient oxygen storage capability over a vehicle's useful life has yet to be established. The variability of the catalyst monitor may be too large to adequately detect small volume catalyst deterioration in the ranges



likely to be required for LEVs. Manufacturers are working on ways to reduce the variability of the monitor. Manufacturers must also establish the durability of oxygen sensors located between catalyst biscuits in a single container.

Given the uncertainty surrounding this approach to LEV catalyst monitoring, AAMA also requests that CARB conduct a Workshop in calendar year 1996 to assess manufacturers' progress in meeting this technology-forcing requirement.

Evaporative System Monitoring

The Staff report indicates that the Staff believes manufacturers will be able to detect 0.020 inch orifice leaks using current monitoring hardware and strategies developed for 0.040 inch orifice leak detection. AAMA member companies have not found this to be true for vacuum-based monitors. Initial evaluations of current monitoring strategies indicate that major monitoring hardware and algorithm changes may be required in order to detect the smaller leaks, while avoiding a significant risk of false MILs. If major hardware or algorithm changes are required, additional lead time beyond the 1998 model year will be needed in order for these manufacturers to develop, validate, and implement new hardware into production.

AAMA recommends that the workshop requested for calendar year 1996 also review the progress of manufacturers in meeting this requirement. If it is determined at the workshop that manufacturers will have to make major changes to monitoring hardware and/or algorithms, the 0.020 inch orifice leak detection requirement should be delayed three additional years, with the phase-in beginning in the 2001 MY. Finally, as discussed later in these comments, given the extreme stringency of this requirement, it is especially critical for this monitor that the average run length restriction for monitoring strategies be increased from six to ten, so as to allow optimization of the exponentially weighted moving average (EWMA) protocol.

Misfire Monitoring

AAMA thanks the Staff for working with manufacturers to cooperatively develop the latest CARB misfire monitoring proposal. AAMA appreciates the Staff's willingness to consider, and to address, manufacturers' concerns in this area. The changes significantly increase the probability of meeting this major technological challenge. However, because AAMA member companies are still concerned about a few of the most difficult engines, AAMA recommends that the workshop requested for calendar year 1996 also assess manufacturers' progress in meeting these requirements and phase-in percentages.

Diesel Monitoring Requirements

Regarding fuel system monitoring for diesel vehicles, AAMA thanks the Staff for clarifying that the emissions MIL illumination threshold of 1.5 times the applicable standard only applies to the extent it is feasible, given the vehicle's control system. AAMA also appreciates the Staff's willingness to limit misfire detection requirements for diesel powered vehicles to certain operating modes, in recognition of their being less prone in general to misfire.



AAMA member companies have been investigating the feasibility of misfire detection technology for diesel engines in an effort to meet this requirement. Current misfire detection techniques developed for gasoline engines may be more difficult to implement on diesel engines due to severe second- and third-order vibrations in the crankshaft and flywheel systems, which distort the signal for cyclic variation detection. Although misfire detection may be possible using cyclic variation detection, this technology has not yet been proven feasible for reliably detecting misfire on diesel engines. AAMA remains concerned that additional lead time may be necessary in order to successfully implement diesel engine misfire detection technology. Therefore, AAMA recommends that the workshop to be conducted in the 1996 calendar year also review manufacturers' progress in meeting diesel misfire monitoring requirements.

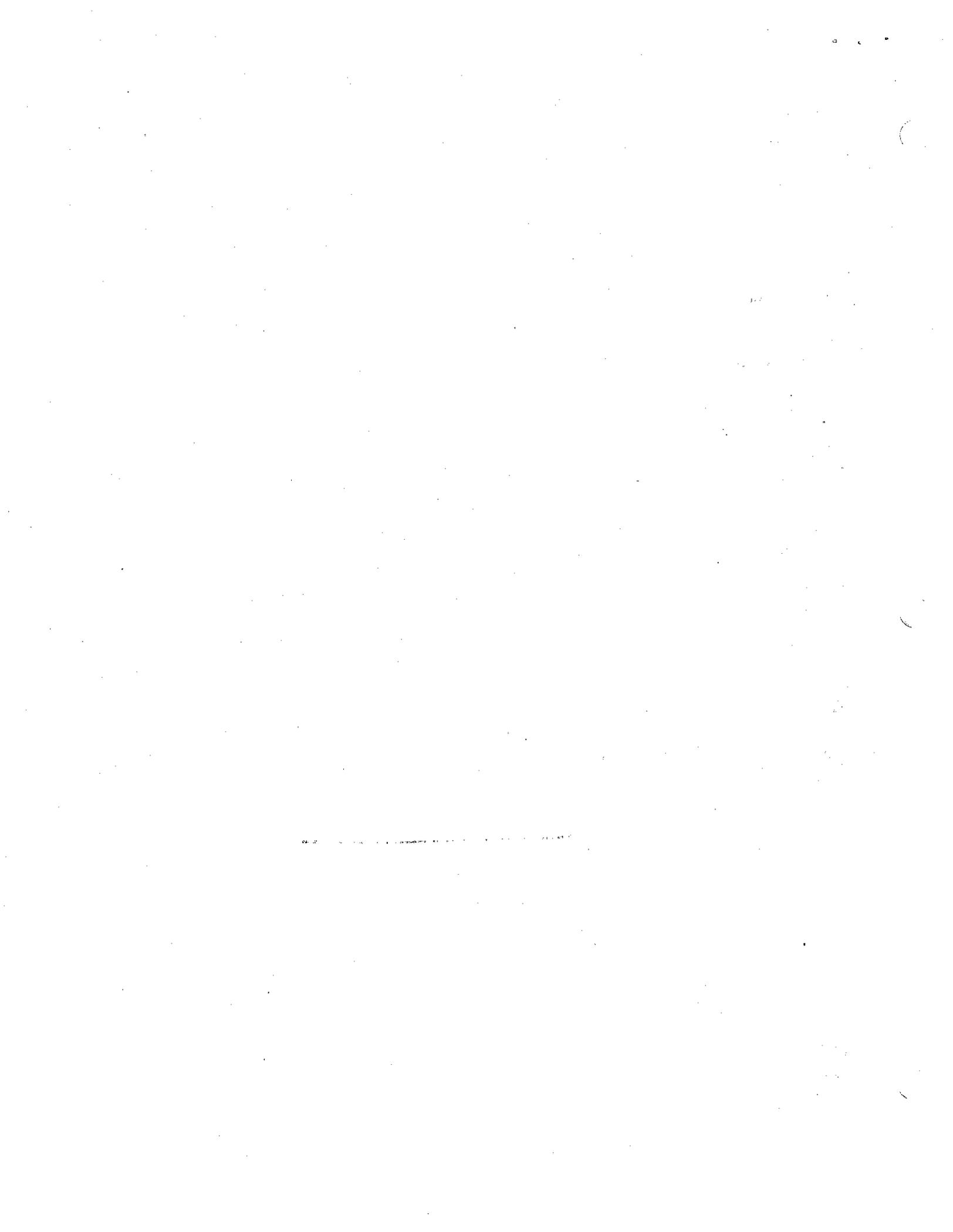
Comprehensive Component Monitoring

Staff has proposed to require monitoring of any component/system that "can affect emissions during any reasonable in-use driving condition," as well as generation of emission data, upon demand, for "any reasonable driving condition." Manufacturers simply do not have the resources to perform the extensive testing and analysis work that would be necessary to meet this requirement as written. For practical reasons, testing and liability should be limited to defined test conditions and procedures associated with FTP cycle conditions, consistent with durability demonstration vehicle requirements.

In addition, AAMA remains concerned over the Staff's interpretation of the phrase "can affect emissions" as meaning any measurable effect on emissions (i.e., no matter how small). Such an interpretation may force manufacturers to illuminate the MIL for components that do not have a significant impact on emissions, causing the MIL to be illuminated on vehicles with emission levels still well below applicable FTP and inspection/maintenance (I/M) standards. This in turn is likely to cause great confusion for vehicle owners and service technicians. AAMA believes that the MIL should only be illuminated for a significant increase in emissions, such that the vehicle is likely to exceed the applicable emission standards. This is more consistent with federal OBD requirements. AAMA recommends that section (b) (10.1) be revised to apply only to electronic powertrain components that can cause exhaust emissions to increase by an amount greater than 25 percent of the applicable standard, under FTP test cycle conditions only.

Anti-Tampering Provisions

The Staff has proposed additional anti-tampering provisions aimed specifically at unauthorized reprogramming. The additional provisions would require that "(b)eginning with the 1999 model year, manufacturers shall include enhanced tamper protection strategies including data encryption using methods to secure the encryption algorithm, and write protect features requiring electronic access to an off-site computer maintained by the manufacturer..." This additional provision as written is inconsistent with AAMA member companies' current plans with regard to reprogramming, and could require major investment if required in its current form.



AAMA recommends that revisions to the anti-tampering provisions be deferred to a future rulemaking, following issuance of the EPA final rule on OBD service information. It is currently unclear if, or to what extent, electronic tampering will be a concern, and it is therefore impossible to determine the appropriate degree of control needed. Given that manufacturers have great incentive to prevent tampering, even in the absence of regulatory requirements, should tampering appear to be a significant risk, manufacturers will be quite willing to cooperate with the Staff, and SAE, in developing appropriate anti-tampering provisions.

However, if CARB believes that it cannot wait for the EPA final rule on OBD service information requirements, then AAMA recommends that the proposed language be amended to read: "(b)eginning with the 1999 model year manufacturers shall include enhanced tampering protection strategies including data encryption using methods to secure the encryption algorithm, and or write protect features requiring electronic access to an off-site computer maintained by the manufacturer..." Without knowing the extent of the risk of tampering that may be associated with reprogramming, AAMA is reluctant to sign up to redundant layers of protection at this time.

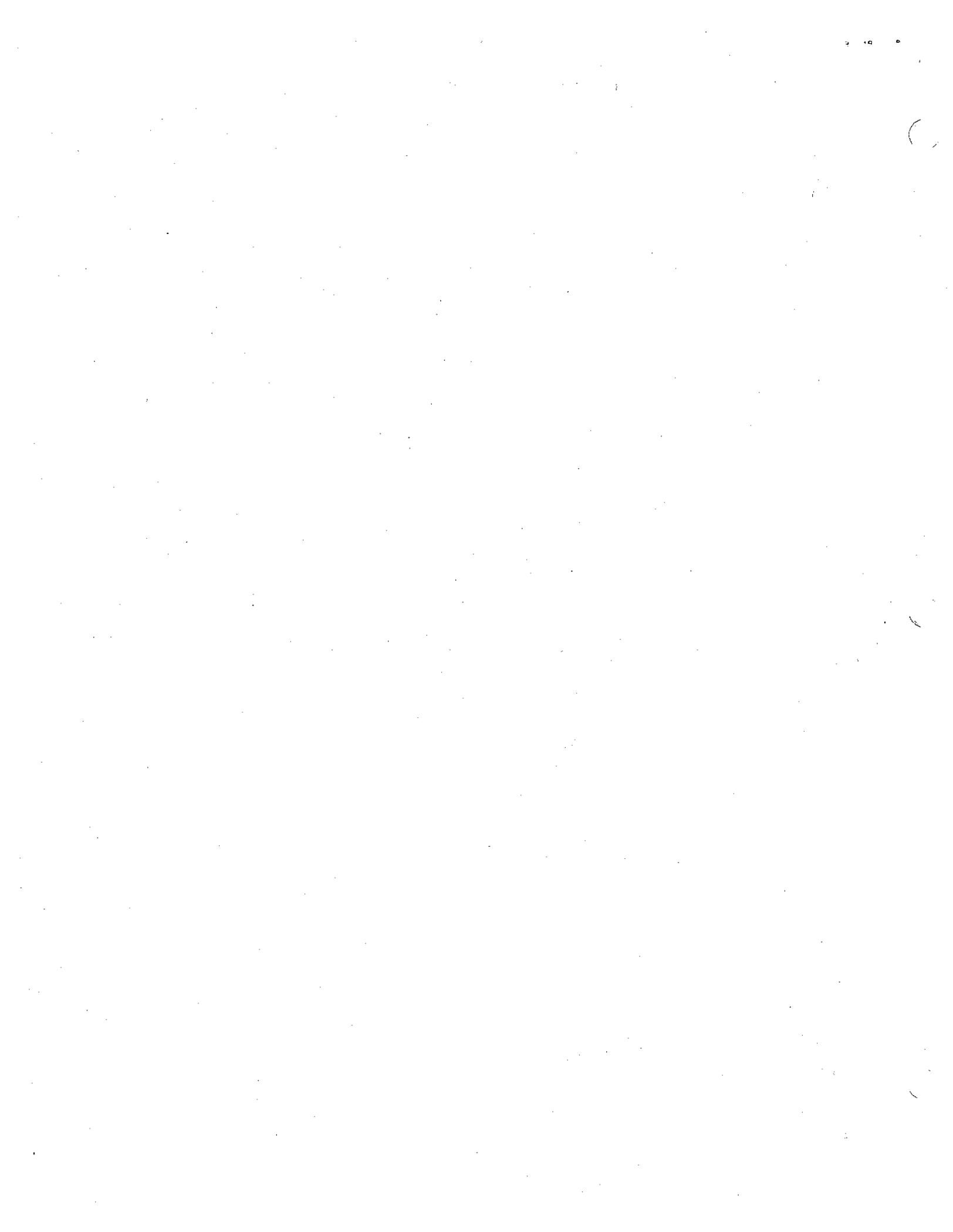
Statistical Malfunction Indicator Light (MIL) Illumination

Current regulatory language unnecessarily limits the use of a statistical MIL illumination protocol based on EWMA. Because EWMA represents the fastest accurate software-based decision-making technique currently available, the MIL should illuminate sooner for real-world failures, and do a better job of preventing false MIL illumination than when the "two-in-a-row" protocol is used. Limiting average monitoring strategy run-length to a maximum of six driving cycles for other than "two-in-a-row" strategies may require manufacturers to modify or abandon their EWMA strategies. This could cause a corresponding disbenefit to air quality because EWMA strategies otherwise identify a failure sooner than the "two-in-a-row" protocol for virtually all real-world failure modes and conditions.

To avoid this outcome, AAMA recommends that average run length for alternative MIL illumination protocols be limited to a maximum of ten, rather than six. This would provide the flexibility necessary to optimize the EWMA protocol for detection of gradual deterioration. If CARB is unwilling to do so for all monitors, then AAMA strongly recommends that, at least for the purposes of the low emission vehicle (LEV) catalyst monitor and the 0.020 inch orifice evaporative system leakage monitor, the maximum average run length be set at ten, rather than six. The ability to optimize malfunction detection through the use of EWMA is especially critical in these cases, because of the extreme difficulty entailed in meeting these particular requirements.

In-Use Recall Testing Protocol

AAMA thanks the Staff for clarifying that manufacturers will not be held responsible for failing to detect tampering or abuse that cannot reasonably be detected. AAMA also appreciates the options of extended warranty or service campaign in lieu of recall for false MILs. However, AAMA still considers the recall provisions to be overly broad and stringent. The phrase "including, but not limited to" is too broad for determining recall, and, as currently worded, the



proposed regulation could result in vehicles being recalled without having failed the applicable emission standards.

AAMA member companies are especially concerned about vehicles equipped with early-implementation OBD II systems. While manufacturers have the ability to test systems and components for *mileage*-dependent deterioration, it is impossible for manufacturers to thoroughly test all systems and components for the multitude of *time*-dependent, customer-induced deterioration, which occurs in-use. Vehicle manufacturers strive to design and implement vehicles that perform properly in the field. However, experience has shown that problems cannot be avoided, especially for vehicle systems which are driven by technology-forcing requirements, such as OBD II. The regulations governing recall should recognize that OBD II system shortcomings, particularly in the early years of implementation, are not the result of sloppy or negligent design and/or manufacture, and therefore do not warrant punitive enforcement action. Moreover, given that the OBD monitors, rather than controls, emissions performance on the vehicle, a failure of the system that is not proximally linked to higher vehicle emissions or false MILs, should not be recalled.

AAMA recommends that recall enforcement guidelines be revised to specify that an OBD recall will only be required if there is an exceedence of the standard, caused by faulty or deteriorated components on the vehicle, with no MIL illumination. In addition, AAMA strongly recommends that there be a moratorium on OBD II system recalls for model years 1994 through 1996. At a minimum, the current 2 times the standard recall threshold for model years 1994 and 1995 should be extended to model year 1996, given that 1996 will be the first year of full OBD II implementation.

AAMA thanks CARB for modifying the regulation in a manner which improves manufacturers' ability to comply, as well as for this opportunity to elaborate on our outstanding concerns. Please contact Barbara Wendling at (313) 871-2305, or Gerald A. Esper at (313) 871-2304, if you have questions regarding these issues.



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Kelly M. Brown
Director
Automotive Emissions and
Fuel Economy Office
Environmental and Safety
Engineering Staff

Ford Motor Company
The American Road
Dearborn, Michigan 48121

December 1, 1994

California Air Resources Board
Board Secretary
2020 "L" Street
Sacramento, CA 95814

Dear Board Member:

Attached are Ford Motor Company's comments regarding proposed revisions to CARB's On-Board Diagnostic (OBD II) requirements contained in Mail-Out #94-38. Comments pertain to CARB's proposed regulatory changes to the Low Emission Vehicle (LEV) catalyst monitoring requirements, expanded misfire detection requirements and 0.020" diameter evaporative leak detection requirements.

Overall, Ford is pleased with the proposed changes and commends CARB Staff for working with manufacturers and addressing many of our concerns with the OBD II requirements. We believe that these proposed revisions come a long way to improve our ability to meet these requirements, while maintaining the intended purposes of the OBD II regulation.

Because of the technology-forcing nature of some of these requirements, we recommend that CARB hold a Workshop in calendar year 1996 to review manufacturers progress and reassess the feasibility of the requirements. We also request that lower phase-in percentages be adopted for the LEV catalyst monitor requirement so that Ford can avoid costly modifications to existing vehicle designs.

Ford appreciates CARB Staff's assistance on this matter and looks forward to the upcoming Hearing on this issue on December 8.

Sincerely,

Kelly M. Brown

Attachment



FORD MOTOR COMPANY

COMMENTS

ON CARB MAIL-OUT #94-38

CONCERNING ON-BOARD DIAGNOSTIC II (OBD II) REQUIREMENTS

INTRODUCTION

Ford Motor Company is pleased to provide the following written comments relating to CARB's Hearing Notice regarding revisions to the OBD II regulation. Ford also fully supports and incorporates here by reference the American Automobile Manufacturers Association (AAMA) written comments.

In general, Ford is pleased with the changes proposed by CARB Staff and commends the Staff for their understanding of the difficulties and technical constraints faced by manufacturers, and for addressing manufacturers' concerns with these requirements. We believe that these proposed revisions come a long way to improve manufacturers' ability to meet the regulations while maintaining the intended purposes of the OBD II regulation. Meeting CARB's proposed requirements for Low Emission Vehicle (LEV) catalyst monitoring and expanded misfire monitoring will be a major technical challenge, and Ford will continue to develop, improve and implement monitoring strategies in an attempt to comply. Ford will also try to meet the more stringent evaporative-leak detection requirement, although we remain very concerned with the ability of our current monitoring strategy to meet this requirement, especially in the time-frame proposed by CARB staff. Our comments and recommendations are summarized below.

FORD COMMENTS/RECOMMENDATIONS

LEV Catalyst Monitoring - Ford understands CARB's desire for LEV catalyst monitoring requirements which ensure that LEVs continue to have low emissions throughout their useful life. Such performance is essential in addressing California's air quality needs and implementation plans. As such, Ford will strive to meet this technology-forcing requirement as proposed by CARB Staff.

Ford has already initiated efforts in an attempt to meet these requirements. We have spent a major amount of time developing preliminary phase-in plans to meet the Staff's proposed phase-in percentages based on CARB Staff's assumption that monitoring a 0.4L to 0.7L catalyst is feasible. We have reviewed these phase-in plans (not finalized even at this point in time) with CARB Staff and discussed the constraints we face implementing them.



Ford is also evaluating the feasibility of monitoring smaller catalyst volumes. The ability to monitor small-volume catalysts over a vehicle's useful life is essential to meeting these requirements. We are also evaluating the feasibility of placing the catalyst-monitor oxygen sensor between two catalyst bricks in one can. This is necessary in order to isolate a sufficiently small catalyst volume to facilitate monitoring for vehicles which require larger front catalysts in order to meet LEV emission standards.

CARB Staff proposes LEV catalyst monitoring requirements which phase-in a more stringent malfunction threshold of 1.5 times the HC standard. This phase-in begins in the 1998 Model Year (MY) with proposed percentages of 40/70/100 percent of projected sales volume. As discussed earlier, Ford has been investigating plans to meet these proposed percentages. In order for us to meet these percentages, we would have to modify existing catalyst configurations and containers on some vehicles in order to design/isolate a small-volume catalyst to facilitate monitoring to the more stringent malfunction threshold. We estimate the incremental cost of these modifications to *existing* vehicle designs would be approximately \$12 Million in facilities, tooling and engineering cost. These incremental costs could be avoided if CARB were to adopt lower phase-in percentages of 30/60/100 percent of projected sales volume, with the phase-in still beginning in the 1998 MY. We have previously reviewed this concern with CARB Staff, and we believe that they could support these lower phase-in percentages in light of the significant cost implications. As a result, ***Ford requests that the Board adopt LEV catalyst-monitor phase-in percentages of 30/60/100 percent of projected sales volume beginning in the 1998 MY.*** Lower percentages will allow Ford to plan necessary vehicle and exhaust-system modifications during the normal design process and avoid incremental costs associated with modifying existing designs.

Even with lower phase-in percentages, meeting these requirements remains a major technical challenge. Manufacturers must address a number of open issues associated with meeting these requirements using current monitoring technology. Some of these issues are:

- The feasibility of monitoring of small catalyst volumes over a vehicle's useful life is presently unknown and represents a significant risk. New catalyst washcoat technologies need to be evaluated to confidently ensure that a small-volume catalyst will be able to retain sufficient oxygen storage, thus allowing adequate monitoring over a vehicle's useful life. We may need to employ an innovative (patented) limited space velocity monitoring strategy.
- The size/volume of the monitored catalyst, washcoat composition and monitoring parameters such as exhaust-gas space-velocity need to be established. A major risk exists if these parameters are not adequately determined, as a manufacturer may not have enough time to make the necessary modifications if hardware changes are again required.

- Additional work is required to reduce the variability of the catalyst monitor. The variability of our current catalyst-monitor index is too large to adequately detect small-volume catalyst deterioration in the ranges that will be required for LEVs (analysis indicates that detecting whole-system efficiency changes of 1-3% will be required... an extremely difficult task).
- The durability of catalyst-monitor oxygen sensors installed between two bricks in one can is unknown and still must be established.

Ford is committed to resolving these and any other issues related to the LEV catalyst monitoring requirements. However, because the feasibility of this requirement has not yet been fully established, ***Ford recommends that CARB conduct a Workshop in calendar year 1996 to review manufacturers' progress and, if necessary, revise these requirements based on this review.***

Misfire Monitoring - Ford supports CARB Staff's proposed technical and phase-in requirements for expanded range of misfire-detection capabilities beginning in the 1997 MY. Once again, Ford commends CARB Staff for their understanding of the technical limitations and difficulties faced by manufacturers and by addressing manufacturers' concerns with the previous requirements for expanded misfire detection. We believe that these newly proposed requirements will greatly improve manufacturers' abilities to implement new technology and improve existing technology to meet this requirement in a reasonable time frame.

Ford has already developed a preliminary plan to meet the proposed phase-in requirements. We are working with Motorola, Inc. in developing an improved technology (Patent granted, and additional Patents pending) which greatly increases the range of misfire detection over our current production technology. Although this technology has not yet been fully proven-out, we believe it has the capability to meet the proposed requirements for most of our engines.

The ability of our new technology and other technologies to meet expanded misfire detection on the few engines which are most difficult for misfire monitoring remains an open issue and represents a major risk at this time. As a result, ***Ford recommends that CARB conduct a Workshop in calendar year 1996 to assess manufacturers' progress in meeting these requirements and phase-in percentages.***

Evaporative System Monitoring - Ford understands CARB's concerns with evaporative-system leaks and the motivation to require more stringent leak-detection requirements. Since this more stringent requirement was first proposed, Ford has been evaluating the capability of our existing monitoring strategy to meet this requirement. Although our investigation continues, thus far, we have not been able to achieve the required capability with the current strategy and hardware.

Ford developed a monitoring strategy for the current 0.040" diameter leak-detection requirement which applies a vacuum to the fuel/evaporative system using engine manifold-vacuum and then holds that vacuum over a period of time with the fuel/evaporative system sealed (the canister-vent solenoid is closed). If a leak is present, the evaporative system will not be able to hold the vacuum and an increase in fuel-tank pressure will be observed.

Fuel-vapor generation can also increase pressure in the fuel tank. Vapor generation during the monitor test can falsely be identified as a leak in a vacuum-type monitoring system when no leak exists. Even with vapor generation concerns, we are confident that our monitoring strategy will not misdiagnose vapor generation as a 0.040" diameter leak. However, vapor generation makes it more difficult, if not impossible, to detect smaller leaks (i.e., 0.020" diameter, which is one-fourth the size of a 0.040" diameter leak) without a significant risk of false MILs.

Some of the conditions which create vapor generation and, consequently, will have to be overcome are:

- Fuel "sloshing" caused by normal vehicle maneuvers.
- High RVP fuel. California reformulated gasolines (Phase I and Phase II) are not controlled to low RVP fuel specifications in the winter months. A 1993 winter fuel survey conducted by AAMA found fuel as high as 13.7 RVP in San Francisco and 12.9 RVP in Los Angeles.
- High fuel-temperatures.

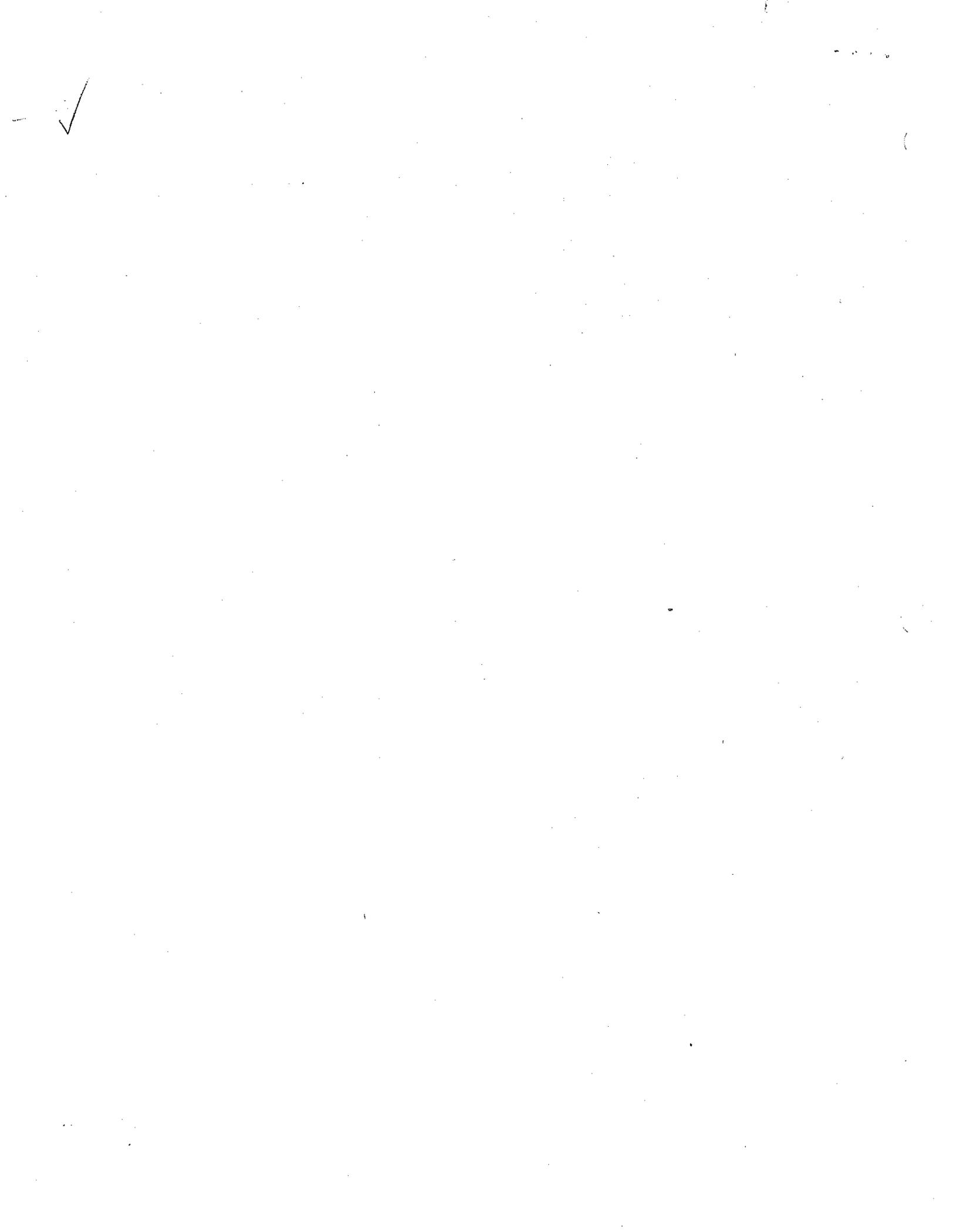
A monitoring strategy which can identify low vapor-generation rates must be developed to ensure that 0.020" diameter leak-detection monitoring is not conducted during vapor-generation conditions which could corrupt the results.

Ford is working to implement the 0.040" diameter-leak test on vehicles beginning in the 1996 MY. As we implement this test on different vehicle lines, we are discovering new issues which need to be resolved. We have found that the plastic tanks on some vehicles will sometimes flex when a vacuum is applied for the monitor test, affecting the results of the monitor. A 0.020" diameter leak test may require us to redesign the fuel tanks on these vehicles.

We have also found that a fuel-level input to the monitor may be required for some vehicles for adequate monitoring. As we continue to discover new vehicle-specific issues with the implementation of the 0.040" diameter leak test, we believe it is premature to think that the 0.020" diameter leak test will not present even more difficult issues which may require major hardware revisions, thus jeopardizing compliance with the 0.020" requirement in the time frame proposed by CARB Staff.



Ford will continue work in an attempt to resolve the many issues with the 0.020" diameter leak-detection requirement. However, even if we are able to resolve the issues we know today, additional problems may be discovered given the limited experience manufacturers have had with the 0.040" diameter leak detection requirement. And, if we find that our "vacuum-type" monitoring strategy will not be capable of reliably detecting 0.020" diameter leaks, new monitoring hardware and strategies will be needed, requiring approximately 4 years for development and implementation into production. As a result, ***Ford recommends that CARB hold a Workshop in calendar year 1996 to assess manufacturers' progress in meeting this requirement. If, at that time, it is found that a "vacuum-type" monitoring strategy will not be capable of reliably detecting 0.020" diameter leaks, Ford recommends that the requirement be delayed three additional years, allowing sufficient time for any necessary redesign, with the phase-in beginning in the 2001 MY.***



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**GENERAL MOTORS STATEMENT TO THE
CALIFORNIA AIR RESOURCES BOARD (CARB)
REGARDING PROPOSED REVISIONS TO THE
ON-BOARD DIAGNOSTIC REQUIREMENTS (OBD-II)**

IN CARB MAIL OUT #94-38

SACRAMENTO, CALIFORNIA

DECEMBER 8, 1994



**GENERAL MOTORS STATEMENT TO THE
CALIFORNIA AIR RESOURCES BOARD (CARB)
REGARDING PROPOSED REVISIONS TO THE
ON-BOARD DIAGNOSTIC REQUIREMENTS (OBD-II)
IN CARB MAIL OUT #94-38
SACRAMENTO, CALIFORNIA
DECEMBER 8, 1994**

Introduction

General Motors (GM) appreciates this opportunity to comment on the proposed revisions to the on-board diagnostic requirements contained in CARB Mail Out #94-38. GM also supports the comments of the American Automobile Manufacturers Association (AAMA) presented at the hearing.

GM appreciates the efforts that the CARB staff has made this past year to understand our concerns and the revisions that are being proposed to address them. However, we believe that some of the staff's technology forcing proposals are still overly aggressive. An overly aggressive strategy can be detrimental to air quality because it increases the risk of false illumination of the malfunction indicator light (MIL) which may cause drivers to ignore it.

We understand that the CARB has allowed for some OBD system deficiencies and that the Board may review some of the more technology forcing requirements and make further revisions in 1996. However, when the CARB makes such late changes to the requirements, it forces us to make late changes to hardware and software, without allowing adequate time for development and validation. Late changes reduce product reliability, customer satisfaction, and air quality benefits. The CARB should require more evidence of real world technical feasibility before adopting new requirements and should allow more lead time and longer phase-ins for technology forcing requirements.

The following is a summary of our remaining concerns.

SPECIFIC TECHNICAL ISSUES

Catalyst Monitoring for LEVs: The staff has proposed to revise section (b)(1.2.1) to require the diagnostic system to detect when catalyst system conversion capability decreases to the point that NMHC emissions exceed 1.5 times the standard, with the exception that pre-1998 model year TLEVs may employ a malfunction criteria of 2.0 times the standard plus the emissions from a 4,000 mile baseline test.

GM welcomes the change of the malfunction criteria from percent efficiency to an emissions based threshold. Although we do not have sufficient data to give us a high confidence of meeting the 2.0 times the standard plus 4,000 mile baseline threshold for all of our 1996 and 1997 model year TLEVs, we believe there is a reasonable chance of meeting this requirement, based on limited data from a few configurations, and we appreciate the staff's efforts to address our concerns. However, additional short-term relief is needed to allow carry over of 1996 and 1997 TLEV systems and to avoid prohibitive expense. The CARB staff proposed that the 1.5 times the standard diagnostic threshold be phased-in at 40/70/100 percent starting with the 1998 model year. **GM recommends that the phase-in be revised to 30/60/100 percent to provide greater confidence that we can meet the requirement for TLEVs.**

GM is concerned that it may not be feasible to meet the 1.5 times the standard diagnostic threshold for LEVs and ULEVs using the current dual oxygen sensor method without a high risk of illuminating the MIL when emissions are still below the standards. The CARB OBD II regulation requires monitoring of the exhaust aftertreatment system, using a diagnostic method based on the oxygen storage capacity of the catalyst. In general, there is a very poor relationship between the oxygen storage index and NMHC emissions which is nonlinear and has very high variability. While there appears to be sufficient empirical correlation to separate "good" from "bad" converters on current Tier 1 vehicle configurations, our data suggests that there is little chance of meeting the 1.5 times the standards threshold with our current and projected LEV configurations. To attempt to meet this requirement for all vehicles, it is likely that major changes would have to be made to many configurations, including major hardware changes, which would result in great expense and could compromise emission performance and driveability.

In an effort to meet the 1.5 times the standard threshold and avoid illuminating the MIL when emissions were still below the standard, we would have to essentially redesign the entire catalyst system to be optimized for monitoring. This includes changing catalyst volumes, catalyst and oxygen sensor locations, and catalyst washcoats. Individual catalyst bricks may have to be a particular size and the oxygen sensor may have to be placed somewhere within a container between two bricks (not necessarily in the middle between two equal size bricks). For many applications, existing space constraints caused by, for example, the floor pan, would prevent the use of optimum catalyst volumes or locations and, therefore, it would be necessary to modify floor pans, etc., to meet these requirements. Changing hardware such as floor pans, etc., for every configuration would cost GM hundreds of millions of dollars. It would be prohibitively expensive to make such modifications until new models are introduced and model lives typically range from 5 years to 10 years or more for some applications, e.g., trucks and vans.

Even after making all these changes, it may not be feasible to meet both LEV emission standards and the 1.5 times the standard diagnostic threshold with all configurations. Emission performance may be compromised to meet this diagnostic requirement for two reasons. First, the catalyst volumes, locations, and washcoats needed for diagnostic performance may not be optimized for emission performance. Second, it may be necessary to use an intrusive diagnostic algorithm, i.e., one which interrupts normal vehicle operation and degrades emissions and driveability. In addition, it is not currently known what catalyst system changes will be required to meet emission standards on the new "Bag 4", etc., test procedures, and what implications they may have for catalyst monitoring. It has not been demonstrated that it is feasible to simultaneously meet LEV emission standards, "Bag 4 requirements," and the proposed 1.5 times the standard diagnostic threshold. Because of these concerns, we will continue our efforts to find a catalyst monitoring technology which is superior to the dual oxygen sensor method.

Even if it ultimately turns out to be feasible to meet the 1.5-times the standards threshold on all configurations, it is unlikely to be cost effective unless phased-in over many years since changing hardware such as floor pans, etc., is so expensive. In addition, balancing diagnostic and emissions performance will be a costly and time consuming iterative process which will have to be performed on each configuration. We are also likely to incur the cost of generating new emissions deterioration factors for certification after making substantial catalyst changes. Such major changes would be prohibitively expensive unless they are phased-in with the introduction of new models over a period of many years.

Because of these concerns, the CARB should seriously reconsider the proposal to implement a 1.5 times the standards threshold for LEVs and ULEVs. GM recommends that the 2.0 times the standard plus 4,000 mile baseline threshold be extended until it has been demonstrated that it is feasible to meet a 1.5 times the standard threshold on LEVs, and ULEVs. The feasibility of this requirement should be discussed in a future workshop. If a 1.5 times the standard threshold is ultimately demonstrated to be feasible, it must then be phased-in gradually, over a period of many years, to avoid prohibitive expense.

Evaporative System Monitoring: The staff has proposed to revise section (b)(4.0) to require detection of 0.020 inch leaks beginning with the 1998 model year with a phase-in of 50/75/100 percent of evaporative families. The justification for the increase in stringency was that there could be significant further emission reductions by reducing the size of leak to be detected. This emissions reduction conclusion is based, in part, upon data generated by GM using a 1990 Buick Regal.

GM believes that the staff is overestimating the significance of the contribution of small leaks (between 0.020 and 0.040 inch) to in-use emissions for many reasons. The data from the CARB surveillance programs, which the staff used as evidence that 0.020 inch leaks occur frequently in-use, was not collected under sufficiently controlled conditions to give accurate results. (While the CARB staff recently investigated the effects of fuel cool down, their study did not reflect the high temperatures reached at the tops of metal fuel tanks because of exhaust system heating, etc., and the subsequent effect of rapid cool down on the pressure of the vapor space.) Furthermore, no attempt was made to find small leaks and determine the area of the leak opening in the surveillance programs. Since the pressure data are suspect and no small leaks were actually identified, the staff has not demonstrated that leaks between 0.020 and 0.040 inch exist in significant numbers in the field. After analyzing the in-use data which has been collected by CARB, EPA, and GM, we have concluded that the percent of in-use vehicles with leaks between 0.020 and 0.040 inch is much lower than the CARB staff's estimate of 7.8 percent.

Furthermore, GM and the rest of the industry are implementing revolutionary changes to the on-board evaporative emission control systems in response to the new enhanced evaporative test procedures. The problems identified by in-use studies have been addressed by improving the design, which further reduces the possibility of small leaks in the future.

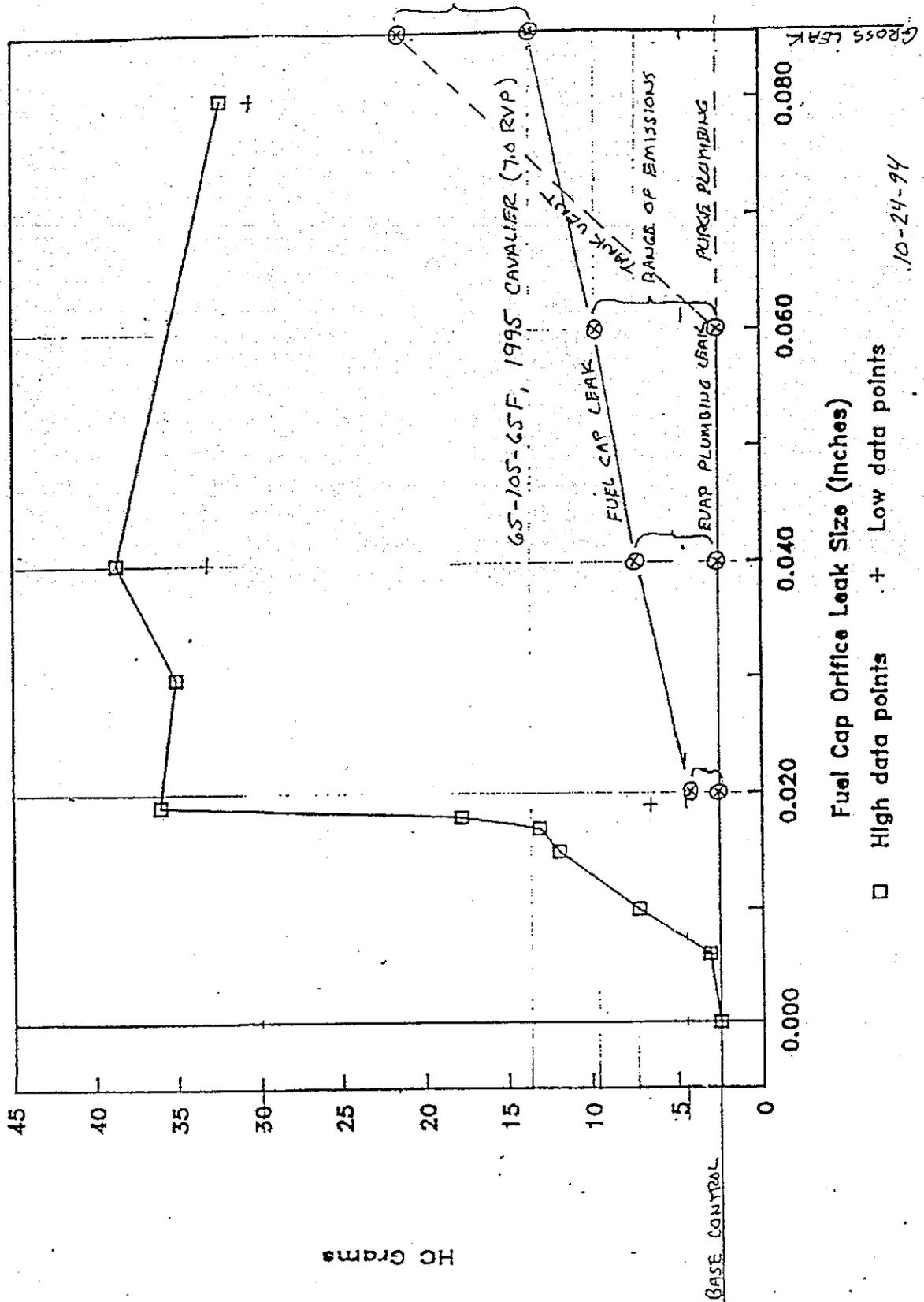
More importantly, radically improved designs needed to meet both the enhanced evaporative and Federal On-board Refueling Vapor Recovery requirements have reduced the resistance of vapor flowing to the canister which has dramatically reduced the potential emissions resulting from small leaks. The previous data we submitted for a 1990 vehicle are no longer applicable. As illustrated in Figure 1, the emissions from a 0.020 inch leak on a 1995 Cavalier with 7.0 RVP fuel are expected to range from negligible to 3 grams HC depending on leak location. Average emissions from 0.020 inch leaks would be much less than 3 grams HC. This is a dramatic reduction from what was observed on a 1990 vehicle. Recent data generated by another manufacturer supports this trend, showing emissions from a 0.020 inch leak that are less than 0.2 grams HC.

In addition, the auto industry has developed the Evaporative System Service Port and new off-board leak location tools and procedures which will be implemented beginning in the 1996 model year. This service port allows non-intrusive access to the evaporative system for testing and repair purposes in both the assembly plant and in-use service applications. This system will be used in the assembly process to reduce the likelihood that vehicles with leaks will be sold and will also significantly reduce the probability of repair-induced leaks in the field.

Figure 1

24 HR DIURNAL EMISSIONS VS LEAK SIZE

65-105-65F, 1990 BUICK REGAL (9.0 RVP)



10-24-94

Finally, the CARB staff's analysis presented in Mail Out #94-38 overestimates the contribution of evaporative emissions in general. For example, the analysis assumes that average evaporative emissions will be 0.077 g/mi (based on 2 grams per test and 26 miles per day) while the test is based on a 99th percentile temperature excursion when a vehicle is parked all day. Furthermore, the analysis assumes average running loss emissions of 0.05 g/mi which would really only exist at the end of a 99th percentile trip. The true average contribution from evaporative emissions from a properly functioning vehicle will be much lower. The potential evaporative emissions from a vehicle with a 0.020 inch leak have been similarly overestimated. Whereas the CARB staff's analysis suggests that vehicles with evaporative leaks between 0.020 and 0.040 inches could cause 2003 model year fleet average HC emissions to increase by more than 50 percent, GM's analysis suggests that the increase would be less than one percent, even assuming that 7.8 percent of the vehicles have such leaks. (Our analysis assumes an average contribution from evaporative emissions of 1 g/day or 0.0385 g/mi HC. Adding this to a 0.062 g/mi HC exhaust emission results in a baseline of 0.1005 g/mi HC from a properly functioning vehicle. Further assume that evaporative emissions from small leaks are negligible during the 77 percent of the days when vehicles are driven and average 0.75 g/day during the 23 percent of the days when vehicles are parked. Assuming 7.8 percent of the vehicles had such small leaks, the average HC emissions would increase by $0.078 \times 0.75 \text{ g/day parked} \times 0.23 \text{ days parked} / 26 \text{ miles per day} = 0.0005 \text{ g/mi HC}$ which is about one half of one percent of the 0.1005 g/mi baseline.)

At this point, no enhanced evaporative systems with OBD II have been introduced in the field. Therefore, there is very little in-use information about the ability of the current diagnostic system to reliably detect 0.040 inch leaks or about the ability of the service industry to locate and repair such leaks. Our data demonstrates that our vacuum based diagnostic, which is calibrated to detect 0.040 inch leaks, will actually detect smaller leaks in many cases. For example, in order to detect a 0.040 inch leak located in the canister area (which is far from the pressure sensor), a vacuum decay time constant must be used which will result in detecting leaks even smaller than 0.040 inch that are located in the fuel tank area (near the pressure sensor). In addition, several smaller leaks could combine to cause a 0.040 inch leak to be indicated. If a 0.020 inch threshold were used, the result would be detection of leaks smaller than 0.020 inch and false MILs. Therefore, before we implement a 0.020 inch threshold, we must prove that the service industry is able to find and fix leaks even smaller than 0.020 inch. The staff has not demonstrated that it is feasible to find and fix leaks smaller than 0.020 inch.

In addition, we have begun evaluation of our evaporative diagnostic's capability to detect 0.020 inch leaks and our initial results indicate that it will not be possible to restrict monitoring conditions enough to reliably detect such

small leaks. The CARB staff's analysis in Mail Out #94-38 did not account for vehicle-to-vehicle variability or "fuel slosh" with high RVP fuel, which may cause false MILs. Such high RVP fuel is commonly available in states around California and in the Northeast states that receive California vehicles. Therefore, it is likely that changes to both hardware and monitoring algorithms will be necessary to detect 0.020 inch leaks and to avoid false MILs.

Considering that (a) the number of small leaks (between 0.020 and 0.040 inch) on older vehicles may be very small, (b) we have dramatically improved designs to reduce both the possibility of, and the emissions that would result from, small leaks on future vehicles, (c) we are introducing an evaporative system service port and off board leak check procedure which will reduce the possibility of leaks following new vehicle assembly or in-use repair, and (d) our existing diagnostic will detect many leaks less than 0.040 inch, we do not believe that it is reasonable or cost effective for us to redesign our evaporative diagnostic system to meet a 0.020 inch threshold requirement. Furthermore, before requiring a 0.020 inch threshold, the staff must demonstrate that it is feasible to find and fix leaks even smaller than 0.020 inch.

Therefore, GM recommends the following:

1. A government/industry study to identify and quantify evaporative system leaks in the real world and evaluate their emissions impact.
2. Allow time for the current evaporative system diagnostics to mature in the field. We are concerned that the service community may not be able to verify, locate, and repair small leaks. This will require proper training, tools, and some real world experience. Changing the diagnostic strategy after only 1 or 2 years in the field may create much confusion if new detection tools and methods need to be implemented.
3. Have a CARB workshop during calendar year 1998 to review the following:
 - Field results with the 0.040 inch leak detection systems
 - Proposed OBD strategies to detect 0.020 inch leaks
 - Potential real world emissions impact of 0.020 inch threshold
 - Ability of service industry to find & repair leaks smaller than 0.020 inch

The CARB should delay requiring a 0.020 inch threshold until it is demonstrated to be cost effective and until it has been demonstrated that it is feasible to find and repair leaks smaller than 0.020 inch. If this can be demonstrated, the 0.020 inch threshold should be phased-in, starting no sooner than the 2001 model year, to allow sufficient lead time for new diagnostic systems/hardware. If the CARB elects not to delay the phase-in, GM would prefer that the phase-in be modified to coincide with the phase-in of the Federal on-board refueling vapor recovery requirements.

Statistical MIL Illumination: The CARB staff has proposed that section (a)(1.7) be modified such that "Strategies requiring on average more than six driving cycles for MIL illumination shall not be accepted." We believe this proposed modification is unnecessary and counterproductive. Independent statistical experts agree that the statistical protocols we intend to use, e.g., exponentially weighted moving average (EWMA), represent the best decision making technology currently available. Therefore, assuming an acceptable risk of false MILs for a particular diagnostic system, the EWMA should illuminate the MIL sooner than the "two-in-a-row" protocol for all real world failure modes and conditions. Limiting the average run length to six is counterproductive because it may prevent us from using EWMA to avoid false MILs or from optimizing EWMA for detection of gradual deterioration. **GM recommends that the average run length be limited to a maximum of ten.**

Misfire monitoring: GM appreciates the staff's efforts to address our concerns on this issue. Although we do not have sufficient data to be certain that we can meet the modified requirements, we are making changes to many of our engines to expand the monitoring conditions and we believe there is a reasonable chance that most engines will be able to comply in the time allowed. However, since we remain concerned about a few of the most difficult engines, **GM recommends that the CARB assess manufacturers progress in a Workshop during calendar year 1996.**

Misfire Monitoring for Diesels: The CARB staff has proposed adding section (b)(3.5) which requires misfire monitoring for diesels under limited operating conditions beginning with the 1998 model year. In response to the staff's requests, GM has investigated various techniques for misfire detection on diesels. To date, none of these techniques has proven to be practical and reliable. While similar crankshaft speed fluctuation technology as is used for gasoline fueled engines should theoretically work, we anticipate there may be unique problems inherent to diesels that may make it difficult to implement. Therefore, **GM recommends that the feasibility of misfire monitoring for diesels be addressed at a future workshop and that implementation be delayed until the 1999 model year.**

Comprehensive Components: The staff proposes to revise section (b)(10.1) to require monitoring of "any electronic powertrain component/system which: (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." The staff also proposes to revise section (b)(10.5) to add, "Emission data may be requested for any reasonable driving condition."

GM has several concerns about these paragraphs. First, test conditions and procedures must be defined. To allow adequate time for diagnostic

development, we need to be able to run tests to determine which components affect emissions. It is not practical to test every component to determine whether malfunctions affect emissions under every possible driving condition, e.g., light acceleration, moderate acceleration, heavy acceleration, deceleration, low speed cruise, high speed cruise, idle, etc. Furthermore, in order to make meaningful and repeatable measurements, a specific testing and measurement process must be defined and developed. To be meaningful, repeatable, and practical, such testing must be limited to defined test conditions associated with emission standards, e.g., FTP, Highway NOx, Cold CO, etc. If the staff believes that a particular in-use driving condition is not adequately represented by existing tests, the appropriate method to address this is through modifications or additions to the test procedures, such as the current work on "Bag 4", etc. We will be willing to provide test data using new EPA or CARB test procedures as soon as they are completed. **The staff has not demonstrated the feasibility and cost effectiveness of this proposed requirement for emission data for "any reasonable driving condition" (without a defined test procedure) and GM recommends that this proposal be deleted.**

Our second concern is that the staff has been interpreting the phrase "can affect emissions" to mean any measurable effect on emissions, no matter how small. We are concerned that this may result in illumination of the MIL for components that do not have a significant impact on emissions when compared to the standard. In these cases, the MIL may be illuminated for many vehicles when emission levels are still well below both the FTP and I&M standards causing great confusion for customers and service technicians. We believe that the MIL should only be illuminated when there is a significant increase in emissions such that a typical vehicle is likely to exceed the FTP emission standards. Therefore, **GM recommends that section (b)(10.1) be revised to apply only to "any electronic powertrain component/system which can cause exhaust emissions to increase by more than 25 percent of the applicable standard."**

Our third concern is regarding the proposed requirement to include any component/system which is used as part of the diagnostic strategy for any other monitored system or component. In some cases, we may use a signal from a component to enhance diagnostic accuracy, however, if we lose that signal or the component malfunctions, we continue monitoring rather than disable the diagnostic. The CARB staff has verbally agreed that such components need not be included as emission components since they are not fundamental to the operation of the diagnostic strategy for the emission-related component. Therefore, **GM recommends that the regulation be revised to include "any component/system which (2) can disable the diagnostic strategy for any other monitored system or component."**

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In-Use Recall Testing Protocol: In section (i)(5) of the regulation, the phrase "presence of identifiable faulty or deteriorated components which affect emissions with no MIL illumination" suggests that vehicles could be recalled without having exceeded the applicable emission standards or thresholds, which would not be appropriate. **GM recommends that the phrase be replaced with "presence of identifiable faulty or deteriorated components which cause emissions to exceed the applicable emission standards or thresholds with no MIL illumination."**

Section (i)(5) contains a provision for the 1994 and 1995 model years that limits recall for excessive emissions without MIL illumination until emissions exceed 2.0 times any of the applicable standards. **GM recommends extending this provision to the 1996 model year, since that is the first time most vehicles will implement OBD II.**

Tampering Protection: The CARB staff proposes to revise section (d) to require "... secure data encryption and write protect features requiring protected electronic access to an off-site computer maintained by the manufacturer. ..." beginning with the 1999 model year. We believe that these additional tampering protection requirements are unnecessary at this time and may be excessive. The staff's proposal would require both on-board and off-board software, hardware, and process modifications. The CARB should not require automakers to implement costly additional tampering protection methods until tampering is evident. If tampering becomes a problem, we will be happy to work with the CARB, EPA, and SAE to develop additional tampering protection methods that are practical and effective. **GM recommends that revisions to the anti-tampering requirements be deferred to a future rulemaking. If the CARB elects not to defer the new requirement, it should be modified to include " secure data encryption or ~~and~~ write protect features requiring protected electronic access to an off-site computer...."**

STATEMENT TO THE CALIFORNIA AIR RESOURCES BOARD
RELATIVE TO PROPOSED CHANGES FOR THE
ON-BOARD DIAGNOSTICS REGULATION

DELIVERED BY NORMAN T. NISHIKUBO
DECEMBER 08, 1994

Good morning. I am Norman Nishikubo with Chrysler Corporation. I wish to take this opportunity to thank your Staff for all of their efforts to address and resolve most of our concerns relative to the On-Board Diagnostic Regulation. During the past two years a cooperative effort was undertaken by both CARB and Chrysler to understand, recognize and address each other's concerns applicable to the goals contained in the OBD-II Regulation. A major part of the document before you today for your consideration and adoption resulted from this cooperative effort.

Now, putting the pleasantries aside, I do not wish to leave the impression that the requirements contained in the document before you will be easily met. This Regulation from its onset and continuing today represents a major and monumental technological challenge. Human resources as well as monetary resources will continue to be pushed to their limits in order to meet these requirements. In fact, some of the provisions contained in the proposed OBD-II Regulation may prove to be non attainable. On the other hand attainment may occur. We just don't know what the future outcome will be at this point. The comments of the American Automobile Manufacturers Association presented earlier described concerns with several OBD-II requirements. We support those comments. However, we commit to all of you as we have committed to your Staff, to devote all reasonable efforts to attain the stated goals. Our commitment is essential to help ensure the protection of the interests of Californians as well as our own.

Thank you for the opportunity to present our views on this very important issue. If you have any questions at this time it will be my pleasure to answer them, if I can.

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California Air Resources Board

NOTICE OF PUBLIC HEARING TO CONSIDER)
 TECHNICAL STATUS AND PROPOSED REVISIONS)
 TO MALFUNCTION AND DIAGNOSTIC SYSTEM) Mail Out
 REQUIREMENTS FOR 1994 MODEL-YEAR) #94-38
 PASSENGER CARS, LIGHT-DUTY TRUCKS)
 AND MEDIUM DUTY VEHICLES AND ENGINES (OBD II))

COMMENTS OF CUMMINS ENGINE COMPANY

My name is Mark Stepper and I am Manager - On Board Diagnostics Programs for Cummins Engine Company, Inc., headquartered in Columbus, Indiana. Cummins is a leading worldwide designer and manufacturer of fuel-efficient diesel engines and related products for trucks and other equipment. Cummins engines, ranging from 76 to 2000 horsepower, provide power for a wide variety of equipment in its key markets: heavy-duty truck, midrange truck, power generation, bus and light commercial vehicles, industrial products, government and marine. In addition, Cummins produces strategic components and subsystems critical to the engine, including filters, turbochargers and electronic control systems. Cummins also produces natural gas engines for some applications. This year we are celebrating our 75th Anniversary of providing power for these very important markets. And we continue to march forward in developing state-of-the-art products to meet the needs of the future.

Cummins offers its support for the latest revisions to the On-Board Diagnostics II rule. We have worked pro-actively with the ARB staff over the last several years in identifying and clarifying aspects of the regulation, and feel confident that the changes and additions proposed here today are appropriate and technically justified. The additional clauses identifying differences between diesel-engine technology and gasoline-engine technology, the recognition that some engines are certified on an engine dynamometer, and recognition of an alternative communication protocol with SAE J1939 are major steps forward for this regulation which crosses a multitude of vehicle classes and weight categories.

However, one element of the proposed regulation is of potential concern to us. That is the requirement for detection of misfire on diesel engines effective in 1998. Cummins has only recently begun research into the methodology and practical application of misfire detection and measurement. As we stand before you today, we are not convinced that over the next two to three years, that we will be able to reliably detect misfire on a diesel engine. However, the latitude provided by the staff for detection only of complete loss of combustion, only during certain operating conditions, and only once per driving cycle increases our confidence as we continue our research and development of such a system. We commit to continue to update the staff on our progress on a periodic basis and we urge the staff and this Board to proceed with establishing a workshop and another status review hearing in 1996 to determine if changes would be needed

to this or other aspects of the OBD II regulation that apply to 1998 and later model year vehicles.

Cummins thanks the Board and the staff for their attention and for the opportunity to present our views on this proposal. If there are any questions, I would be happy to entertain them at this time.



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December 8, 1994

THOMAS A. FRAZIER, JR.

By Hand

California Air Resources Board
c/o Ms. Pat Hutchens, Board Secretary
P.O. Box 2815
Sacramento, California 95812

Re: Proposed Revisions to Malfunction and Diagnostic
System Requirements for 1994 Model Year Passenger
Cars, Light-Duty Trucks and Medium Duty Vehicles
and Engines (OBD II)

Dear Madam Secretary:

The following comments are provided on behalf of the Auto International Association (AIA), Automotive Engine Rebuilders Association (AERA), Automotive Parts & Accessories Association (APAA), Automotive Parts Rebuilders Association (APRA), Automotive Service Association (ASA), Automotive Service Industry Association (ASIA), Automotive Warehouse Distributors Association (AWDA), Motor & Equipment Manufacturers Association (MEMA) and the Specialty Equipment Market Association (SEMA) (hereinafter the "Aftermarket") concerning the above-noted proposal. These associations represent businesses in all sectors of the independent vehicle aftermarket, from parts manufacturing and rebuilding to distribution, installation and service. This industry provides consumers the benefit of choice, quality, and competitive prices and will play a crucial role in the success of California's vehicle inspection and maintenance program. The Aftermarket appreciates the opportunity to provide these comments on an issue which it views as critical to the industry's future.

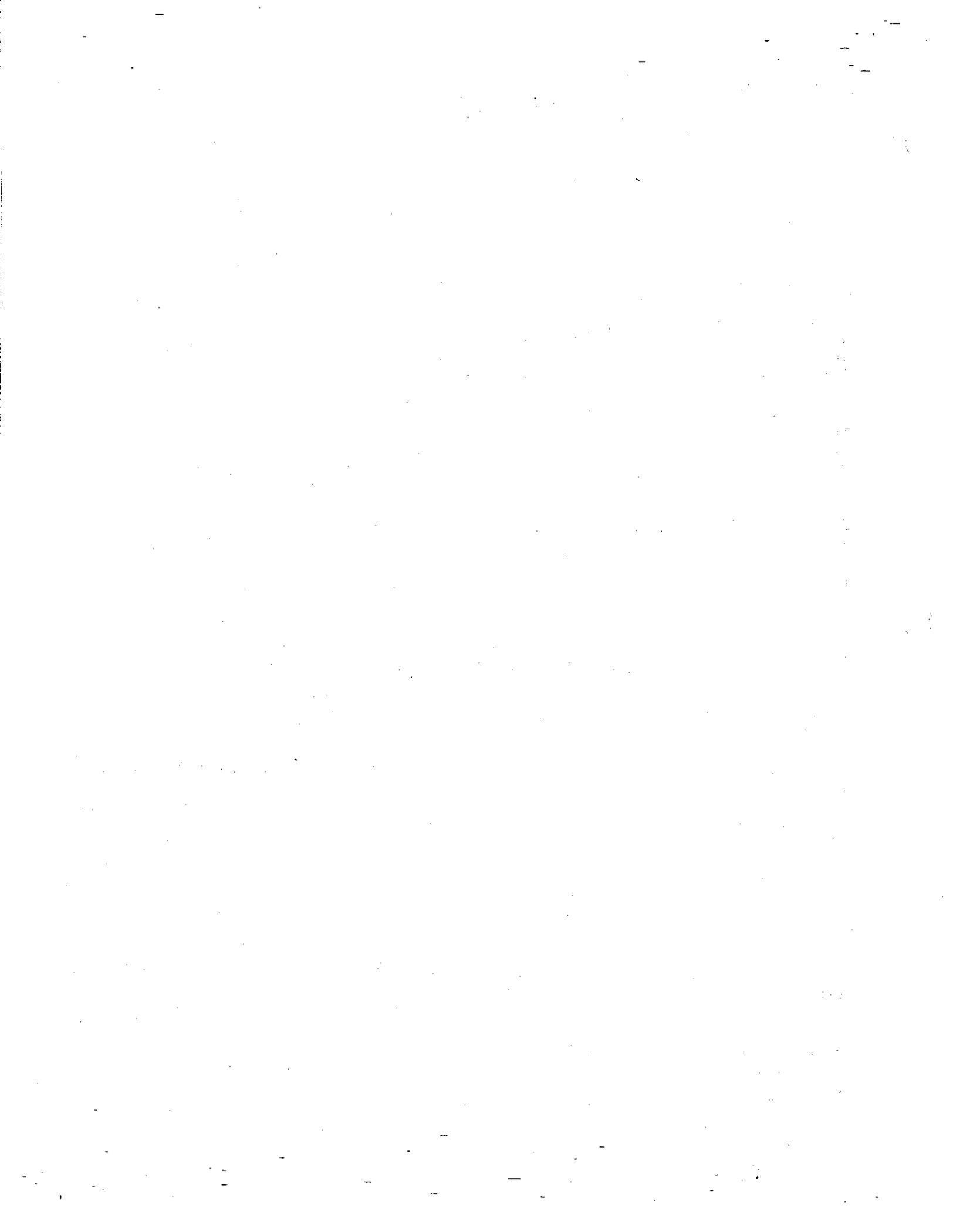
The California Air Resources Board (ARB) has adopted regulations which have as their purpose the control of emissions from motor vehicles. For some number of years, these regulations



have established standards of performance for new and in-use vehicles to attempt to deal with the serious nature of air quality in various parts of California. It has become apparent from various studies that while vehicles can be produced to meet high standards, most vehicles do not maintain those standards in use. Proper maintenance and repair is essential to compliance with emissions standards. Unfortunately, even with the periodic vehicle inspection and maintenance system, it is difficult to insure that vehicles are properly maintained and in compliance.

In order to deal with in-use compliance problems, regulations have been proposed which would require sophisticated computer technology and on-board diagnostic systems (OBD) on motor vehicles. These devices are intended to help maintain the emissions characteristics of the vehicles and monitor the performance of the vehicles for the purpose of periodic analysis. As these systems become more sophisticated and emissions requirements become more stringent, the Aftermarket faces increasing difficulties remaining competitive in the parts and service industries and, in fact, faces difficulties in competing with the OEMs on an equal basis. So long as the challenges to the Aftermarket are presented by technology, the industry will be able to survive. On the other hand, when the regulations which create these programs take specific aim at the Aftermarket and have the unnecessary effect of precluding participation by the Aftermarket in manufacturing or rebuilding emissions-related parts or undertaking emissions-related service on vehicles, the task of the Aftermarket becomes overwhelming. We believe that the ARB's antitampering provisions have gone too far and that the proposals will not only adversely affect the Aftermarket and consumers, they will disserve the interests of clean air as well.

The Aftermarket has always served as an integral part of the automotive industry. It has been responsible for supplying roughly 75% of the parts and service on motor vehicles. In addition to providing an invaluable service to the motoring public, the Aftermarket serves as a major employer and as a productive member of the business community. The industry has achieved its position by providing consumers a choice and following through with quality products and service at reasonable prices. It is highly unlikely that the vehicle manufacturers could have met the needs of vehicle owners on their own in the past and it is even less likely that they will be able to do so in the future. In this regard, the success of state emission inspection and maintenance (I/M) programs therefore depends on the availability of a strong and effective aftermarket. In short, there are good and sufficient reasons for maintaining a viable automotive Aftermarket.



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The proposed regulations Title 13, California Code of Regulations (CCR) Section 1968.1(d), would require that motor vehicles be equipped with antitampering measures which would prevent Aftermarket access, thus making it impossible to be able to design or rebuild parts which when installed on the vehicle would allow it to operate properly. Similarly, the denial of access will effectively prevent service facilities from working on vehicles.

Legislative Authority of ARB

Denying the Aftermarket the opportunity to compete would be bad enough if the ARB had the authority to eliminate the Aftermarket or if it had complied with all of the requirements which are imposed upon it by law. In fact, the ARB does not have the authority and in fact has failed to meet all statutory requirements.

The Clean Air Act, as amended, provides authority to the Environmental Protection Agency (EPA) to engage in certain regulatory programs to restore and protect air quality. While part of the authority of the Act is to be delegated to the states under specified circumstances, the federal law is designed to deal with air quality issues on a national basis. Only where authority has been delegated, does the ARB have authority to act, and then it must act within the prescriptions of the delegation. The authority in the area of clean air regulation has been preempted by Federal law and is beyond the jurisdiction of the states. The only question, then, is whether the ARB has been delegated the authority to require the types of antitampering measures which are included in the proposed regulation. It would appear that the ARB could not have been delegated such authority because the EPA itself is expressly proscribed by federal law from limiting access to the system by access codes or devices available only from the manufacturer. In this, the Clean Air Act not only omits authority to undertake antitampering measures, it expressly prohibits such exclusive measures by requiring that the Aftermarket be given OBD access and information.

Even were there authority in the Clean Air Act to require antitampering devices and that authority could be delegated to the states, the ARB has made no request to EPA for a waiver of federal jurisdiction, the process through which authority is delegated and approved. The Aftermarket notes that in absence of a federal waiver, the ARB OBD II regulations are without force or effect.

While it is clear that there is no authority in the Clean Air Act for the ARB proposal and that the federal law is preempt-



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tive in any case, even were this not so, the ARB would not be able to maintain the regulation in that there is no independent authority for such action in California law. As a result, the language which has been proposed to require antitampering measures is without authority and must be struck.

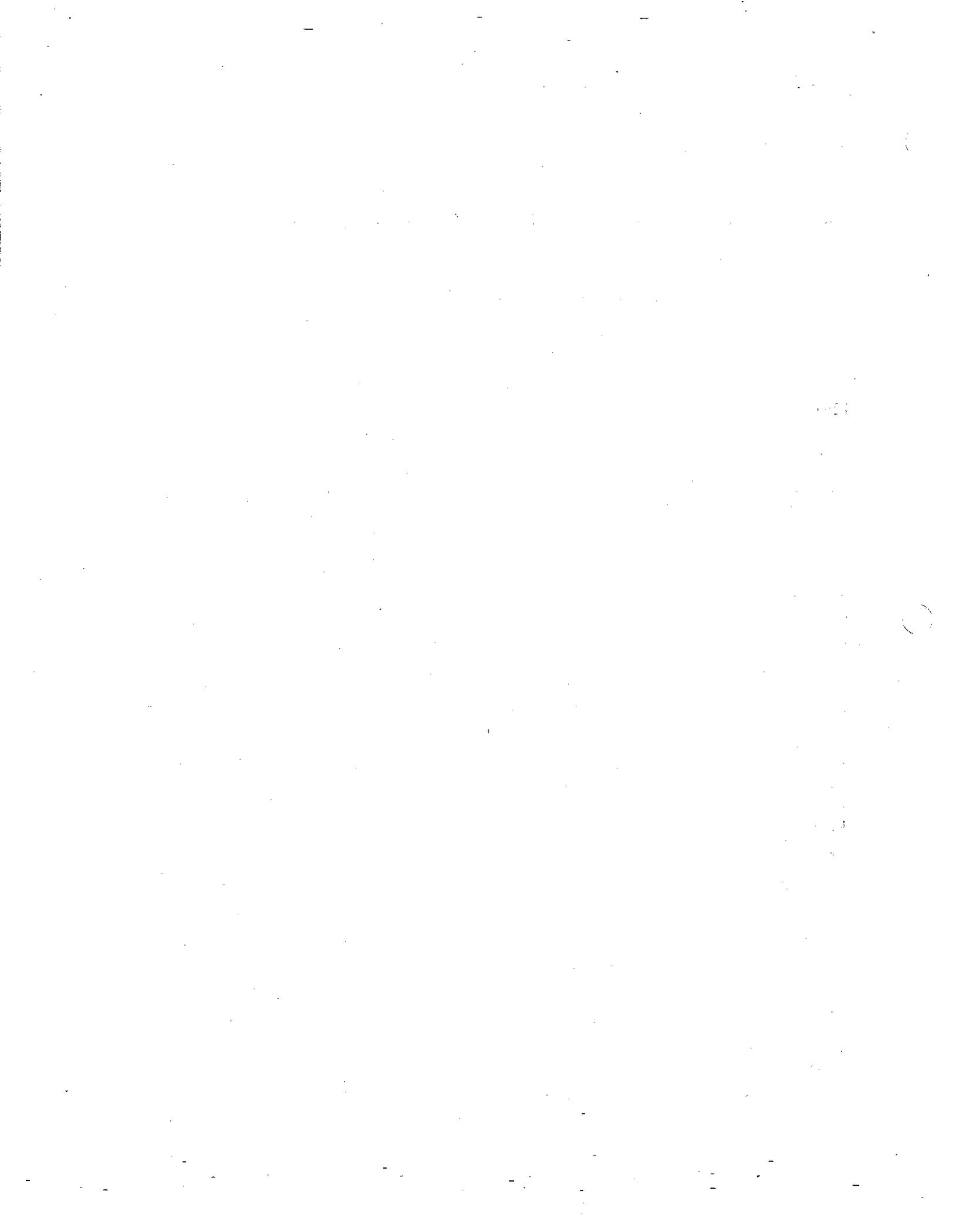
Failure To Comply With
California Administrative Procedures Act

The Aftermarket has maintained throughout consideration of the ARB's OBD II proposal that the antitampering provisions are unnecessary and do not comply with requirements of California administrative law. Standards against which ARB regulations must be reviewed are set forth in Cal Admin. Code Section 11349 et seq. and Title 1 Cal. Code of Regs. Section 1 et seq. Specifically, we assert ARB has not complied with standards calling for necessity, non-duplication and authority in promulgating the antitampering regulations.

Concerning "necessity" there is nothing in the record indicating that the antitampering provisions are mandated by California or federal statute. Nor are there specific elements of the record demonstrating that the antitampering provisions are necessary in carrying out the purposes of the OBD II regulations. A proper showing would include facts, studies, or expert opinion indicating that unlawful alteration of the OBD systems is, or will likely become, a significant problem. The Aftermarket has, in fact, been frustrated by ARB's failure to provide information demonstrating that unlawful alteration of the complex OBD II system is likely to be more than a very infrequent occurrence. It seems almost incomprehensible that ARB is proposing to eliminate the Aftermarket to prevent what to date is only a speculative problem.

The ARB also has failed to avoid unnecessary duplication in its regulations. Both California and federal statutes and regulations currently prohibit tampering with vehicles in a manner which would defeat or render inoperative vehicle emission control systems. The existing provisions prohibit and make punishable all acts of unlawful tampering, including any which could be associated with the OBD system. ARB's proposed "tampering prevention" would serve no new purpose. Although California administrative law allows for duplication under certain conditions, such as when a statute specifically authorizes the duplication, these conditions do not apply to the subject regulation.

California administrative law also requires agencies to cite statutory provisions authorizing the agency to adopt or amend a

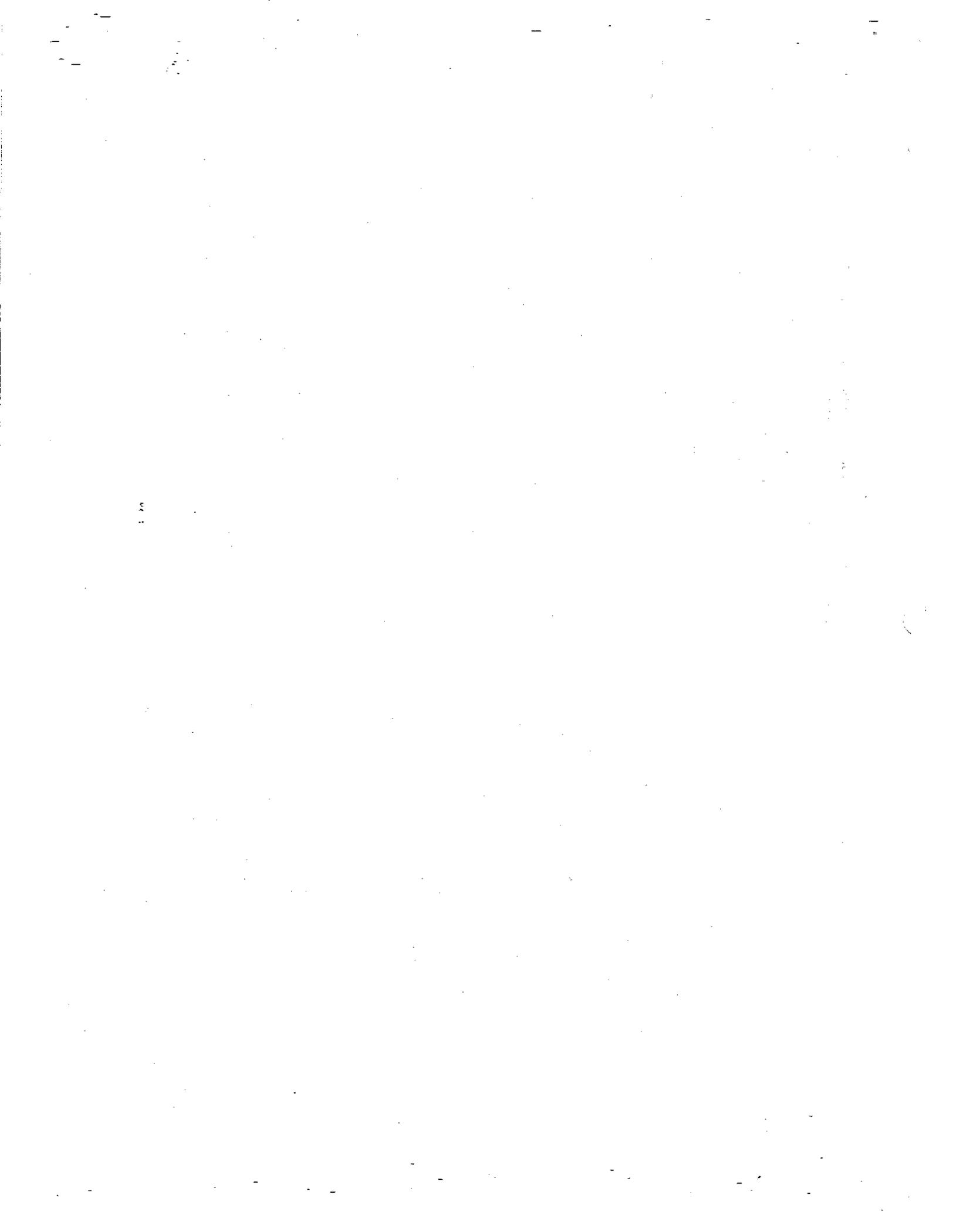


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regulation. The authority cited in the instant regulation is inadequate to the extent the California legislature has not addressed the need for tampering prevention regulations in connection with the OBD II program. Further, in view of ARB's stated interest in minimizing unnecessary conflicts with federal OBD regulations, it is noteworthy that EPA recently withdrew the antitampering provisions of its OBD regulations, which included incorporation of ARB's "tampering prevention" regulation. EPA's action was in response to a Petition for Review filed by the Aftermarket challenging the agency's authority for promulgating the EPA antitampering provisions.

Although ARB has acknowledged the expected detrimental impact of its proposed regulations on Aftermarket businesses, it implies such businesses will suffer only the adverse economic consequences of having to certify their parts for sale in California. Even if ARB's assertion is partially accurate, it only addresses one aspect of potential economic impact, namely, certification costs. Unfortunately, the proposed "tampering prevention" section would prevent aftermarket manufacturers and rebuilders from ever getting to the certification stage. Access to the system and system information as well as the opportunity to make software changes will be necessary during product development and testing. The proposed "tampering prevention" regulations would make product development impossible. Further, the sale and installation of even certified Aftermarket components would in many cases be barred because the regulation's "write protect" features would prevent computer reprogramming necessary to properly accommodate the aftermarket component. The foregoing would effectively eliminate the Aftermarket in California. To the extent vehicle manufacturers will be producing cars for all states based on the California OBD II requirements through 1998, development and sales of parts for sale in all other states will be eliminated as well.

As noted in the ARB's Notice of Public Hearing in this matter, the Board must determine that no alternative considered by the agency would be as effective but less burdensome to affected persons than the proposed action. The Board has requested comments on potential alternatives that would lessen the economic impact on business. Toward this end, the Aftermarket has been meeting with ARB representatives in recent weeks to devise alternatives which would discourage unlawful tampering but allow legitimate Aftermarket businesses to continue designing, certifying and installing OBD-compatible components, as well as performing vehicle service. Future meetings have been scheduled and we will submit details of alternative proposals as they are developed.



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Improper Delegation of Authority

ARB's "Tampering Prevention" provisions require vehicle manufacturers to institute what amounts to a regulatory program to prevent tampering -- without any limitations to assure adequate opportunities for competition from the Aftermarket. Specifically, ARB directs the vehicle manufacturers to include "write protect features requiring electronic access to an off-site computer maintained by the vehicle manufacturer." This requirement would allow the OEMs to dictate the terms and participants in any service and parts design and installation which require on-board system reprogramming. Such unchecked latitude certainly constitutes an unlawful delegation of ARB authority to regulate in this regard.

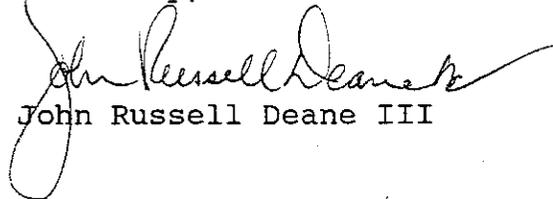
The Aftermarket submits that incorporation of SAE J1979 and J1939 may potentially represent a further unlawful delegation of authority. The proposed regulation does not clarify whether later changes to these SAE standards will have no effect on the regulation or if such later changes will be deemed incorporated. If ARB intends the latter, the agency will have improperly delegated the promulgation of this aspect of the regulations.

Conclusion

For the foregoing reasons, the Aftermarket requests the ARB reconsider the proposed antitampering provisions of the OBD II regulation. The Aftermarket is enthusiastic about participating in planned meetings with the ARB, EPA and the vehicle manufacturers to resolve the parties' respective concerns. We strongly suggest that finalization of the antitampering provisions be delayed to allow for this dialogue and potential resolve.

The Aftermarket appreciates the opportunity to provide comments on this important matter. We would be pleased to provide any additional information you may require.

Sincerely,



John Russell Deane III

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**COMMENTS
OF THE
AUTOMOTIVE PARTS AND ACCESSORIES ASSOCIATION, INC.**

**CONCERNING PROPOSED REVISIONS TO MALFUNCTION AND
DIAGNOSTIC SYSTEM REQUIREMENTS FOR OBD II SYSTEMS**

**PRESENTED TO
THE CALIFORNIA AIR RESOURCES BOARD
DECEMBER 8, 1994**

The Automotive Parts and Accessories Association is a trade association representing over 1,600 manufacturers, manufacturers' representatives, distributors and retailers of automotive parts and services nationwide. APAA is concerned about California Air Resources Board proposed and already promulgated anti-tampering provisions for on-board diagnostic systems. Since the aftermarket associations have submitted a more detailed set of comments, I will make my comments brief and only cover APAA's general areas of concern regarding the OBD II rules and proposed changes.

At the outset, I want to be clear that APAA supports efforts by the Environmental Protection Agency and CARB to ensure that the new mandated OBD systems are not utilized in such a way as to cause either the diagnostic system to operate improperly or vehicle emissions to exceed permitted levels. However, APAA opposes CARB anti-tampering provisions, as currently written, due to concerns that they will shut out the independent parts and service industry from competing with the car companies and their franchised dealers for many emissions and driveability repairs. Clearly, CARB does not have authority to promulgate these antitampering provisions based on the Section 202(m) on-board diagnostic provisions of the Clean Air Act. These provisions provide for full access to the OBD system by independents and prohibits "any access code or any device which is only available from a vehicle manufacturer." Further, restricting access is not in the best interest of car owners which depend on a competitive repair market in order to obtain affordable, convenient and effective vehicle service. Absent an independent aftermarket, car owners will face significantly higher vehicle repair costs and have less incentive to properly maintain their vehicles. In-use vehicle emissions, which the OBD system is promulgated

to improve, will suffer as a direct result.

Generally independents need reprogramming information for the following reasons:

- To install OE developed reprogramming changes which are necessary to correct either a driveability or emissions problem. Often these changes must be made before other repairs are initiated.
- To install a replacement ECU. Car companies likely will provide replacement ECUs equipped with a generic chip which can be programmed at the dealership for each particular application. These applications can vary by vehicle line or even by VIN. Without a similar capability, independent service and ECU suppliers will not find it profitable to be involved in this business. The anticompetitive implications become more serious if vehicle manufacturers begin equipping other components with generic chips which are programmed at the dealership to fit different applications. Such action is very possible since it is both technically feasible and would reduce parts proliferation, thereby saving car companies significant amounts of money.
- To install an aftermarket or speciality part which might be different than the OE parts it replaces. The reprogramming in this regard is necessary to insure the MIL does not illuminate unnecessarily. However, installation of these parts does not necessarily translate into an increase in emissions. In some cases aftermarket parts might mean an

improvement over the OE component by actually causing a reduction in emissions from a particular vehicle. It should further be noted that we believe that OEs could also require calibration changes for installation of components produced by their aftermarket divisions.

While independent parts manufacturers share the reprogramming needs of the independent service facilities for installation of their parts, they also will require additional information in order to design and produce aftermarket components. Specifically, these aftermarket manufacturers will require certain parts specifications and calibrations in order to ensure that replacement components will work properly with the OBD system. Exactly what information will be necessary can only be determined based on further discussions between aftermarket parts producers and the OEs. We are concerned that due to the rapidly changing technology of the OBD system and our general lack of experience in working with new diagnostic systems, there is much which we need to learn to insure that our parts are compatible with these advanced OE systems.

APAA fully understands that certain issues related to the parts manufacturers might involve complex solutions. However survival of the aftermarket parts industry is no less critical to affordable repairs than survival of a competitive service industry. A supply of competitive parts for many applications is a major factor in the capability of independent service facilities to provide effective and affordable repairs. This competitive aftermarket parts market also serves to keep OE component prices down.

Therefore in order ensure security of the diagnostic systems and protect consumer rights, we urge that the CARB develop a process whereby independents have access to critical OBD related information. While it would be preferable for OEs and independents to resolve this problem on our own, APAA does not believe that, absent CARB involvement, such cooperation will not occur in time for our parts manufacturers to develop aftermarket components for OBD vehicles already hitting the streets. APAA further suggests that if CARB is to initiate a process to address these concerns, that issues regarding parts which are direct replacement and those which might require changes to OE calibrations be considered separately since each process likely will mandate different information sharing procedures.

In conclusion, APAA strongly urges the Board to delay adoption of these antitampering provisions until a process can be developed whereby the aftermarket is provided sufficient access to the government mandated OBD II system to design and install components which operate properly with the vehicle emissions system. Without this delay and subsequent action to insure access for independents, the Board may impose restrictions which will be detrimental to the independent aftermarket and ultimately clean air and the consumer.





401 North Michigan Avenue
Chicago, Illinois 60611-4267
312/644-6610

94-12-2
12/8/94

STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 12/8/94
BY BOARD SECRETARY
XC BOARD MEMBERS
JDB Legal
TAC MSD

December 2, 1994

Via Overnight Mail

Mr. Don Drachand
Chief, Mobile Source Division
Air Resources Board
9528 Telstar Avenue
El Monte, CA 91731

RE: **ARB Hearing Item 94-12-2: Technical Status and Proposed Revisions to Malfunction and Diagnostic System Requirements for 1994 Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines (OBD II)**

Dear Don:

The Engine Manufacturers Association (EMA) has reviewed the subject report and proposed revisions concerning the emission control malfunction and diagnostic system requirements and presents its comments concerning the provisions which directly affect medium-duty vehicles and engines. EMA offers its support for the latest revisions to the On-Board Diagnostics II rule which will be reviewed with the Board as an agenda item at the December 8, 1994 hearing.

In developing its report, ARB staff has followed a process that solicited information from those most likely to be affected by, and informed about, OBD II systems requirements for medium-duty vehicles and engines. The latest revision allows the use of heavy-duty diagnostic protocols as documented in SAE J1939 which is still in the process of development. In addition, the conclusions as stated in the report clearly indicate that ARB has carefully studied and utilized the input it has received, and in so doing, has fulfilled responsibly its legislative mandate to determine the cost-effectiveness of the OBD II systems requirement.

EMA and its member companies have worked with ARB staff on this and many other issues over the years. We look forward to continuing to explore with CARB cost-effective, commercially-viable means to improve air quality in California.

Sincerely,

Glenn F. Keller
Executive Director

cc: Ms. Pat Hutchins
ARB Secretary

gfk\hdoh\obdii.arb

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FIAT AUTO R&D U.S.A.
A division of FIAT AUTO U.S.A., INC.

94-12-2
12/8/94

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BY BOARD SECRETARY
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39300 COUNTRY CLUB DRIVE
FARMINGTON HILLS, MICHIGAN 48331-3473
(313) 488-5600
FAX (313) 488-5820

December 2, 1994

R & D - USA

Secretary
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

**SUBJECT: Public Hearing of December 8, 1994 to
Consider Proposed Revisions to OBD II Regulations**

Dear Gentlemen:

I would like to emphasize the importance of the proposed OBD II modifications in Mail Out #94-38, to the continued viability of small volume manufacturers in California.

Small volume manufacturers are given low priority by engine control system suppliers because of the extremely low sales volume of the small volume manufacturers.

Alfa Romeo and Ferrari have always been in the vanguard of emission control technology for high performance vehicles, achieving stringent standards in advance of their required implementation schedules.

In this difficult economic situation, we need CARB to retain, in its OBD II regulation, the discretion of the Executive Officer to extend additional leniency in particular cases in which the introduction of new technology, which is difficult to obtain in a timely manner, could jeopardize the very fragile market presence of a small volume manufacturer.

We ask this also in consideration of the minimal environmental impact of a delay in OBD II compliance by small volume manufacturers.

I thank you for your consideration.

Sincerely,

Alberto Negro
Chief Executive Officer

MAR/gc

cc: Mr. Steve Albu - CARB

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The Gas Company™



December 6, 1994

94-12-2
12/8/94

Andrew C. Hirsch

Senior External Affairs Manager

Environment & Safety

STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 12/7/94
BY BOARD SECRETARY
XC BOARD MEMBERS
JDB Legal
TAC MSD

Hon. Members of the Air Resources Board
c/o Board Secretary
California Air Resources Board
2020 L Street
Sacramento, California 95814

Southern California
Gas Company

555 W. Fifth Street
Los Angeles, CA
90013-1011

Dear Members of the Air Resources Board:

Mailing Address:

Box 3249
Los Angeles, CA
90051-1249
M.L. 27D0

Southern California Gas Company supports adoption of the proposed changes to the Malfunction and Diagnostic System Requirements for 1994 Model-Year Passenger Cars, Light-Duty Trucks, and Medium Duty Vehicles and Engines ("OBD II"), as published on October 11, 1994.

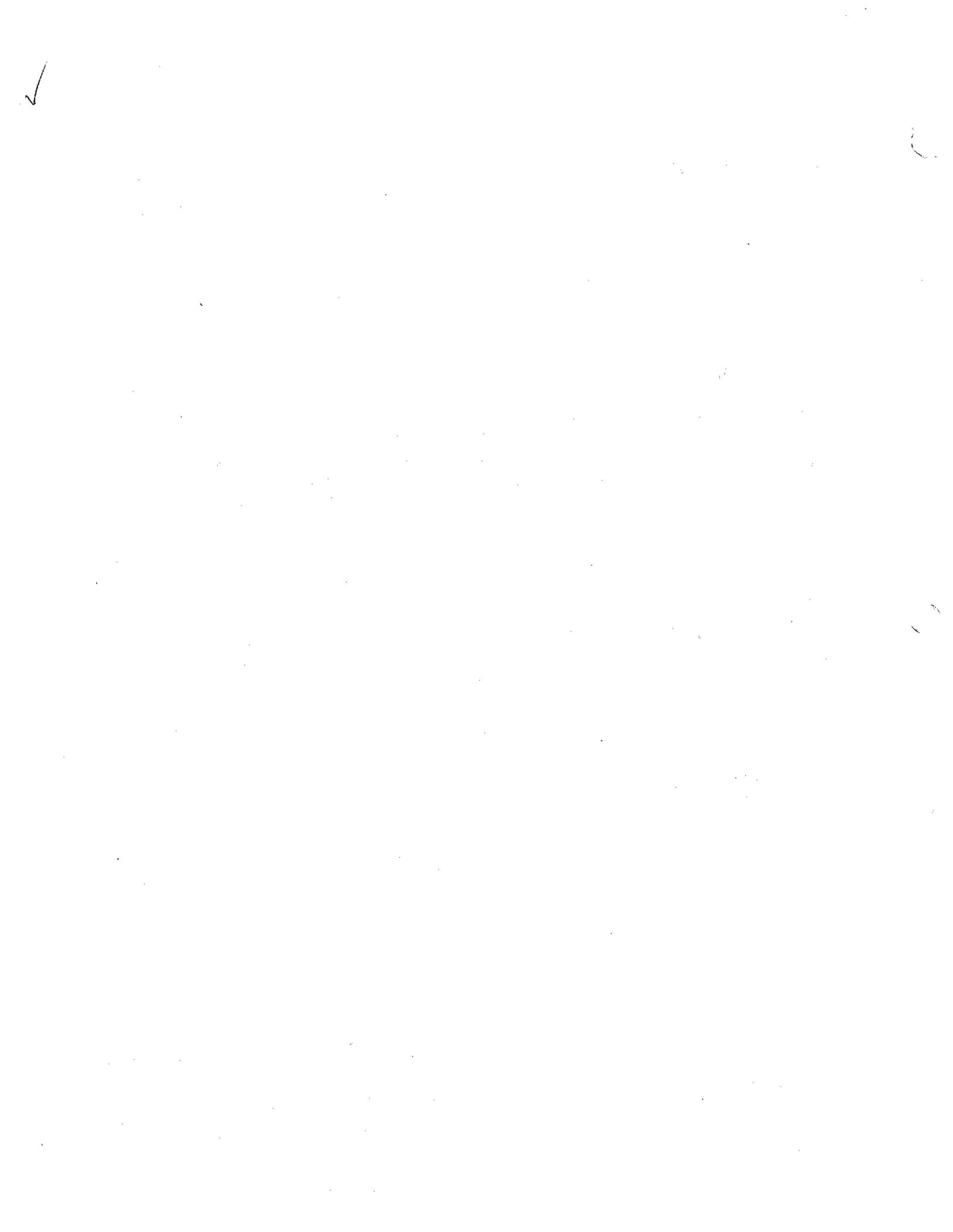
tel 213 244-2509
fax 213 244-8181

The Gas Company notes that the proposed revisions include a conditional delay in the new OBD II requirements for both OEM and retrofit natural gas vehicles until the 1999 model year. The inclusion of this provision will afford alternative fuel vehicle manufacturers both added flexibility and additional time. The Gas Company appreciates the Air Resources Board's recognition of alternative fuel vehicles in such a fashion.

Thank you for the chance to support this rule-making.

Sincerely,

a:Disk AI:ARBOBD
c:win:ach:ARBOBD



December 7, 1994

Board Secretary
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Subject: Proposed Amendments to regulations regarding On-Board Diagnostic Systems.

IMPCO, as the world's leading manufacturer of alternative fuel conversion systems, would like to offer support to the California Air Resources Board in the promulgation of regulations intended to reduce the emissions of motor vehicles. However, IMPCO would like to offer some comments regarding the proposed amendments to the OBD II regulations.

1. In section 3.0.d, manufacturers are required to provide tamper resistance for their computer systems, included potting of the ECM. Additionally, starting in model year 1999, data encryption is required for reprogrammable computer systems. IMPCO feels that this requirement is overly burdensome on the aftermarket conversion system industry. It is important for an aftermarket conversion system manufacturer to be able to access the vehicle's ECM to allow for modifications to be made while the vehicle is operating in alternative fuel mode. Without this ability, an aftermarket conversion system manufacturer would not be able to assure proper operation of the diagnostic system in alternative fuel mode.

A possible solution would be an input to the OEM ECM which would disable the vehicle's fuel system. This would then disable the diagnostic strategies which require closed loop fuel control. An aftermarket equipment manufacturer could then install a secondary ECM which would take up the responsibility for closed loop diagnostics. The tampering protection would not be affected, as the vehicle would not be capable of operating on gasoline with the diagnostics disabled.

2. In the proposal, a modification is made to the current procedures for certifying alternative fuel conversion systems. This modification allows an aftermarket system manufacturer to disable some diagnostics during alternative fuel mode using engineering evaluation prior to model year 1998. It must be understood that an aftermarket conversion system manufacturer will have to redesign any diagnostic which must run on alternative fuels and would have the parameters changed by alternative fuel operation. This is equivalent to designing our own OBD II system for the vehicle. For this reason, IMPCO believes that the requirement for affected OBD II strategies should be extended at least until 1999, when the automotive manufacturers will be required to provide alternative fuel diagnostics. Additionally, for demonstration of OBD compliance, it would be overly burdensome for an aftermarket equipment manufacturer to have to demonstrate that the OBD II system is operational within the required emission limits. Instead, an aftermarket conversion system manufacturer should demonstrate that the MIL will illuminate under similar conditions as the OEM OBD II system.



Thank you for your time. If you have any questions, please contact me at (310) 860-6666 Ext. 289.

Sincerely

Ambre McMillan
Regulatory Compliance Engineer

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NISSAN RESEARCH & DEVELOPMENT, INC.

December 8, 1994

State of California
Air Resources Board
P.O. Box 2815
Sacramento, California
USA 95812

18455 South Figueroa Street
Gardena, CA 90247

Mailing Address

P.O. Box 47028
Gardena, CA 90247
Telephone: (213) 532-3111
Facsimile: (213) 719-5658

Attn.: Board Secretary
Subject: On-Board Diagnostic Regulations - Comments on Proposed Modifications

Dear Reader,

On October 11, 1994 the Air Resources Board ("ARB") published the text of proposed changes to the regulations governing phase two of the On-Board Diagnosis Requirements ("OBDII"). We are writing to provide Nissan's comments to those proposed changes in mainly three areas:

1. Reduction of the evaporative loss system leak detection area limit by 75%
2. LEV Catalyst Monitoring Requirements
3. Misfire Monitoring Requirements

1. Detection of 0.02 Inch Diameter Equivalent Vapor System Leaks: The current OBDII requirements stipulate that manufacturers must evaluate the vapor integrity of the evaporative loss emission control system. The threshold for fault diagnosis is specified as the equivalent of a 0.04 inch diameter orifice installed in the vapor system (the "0.04 inch requirement"). The 0.04 inch requirement is largely untried for volume production in customer hands. We believe that most manufacturers will not incorporate this feature on a large part of their product line until 1995 or later model year. Consequently, large-scale customer-based in-use data does not exist on the efficacy of 0.04 diagnosis and the frequency of mis-detection. However, the now-proposed requirement further reduces the malfunction threshold area by 75%. We believe that this proposed requirement (the "0.02 requirement") is premature at the very least. Evaluation of the feasibility of the 0.02 inch requirement will require additional study including feed-back from in-use vehicles meeting the 0.04 requirement.

Nissan has developed some preliminary data assessing the 0.02 inch requirement. This data is based on our current 0.04 inch requirement hardware and diagnostic algorithms. The limited data that we have developed, to date, do not allow us to conclude that the 0.02 inch requirement can be achieved. However, Nissan believes that further study is required before any definitive conclusion can be reached. The staff report that prefaces the proposed rule changes asserts that "...detecting leaks as small as a 0.02 inch orifice appears feasible...". That prefacing material includes some data and techniques used by the staff in evaluating the 0.02 inch requirement. Nissan has not had sufficient time to evaluate this material in order to judge its applicability to our systems and vehicles.

In order to evaluate the staff's techniques and assertions, Nissan will need additional time and testing. Allowing time for evaluation of the 0.02 inch requirement feasibility will simultaneously permit manufacturers to begin to obtain feed-back from in-use vehicles intended to meet the 0.04 inch requirement.

Even after a brief review, we can see some differences between the evaluation test parameters used by the staff and those used by Nissan. We have not had sufficient time to evaluate the magnitude and significance of these differences, some examples are:

A. Canister Volume and Capacity: Nissan conducted our evaluation using production style canister of the same design and capacity as those that will meet the 0.04 inch standard. We believe that the ARB staff used a previous generation canister with significantly reduced volume and capacity. We believe that this difference would tend to overstate the feasibility of the 0.02 inch requirement.

B. Influences of Canister Desorption Under Checking Conditions: Nissan has seen that the carbon canister will readily surrender stored vapor during a vacuum-based checking sequence. This surrendered vapor can cause a spurious pressure increase that mimics the pressure characteristic of a vapor leak. Different canister loading at the start of the test can produce different pressure changes and contribute to the risk of mis-diagnosis. It is not clear that the ARB staff considered this effect fully when conducting their testing. Ignoring this effect would tend to overstate the feasibility of the 0.02 inch requirement.

C. Evaporative Loss System Hardware and System Complexity: The new evaporative loss standards and test procedures substantially increase the hardware content and complexity of Nissan's evaporative loss control systems. Systems meeting the new standards and test procedures have greater volume, more connections, more valves, more hoses, and larger canisters installed in very different locations.

For our evaluation testing, Nissan used diagnosis hardware (especially canister vent cut valve) of the same design and capacity as those that will meet the 0.04 inch requirement. The staff report was unclear about what type of hardware was used. Nissan has found that hardware limitations (especially any small seepage flow of a nominally closed valve) can have a very large influence on diagnosis variability. Our data indicate that normal vacuum seepage from a single valve can account for as much as 25% of the proposed standard. Many systems, including Nissan's, will incorporate more than one valve that may exhibit seepage during diagnosis. This seepage has no emission influence but only effects the accuracy and variability of the diagnosis.

Evaporative loss system hardware and system complexity can both contribute to scatter in diagnostic test results (even with an intact system). Nissan conducted evaluation tests using systems that meet the new evaporative loss standards and test procedures.

We believe that the ARB staff used previous generation systems with significantly reduced hardware and complexity. We believe that this difference would tend to overstate the feasibility of the 0.02 inch requirement.

Since our discussion with the ARB staff on December 5, 1994 we have briefly considered the technique used by the ARB staff in evaluating 0.02 inch leak detection. The technique disables 0.02 inch leak detection on the basis of a preliminary pressure indication. However, we believe that this pressure assessment technique would require a fairly lengthy period to de-pressurize the vapor system to a known low (and relatively stable) pressure before reliable pressure assessment could be done. The need to establish a known pressure condition before assessing the fuel vapor generating capacity, will have three distinct disadvantages:

D. Time Requirements to Establish a Known Pressure Condition: Any leak diagnosis should be conducted promptly after cold start, with the fuel in the lowest temperature condition. De-pressurization will take time. The time required will work against the possibility of actually passing the pressure assessment pre-condition.

E. Effects on Evap System Effectiveness: De-pressurization time will reduce the available purge time and reduce the effectiveness of the running loss control algorithm, leading to reduced evaporative loss system effectiveness. That is, the diagnosis itself will interfere with the most efficient operation of the vapor control system.

F. Tailpipe Emission Influences: De-pressurizing the system requires the vehicle to process a large volume of vapor while trying to minimize tailpipe emission influences. De-pressurizing the vapor system should wait until the engine and emission system are fully warmed up. Otherwise we encounter the risk of increasing tailpipe emission levels. The required de-pressurization time will work against the possibility of actually passing the pressurization assessment pre-condition.

In summary, Nissan's limited preliminary data does not allow us to conclude that the 0.02 inch diagnosis requirement can be achieved with our systems, as currently designed to meet the new evaporative loss standards and test procedures including 0.04 inch leak diagnosis. Nissan asks that the 0.02 inch requirement be held in abeyance until we complete further studies on the feasibility of the requirement.

2. Misfire Detection: ARB proposes to expand the range of the misfire monitoring requirement. The proposed change expands the monitored range to include all engine speeds and positive torque conditions with the exception of a small area of high engine speeds and light engine loads. Nissan foresees the possibility of meeting the proposed misfire requirements for our 4-cylinder and 6-cylinder engines. For 8-cylinder engines however, Nissan believes that misfire diagnosis may have to be suspended under certain defined engine operating conditions in order to prevent mis-diagnosis and false MIL illumination. The potential for mis-diagnosis is not limited to the conditions of rough road or transmission shift points mentioned as examples in the

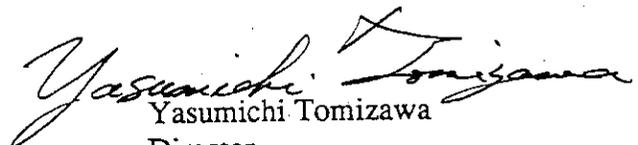
proposed revised regulation language. Nissan asks that ARB permit manufacturers to present data showing the necessity of suspending misfire diagnosis under certain defined conditions, in order to prevent mis-diagnosis. If this data is acceptable, then the Executive Officer would agree to require misfire diagnosis in the largest area of speeds and loads feasible according to data presented by the manufacturer.

3. LEV Catalyst Monitoring: Nissan believes that ARB is moving the right direction to allow 1998-2000 phase-in of the more stringent catalyst monitoring thresholds. Nissan believes that this phase-in period will allow time for manufacturers to gather in-use data on the new catalyst configurations that will be used for complying with the LEV and ULEV standards. Nissan anticipates that monitoring front catalyst using a threshold of 50% conversion efficiency may be feasible for some LEV 4-cylinder and 6-cylinder engines. However, Nissan may have to re-configure the catalyst systems, increasing the total catalyst volume above that required for compliance with the tailpipe certification emission levels. This increase in catalyst volume (with its attendant high cost) results from the MIL=On threshold requirements alone. For certain models, in particular larger displacement engines and intermediate displacement engines meeting the more stringent LEV and ULEV standards feasibility and cost performance is less clear. We ask that the ARB schedule another hearing in the 1996 calendar year to review manufacturer's data regarding feasibility and cost performance of the proposed emission thresholds.

We appreciate the opportunity to comment on the proposed OBDII rule changes. Nissan is currently under a significant burden to comply with new standards (both tailpipe and evaporative loss), new test procedures (for tailpipe, evaporative loss, running loss, and re-fueling loss) and new OBDII requirements. Nissan has made significant strides in developing and certifying OBDII systems for some of our highest selling models. We have also designed and developed OBDII systems for our new vehicles that meet the new evaporative loss standards and test procedures from early next year. Nissan's comments are intended to help assure that the proposed standards are considered in the light of the manufacturers finite development capacity and also achieve the best cost performance for the desired goal.

If you have any questions or comments, please feel free to contact Mr. T. Shibuya of my staff at (313) 665-1893 or Mr. Randal Busick at (313) 668-7300. Thank you.

Sincerely Yours,



Yasumichi Tomizawa

Director,
Engine Testing and
Emission Certification

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California
Natural Gas Vehicle
Coalition



December 6, 1994

Mr. James D. Boyd
Executive Officer
California Air Resources Board
P. O. Box 2815
Sacramento, CA 95814

94-12-2
12/8/94

STATE OF CALIFORNIA
AIR RESOURCES BOARD
RECEIVED 12/11/94
BY BOARD SECRETARY

XC Board Member
JDB Legal
TAC MSD

Dear Mr. Boyd:

Re: OBD II Amendments Relating to Gaseous Fuel Retrofit Systems

The California NGV Coalition appreciates this opportunity to comment on the proposed amendments to OBD II regulations scheduled for Board consideration on December 8, 1994. The Coalition is comprised of utility and non utility CNG retailers and public entities, each with a business stake in bringing the pollution-reducing potential of NGVs and natural gas to fruition in the California transportation market.

The NGV industry has long held that converted CNG vehicles comprise a critical market link for establishing consumer acceptance of NGVs and CNG motor fuel. Conversions offer a reasonably cost effective fleet alternative to the OEMs' initially limited and high-premium offerings. More importantly, conversions are providing most of the early market CNG fuel demand, leading to construction of over 100 new California CNG fueling stations in the 4 years since ARB's LEV regulations were adopted, and a total of over 175 CNG stations by the end of 1995. This infrastructure growth, in turn, is critical to fostering the OEMs' confidence in increased production of ULEV NGVs like the Chrysler mini-vans, as well as low-emission heavy-duty engines.

Considering the relatively minute size and limited resources of the industry, CNG retrofit system technology has progressed extremely quickly in the past few years. Small manufacturers have closed the gap between OEM and

retrofit technologies dramatically. They have struggled mightily to meet the spirit of the new certification and installation procedures for retrofit systems that took effect with 1994 models, in spite of these procedures proving *orders of magnitude more costly* than industry or ARB ever envisioned. Their efforts have begun to provide, for the first time, high mileage data that attests to the durability of NGV conversion emission controls.

However, the California conversion industry can ill-afford to assume further costly development and testing burdens without a substantial increase in sales opportunities and market potential for the retrofit system components and configurations currently certified. **We, therefore, strongly support the proposed amendment to California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for 1994 and Subsequent Model Years, Section 3. (a) (iii) allowing systems to forego unreliable OBD II monitoring strategies, under specified circumstances, through the 1998 model year.**

As retrofit system manufacturers are enabled to increase sales through expanded vehicle conversion offerings, they will be better able to undertake further product development (e.g., fully capable OBD II interfaces) and testing to assure OEM-level reliability and durability along with reduced net emissions.

We are pleased to see the degree to which the staff has considered impacts to the California economy in crafting the OBD II amendments. It is important to note that all of the economic justifications cited for postponing full OEM conformance with OBD II is equally applicable to retrofit vehicles¹. It is also

¹ Staff Report citations: Page 34- 35 pertaining to OEM AFVs; Page 37, last paragraph pertaining to economic exclusion of OEM vehicles from the California market in general; Page 38, first paragraph pertaining to negligible emissions impacts of OEM AFVs that do not fully conform to OBD II.

worth noting that a significant percentage of investment dollars and revenue accruing from the national NGV conversion business returns to or remains in California, thanks to California-based companies like IMPCO, Baytech Corporation, CNG Cylinders, Structural Composites, Inc. (CNG cylinders), Engine, Fuels and Emissions Engineering, Inc., Ecotrans and others. The NGV conversion market is also helping attract CNG infrastructure investments from out-of-state companies like MESA Environmental and Fleetstar.

The Coalition urges ARB to pursue a more flexible, market-driven approach to regulating the small volume retrofit manufacturers, an approach weighted more toward "test-as-you-go" in-use compliance, and less toward cost-prohibitive engine family-specific testing. We look forward to continuing to work with ARB toward economic and technical solutions that will secure the air quality benefits of NGV commercialization for all Californians into the 21st century and beyond.

Very truly yours,



Greg Vlasek,
executive director

cc: Mr. K. Don Drachand, (via FAX)
Mobile Source Division Chief

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