STATE OF CALIFORNIA
AIR RESOURCES BOARD

Notice of Public Hearing to Consider Technical Status and Proposed Revisions to On-Board Diagnostic System Requirements for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines and Heavy-Duty Engines On-Board Diagnostic System Requirements, and to Consider Enforcement Provisions for Heavy-Duty Engines On-Board Diagnostic System Requirements.	**)**	**Hearing Date: May 28, 2009** **Agenda Item 09-5-2**

COMMENTS OF THE ENGINE MANUFACTURERS ASSOCIATION

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COMMENTS OF THE
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The Engine Manufacturers Association is the national trade association representing worldwide manufacturers of internal combustion engines. EMA's members include the major manufacturers of heavy-duty engines used in vehicles between 8,500 and 14,000 lbs. GVWR ("medium-duty engines and vehicles") and over 14,000 lbs. GVWR ("heavy-duty engines") that are the subject of the proposed amendments to the existing on-board diagnostic ("OBD") rules (the "proposed amendments") and the new enforcement provisions for heavy-duty engine OBD requirements ("HD OBD enforcement regulations"). Although similar amendments are being made to the medium-duty and heavy-duty OBD rules, EMA's comments focus primarily on the proposed amendments to the heavy-duty OBD rule.

I. Background and Principles Underlying the Proposed OBD Amendments

Although ARB uses the term "medium-duty" to describe engines and vehicles in the 8,500-14,000 lbs. GVWR range, engines in this range actually are "heavy-duty" engines as defined in the federal Clean Air Act. The heavy-duty engine industry (which also encompasses those engines and vehicles regulated by the medium-duty OBD rule) is unlike the passenger car and light-duty industry. The heavy-duty industry is generally a non-integrated industry, where the manufacturers of engines are not typically the manufacturers of the chassis or vehicles in which those engines are used. Rather, heavy-duty manufacturers produce and sell engines to customers who then incorporate the engines into many different types of chassis or vehicles, with many different types of customer specifications and performance requirements. In contrast, in the light-duty industry, a single manufacturer produces both engine and vehicle, integrating all systems into a single product for sale to consumers.

Heavy-duty engines and vehicles also play a far more significant role in commerce than do light-duty vehicles. Heavy-duty engines and vehicles are used to perform work – from construction to goods transport, tow trucks to utility vehicles, waste haulers to delivery trucks. Such vehicles are commercial assets of their respective businesses, and represent a significant capital investment by their owners. Any regulatory provisions covering heavy-duty engines and vehicles must account for the fact that such vehicles engage in a wide range of commercial activities supporting California's economy and the economy nationwide.

A. **ARB's Obligation To Adopt Technologically Feasible Standards**

In recognition of the nature of this industry and its importance in commerce, the U.S. Congress established unique provisions and protections in the federal Clean Air Act for engines used in vehicles over 6,000 lbs. GVWR, which encompasses the heavy-duty engines covered by the proposed amendments. Those provisions of the CAA, as well as California law, require ARB to adopt technologically feasible and cost-effective standards (see detailed discussion in Section IV). Manufacturers have raised with Staff their substantial feasibility concerns with the existing OBD thresholds and requirements and the proposed amendments to those thresholds and requirements.

The OBD requirements constitute emission standards within the meaning of the CAA because they are established and intended by ARB to control engine and vehicle emissions. Principally, the OBD standards achieve that control by placing upper limits (thresholds) on the emissions from each engine, above which no OBD system may be certified. And, only engines certified to the ARB-promulgated OBD standards may be sold in California. Both federal and state laws require that ARB demonstrate that the technology needed to meet those OBD standards is both feasible and cost-effective. In several cases, detailed below, ARB's proposal for heavy-duty engines and vehicles is neither technologically feasible nor cost-effective.

While ARB has had OBD requirements for heavy-duty engines in place since 2005 and for medium-duty engines and vehicles in place for many years, those requirements have evolved into more sophisticated and complex provisions with each new round of OBD amendments. Manufacturers have spent and continue to spend significant resources in meeting the OBD standards. Each time changes to the OBD rule are adopted and new technological challenges are added, manufacturers are forced to expend resources to meet those challenges. Yet many times those challenges have proven to be infeasible, requiring last minute changes, and wasting the limited resources available to manufacturers. This rulemaking is another example of an infeasible proposal which will have to be corrected later and which will compel the waste of manufacturers' resources.

As Staff explains in the Staff Report: Initial Statement of Reasons for Proposed Rulemaking ("ISOR" or "Staff Report"), some of the thresholds and requirements that ARB adopted in 2005, despite manufacturers' best efforts, are not feasible and now must be revised. While such relief is absolutely necessary in this instance, ARB should not

again adopt standards that are beyond technological reach, yet cause manufacturers to use limited resources and precious test cell time in attempting to meet them.

Manufacturers should not be required to expend time and effort in attempting to develop costly monitoring strategies that are not feasible. While ARB can set technology-forcing standards, ARB has an obligation to set standards that reasonably can be projected to be technologically feasible. Unless changes are made to the proposed amendments to the OBD II rule to make those provisions technologically feasible, manufacturers will again find themselves having wasted resources and subject to changes "at the eleventh hour," when manufacturers are asked to certify engines and vehicles subject to OBD standards that are far beyond their reach.

B. Leadtime and Period of Stability Requirements Established By Law

In addition to assuring that the standards are technologically feasible and cost-effective, ARB also has an obligation under the CAA and California law to adopt standards within reasonable time frames. The federal CAA provisions include a requirement that any standard affecting emissions may not be adopted unless the regulating agency provides at least 4 years' leadtime (measured in full model years) between the adoption of the final standard and the time the standard becomes effective, plus at least 3 years' period of stability – in other words, at least 3 years between each new change or step-down in standards. (See detailed discussion in Section IV.)

Leadtime is needed in order to provide manufacturers with sufficient time to research, develop and produce engines for commercial use. A period of stability is necessary to provide manufacturers time in which they may, in theory, begin to recoup some of the significant investments they have made in new technology to meet those standards. The heavy-duty engines and medium-duty engines and vehicles covered by the proposed amendments are subject to the 4 years' leadtime and 3 years' stability protections of the Clean Air Act. Furthermore, California law also requires that standards must be adopted within reasonable time frames. As will be discussed more fully below, ARB's proposed amendments do not provide sufficient leadtime or stability for the heavy-duty engines and medium-duty engines and vehicles covered by the rule.

C. The Realities And Impact Of ARB's Rulemaking Process

As discussed above, providing manufacturers with sufficient leadtime and period of stability between changes in standards is required under federal and California law. Providing reasonable notice of the standards that manufacturers must meet, and giving them enough time in which to attempt to comply with those standards, is not just a legal or academic exercise. It is absolutely essential to the way manufacturers do business.

Manufacturers must devote substantial time and resources to the process of researching, developing and producing engine emissions control technology and OBD monitoring technology to meet the standards that regulators adopt. It is not an easy task and cannot be done "on the fly." Manufacturers first have to research possible technology options, develop those that look promising, and spend countless hours in the

test cell to achieve products that can meet the standards. It is not necessarily a linear process, either, as technologies are tried, tested, adjusted or abandoned, and developed and tested some more. After years of going through the development process, manufacturers begin the production and certification process, which requires testing to regulatory procedures and measuring the compliance of the technology (both engine emission control technology and OBD monitoring technology) to the required standards and obtaining approval from the regulatory agencies. Because of the way in which model year is defined, engine manufacturers may certify (both "emission-certify" and "OBD-certify") their 2010 products, for example, as early as January 1, 2009. Once manufacturers begin the process of certifying their products, it is generally too late to make changes.

There are a number of ways in which ARB's rulemaking process – and this rule in particular – disregards those real notice and timing issues that manufacturers face. The most significant of these are three areas, detailed more fully in Section II (Technical Discussion), in which ARB is (i) proposing new, last-minute requirements with less than one year's (let alone four years') leadtime and in some cases even after the model year has started, (ii) failing to specify the actual standards or any defined method to meet the requirements, and (iii) attempting to codify practices that allows ARB to change the standards from year to year. In other words, ARB is making changes to the rule and adding new requirements when it is too late – manufacturers' product designs are already settled. Moreover, ARB is refusing to set standards and then stick with those standards for the necessary period of stability.

Such an approach causes an undue burden and unjustified expense for manufacturers, who have invested their limited resources in meeting ARB's regulatory requirements only to find out, at the last minute, that those requirements have changed or that new requirements have been added on. Manufacturers need certainty so they may use their limited resources most effectively – certainty in knowing what standards they must meet and the time frame in which to meet them. ARB's rulemaking process has failed to provide such certainty. ARB must provide the certainty that manufacturers need by assuring that it upholds the leadtime, stability, notice and process requirements of federal and California law. ARB must revise its rulemaking process, must adopt clear standards and requirements, and must provide sufficient time for meeting those standards.

D. The Many Challenges Manufacturers Face In Meeting Emission Standards And OBD Standards

Engine manufacturers are in the midst of a multiple-year effort to meet stringent new federal and California emissions standards that began in 2007 and that will be fully realized by 2010 for on-highway engines used in vehicles over 8,500 lbs. GVWR. The new emission standards will reduce engine emissions by an additional 90% over the previous standards, and those reductions will come primarily through a systems approach of advanced engine technology, aftertreatment systems, and low-sulfur fuel. The 2007/2010 heavy-duty engine emission standards will result in diesel technology – long known for being the most durable and energy-efficient – having the right to also be called clean.

Engine manufacturers have essentially completed their work to develop and produce 2007 through 2010 model year engine and aftertreatment technology systems meeting the stringent new emission standards. Manufacturers have devoted and continue to devote thousands of hours of engineering time and expertise and thousands of hours of time in the emissions test cell to achieve those standards. During the time leading up to the implementation of the 2010 standards and beyond, they also must address the challenges of the new manufacturers' run heavy-duty in-use test program applicable to those engines federally and in California.

On top of those underlying emission standards, and the in-use compliance program, the OBD rules further require manufacturers to certify engines and vehicles to new, stringent OBD requirements. OBD is technically complex, and requires the development and commercialization of sophisticated new systems placed on engines and vehicles. Software that can diagnose emission component problems to the stringent levels required in the rule must be developed, tested and verified. The level of coding necessary to achieve such diagnostics is extremely complicated, and must account for the inter-connectedness of numerous systems, sub-systems and components. Base software must be developed and then further developed for each engine model and rating. Some manufacturers' development deadlines called for OBD software to be finalized in the fall of 2008, more than six months ago. Yet now, ARB is proposing to make further changes to the rule to be effective in 2010. Regulating how manufacturers use OBD and monitor their engine emission control adds more complexities and new challenges to produce engines that are compliant with 2010 and later standards.

Finally, what has worked for light- and medium-duty OBD will not necessarily work for heavy-duty engines. The two industries are very different. The heavy-duty industry is generally a non-integrated industry, meaning that engine manufacturers sell their products – engines – to customers who take those engines and incorporate them into many different types of vehicles, with many different types of transmissions, customer specifications and performance requirements. Engine manufacturers simply cannot predict all the possible variations in which their engines will be used and they do not have control over vehicles. In the non-integrated heavy-duty engine and vehicle industry, there is an extreme burden associated with calibrating OBD monitors for use in a myriad of different vehicle configurations. Further changes must be made to the OBD rule to limit engine manufacturers' responsibility for vehicle matters outside their control.

In sum, in light of the legal framework underlying the OBD standards, the impact on manufacturers of ARB's rulemaking process, and the many challenges manufacturers face, all described in great detail below, ARB must make substantial changes to the proposed HD OBD amendments.

II. **Technical Discussion**

In the following technical discussion, EMA details its significant concerns with the proposed amendments, including how ARB's proposal fails to provide the necessary leadtime and stability and to demonstrate that the proposed amendments to ARB's OBD standards are technologically feasible and cost-effective. While EMA's comments are

focused primarily on heavy-duty engine diagnostics under the HD OBD rule (section 1971.1), the same issues also apply to medium-duty diesel engines regulated under the OBDII rule (section 1968.2), requiring similar changes as those EMA recommends for heavy-duty.

A. **ARB's Manufacturer In-Use Enforcement Testing Requirements are Burdensome and Unreasonable and Should Be Removed from the Proposal**

In CCR, Title 13, Section 1971.5, ARB has proposed new HD OBD enforcement regulations to accompany the heavy-duty OBD amendments. Under section 1971.5, ARB may conduct enforcement testing to ensure OBD compliance. Yet, a principal feature of the HD OBD enforcement regulations at issue is a regulatory section – section 1971.5(c) – which seeks to impose an excessively burdensome set of in-use OBD testing obligations on heavy-duty engine manufacturers, as described below. Moreover, imposing such enforcement requirements on manufacturers *at their own cost* is unlawful, as discussed in detail in Section IV below.

1. ARB's Manufacturer Self-Testing Requirements Pose an Excessive Burden on Manufacturers

Pursuant to those new obligations, engine manufacturers would be required to undertake the following steps on an annual basis starting with the 2010 model year:

(i) identify one to three engine ratings for in-use testing;

(ii) for the identified engine ratings, locate a test sample of non-new, in-use engines (i.e., engines previously sold and installed in heavy-duty vehicles operating in commerce) that have accumulated mileage that is between 70 to 80 percent of the engines' full "useful life" mileage of 435,000 miles;

(iii) negotiate with the owners of the identified heavy-duty vehicles to exchange from 1 to as many as 10 of the identified non-new, in-use test sample engines for new replacement engines to be supplied by the engine manufacturer;

(iv) remove from 1 to as many as 10 of the identified test sample engines from the identified heavy-duty vehicles, and install in their place new replacement heavy-duty engines, all at the engine manufacturer's expense;

(v) transport the uninstalled high-mileage test sample engines (each with accumulated mileage between 304,500 and 348,000 miles) to the engine manufacturer's testing facilities;

(vi) replace each of the uninstalled engine's major OBD system components with deteriorated or defective OBD components that can simulate or cause potential exceedances of the relevant OBD malfunction criteria -- i.e., install defective OBD system components that can produce the excessive

emission levels or other monitored signals that would trigger a malfunction indicator light ("MIL") if the exceedances actually occurred during real-world operation of the engine (as equipped with its original OBD system components);

(vii) test on an engine dynamometer in the manufacturer's engine testing facilities, and in an iterative one-by-one fashion, each of the deteriorated or defective OBD system components to cause an exceedance of the applicable OBD malfunction criteria;

(viii) measure the emissions of the reconfigured engine with each of the deteriorated OBD system components to assess whether the appropriate MIL is illuminated before the reconfigured engine's artificially-increased emissions exceed the relevant OBD threshold (e.g., 2 times the applicable standard);

(ix) test up to 10 engines from as many as 3 identified engine ratings in this manner; and

(x) prepare to respond to an ARB-issued mandatory engine recall order if 50% or more of the reconfigured test engines do not illuminate a MIL when any deteriorated or defective replacement OBD system component has caused the engine's emissions to exceed any applicable OBD threshold.

The burdens that ARB seeks to impose on engine manufacturers under the above-described in-use testing regime are unprecedented and unreasonable. ARB, in essence, would require manufacturers to: (a) give away in trade as many as 30 new "free" heavy-duty engines each year (up to 10 engines for as many as 3 engine ratings); (b) install the new "free" engines in place of the uninstalled high-mileage engines in up to 30 vehicles each year; (c) reconfigure each of the (up to 30) uninstalled engines with broken OBD system components; and (d) conduct extensive engine dynamometer testing on each of the (up to 30) uninstalled reconfigured engines to assess whether any incidence might be found where a MIL is not triggered before an artificial exceedance of an OBD threshold can be engineered and measured. There are no proper justifications for the costs that such an in-use testing program would force manufacturers to incur.

ARB's approach appears to be that because engine manufacturers can more easily conduct such testing, they should have to pay for such testing. ARB also completely dismisses, by failing even to mention, the significant challenges manufacturers would face in seeking to obtain engines from in-use trucks. Once engine manufacturers sell their engines, they no longer have control over those engines. Yet, Staff has indicated in discussions that engine manufacturers could, and ARB's proposal would compel them to, buy back engines from customers, give customers new engines, sell replacement engines at discounts, rent trucks to get the engines, or try to find other ways to obtain high-mileage engines for in-use testing. Engine manufacturers also would be required to find some way to warehouse – for years and years – the "perfect threshold parts" that could be

implanted into test engines to ensure the OBD detection systems were operating. For engine manufacturers, there is also significant risk that the engines which manufacturers get back for testing will be those engines that customers are having problems with in the first place.

2. ARB Has Significantly Understated The Costs Of The Proposed Mandatory In-Use OBD Testing Program

As described above, the proposed in-use OBD testing program would impose unprecedented burdens on engine manufacturers, including the burdens of providing replacement engines to vehicle owners, and conducting multiple iterative engine dynamometer tests (pursuant to 40 CFR Part 1065) of engines reconfigured with defective OBD components.

Even under ARB's cost assumptions, each manufacturer could have to spend more than $3,000,000 each year to implement the proposed in-use OBD testing program. If one assumes (even using ARB's significantly understated and erroneous cost numbers) that the cost of each engine that manufacturers would be forced to give away in trade is $23,000, and that the cost for the engine dynamometer testing at issue is $80,000 per engine, then the per engine cost of the proposed in-use OBD testing program is more than $103,000 per engine (especially when the manufacturer's man-hours for implementing the extensive in-use testing are fully factored in). Under a worst case scenario, therefore, where a manufacturer is required to conduct up to 30 in-use engine tests, the total annual cost would be more than $3,090,000. ARB has no authority under the relevant California statutes to impose such an extreme in-use testing burden on engine manufacturers.

ARB's cost assumptions, however, are incorrect by a very wide margin. In that regard, and among other errors, ARB has failed: (i) to allocate costs over engines sold in California (as opposed to nationwide); (ii) to include the necessary fully-burdened labor costs for the program; (iii) to properly account for the full costs of aging the OBD components at issue; and (iv) to fully account for the significant fuel costs at issue.

EMA has conducted a survey of the actual costs that engine manufacturers would incur if they were faced to implement the unlawful in-use OBD testing program at issue. The average cost for testing each designated engine in the manner that ARB would mandate under its proposal is as follows:

Estimated Costs for Complying
With Proposed Section 1971.5

Cost Item	**ARB Estimate**	**Manufacturer Cost**
Incentive for vehicle owner (e.g., one-week truck rental, plus oil/fluid change)		$2,000.00
Replacement engine for vehicle owner	$23,150.00	$30,000.00

Transport of new engine to vehicle owner location		$3,000.00
Labor for engine swap-out		$2,000.00
Transport of used engine to manufacturer's testing facilities		$3,000.00
Failed OBD components		$21,000.00
Demonstration dynamometer testing	$47,770.00	$220,000.00
Total cost for testing single engine	$70,920.00	$281,000.00
Worst case cost for 30 engine tests	$2,127,600.00	$8,430,000.00
Engines sold per year	72,000	(72,000 x 20%) 14,400
Total cost per engine sold	$0.99 - $29.55	$19.51-$585.42

As demonstrated by the foregoing, ARB has underestimated the costs of its in-use OBD testing program, at a minimum, by a factor of 20. Consequently, ARB's cost-effectiveness analysis is similarly flawed, and cannot be relied upon to justify an in-use testing program that is unlawful in any event. (See discussion in Section IV.)

It should be noted that the above costs were estimated based on testing engines using the emissions certification testing procedure applicable to 2010 and later model year heavy-duty engines. ARB has proposed that engine manufacturers would not be able to use those procedures for in-use enforcement testing. Such an approach is outrageous and entirely unreasonable. As discussed in further detail below, ARB cannot attempt to change the test procedure applicable to heavy-duty engines. Any changes in test procedure for in-use enforcement testing represent changes in the standard and would increase the costs of testing substantially. Changes in the standard may only be proposed after thorough review and assessment of the feasibility of achieving those standards. Moreover, at least four model years' leadtime must be provided before such changes may be implemented. ARB has failed to provide an appropriate feasibility assessment or adequate leadtime to adopt such changes for in-use enforcement testing. (See further discussion at section III(B) below.)

3. ARB Should Remove Section 1971.5(c) from the Proposed Rule

Engine manufacturers worked diligently to investigate and propose to Staff other ways that would allow ARB to obtain an assessment of OBD detection in-use at far less cost than manufacturers would be burdened with under 1971.5(c) manufacturer self-testing requirements. EMA's proposed alternative in-use testing program, in which all manufacturers would have been required to test a limited number of engines over the next

ten years, would have been a reasonable approach that could have satisfied ARB's need for input on in-use engines. However, given the unreasonable costs and burdens that this testing would impose on manufacturers, and the fact that ARB has no authority under California or federal law to compel manufacturers to pay for the costs of in-use enforcement of their own engine products (see discussion at IV, below), section 1971.5(c) must be removed from the proposed HD OBD rule.

B. ARB Should Revise Its Unreasonable Aging Demonstration Validation Requirements

The proposed HD OBD regulations would go even further in imposing even greater in-use data collection and testing burdens on manufacturers. Specifically, under new regulatory section 1971.1(i)(2.3), manufacturers "would be required to collect and report in-use emissions data from 2010 and later model year engines operated in the real world" to demonstrate the emissions performance of aged engine components. (See, ISOR, p. 58). As ARB describes this feature of its rulemaking,

> Such data collection by manufacturers would require removing real-world aged systems (engine and after-treatment) from vehicles, installing the [removed] systems on engine dynamometers, running various emission tests to quantify the system deterioration, and reporting the data to ARB late in the 2011 calendar year…. For engines subject to a 435,000 mile useful life, manufacturers would additionally be required to collect data from 2010 or newer model year real-world aged systems with mileage equal to 435,000 miles and report the data to ARB in the 2014 calendar year. (ISOR, pp. 58-59.)

In addition to the same difficulties described above with respect to procuring engines for testing and data collection, there is simply no need for this expensive and time-consuming testing. EMA, ARB and EPA are currently involved in establishing a program for collection of emissions data to show that the deterioration factors that engine manufacturers apply are appropriate and accurately predict end of useful life emissions. That same data that is collected and testing that is conducted to validate emissions certification deterioration factors can provide the information that ARB seeks to correlate OBD engine and aftertreatment aging system projections. The data can then be used on a going-forward basis to make adjustments to aging to show that the aging demonstration testing is representative of full useful life. In other words, any such data that is collected should not be used as a basis for recalls or other enforcement action against manufacturers for previously certified product, but should be used only on a prospective basis for informing future certification demonstration testing, provided that manufacturers are given at least four years' leadtime in which to implement changes.

Engine manufacturers do not dispute that it is appropriate for ARB to seek information on real-world emissions. But engine manufacturers do dispute the methods by which ARB is doing it – without regard to existing programs and the substantial costs, work effort, and resources involved in obtaining such information, especially in the extreme economic situation in which our nation's economy, and this industry, finds itself.

ARB should remove the data collection requirements of section (i)(2.3.2) and (2.3.3) of the proposed OBD rule. ARB also should revise section (i)(2.3.1) of the proposed heavy-duty OBD amendments and section (h)(2.3) of the medium-duty OBD II rule to require test engines for all model years to be 125-hour engines ("de-greened engines") and aftertreatment that is aged to be representative of full useful life. ARB implies that it is compelling manufacturers to obtain data from full useful life engines (as well as aftertreatment) in order to help minimize manufacturers' "risk [of] noncompliance and recall, fines, or other remedial action." (ISOR, p. 57) ARB stated its concern regarding, and apparently is trying to protect manufacturers from, the "synergistic effects and total system deterioration." (Id.) Yet manufacturers, who are taking the risk and will be held responsible if it turns out that their projections were wrong, support an approach which uses the emissions deterioration information as a baseline. ARB should be willing to accept that approach. ARB should not be adding additional expense to manufacturers' already-strained resources when it is unnecessary.

C. ARB Should Eliminate Infrequent Regeneration Adjustment Factor Requirements

One of EMA's primary concerns with the proposed amendments are brand-new provisions that would immediately increase the stringency of the OBD threshold standards by at least 10% and maybe more, and that would lead to even greater stringency in the OBD standards over a short period of time. These provisions are noteworthy, because ARB is proposing to make significant changes to an already complex and highly technical OBD rule by adding more complex, technical and burdensome requirements for which ARB has not established any need. Those are the proposed infrequent regeneration adjustment factor requirements.

ARB has proposed that, for engines equipped with emission controls that experience infrequent regeneration, manufacturers must determine unique emissions adjustment factors for threshold monitors. These unique "adjustment factors" to be developed for each monitor would need to be factored in to emissions test results to determine the malfunction thresholds for OBD monitors.

EMA opposes the application of infrequent regeneration adjustment factors ("IRAFs") to OBD monitors in this rulemaking for numerous reasons, including feasibility and stringency concerns, the workload burden IRAFs would place on manufacturers, the lack of necessary leadtime in imposing these new requirements. EMA believes further analysis is necessary before it can be determined whether and how IRAFs should be applied to OBD monitors.

1. Applying Infrequent Regeneration Adjustment Factors Increases The Stringency Of The OBD Standards And Makes Them Infeasible

When ARB adopted OBD thresholds for heavy-duty engines in 2005, and when it proposed new thresholds in this rulemaking, it did so without any consideration of the additional stringency created by the addition of IRAFs. Indeed, as OBD thresholds were reviewed and set in previous OBD rulemakings and in the workshop and discussions leading up to the proposed amendments at issue, the Agency has not sufficiently analyzed and accounted for the feasibility and cost impacts of having to apply IRAFs to OBD emission threshold testing results to determine appropriate thresholds. EMA's comments on the OBD II rulemaking in 2006 discussed feasibility issues in detail. (See, "Comments of the Engine Manufacturers Association," Agenda item 06-8-4, September 28, 2006, which are incorporated herein by reference.)

Applying IRAFs to OBD monitors, as ARB is proposing, increases the stringency of the OBD thresholds which, as discussed below, already are of highly questionable feasibility. When designing engine-aftertreatment systems to meet emission standards, and designing OBD systems to meet OBD standards, manufacturers must leave "headroom" or margin to account for variability and other factors that may increase engine or OBD emissions in a given situation. In other words, if the standard is 2.5 g/bhp-hr or .01 g/bhp-hr, manufacturers must design to some level below that number. Adding IRAFs – whether they are emission certification adjustment factors or uniquely-calculated adjustment factors – reduces or eliminates that margin, thereby increasing the stringency of the OBD threshold standards.

ARB's focus on adding IRAFs for OBD thresholds is unnecessary. Infrequent regeneration emissions from heavy-duty engines already are accounted for in the underlying emission standards. Manufacturers must certify all their engines to emissions standards which are based on average weighted emissions over a test cycle, including not-to-exceed emissions and supplemental test requirements, and which include adjustments for infrequent regeneration events. These heavy-duty engines and vehicles for which ARB desires to add more stringent OBD requirements already are meeting incredibly stringent standards. Requiring the calculation of IRAFs in OBD emission threshold test results is unnecessary, unreasonable and unjustified.

2. Requiring The Use Of Infrequent Regeneration Adjustment Factors For OBD Creates An Unreasonable Workload

ARB's proposed requirement to calculate IRAFs for every monitor creates an unreasonable and extremely high workload for manufacturers. Due to the multiple test cycles necessary to determine regeneration frequencies and establish emissions impact, robust determination of such adjustment factors for all applicable threshold monitors requires a prohibitive amount of testing, despite Staff's statements to the contrary in the ISOR. In their workshop and board hearing proposals, ARB proposed language that would allow manufacturers to submit alternative plans for IRAF determination subject to administrator approval upon determination that such plans were based on good

engineering judgment. Such flexibility is welcome for certification, but raises concerns with potential in-use risks during initial years of the HD OBD program.

3. The Costs Of Adding IRAFs Far Outweigh The Benefits

Given the high cost of calculating infrequent regeneration adjustment factors for OBD threshold monitors and the minimal anticipated benefits from adding IRAFs, ARB should not adopt IRAF requirements in this rule. The sections of the Staff Report describing the overall emission benefits and cost-effectiveness of the OBD rule provide little justification for the proposed amendments generally and substantially underestimate the costs associated with adding IRAF provisions.

4. ARB Should Revise the IRAF Provisions

EMA proposed to Staff after the public workshop on the rule that a number of changes be made to lessen the burden of IRAF provisions on engine manufacturers. In the ISOR, Staff has either minimized or entirely dismissed those recommendations. As outlined above, however, the challenges with calculating and applying IRAFs are substantial. Limited testing resources make the extensive requirements for IRAF determination a severe strain on facilities already committed to development, validation, and certification of new monitors. Allowing for relief from this testing burden will allow manufacturers to manage available resources without committing significant capital investments into facilities required only for the initial years of the HD OBD regulation's applicability.

The risk of allowing such accommodation is minimized by offering better-defined criteria for analytical derivation of IRAFs than is proposed in the proposed language. Risks due to the uncertainty associated with the new emissions adjustment requirements and methods of determination are mitigated by in-use allowances during the early years of the HD OBD program provided that the resulting emissions do not grossly exceed the applicable thresholds. EMA, therefore, proposes the following changes:

In summary, EMA's proposed changes would do the following:

- Add references to EPA Guidance Document CIDS-06-22(HD-HWY), dated November 6, 2006) when citing adjustment factor determination methods
- Limit the number of non-analytical unique adjustment factor determinations required for an HDOBD approval
- Include more prescriptive regulatory language for alternate IRAF determination plans based on existing data
- Limit manufacturer in-use liability for analytically derived IRAFs through the 2015 model year.
- Add a minor revision to the certification documentation requirements acknowledging analytically-derived adjustment factors

EMA's specific proposed regulatory changes are as follows[1]:

> (d)(6.2) On engines equipped with emission controls that experience infrequent regeneration events, a manufacturer shall adjust the emission test results that are used to determine the malfunction criterion for monitors that are required to indicate a malfunction before emissions exceed a certain emission threshold (e.g., 2.0 times any of the applicable standards). Except as provided in section (d)(6.2.3), For each monitor, the manufacturer shall adjust the emission result using the procedure described in CFR title 40, part 86.004-28(i) and EPA Guidance Document CIDS-06-22(HD-HWY), dated November 6, 2006, with the component for which the malfunction criteria is being established deteriorated to the malfunction threshold. The adjusted emission value shall be used for purposes of determining whether or not the specified emission threshold is exceeded (e.g., a malfunction must be detected before the adjusted emission value exceeds 2.0 times any applicable standard).
>
> (6.2.1) For purposes of section (d)(6.2), "regeneration" means an event during which emissions levels change while the emission control performance is being restored by design.
>
> (6.2.2) For purposes of section (d)(6.2), "infrequent" means having an expected frequency of less than once per FTP cycle.
>
> (6.2.3) In lieu of using the procedure described in CFR title 40, part 86.004-28(i) and EPA Guidance Document CIDS-06-22(HD-HWY), dated November 6, 2006, the manufacturer may submit an alternate plan to calculate the adjustment factors for determining the adjusted emission values to the Executive Officer for review and approval. Executive Officer approval of the plan shall be conditioned upon the manufacturer providing an engineering evaluation and if needed, pre-existing development data to determine OBD IRAFs. The Executive Officer shall approve plans (including specific IRAF estimates) that meet the following criteria:
>
> (A) Describes how a fault in the system may affect the certification regeneration frequency, and provides an estimate of the new frequency factor if it is affected by the fault.
>
> (B) Describes how a fault in the system may affect regeneration emissions, and provides an estimate of the emissions during regeneration if it is affected by the fault.

[1] The changes are presented as a mark-up to Title 13 1971.1, but EMA would also propose analogous revisions to the proposed IRAF requirements in Title 13 1968.2 as well.

(C) Provides an estimate of the IRAF for each monitor and threshold.

(D) Provides any pre-existing development data that may have been used to judge the effect of the malfunction on regeneration emissions, regeneration frequency, and non-regeneration emissions

(E) Provides any new data, if needed, to determine IRAFs or support IRAF estimates, within the limitations of (d)(6.2.4). In lieu of providing this data before approval of this plan, the manufacturer may elect to be approved for all of the other IRAFs aside from any specific ones requiring new data and to be approved for the remaining IRAFs when the data supporting them is available.

(6.2.4) The Executive Officer shall limit the amount of additional data required to be generated by a manufacturer solely for the determination of IRAF corrections under the following circumstances:

(A) For monitors in which a manufacturer has used existing development data to estimate an IRAF correction, and the Executive Officer believes that the manufacturer's estimate may not be sufficiently accurate without additional data to supplement the estimate, new data shall not be required to be generated on more than four of the required malfunction thresholds.

(B) Malfunction threshold in the context above means a required OBD malfunction threshold pertaining to one malfunction effect (e.g., high EGR flow and low EGR flow are considered two malfunction thresholds).

(C) Manufacturers shall be allowed to separate the effects of regeneration emissions and regeneration frequency when determining IRAFs such that only the dominant of the two effects require new data to be generated (e.g., if the malfunction affects regeneration emissions much more than regeneration frequency, then only data for the emissions affect would be required).

(6.2.5) A manufacturer's analysis or measurement of the relative effect of a malfunction on engine-out PM emissions over the applicable cycle shall be considered sufficient for estimating the effect on PM filter regeneration frequency.

(6.2.6) The IRAF at the OBD threshold may be approximated by interpolating or extrapolating data from a malfunction that results in emissions above or below the OBD threshold. Existing data of this type may be used to support engineering judgment. New data used in this way will be considered sufficient to fulfill an Executive Officer request for additional data (within the limitations specified in (d)(6.2.4)).

(6.2.7) A manufacturer may submit for approval IRAFs that are lower than the corresponding certification IRAF using the criteria specified in (d)(6.2.3) through (6.2.6).

(6.2.8) The Executive Officer shall approve a manufacturer's IRAF estimate provided they have been submitted for approval and the Executive Officer has determined the assessment meets the criteria specified in (d)(6.2.3) through (6.2.7). Approval shall be granted at least six months prior to the desired OBD approval date declared by the manufacturer, or one month after the request for approval of the IRAF assessment has been made, whichever occurs later.

(6.2.9) 2010 through 2015 model year engines with malfunction criteria using tailpipe certification adjustment factors that have been adjusted using the alternate criteria specified in (d)(6.2.3) through (6.2.7) shall not be subjected to remedial action for emissions threshold determination if subsequent testing of in-use engines reveals that regeneration emissions or frequency are higher than the manufacturer's estimate that was reviewed and approved by the Executive Officer during certification unless the resulting emissions would be more than two times the applicable OBD threshold.

Changes to Cert Documentation Requirements in Section (j):

(j) (2.7) Data supporting the criteria used to detect a malfunction of the fuel system, EGR system, boost pressure control system, catalyst, NOx adsorber, PM filter, cold start emission reduction strategy, secondary air, evaporative system, VVT system, exhaust gas sensors, and other emission controls which causes emissions to exceed the applicable malfunction criteria specified in sections (e), (f), and (g). For diesel engine monitors in sections (e) and (g) that are required to indicate a malfunction before emissions exceed an emission threshold based on any applicable standard (e.g., 1.5 times any of the applicable standards), the test cycle and standard determined by the manufacturer to be the most stringent for each applicable monitor in accordance with section (d)(6.1) and the adjustment factors and analysis determined by the manufacturer for each applicable monitor in accordance with section (d)(6.2).

At a minimum, ARB should provide written guidance to manufacturers on what constitutes good engineering judgment sufficient for calculation of IRAFs. Such guidance is needed in order to provide direction to manufacturers and also to assure uniform judgments by ARB on whether a manufacturer's engineering judgment meets the requirements of the OBD rule. Putting some parameters around engineering judgment levels the playing-field for manufacturers and also minimizes the burden associated with having to calculate unique adjustment factors for each monitor.

D. ARB Must Revise The 2010 Heavy-Duty OBD Threshold Standards And Requirements

Manufacturers support many of the changes that ARB has proposed to make to the requirements for 2010 HD OBD monitoring requirements. While some of the emission malfunction thresholds have been "relaxed" from those currently in the regulation (e.g., PM filter, ISOR, p. 26), the current threshold requirements that ARB adopted in 2005 were not technologically feasible. Thus, changes to the existing thresholds are absolutely necessary. But ARB has not gone far enough to adopt technologically feasible thresholds in the proposed amendments and further changes are needed. Moreover, ARB has added new requirements to the rule for 2010, thereby imposing additional burden on manufacturers.

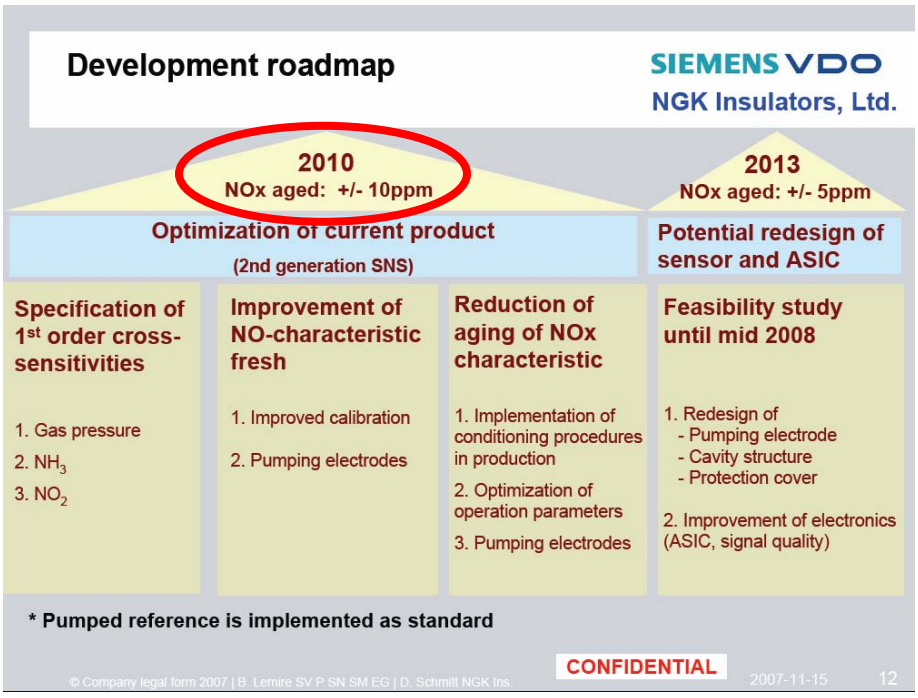
Throughout the time leading up to the hearing, EMA has recommended to Staff numerous changes to the 2010 heavy-duty OBD threshold requirements. Where Staff has made changes to the rule, ARB must provide sufficient leadtime to achieve those substantially more detailed and rigorous monitoring requirements. In some cases, the requirements are new as applied to diesel engines and, in those cases, sufficient leadtime also must be provided. Finally, in some cases, ARB has proposed amendments which are still not technically feasible.

1. NOx Converting Catalyst (e)(6) and NOx Sensor Monitoring (e)(9)

ARB has proposed that manufacturers must meet an OBD threshold of 0.4 g/bhp-hr NOx for 2010. To meet 2010 emission standards, engine manufacturers will use two NOx sensors: one up-stream and the other downstream of the SCR catalyst. The issue is the different range and resolution/accuracy than required for OBD monitoring (down-stream SCR catalyst). Current NOx sensors do not have the much narrower range and far greater accuracy that is required for OBD monitoring purposes, nor have they been shown to have the necessary long term durability for OBD monitoring. Development and validation requirements for the 2010 emission standards have forced manufacturers to make design decisions based on NOx sensor technology as it exists today. Current NOx sensor technology accuracy is not capable of achieving the 0.4 g/bhphr NOx sensor and aftertreatment emissions thresholds monitor requirements for 2010. Moreover, ARB has not appropriately accounted for the impact of the second sensor.

As a result, ARB must reduce the stringency of the 2010 emission thresholds for NOx aftertreatment to the standard/FEL +0.60 until such time as durable, reliable, and effective sensing technology has been developed. NOx sensors under development with the accuracy necessary to meet the stringent OBD requirements are not currently available. Indeed, research reveals that the accuracy of current NOx sensor technology is not capable of achieving the NOx emissions thresholds requirements (see, "Threshold monitoring of urea SCR Systems," SAE Paper # 2006-01-3548).

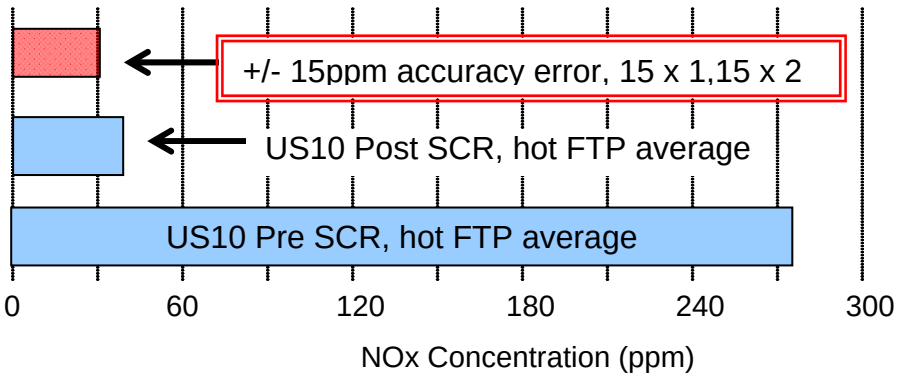
Sensor suppliers in 2007 predicted aged NOx sensor accuracy to be at +/-10 ppm. However, that level of accuracy has not been achieved or demonstrated for 2010 products.



In fact, current information from NOx sensor suppliers indicates the accuracy specification is +/- 15% in the range of 0-100 ppm for temperatures < 85°C. Recent aged NOx sensor data from 2010 MY engines have been supplied to ARB and have shown an output loss of up to 12.4% in less than 100,000 miles. This adds further doubt on the long-term supplier NOx sensor accuracy claims and supports that manufacturers' fears and concerns regarding adequate NOx sensor accuracy are well-founded.

Furthermore, the discussion of feasibility in the ISOR fails to account for the combined tolerance error impact associated with the use of two NOx sensors on the same engine/aftertreatment system.

The following is an illustration showing the impact of a 15% error



As the above illustrates, the accuracy error takes up most of the standard and does not allow for any separation between good and bad catalysts. Thus, monitoring to a threshold at 2x the standard is not technically feasible. ARB must revise the NOx catalyst and NOx sensor threshold upward to the standard +0.60 (4x std).

2. NMHC-Converting Catalyst Monitoring (e)(5)

EMA remains concerned that the 2010 MY NMHC emissions thresholds in the regulation are too low and will be exceeded on engines meeting 2010 MY emissions requirements when total failure of the DOC or DPF NMHC conversion efficiency (DOC/DPF) occurs. This will require manufacturers to implement an emissions threshold-based monitor rather than revert to functional-only monitors. And, there is no monitoring technology available that can robustly monitor NMHC converting capability at 2.5 times the NMHC standard with IRAF correction factor applied without a significant risk of false MILs.

ARB should increase the emissions-based malfunction threshold for NMHC converting catalysts to a high-enough level to ensure that 2010 MY engines will only have to meet functional monitoring requirements. EMA believes a threshold of 4 times the NMHC standard would ensure functional monitoring on most engine applications.

There is a significant risk that manufacturers will be required to meet this infeasible emissions threshold-based monitoring requirement for DOC/DPFs on engines meeting 2010 MY emissions requirements. The reasons for this are as follows:

- There is a clear tradeoff between engine out NMHC and NOx emissions, which will result in higher NMHC levels in order to meet the more stringent NOx standard in 2010.
- As a result of higher engine-out NMHC levels, oxidation catalysts will be operating at a higher efficiency in order to meet the 0.14g/bhp-hr NMHC standard.
- Although medium-duty engine manufacturers were able to avoid threshold-monitoring requirements for 2007 through 2009 MY engines, those engines were designed to meet higher NOx emission levels. Reducing NOx emissions from 1.2 g/bhp-hr to 0.2 g/bhp-hr in 2010 will also force these engines to decrease engine-out NOx levels, resulting in higher NMHC levels. These engines will be faced with the same dilemma as heavy-duty engines.

If an emissions threshold monitor is required, there is no monitoring technology available to meet ARB's monitoring requirement. SAE Technical Paper 2005-01-3602, "Diagnostics for Diesel Oxidation Catalysts," evaluated the feasibility of monitoring DOC/DPFs to specific emissions threshold levels. This paper evaluated the feasibility of both the exhaust oxygen sensor and catalyst temperature monitoring approaches. Some of the major findings and conclusions from this paper were as follows:

- The paper showed that diesel oxidation catalysts age by shifting the light-off to higher temperatures, and that exotherm from higher temperature-aged and fresh catalysts were indistinguishable at the higher catalyst temperatures. As a result, the exotherm monitor must be operated in a fairly narrow temperature window around catalyst light-off (200 to 400 degrees C).
- The HC levels occurring in diesel exhaust are too low to generate any appreciable exotherm to monitor at the required threshold levels. And the DPF regeneration event does not provide optimal conditions for monitoring since temperatures are above the light-off temperature of the catalyst.
- The error stack-up of RTD temperature sensors create significant uncertainty for monitoring the DOC/DPF. The paper evaluated the uncertainties due to sensor variability, sensor aging, measuring circuit, sensor length and mounting orientation, and A/D processing, and related the cumulative error for these uncertainties to a 3 sigma error bound that manufacturers must account for in determining threshold monitoring capability.
- A monitoring approach using oxygen sensors to infer HC conversion efficiency by determining the difference in oxygen concentration before and after the catalyst was evaluated and found to be less accurate than the exotherm monitoring approach for diesels. This was because the accuracy of lambda sensors deteriorated rapidly for lean air/fuel ratios. This paper presented data that shows this effect, and provided analysis that showed the uncertainty of HC conversion measurement to be between 2000 to 3000 ppm during typical diesel lambda values of 1.5 to 2, compared to the exotherm measurement uncertainty of 1000 to 1500 ppm HC found in the catalyst light-off temperature range.
- When all the noise factors for a normalized exotherm metric were added together, the paper found that the separation between a marginal and threshold catalyst was very poor, and would result in both false MILs and undetectable failures.

As a result, the paper concluded that emissions threshold-based monitoring of the HC conversion capability of the DOC was not feasible. On the other hand, manufacturers have found the exotherm monitoring approach to be feasible for functional monitoring of the DOC/DPF.

Additionally, ARB discussed some monitoring approaches in the ISOR which they believed help justify the current NMHC catalyst monitoring threshold requirement. EMA's response to each one of ARB's monitoring concepts and enhancements are discussed as follows:

- On Page 17 of the ISOR, ARB stated that intermediate levels of catalyst deterioration that cause increases in light-off temperature and lower conversion efficiencies can be detected. By looking at the catalyst behavior during active regeneration (e.g., by investigating how much time and/or fuel is needed to generate an exotherm, tracking the actual temperature rise from the

exotherm versus the expected, and using better temperature sensors), they believe that manufacturers will be able to better determine the characteristics exhibited as an NMHC catalyst degrades (even if it is still capable of eventually getting to a high enough exotherm to achieve regeneration of the PM filter). Although EMA believes there is some validity to monitoring catalyst light-off, we also believe there are significant limitations. For example, manufacturers must warm-up the catalyst as quickly as possible after a cold start in order to minimize HC slip. As a result, and as stated in the SAE paper referenced above, the exotherm monitor must be run in a fairly narrow temperature and time window around catalyst light-off, making it very difficult to complete the monitor and detect a partially deteriorated catalyst, especially when you take into account other noise factors that affect catalyst light-off. Further, these monitoring feasibility projections are based on the best temperature sensors that will be available for 2010 MY production.

- Additionally on Page 17, ARB also offered the following monitoring approach: "As an alternate approach, there are at least two light-duty manufacturers that are planning on monitoring the catalyst during a cold start. Often combined with an accelerated catalyst light-off strategy similar in concept to what many gasoline manufacturers use, this monitoring approach tracks the light-off and/or temperature rise characteristics to evaluate the catalyst during intrusive actions intended to bring the catalyst up to the desired temperature quickly after a cold start." But this approach has limitations as well, as there are many factors that can affect catalyst warm-up, with the condition of the DOC being only one of them.

- On Page 17, ARB stated that manufacturers simply work on reducing engine-out NMHC levels such that degraded catalysts will have less of an emissions effect. However, as we have stated above, measures taken to lower engine out NMHC will result in higher engine-out NOx levels. This would jeopardize both the ability to comply with the NOx emissions standard as well as making it more difficult to meet NOx catalyst monitoring requirements due to the resulting higher NOx conversion efficiency that would be needed. Manufacturers must strike a fine balance for engine-out NMHC and NOx levels to ensure that both requirements are met, and cannot simply jeopardize one to meet the other.

In conclusion, ARB has not presented any data demonstrating that the proposed threshold monitoring requirement for the DOC/DPF can be met. The proposed threshold-monitoring requirement in the HDOBD regulation for diesel oxidation catalysts is not feasible and must be revised.

3. <u>DPF Monitoring (e)(8)</u>

ARB has proposed to revise the OBD threshold for the PM filter to .07 for 2010. EMA supports that change as directionally correct. EMA nonetheless believes that the better approach would be raising the threshold to .09 and/or a requirement based on the physics of the PM filter system in which a malfunction is detected based on a decrease in

expected pressure drop at specified speeds and loads. That is the approach adopted by EPA as an alternative to a threshold in the nationwide HD OBD rule.

With respect to the 2013 PM filter thresholds, EMA believes those must be revised upward as well. Currently, PM sensor technology has not developed to the level where a .03 threshold can be met. Whether the threshold is right for 2013 will depend on the capabilities of the PM sensor and must be carefully evaluated in the next biennial review.

4. Engine Cooling System Monitoring (g)(1)

ARB has proposed that engine manufacturers would be required to monitor for failures which cause the ECT to cool back down below diagnostic enablement temperatures after they have been reached (e.g. monitoring to ensure temperatures stay above thresholds after they are initially reached):

> (1.2.1)(B) For 2016 and subsequent model year engines, the OBD system shall detect a thermostat fault if, after the coolant temperature has reached the temperatures indicated in sections (g)(1.2.1)(A)(i) and (ii), the coolant temperature drops below the temperature indicated in section (g)(1.2.1)(A)(i).

ARB is attempting to add a requirement that engine manufacturers detect a thermostat fault if, after the coolant temperature has reached the highest temperature required by the OBD system to enable other diagnostics AND reached a warmed-up temperature within 20 degrees Fahrenheit of the manufacturer's nominal thermostat regulating temperature, the coolant temperature drops below the highest temperature required by the OBD system to enable other diagnostics.

EMA requests ARB eliminate the newly proposed requirement to require engine manufacturers to detect a "malfunction" based on a coolant temperature drop below the highest temperature required by the OBD system to enable other diagnostics. The requirement is unnecessary because the OBD regulation already requires detection of thermostat malfunction, therefore, there is no further need to define a failed thermostat.

Moreover, such a drop does not necessarily represent a failure. Indeed, coolant temperature can drop below the highest OBD enabling coolant temperature during the course of normal operation without malfunction of the thermostat in cold operating conditions. The following are examples of items that could cause a decrease in coolant temperature below the threshold that are not due to a malfunctioning thermostat:

- Hysteresis: Temperature rises a few degrees above threshold and then drops back
- Operator turns heater on
- Temperature increased at idle and then drives at high speed with a high wind cooling down the radiator

- Idle operation
- Down hill operation in cold temperatures

If adopted, such a requirement also would have significant impacts on vehicle design. Engine manufacturers do not and cannot dictate how their customers design vehicles. At a minimum, therefore, ARB must provide substantial leadtime before such a requirement would go into effect. As EMA does not believe this requirement is even necessary to proper detection of malfunctions, ARB should eliminate it from the rule.

5. Misfire Monitoring (e)(2)

EMA supports the clarification made in section (e)(2.2.4). ARB should further clarify the language in the provision to say "50% of all cylinders."

6. EGR Coolers and Charge Air Cooling (e)(3.2.9) and (e)(4.2.8)

ARB has proposed that manufacturers submit an aging and monitoring plan for EGR coolers and for charge air cooling systems that consist of more than one cooler. The development of such a plan is extremely burdensome, as it requires not only the monitoring strategy for each component and combination of components but also requires the aging to be representative in the real world under normal and malfunctioning engine operating conditions. The rule would require that manufacturers anticipate every potential engine system malfunction that could occur in the real world and affect these systems. The requirements to submit such aging and monitoring plans should be removed or, at a minimum, greatly simplified.

7. ARB Should Eliminate Hybrid Component Monitoring Requirements (g)(3.1.5)

ARB staff appears concerned, among other things, about whether the engine and its emissions controls, as used in a hybrid drive system, will operate as effectively in a hybrid drive vehicle as with a traditional, mechanical transmission. Vehicle buyers and manufacturers also are concerned whether the emissions savings of a hybrid drive will pay back the initial investment in batteries, traction motors, and control systems as is needed to make hybrid systems economically attractive.

Such concerns are better addressed within emissions and emissions certification regulations than in HD OBD regulations. Because hybrid-drive systems do not emit specific combustion species, the application of an OBD threshold is not appropriate. Varying vehicle lading and operating profiles, especially other than an urban bus, create questions should the desired policy outcome of HD OBD for hybrid drives be the monitoring of Emissions Factor (EFs) and Emissions Factor Ratios (EFRs) which define the emissions reductions created by the hybrid drive system. The interim certification process contains formulations for EF and EFR that are test cycle sensitive and are focused on urban buses, not other vehicle applications.

Engine manufacturers are concerned that they are being asked to certify HD OBD diagnostics from systems that are equipment not of their own design or manufacture and produced by relatively few suppliers, that are vehicle-mounted apart from the engine, and that produce no brake specific emissions. The brake-specific operation of the engine has no bearing on the emissions produced by a drive system (i.e. generator, motor, and a battery) with no internal combustion components.

Given the broad nature of the concerns, engine manufacturers should not be required to certify diagnostics on the emissions created by a hybrid drive system until the nature of such emissions are better understood and there is data to direct appropriate policy on the diagnostics desired. Creating requirements in an HD OBD regulation for hybrid drive systems, without addressing interim certification issues and the responsibility for hybrid drive certification, is premature.

As a result, ARB should eliminate hybrid drive monitoring requirements from the proposal, including proposed section (g)(3.1.5) and the first clause of new proposed section (g)(3.1.4).

a. Interim Certification Procedure Effects

Heavy-duty emissions regulations (13 CCR 1956.8) currently reference "California Interim Certification Procedures for 2004 and Subsequent Model Hybrid-Electric Vehicles, in the Urban Bus and Heavy-Duty Vehicle Classes" to provide supplementary certification of hybrid electric drive systems. The principal function of the interim procedures has been the estimation of NOx emissions reduction through comparative testing of a baseline vehicle and modified vehicle on a chassis dynamometer. This testing creates EFs and EFRs that are used to scale the brake specific NOx emissions of the engine, i.e., (HEB NOx Emissions = EFR * Engine NOx Rating).

Since their adoption in 2002, the interim procedures have not been enhanced to better define test procedures for vehicle applications other than urban buses. Thus a myriad of other applications, including many which provide essential public services such as fire trucks, ambulances, electrical utility, road maintenance, and towing and recovery vehicles, have the effectiveness of their hybrid drive systems determined by the "Orange County Urban Bus Cycle." The interim procedures do not address whether the engine and its emissions controls will operate as effectively as they do with a traditional mechanical transmission.

b. Waste in Engine Certification of Hybrid Manufacturers

The manufacturing structure for heavy duty vehicles in North America is horizontally integrated. There is an infrastructure of a few, key technology suppliers that serve multiple vehicle manufacturers. In addition to engine manufacturers, transmission manufacturers and brake manufacturers supply key technologies and components for use in HD vehicles. Together, Allison and Eaton exceed 50% market share of the US and Canadian market for HD vehicle transmission systems.

Existing transmission manufacturers, including Eaton Corp and Allison Transmissions, have sought to develop their own hybrid drive technologies, lest their traditional mechanical transmission business be supplanted by hybrid drive technologies. (For example see Allison Hybrid Drives for Allison and Eaton Fuel Savings Claims for Eaton.) Multiple engine manufacturers cannot be expected to each certify the benefits of these products at their own expense for the hybrid manufacturers.

Under ARB's current regulatory framework, hybrid drive systems of these two manufacturers are to be certified by each engine manufacturer for each 2010+ engine family desired to operate with the given hybrid drive. Thus a single, generic system for a HD vehicle will be certified multiple times by each engine manufacturer. This is wasteful in the interim certification procedure, and it will be further wasteful in HD OBD certification.

As the proposed regulation stands, it creates huge disincentives for any hybrid drive technology reach the California marketplace. ARB should eliminate specific OBD monitoring of hybrid components from the HD OBD rule.

8. Mobile PTO Operation (g)(5.6)

Among the exceptions to monitoring requirements, the regulation currently requires that the readiness status for all monitors be reset to indicate "not complete" during PTO operation, then restored to its "previous state" once out of PTO mode. The use of PTO while the vehicle is mobile could affect the function of some monitors. Typical applications for mobile PTO operation include operating the water pump for fire trucks, operating the hydraulic pump for applications like a salt spreader or air compressors, or a refrigeration compressor.

ARB should add as an alternative to the current language an option allowing manufacturers to request the disablement of up to two OBD monitors during mobile PTO operation, as detailed in the proposed regulation change listed below. Paragraphs (g)(5.6) in HD OBD regulation and paragraphs (e)(17.6) and (f)(17.6) in the OBD II regulation should be modified as follows:

> *(17.6) A manufacturer may disable affected monitoring systems in vehicles designed to accommodate the installation of Power Take-Off (PTO) units (as defined in section (c)), provided disablement occurs only while the PTO unit is active, and the OBD II readiness status is cleared by the on-board computer (i.e., all monitors set to indicate "not complete") while the PTO unit is activated (see section [(g) or (h)] (4.1) below). If the disablement occurs, the readiness status may be restored to its state prior to PTO activation when the disablement ends.* *For applications that allow PTO operation while the vehicle is not stationary, a manufacturer may request Executive Officer approval to retain normal OBD II readiness status function during mobile PTO operation, provided that the onboard computer can distinguish between mobile and stationary PTO operation and no more than two monitors are disabled during mobile PTO*

operation. For continuous mobile PTO operation exceeding 750 minutes or 500 miles, the OBD II readiness status for disabled monitor(s) must be cleared (set to "not complete") until the disabled monitors again meet the criteria to indicate that the affected monitors are "complete".

Some vehicle applications result in extensive use of mobile PTO operation (e.g., refrigeration trucks, etc.). As a result, manufacturers request to retain the readiness status for all monitors for a limited amount of continuous PTO mobile operation provided only one or two monitors that are disabled. Resetting and restoring the readiness status to the "previous state" for monitors that are not disabled would create a mismatch of the data for those monitors that are continuing to run. Because the regulation currently states that all monitors must be reset to "not complete", EMA requests a regulation change as detailed above.

ARB, however, also should maintain the language of the current provision and add this new language only as an additional way to handle readiness status for mobile PTO operation. Many manufacturers already have developed systems to meet the requirements of the current rule and it should be maintained for both mobile and stationary PTO operation.

E. The Proposed AECD-Related Requirements Are Not Appropriate Or Justified OBD Measures and Must Be Eliminated from the Rule

The proposed amendments would require the HD OBD system to keep track of how often a subset of "auxiliary emission control devices" ("AECDs") are activated. As ARB describes them, AECDs are typically software strategies that alter the way an engine or its emission control system works when specific conditions are met in order to protect the vehicle, engine, or other emission control components from damage. The subset of AECDs at issue in the pending OBD rulemaking are those AECDs that: (a) are justified by the manufacturer as necessary to avoid vehicle, engine, or emission control component damage; and (b) reduce the effectiveness of the emission control system under conditions which may reasonably be expected to be encountered during normal vehicle operation and use (hereinafter, "emission-increasing AECDs" or "EI-AECDs"). Significantly, an AECD that is certified as a "NTE deficiency" will not be considered an EI-AECD. Further, an AECD that does not sense, measure, or calculate any parameter or command or trigger any action, algorithm, or alternate strategy will not be considered an EI-AECD. Finally, an AECD that is activated solely due to any of the following conditions is not considered an EI-AECD: (1) operation of the vehicle above 8000 feet in elevation; (2) ambient temperature; (3) when the engine is warming up and is not reactivated once the engine has warmed up in the same driving cycle; (4) failure detection by the OBD system; (5) execution of an OBD monitor; or (6) execution of an infrequent regeneration event.

The proposed OBD requirements for EI-AECDs are extensive and very onerous. Specifically, starting with the 2013 model year, manufacturers of diesel engines installed in medium-duty vehicles will need to develop software algorithms to individually track and report in a standardized format the total engine run time during the time period that

each separate EI-AECD is active (e.g., total run time with EI-AECD #1 active, total run time with EI-AECD #2 active, and so on up to total run time with EI-AECD #n active). Moreover, each unique combination of action, parameter and condition within a purpose, all as defined in the rule, must be tracked as a separate EI-AECD. In addition, for any EI-AECDs that have variable actions or degrees of action, those EI-AECDs will need to be tracked with two separate counters. The first of the two counters is required to be incremented whenever the EI-AECD is commanding some amount of reduced emission control effectiveness up to but not including 75% of the maximum reduced emission control effectiveness that the EI-AECD is capable of commanding during in-use vehicle or engine operation. The second of the two counters is required to be incremented whenever the EI-AECD is commanding 75% or more of the maximum reduced emission control effectiveness that the EI-AECD is capable of commanding during in-use vehicle or engine operation.

In its ISOR for the proposed amendments, Staff describes the rationale for the EI-AECD requirements as follows:

> For those strategies that meet all the requirements above to be considered an EI-AECD, the on-board computer would be required to log cumulative time each one is active and update the stored counter at the end of each driving cycle with the total cumulative time during the driving cycle. Further, each EI-AECD would be counted and reported separately (EI-AECD #1, etc.). ARB staff would be able to use this data to confirm or refute previous assumptions about expected frequency of occurrence in-use and use the data to support modifications to future model year [certification] applications and better ensure equity among all manufacturers. This data will also help ARB staff identify "frail" engine designs that are under-designed relative to their competitors and inappropriately relying on EI-AECD activation to protect the under-designed system.
>
> (ISOR, p. 53.)

EMA has very significant concerns with the proposed amendments as they pertain to EI-AECDs.

As an initial matter, the proposed EI-AECD requirements have nothing to do with OBD-related issues and functions. The EI-AECD requirements at issue are not in any way related to the identification, diagnosis or remediation of malfunctions in engine emission control systems or their various components. Instead, the proposed EI-AECD requirements are only potentially germane to initial engine family certification determinations. Consequently, there is no justification for including such EI-AECD requirements in an OBD regulation.

Moreover, ARB Staff has not demonstrated why the current certification process -- which requires engine manufacturers to provide ARB with extensive disclosures, detailed descriptions and data relating to the necessity for and operation of any AECD -- is insufficient to protect ARB interests and prevent unwarranted uses of AECDs. This is especially true since the AECDs at issue here are not those related to approved "NTE deficiencies," and so are not those that could result in any non-compliance with the underlying emission standards in any event. Indeed, even if the EI-AECDs at issue could impact emissions compliance in-use (again, not the case here), any such deficiency-related AECDs, by their very nature, may only be provisional measures that manufacturers are required to phase-out over time, and may not be carried over routinely from one model year to another. ARB's existing regulations are very clear on this point, and unambiguously state, as follows:

> Deficiencies for NTE Requirements
>
> 3.1 For model years 2005 through 2009, upon application by the manufacturer, the Executive Officer may accept a HDDE as compliant with the NTE requirements even though specific requirements are not fully met. Such compliances without meeting specific requirements, or deficiencies, will be granted only if compliance would be infeasible or unreasonable considering such factors as, but not limited to: technical feasibility of the given hardware and lead time and production cycles including phase-in or phase-out of engines or vehicle designs and programmed upgrades of computers. Deficiencies will be approved on an engine model and/or horsepower rating basis within an engine family, and each approval is applicable for a single model year. A manufacturer's application must include a description of the auxiliary emission control device(s) which will be used to maintain emissions to the lowest practical level, considering the deficiency being requested, if applicable. An application for a deficiency must be made during the certification process; no deficiency will be granted to retroactively cover engines already certified.
>
> 3.2 Unmet requirements should not be carried over from the previous model year except where unreasonable hardware or software modifications would be necessary to correct the deficiency, and the manufacturer has demonstrated an acceptable level of effort toward compliance as determined by the Executive Officer. The NTE deficiency should only be seen as an allowance for minor deviations from the NTE requirements. The NTE deficiency provisions allow a manufacturer to apply for relief from the NTE emission requirements under limited conditions. ARB expects that manufacturers should have the necessary functioning emission control hardware in place to comply with the NTE.

(40 CFR (Subpart N), §86.1370-2007 (California provisions, ¶¶ 3.1 and 3.2).)

Thus, there is no justification for including the AECD-related requirement at issue in the pending amendments to the HD OBD rule. Those requirements have nothing to do with the maintenance and repair of malfunctioning emission control components, and ARB already has ample means at the time of certification to ensure that AECDs are not claimed or relied upon inappropriately by engine manufacturers. Indeed, since the AECDs at issue here are not those that could occasion an NTE deficiency in any event, the rationale for compelling such detailed tracking of those AECDs as additional elements of an already over-taxing OBD program is, from an environmental perspective (let alone from a cost and feasibility perspective), without basis.

Turning to feasibility concerns, ARB has failed to demonstrate the technical feasibility of implementing the proposed EI-AECD requirements (including the dual tracking requirements for EI-AECDs that have variable degrees of action) on top of all of the other onerous requirements at issue in the OBD proposed amendments. The potential impacts and strains that the proposed EI-AECD requirements will impose on already-strained ECM storage and operational limits have not been assessed, nor has the feasibility of discerning the proposed 75% threshold been established (i.e., requiring the development and installation of counters capable of distinguishing on a second-by-second basis when an EI-AECD is operating above and below "75% of the maximum reduced emission control effectiveness that the EI-AECD is capable of commanding"). Until such time as ARB has clearly demonstrated the feasibility of the EI-AECD tracking requirements at issue, those requirements should not be adopted or implemented.

Similarly, ARB has made no showing whatsoever of the cost-effectiveness of the proposed EI-AECD requirements. Indeed, because those requirements are not directed at detecting and correcting any excess vehicle emissions that might occur in-use as a result of malfunctioning emission control components (the focus of legitimate OBD-related requirements) there are no emission benefits that can be associated with the EI-AECD requirements at issue. The lack of emissions benefits is particularly obvious since, as noted above, the EI-AECDs at issue are specifically defined to exclude those AECDs that might occasion an NTE deficiency. As a result, the cost-effectiveness of the proposed AECD-tracking requirements simply cannot be established.

In sum, ARB should not include any of the proposed EI-AECD requirements in the final OBD II regulations. Those EI-AECD requirements are wholly unrelated to any legitimate OBD objectives and functions. Moreover, the feasibility and cost-effectiveness of those requirements has not been and cannot be established.

At a minimum, if ARB fails to remove the EI-AECD requirements, it should revise the definition of "EI-AECD" and revise section (h)(5.2.3)(D) to change "8000 feet" to "5500 feet." ARB has no justification for requiring "EI-AECD tracking" tracking up to 8000 feet elevation. California has only two counties with altitudes above 5500 feet, likely representing approximately 1% of vehicle miles traveled. Moreover, under existing emission certification requirements, a cutpoint at 5500 feet is consistent with the federal NTE requirements and definition of AECDs. Any differences from that are not justified.

F. ARB Must Revise or Eliminate Other Comprehensive Component Monitoring Requirements

1. ARB Should Not Force Manufacturers To Provide A "Smart" Component For Tolerance Compensation Matching (g)(3.2.2)(F)

ARB has proposed that, beginning with the 2013 model year, manufacturers must incorporate software strategies to detect the use of fuel system components that have the incorrect tolerance ("component tolerance compensation matching") (1971.1(g)(3.2.2)(F)). Staff indicated it has included this provision to ensure service technicians make the right repairs and do not have to manually code in the tolerance compensation features of the fuel system component being repaired or replaced.

Modifying the design of the engine control system to automatically detect the use of fuel system components without proper or "matched" tolerance compensation is not a practical solution to the perceived problem. The cost to add hardware and software to automatically detect this type of error – creating a "smart" component because someone might make a mistake – is very costly and is not justified. In fact, manufacturers question whether or not this is a problem that causes in-use emission issues. While accidentally coding in the wrong tolerance compensation features could occur, that is the case with many of the mechanical components on the engine. But it would be impractical to try to guess at and anticipate -- and force manufacturers to incorporate into their products the added capability to automatically detect the application of the wrong part to the engine for -- every error that may or may not occur.

For the specific fuel system components, the Agency has identified emission and drive-cycle requirements that are significantly more stringent than other comprehensive components such as those for emission-related sensors. It appears that sensor monitoring requirements are many times less stringent than the requirements for those specific fuel system components. ARB should identify reasonable malfunction detection criteria and emission threshold requirements that must be met so that manufacturers can provide a cost-effective solution for those fuel system components.

As currently written, the proposed requirement is overly restrictive in that it requires a manufacturer to detect a malfunction of a single component (e.g., injector) using the wrong compensation that can cause a measurable increase in emissions during any reasonable driving condition, or the manufacturer must detect a malfunction for the minimum number of components using the wrong compensation needed to cause an emission increase. Further, the stored fault code must identify the specific component that does not match the compensation. So, at issue are the following requirements: detect any measurable emission increase, detect over any reasonable driving condition, and, finally, isolate the failure to the specific component.

Manufacturers rely on service technicians working on heavy-duty engines to be properly trained to ensure the correct parts are installed when the engine is serviced. Those who want to service the product correctly – particularly those who service, or themselves rely on, the product for commercial purposes – will have the information to

do so. Manufacturers already ensure – and will continue to ensure – that adequate and appropriate service information is provided to allow mechanics to be trained properly and to have the ability to identify the properly toleranced parts for the specific application. ARB should not adopt the proposed amendments to this provision. If the Agency pushes forward with the requirement, then the clarifications identified above must be adequately addressed so cost-effective solutions can be identified.

2. MIL Circuit Monitoring (g)(3.2.2)(D)

ARB has proposed to eliminate the requirement to monitor the MIL for circuit malfunctions. Engine manufacturers support removal of the requirement for the reasons stated in the ISOR.

An identical request was made regarding the wait-to-start lamp, which was denied as discussed on page 44 of the ISOR. The ISOR presumes that industry costs for providing diagnostics for the wait-to-Start lamp for LED lamps must be less than the emissions benefit provided without quantitative justification. Engine manufacturers believe that any increase in emissions resulting from a failed wait-to-start lamp for an engine with no other failures would be inconsequential. Cold start emission reduction strategy monitoring (1971.1(e)(11)) requires manufacturers to develop detection means to detect consequential increases in emissions during a cold start. Paragraph (g)(3.2.2)(C) requires that the cold starting aids be directly diagnosed for failures. Engines that do not reliably start are repaired promptly in order to meet the demands of commercial vehicle owners, who must have reliable equipment to return the capital on their investment in a HD vehicle. The costs of providing diagnostics for LED wait-to-start lamps will borne by multiple vehicle manufacturers, who are not directly regulated by 13 CCR 1971.1 and 13 CCR 1958.6. By requiring diagnostics on the wait-to-start lamp, ARB staff are actually re-regulating emissions performance, more properly regulated in 13 CCR 1958.6 than in the HD OBD rule, 13 CCR 1971.1.

3. Vehicle Speed Sensor (g)(3.1.1)

Engine manufacturers appreciate the need for comprehensive component monitoring for HD OBD systems. Engine manufacturers disagree that electronically controlled transmissions are not robust, and that failure of their output shaft speed sensor systems, when used to estimate vehicle speed, would go undetected and uncorrected for indefinite periods of time.

- Electronic transmission control technologies have been sold in HD vehicles for nearly 20 years. Automated manual transmissions' technologies exceed 10 years of use on public highways.[2] To suggest the existing technologies are not robust for HD OBD also suggests that these technologies are perhaps unfit for use in commercial vehicles.

[2] Allison HT transmissions are among the earlier examples. Automated transmissions are also offered in North America by Eaton Corporation, and Meritor-ZF (formerly Rockwell). There is an insufficient number of HD transmission manufacturers to support a vertical industry structure.

- Electronically controlled transmissions are equipped with their own failure indication lamps which illuminate when transmission output shaft speed sensors fail. Example lamps state "Check Trans" and/or "Range Inhibited." Owner's manuals direct vehicle operators to move the vehicle to the side of the road and seek assistance.[3] [4]
- Vehicles with speedometer or transmission control system failures are not suitable for continued use in public passenger, private, or commercial carriage. Continued use is prohibited by state and federal Motor Carrier Safety regulations.[5]

The Staff Report summarizes ARB staff's discussions with industry associations and with separate manufacturers on separate occasions.[6] (ISOR, pp. 4, 43, and 44.) There are three additional questions that must be reviewed to complete the discussion: (1) What is the engine emissions warranty for parts not provided with the engine and not under the engine manufacturers' control? (2) Are engine manufacturers able to demonstrate all the desired qualities of the transmission manufacturers' diagnostics? (3) What is practical for industry to provide, including transmission manufacturers, engine manufacturers, and vehicle manufacturers?

ARB staff suggests that vehicle owners may not be able to have a vehicle speed sensor repaired because it may not be covered under an engine manufacturer's emission warranty. Lack of coverage under the mandated emissions warranty will not create a significant barrier for vehicle owners to seek warranty repairs for transmission output shaft speed sensors. Even if not warranted by the engine manufacturer under an emissions warranty, the vehicle manufacturer's typical warranty terms for commercial HD vehicles range from 1 to 3 years and 100,000 to 300,000 miles. Extended warranty terms are routinely offered. These terms are comparable with the required emissions warranty coverage for the engine, and transmission manufacturers may be willing to

[3] Pages 90 and 92, Operator's Manual VNL and VLN, Volvo North American Corporation 2001. http://www.volvo.com/NR/rdonlyres/93DB215C-5F81-466A-AE69-1A9E9751210E/0/PV776_TSP20154796_lores.pdf

[4] Page 4, FreedomLine™ Transmission Maintenance and Diagnostics Manual MM-0150, ArvinMertor Corporation February 2009.

[5] For examples see FMCSR 393, FMCSR 396, and FMVSS 102. FMCSR §393.82 requires an operable speedometer. FMCSR §396.3 requires systematic inspection of vehicles and §393.7 prohibits operation of vehicles where any part is not in good working order. FMVSS 102 S3.1.2 Transmission braking effect requires an operable transmission in order to provide a second gear ratio with "a greater degree of engine braking than the highest speed transmission ratio at vehicle speeds below 40 kilometers per hour." The appropriate response to a transmission system failure is to place the commercial vehicle out of service.

[6] Implementation costs reviewed during the original HD OBD rulemaking in 2005 do not discuss the requirement for an engine manufacturer or vehicle manufacturer to add an additional, independent vehicle speed sensor. Engine manufacturers estimate such costs at approximately $100 including transmission effects to accept an additional sensor.

provide a warranty that is equivalent to the emissions' 5 year 100,000 mile warranty for the transmission output shaft speed sensor failures.

Engine manufacturers have agreed to light the MIL for vehicle speed sensor failures when vehicle speed is used for OBD monitors in their products. But instead of detecting all possible transmission output shaft speed sensor and circuit failures by themselves, engine manufacturers propose to leverage the existing capabilities of transmission manufacturers for speed sensor and speed sensor circuit error detection, and not duplicate these methods with (likely) inferior methods at higher per vehicle costs than anticipated by the 2005 HD OBD Staff Report. (See, Staff Report: Initial Statement Of Reasons For Proposed Rulemaking, Malfunction and Diagnostic System Requirements for 2010 and Subsequent Model Year Heavy-Duty Engines, available at http://www.arb.ca.gov/regact/hdobd05/isor.pdf, page 121).

The method for collaboration with the transmission control unit (TCU) is simple in concept. When the transmission detects a failure with the vehicle speed sensor or vehicle speed sensor circuit, this failure will be communicated by the TCU to the HD OBD engine control module. The engine control module will demand that the MIL become illuminated, when it receives this error indication.[7] In addition, the ECM will provide a signal data rationality check of the engine manufacturers design for the transmission output shaft speed value communicated by the TCU that will indicate failures that are undetected by the TCU. This rationality check algorithm would be fully disclosed to ARB by the engine manufacturer as a part of their diagnostics description in the certification package. Lastly, the engine ECM will light the MIL when the data from the TCU is not available on the vehicle's data link. These methods can readily be demonstrated by the manufacturer prior to production and post-production as a part of the engine manufacturers' production vehicle evaluation tests required by the HD OBD rule (1971.1 (i)(2)) and are sufficient to diagnose vehicle speed sensor failures.

ARB staff and industry disagree on the capabilities of transmission manufacturers' output shaft speed diagnostics. Industry believes that the transmission manufacturers' diagnostics for detecting transmission output shaft sensor failures are more robust than that which could be provided by engine manufacturers themselves, using an additional speed sensor. This is because transmissions have additional data, such as input and intermediate shaft speeds and transmission gear ratio on which to base their diagnostic decisions. Also variable reluctance and Hall effect technology choices that are appropriate for measuring rotational velocity of ferrous gears, if an additional sensor were to be used, have well known limitations regarding their capabilities to

[7] The rules given in SAE J1939-71 Table 1 will be used to provide the error indication for those vehicles that use SAE J1939-73 and SAE J1939-71 to fulfill standardized communications requirements. Table 1 provides a multifunction signal description. An error indication is required to be broadcast whenever the transmitter detects an error in the signal that would make its data transmission invalid. Otherwise, the normal scaling of the data is performed and transmitted on this publicly defined control bus. Manufacturers using proprietary control bus descriptions will provide alternate means for conveying a failed transmission output shaft speed sensor signal.

support open and short circuit diagnostics.[8] Lastly, all agree that the ECM's ability to diagnose the TCU's vehicle speed sensor is limited due to the fact the ECM is not directly connected to the sensor.

Transmissions are manufactured by separate corporations from the engine and vehicle manufacturers. As a result, engine and vehicle manufacturers do not own diagnostics and control algorithms in transmission TCUs, the transmission TCU designs, or the service literature copyrights for electronically controlled transmissions. Where transmission design is not under an engine manufacturer's direct control, it is impractical to assume that the engine manufacturers can provide ARB with any of a transmission manufacturer's proprietary data regarding the transmission control system's detailed diagnostic capabilities, or to assume that engine manufacturers can effect permanent changes in transmission ECU operation.[9]

Engine manufacturers have sought to eliminate VSS from HD OBD requirements and monitor designs to eliminate this issue as a point of contention between engine manufacturers and ARB staff, and to minimize the potential costs of an HD OBD engine installation in a vehicle. Moreover, engine manufacturers anticipate the HD OBD rule as providing a model for future stationary or marine applications where there will be no vehicle speed sensor. Unfortunately not all use of vehicle speed data has been successfully eliminated to date. Industry believes that a plurality of the required HD OBD monitors have been made independent from vehicle speed conditions and will operate correctly without the use of vehicle speed. In summary, ARB should eliminate requirements to monitor output shaft vehicle speed sensors.

4. Idle Control/Fuel Injection Quantity Monitoring (g)(3.2.2)(B)

ARB has proposed the following with respect to idle control/fuel injection quantity monitoring under comprehensive component monitoring requirements:

> …A malfunction shall be detected when…For 2013 and subsequent model year engines, the idle control system cannot achieve the target idle speed with a fuel injection quantity within +/-50 percent of the fuel quantity necessary to achieve the target idle speed for a properly functioning

[8] Hall effect sensors typically mimic open circuits when they are not excited by ferrous material. Variable reluctance sensors have very high peak to peak operating voltages at highway speeds creating high dynamic ranges that challenge circuit failure detection with typical A/D devices that measure voltage. A negative voltage on a variable reluctance sensor is not out of range low, but part of its rotational speed to frequency transfer function.

[9] The HD vehicle industry for commercial vehicles above 14,000 pounds GVW in North America is horizontally integrated. Engine manufacturers are not responsible for the transmission because under this horizontal market structure, engine manufacturers do not typically manufacture the transmissions in HD vehicles. Certifications for HD OBD apply to engine emissions that manufacturers certify according to 13 CCR 1956.8. 13 CCR 1956.8 regulates engine emissions independently from the details of its application. Emissions for transmissions that have no internal combustion components or aftertreatment devices are not certified.

engine and the given operating conditions. 1971.1(g)(3.2.2)(B)(ii)(d) and 1968.2(f)(15.2.2)(B)(iv).

There are several issues with this requirement that will make robust monitoring impossible. Significant work would be required to address the following issues prior to adopting any requirement of this nature. For example, there are no immediate solutions to the following issues:

1. Poor fuel quality, particularly low cetane fuel with low energy content, would result in a higher than "normal" fuel to maintain the same idle speed as the same engine using a high cetane fuel given the same environmental conditions. There is no practical way to determine fuel quality through OBD.
2. Variable engine loads would have the most pronounced effect on idle fuel quantity. Accessory loads (A/C, power steering, vacuum pump during brake applies, alternator) alone will use up most of the allowed +/- 50% idle fuel requirement. Sensing these loads would require new I/O and bring new non-ECU-controlled components into OBD.
3. A manual transmission application will routinely exceed the idle fault tolerance during idle-only launches or when the idle governor is driving the vehicle in gear. There is no reliable way to monitor and react to such a situation.
4. The vehicle driving the engine during decelerations (coasting) will routinely cause the idle fuel to drop below the minimum allowed tolerance.

Diesel engines do not target a fuel quantity in order to attain a desired idle speed. The idle rpm is closed-loop-controlled by the ECM using fuel, but a specific desired/correct idle fuel quantity does not exist for any particular desired rpm. Idle fuel quantity for any given rpm varies greatly based on environmental conditions as mentioned above. In typical PID fashion, idle fuel can be 0 to a calibratable maximum authority of the idle control system as required to maintain the desired idle speed.

Engine manufacturers do not agree with ARB's assessment that a "normal" engine that requires 10mm3 of fuel to maintain a desired idle speed has a malfunction if it should require 15mm3 of fuel to maintain the same desired idle speed. The increase in fuel is much more likely to be a result of load, fuel or environmental conditions (which cannot be robustly monitored and accounted for). The repair procedure to fix an engine setting this code would be quite problematic.

Other regulations already exist requiring a monitor to set if the idle governor is unable to maintain the desired idle rpm within fault tolerances. This requirement should be removed from both the MD OBDII and HD OBD proposals. At a minimum, ARB should delay such a requirement until the 2016 model year.

G. **ARB Must Eliminate Vague Requirements From the Proposal**

1. "Other Emission Control System Monitoring" (g)(4.3)

ARB has proposed to add the following new section to the HD OBD rule:

> (4.3) For emission control strategies that are not covered under sections (e), (f), and (g)(1) (.e.g, a control strategy that regulates SCR catalyst inlet temperatures within a target window), EO approval shall be based on the effectiveness of the plan in detecting malfunctions that prevent the strategy from operating in its intended manner. These malfunctions include faults that inappropriately prevent or delay the activation of the emission control strategy, faults that cause the system to erroneously exit the emission control strategy, and faults where the control strategy has used up all of the adjustments or authority allowed by the manufacturer and is still unable to achieve the desired condition. The EO may waive detection of specific malfunctions upon determining that the manufacturer has submitted data and/or an engineering evaluation that demonstrate that reliable detection of the malfunction is technically infeasible or would require additional hardware.

As described more fully below with respect to best available monitoring technology language, ARB has added what could only be termed a "catchall" clause to the regulation. This clause would require manufacturers to meet OBD monitoring requirements for anything that is not specified in the rule, but that ARB believes should be monitored. Such a provision is completely unreasonable and unlawful. ARB is expecting manufacturers to meet standards that are not even specified in the rule. Manufacturers have no clarity as to the expectations for meeting such "standards," and not even any notice as to what those standards might be. It is unfair, unreasonable, and unlawful to demand that manufacturers comply with something that is not specified in the regulation. Manufacturers need adequate notice of the requirements and they need sufficient leadtime and stability to be able to incorporate new monitoring requirements into their designs. This section is unreasonable and fails to provide manufacturers with notice of what they must meet.

2. "Best Available Monitoring Technology" (g)(5.7)

The proposed amendments would allow the Executive Officer to determine whether a manufacturer has met an OBD standard in a given year by comparing that manufacturer's technology with that used by other manufacturers. Specifically, ARB would require the Executive Officer to review manufacturers' proposals for monitoring components that are required to be monitored "to the extent feasible" by considering, among other factors, "best available monitoring technology [BAMT] to the extent that it is known or should have been known to the manufacturer" (1971.1(g)(5.7)). What that would mean in practice is that when a manufacturer presented its monitoring plan on a

given component to ARB for approval, ARB could review and reject the plan because it did not use the technology that another manufacturer used, and on that basis deny certification.

BAMT is not an appropriate measure for ARB to use in establishing OBD standards, and ARB should eliminate the BAMT language from the proposed amendments. The BAMT language the ARB has proposed to add would subject manufacturers to a standard that is, at worst, completely unknown (and, therefore, not a standard at all) and, at best, a moving target that unquestionably violates the 4-year leadtime and 3-year period of stability requirements.

Essentially, the proposed language would require manufacturers to use their competitors' technology when ARB decided it was appropriate. But that results in no clear standard at all. Manufacturers do not know their competitors' technology. Even if they know what technologies their competitors may be using generally, they do not have access to the specific information and details required to successfully apply the OBD monitoring technology to the engine component at issue.

Moreover, each manufacturer must develop OBD technologies appropriate to its own engine systems and technologies used to meet the underlying emission standards. One manufacturer's OBD monitoring approach may or may not be appropriate for another manufacturer or technology. Emission standards and OBD standards must be developed based on what is technologically feasible, as determined by looking at various technologies which manufacturers are developing, and are meant to be technology-neutral. In other words, the standards do not – nor should they – prescribe technologies manufacturers must use in meeting those standards. ARB's proposed amendment to consider BAMT when approving a monitoring plan would do just that.

Furthermore, basing approval of manufacturers' monitoring plans on "best available monitoring technology" would create a "standard" that is constantly moving and would codify ARB's practice of playing manufacturers off against each other year after year after year. Staff has acknowledged that their current practice is to review what manufacturers are doing year to year and suggest changes to OBD monitoring technology that must be incorporated for the next year's OBD certification, thereby changing the standards on a yearly basis. Staff also has indicated that ARB could, in fact, deny certification in any given year (i.e., without giving manufacturers even a year to adopt the new suggested approach) based on consideration of BAMT and the other criteria that have been proposed. Such an approach ignores and, indeed, violates the leadtime and stability requirements of the CAA (and California law) by forcing yearly changes in monitoring strategies.

H. **ARB Must Revise Certain General Requirements of the Proposal**

1. <u>MIL and fault code requirements (d)(2)</u>

ARB's OBD rule currently requires different treatment for pending fault codes after storage depending on whether a vehicle uses the ISO 15765-4 protocol or the J1939

protocol. Light and medium-duty or ISO methods retain the pending fault, while heavy-duty methods erase pending faults. ARB should revise the language in sections (d)(2.2.1)(B) and (2.2.2)(B) to indicate that, in either case, the pending fault code may be erased or retained.

Such a change supports the use of common diagnostic executives across medium- and heavy-duty engine control systems. EMA proposes the following language revision to both sections (d)(2.2.1)(B) and (2.2.2)(B) (change underlined):

> After storage of a pending fault code, if the identified malfunction is again detected before the end of the next driving cycle in which monitoring occurs, the OBD system shall illuminate the MIL continuously, <u>erase or retain the pending fault code</u>, and store a MIL-on fault code within 10 seconds. If a malfunction is not detected before the end of the next driving cycle in which monitoring occurs (i.e., there is no indication of the malfunction at any time during the driving cycle), the corresponding pending fault code set according to section (d)(2.2.2)(A) shall be erased at the end of the driving cycle.

The US EPA HD OBD rule and the ARB Rule differ regarding the requirement to erase the pending fault, when a pending fault matures into a MIL-on (or confirmed) fault. The US EPA rule provides a manufacturer option to either retain or erase the pending fault. The ARB rule requires the pending fault to be erased. There are advantages and disadvantages to either method, and ARB should revise its rule to harmonize with the EPA approach.

J1939-73 MIL-on faults are captive to the "three trip rule," and will appear in the MIL-on list provided by DM12 when not detected (i.e. active) for at least three trips. Pending faults can be compared to the MIL-on list to understand those established or re-detected during the current trip. Dividing confirmed faults into MIL-on and MIL-off (in DM23) only separates recently detected faults from those confirmed faults that are waiting to be erased under the 40-trip rule. This was intended to allow repair efforts to concentrate on the most recently detected problems that had illuminated the MIL, but does not eliminate potential confusion between pending and confirmed faults under a two trip regimen.

2. <u>Denominator Specifications for Incrementing</u>

a. Incrementing for Certain Output Component Monitors (d)(4.3.2)(E)

For denominator incrementing of certain output component monitors, ARB has proposed that certain specified components "shall be incremented if and only if the component is commanded to function (e.g., commanded "on", "open", "closed", "locked") on two or more occasions for greater than two seconds during the driving cycle or for a cumulative time greater than or equal to 10 seconds, whichever occurs first."

EMA proposes that this language be revised as follows: "…shall be incremented if and only if the component is commanded to function (e.g., commanded "on", "open", "closed", "locked") for a cumulative time greater than or equal to 10 seconds; provided, however, that in the alternative, manufacturers shall have the option to use the specifications set forth in 1968.2." EMA believes our proposal meets ARB's intent to only count denominators if the component is actually used and covers both components that are operated frequently (but briefly) or less frequently (but for longer periods of time). It is a straightforward and simple approach. However, manufacturers with control systems that are used on engines/vehicles below 14,000 lbs. GVWR require compatibility with light duty regulations and thus we are requesting optional compliance with the denominator requirements of 1968.2.

b. Incrementing of Emission Controls that Experience Infrequent Regeneration (d)(4.3.2)(G)

Section (d)(4.3.2)(G) requires that, for monitors of emission controls that experience infrequent regeneration events, prior to incrementing the denominator there must be at least 750 minutes of cumulative engine run time since the last time the denominator was incremented. This requirement does not align with the medium-duty OBD II regulation 1968.2 (d) (4.3.2)(G) which requires at least 500 miles of cumulative vehicle operation to increment the denominator.

EMA believes that the HD OBD and MD OBD regulatory requirements for incrementing the denominator for emission controls that experience infrequent regeneration events should be consistent. In lieu of the requirement of at least 750 minutes of cumulative engine run time since the denominator was incremented, EMA would also like manufacturers to have the option to increment the denominator if there has been 500 miles of cumulative vehicle operation since the denominator was last incremented. We propose that 1971.1 (d)(4.3.2)(G) be amended as follows:

> For monitors of the following components or other emission controls that experience infrequent regeneration events, the denominator(s) shall be incremented by one if and only if, in addition to meeting the requirements of section (d)(4.3.2)(B) on the current driving cycle, at least 750 minutes of cumulative <u>non-idle</u> engine run time <u>or at least 500 miles of cumulative vehicle operation</u> have occurred since the last time the denominator was incremented. The 750-minute engine run time counter <u>or the 500 mile engine operation counter</u> shall be reset to zero and begin counting again after the denominator has been incremented and no later than the start of the next ignition cycle; ...

The incongruity between the HD and MD OBD requirements on this point can add complexity for manufacturers that have an engine that will be certified for both medium and heavy-duty applications. If the same engine is certified for both applications, HD OBD would have a time based metric for incrementing the denominator while MD OBD would have at distance based requirement for the same monitor; thus introducing additional complexity to the manufacturer. The change being proposed

would alleviate this concern. In the alternative, the alternative time-based metric could be limited to light-heavy-duty engines only (≤19,500 lbs. GVWR).

In addition, at the workshop on the draft regulation, ARB indicated the engine run time to be measured for 750 minutes would be *non-idle* engine run time. EMA supports such a change. There will be "clean-idle" heavy-duty engines and vehicles meeting the requirements of California's idling rule that will be idling for substantial periods of time. As a result, the measurement for determining incrementing should be based on non-idle time in order to assure incrementing at proper intervals. There is very little filter loading at idle, so measuring at idle is not critical. Thus, ARB should add "non-idle" before the words "engine run time" in section 4.3.2(G).

I. ARB Should Delete Service Information Requirements and Adopt Other Proposed Changes to Standardization Requirements

ARB's proposed changes to section (h)(1) would reference more relevant versions of the SAE standards for standardized communications that begin in 2013. EMA agrees that ARB should recognize those standards development accomplishments in (h)(1) that better harmonize details in the standard to details in the regulations. Industry will continue its efforts to maintain these standards as the regulations evolve. EMA also agrees that required diagnostic connectors should be located and oriented such that it is possible to safely operate a vehicle with the diagnostic connecter in use as is suggested for (h)(2).

EMA believes that PM sensor technology must be subject to further biennial reviews, and that use of PM sensor data as is proposed in (h)(4) should be subject to agreement between industry and ARB staff that the PM sensor technology is durable, reliable, accurate and appropriate to the desired task at reasonable production costs which closely match the cost expectations of the 2005 ISOR. EMA does not believe that an engine can reliably measure and predict hybrid battery pack remaining change, and believes that no engines will be so equipped. Battery charge is not measured by engine control systems that perform HD OBD functions.

EMA supports the additional clarification provided by the changes to (h)(4.5.5) through (h)(4.5.7). ARB should continue to work with industry to better understand the measurement methods used in diesel engine monitors and review, as a part of its ongoing administration of the OBD requirements, the list provided in proposed (h)(4.5.7) for additional cases where unique test results are not practicable. Engine manufacturers also support allowing multiple CAL-IDs and CVNs in (h)(4.6) and (h)(4.7), which some manufacturers already use in their production and record-keeping systems. Engine manufacturers can only insure that a CAL ID and CVN are provided for the engine and the engine's subsystems, and interpret the term "vehicle" to mean "engine" where an engine dynamometer is typically used to certify emissions and HD OBD performance.

Engine manufacturers note that the availability of ESN aids the administration of engine service today and agree to provide ESN for heavy-duty engines as proposed in (h)(4.8). Section (h)(4.8.3) should now refer to (h)(4.10.1) instead of (h)(4.9.1). The

requirement for ECUNAME in proposed (h)(4.9) needs to be clarified for engines using SAE J1939-73, if it is not restricted to only engines using SAE J1979. Engines using SAE J1939-73 will provide the function field, as defined for SPN 2848 Name in SAE J1939-81. The function field of the name will suffice to identify what jobs [OBD] controllers perform. Individual function definitions are listed in Appendix B of SAE J1939. The engine is listed as function 0.

Engine manufacturers support the changes to the idle time definition in (h)(5) where engine speed may be substituted for vehicle speed for those engines not equipped with a vehicle speed sensor. Engine manufacturers also note that future Federal Motor Carrier Safety Administration rules may require vehicle manufacturers to provide incident-recording devices on vehicles in the future. These devices will likely be programmed with their own copy of the vehicle's VIN, as a means for detecting unlawful substitution of devices among vehicles. At such time, vehicle manufacturers may no longer be able to provide a single source for the VIN on the vehicle.

1. <u>ARB Should Delete the Service Information Requirements from the HD OBD Rule (h)(6)</u>

The adoption by ARB in 2006 of 13 CCR 1969 changes incorporating heavy-duty engine requirements into the existing light/medium-duty service information rule – one year after adoption of the original heavy-duty OBD requirements (1971.1) – supersedes the requirements in 1971.1(h)(6). As (h)(6) has been superseded by a previously-adopted rule, it should be deleted from 13 CCR 1971.1. It is, at best, inappropriate for two separate ARB staff sections to separately promulgate rules and separately administer them on the same topic. ARB's HD OBD staff concerns with the content of this rule should be addressed within ARB and not within separate rules.

Moreover, an obligation to comply with service information rules can occur only after certification of a manufacturer's heavy-duty OBD system. To require that manufacturers fully prepare engine service literature and tools to meet a service information component of an OBD rule creates a workload burden for materials which the manufacturer is not obligated to provide, if the HD OBD certification is denied.

If ARB desires changes to service information rule content, those should be made in a new rule making for 13 CCR 1969, and section (h)(6) should be deleted from 13 CCR 1971.1.

J. **ARB Should Limit Demonstration Testing Requirements**

The HD OBD rule requires that engine manufacturers provide emission test data from a certain number of certification demonstration test engines each year. For 2011 and subsequent years, manufacturers provide data on a differing number of test engines depending on how many engine families they certify. EMA requests that ARB reduce the testing burden for all manufacturers in the early years of the program by revising the number of test engines from which data must be provide to one for the 2011 and 2012

model years, regardless of the number of engine families certified. EMA's proposed language is as follows:

> (i)(2.2.2) For the 2011 and 2012 model years, a manufacturer shall provide emission test data of a test engine from the OBD child rating that has changes compare to the 2010 OBD parent.

Manufacturers will be analyzing development test results and making engineering judgments on the child ratings to ensure that they satisfy the extrapolated OBD requirements.

K. ARB Should Make Changes to the Medium-Duty OBD II Regulation (1968.2) and the HD OBD Rule to Ensure Consistency

The following requirements in Section 1968.2 for diesel medium-duty engines and vehicles are not consistent with the requirements specified for heavy-duty engines in Section 1971.1:

- TC Boost slow response functional check requirement for 2010-12.
  - HDOBD 2010-12: "…no detectable response to a change in commanded turbocharger geometry occurs."
  - OBD II 2010-12: ""…proper functional response of the system to computer commands does not occur."
- Upstream A/F Ratio Sensor NOx threshold:
  - HDOBD: 2010-12 is 2.5x NOx FEL; 2013+ is 2x NOx FEL
  - OBD II: 2010-12 is NOx FEL + 0.3; 2013+ is NOx FEL + 0.2
- Downstream A/F Ratio Sensor:
  - CO is specified in threshold for OBD II but not in HDOBD.
- NOx/PM Sensors:
  - NMHC is specified in the threshold for OBD II but not in HDOBD.
- VVT Target Error and Slow Response:
  - HDOBD: 2010-12 is 2.5x NOx FEL; 2013+ is 2x NOx FEL
  - OBD II: 2010-12 is NOx FEL + 0.3; 2013+ is NOx FEL + 0.2
- Thermostat Monitoring:
  - New requirement to detect fault in coolant temp reaches but later drops below threshold temperature applies in 2013 MY for OBD II and 2016 MY for HDOBD.
- Idle Speed Control functional check:
  - Detect when idle speed cannot be controlled to within 50% of target for HDOBD; this spec is 30% in OBD II.

EMA recommends, therefore, that ARB make the following changes to 1971.1 and 1968.2:

- Change 1968.2 such that the TC Boost slow response functional check requirement for 2010-12 reads "…no detectable response to a change in commanded turbocharger geometry occurs."
- Change 1971.1 such that the Upstream A/F Ratio Sensor NOx threshold is specified as: 2010-12 is NOx FEL + 0.3; 2013+ is NOx FEL + 0.2
- Change 1968.2 to remove CO in the threshold for the Downstream A/F Ratio Sensor.
- Change 1968.2 to remove NMHC in the threshold for NOx/PM Sensors.
- Change 1971.1 such that the VVT Target Error and Slow Response thresholds are specified as: 2010-12 is NOx FEL + 0.3; 2013+ is NOx FEL + 0.2
- Eliminate new Thermostat Monitoring requirement to detect fault in coolant temp reaches but later drops below threshold temperature for both 1968.2and 1971.1.
- Change 1968.2 Idle Speed Control functional check requirement to detect when idle speed cannot be controlled to within 50% of target.

A manufacturer's diesel engines used in a medium-duty truck is often used in a heavy-duty truck application over 14,000 lb. GVWR as well. Differences in monitoring requirements between the two weight categories create additional workload and complexity for engine manufacturers. Also, there is no reason for the requirements listed above to be different between the two regulations.

L. ARB Should Make a Correction to 1971.1(f)

Section (f) the proposed HD OBD amendments concerning heavy-duty gasoline engines contains a section that is not applicable and must be deleted. Section (f)(1.2.6) refers to a phase-in of the air/fuel cylinder imbalance monitor. This is a provision from the light-duty rule that does not apply to the heavy-duty OBD rule, as there is no phase-in of the requirement. Section (f)(1.2.6) should be deleted, as should the first clause of section (f)(1.2.1)(C).

III. Other Aspects of the HD OBD Enforcement Regulation (1971.5)

A. 1971.5(b) Testing Procedures for ARB-Conducted Testing – Compliance Flexibility and Low Volume Exemption

ARB has proposed to provide compliance flexibility to manufacturers by allowing emissions to exceed two times the malfunction criteria in the early years of the program before a nonconformance is found and remedial action must be taken. Engine manufacturers support such compliance flexibility, as it is absolutely necessary to help

manufacturers comply in-use with the stringent OBD standards being implemented over the next several years. In discussions with Staff, the Staff indicated that additional compliance flexibility was being provided for PM filter compliance, in recognition of the particular feasibility concerns with the PM threshold requirements. Specifically, nonconformance levels were to be set at two times the malfunction criteria (three times for PM) until 2016 and two times the malfunction criteria for PM until 2019. ARB should make corrections to the OBD rule to incorporate that indicated flexibility.

ARB also should provide an exemption from in-use enforcement testing for low sales volume engine families. Such a provision should provide an exemption from testing for engine family volumes less than 1000 per year or engine family ratings with less than 500 per year.

B. **1971.5(c) Manufacturer Self-Testing – Test Procedure**

As discussed above and in the legal discussion below, EMA does not support the proposed requirements for manufacturer self-testing of in-use heavy-duty engines. Nor does ARB have the authority to compel manufacturers to pay for in-use enforcement testing of their own engines. However, should ARB decide to proceed with its unauthorized requirement, then, at a minimum, ARB must delete section 1971.5(c)(3)(D) from the rule. That section restricts engine manufacturers from being able to make the engine that is taken from an in-use truck to be made compatible with engine dynamometer testing without Executive Officer approval. Such a restriction is unlawful and unreasonable.

This restriction appears to be an unlawful attempt by the ARB OBD staff to make changes to the engine dynamometer *emissions certification test procedure* in the HD OBD rule. The test procedure that is used to measure emissions for OBD testing must be the same as the procedure that is used to measure emissions for emissions certification. ARB's proposed section 1971.5(c)(3)(D) would increase testing costs dramatically and would unlawfully change the standard by changing the test procedure to be applied to heavy-duty engines that have been previously certified according to the emission certification test procedure. ARB should not and cannot adopt new test procedures without an assessment of their feasibility or without providing at least four model years' leadtime in which to meet the new standard

Manufacturers must be able to make appropriate changes to ensure the engine is compatible with dynamometer testing. Any restriction on manufacturers' ability to ensure the test procedure is consistent with the procedure according to which the engines were certified is inappropriate, unfair and outside the scope of the HD OBD regulation. ARB must delete section 1971.5(c)(3)(D) from the rule.

C. **1971.5(d) Remedial Actions – Timing of Plans**

As part of remedial actions, ARB has proposed that manufacturers have 45 days within which to respond to a notice from the Executive Officer to elect to conduct an influenced OBD-related recall and submit an action plan for such recall:

> [T]he manufacturer may, within 45 days from...notification, elect to conduct an influenced OBD-related recall.... Upon such an election, the manufacturer shall submit an influenced OBD-related recall plan.... (d)(2)(A)

The plan must meet the requirements of section (e)(1). As the section reads, the manufacturer has only 45 days to make an election and submit a plan. Forty-five days is an insufficient time in which to make a determination and prepare an influenced recall action plan for what heavy-duty engine manufacturers anticipate would be a very complex and time-consuming undertaking. ARB should revise the timing to allow manufacturers 90 days within which to submit such a plan to the EO.

D. 1971.5(d) In-Use Monitor Performance Ratio - Mandatory Recall Requirements

In the 2016 model year, engines with major monitors required to meet in-use performance ratio requirements are subject to mandatory recall if the average for one or more of the major monitors in a test sample group is less than or equal to 33.0 percent of the applicable minimum ratio, or 66.0% or more of the vehicles in the test sample group have an in-use monitor performance ratio of less than or equal to 33.0 percent of the applicable minimum ratio. ARB should add language to the OBD rule to ensure the distribution of the test sample covers different usage patterns. The varied duty cycles of HD engines make this a critical issue.

EMA believes two things are needed:

1. An exemption in the event a disproportionate number of failures result from a single source (e.g., one fleet);
2. More leadtime beyond 2016 for this requirement (to incorporate monitoring changes, to learn how to sample vehicles and get representative samples).

Based on the experience of some member companies with in-use monitor performance ratios for light-duty applications, EMA believe that ratio results for different test samples with the same engine and calibration can vary significantly based on the duty cycle of the end user. There may be duty cycles that will not run a monitor but also are not indicative of the entire engine population. ARB should add an exemption and additional leadtime to address these issues.

E. 1971.5(e) Requirements for Implementing Remedial Actions – Timing, Notices, Recordkeeping and Reports

ARB has proposed that manufacturers must, within 10 days of an ARB rejection of the manufacturer's submitted plan for remedial action, respond to and submit a revised remedial plan. (e)(1)(B)(iii) ARB should revise the time period to 30 days. Remedial plans are very complicated action plans. More time especially is needed because HD engine manufacturers are not generally vertically-integrated. Ten days is simply far too

short a time considering the factors relating to the non-vertically integrated heavy-duty business. Extending the response window to 30 days would relieve both ARB and the manufacturers of the burden of having to submit and entertain extension requests that are likely to occur in almost every case.

ARB proposes that manufacturers must include in remedial action notices to owners a "statement describing the adverse effects, if any, of an uncorrected nonconforming OBD system on the performance, fuel economy or durability of the engine." (e)(3)(C)(ix)(c) ARB should delete this requirement as it would only create extra work for no benefit.

ARB also proposes to require manufacturers to maintain records and report to the Executive Officer on "the number of engines determined to be unavailable for inspection and remedial action, during the campaign since its inception, due to exportation, theft, scrapping, or other reasons." (e)(6)(B)(viii) Heavy-duty engine manufacturers have no easy source of such information (compared to the light-duty market, where such information is maintained by third parties). Reporting on such information is costly for manufacturers as the information is difficult to obtain. This requirement should be eliminated from the rule.

ARB also proposes that engine manufacturers must list all engines and vehicles subject to recall along with certain data elements, including license plate number. (e)(6)(B)(x). Heavy-duty vehicle license plate information is not available to heavy-duty engines manufacturers, and it is not within manufacturers' responsibility or capability to match vehicles and license plate numbers on an ongoing basis. ARB must delete such requirement from the HD OBD rule.

Finally, ARB proposes that manufacturers maintain records for at least one year past the "useful life" of the engines. (e)(6)(E) It is unclear what definition of "useful life" manufacturers would be required to use in this context. ARB should clarify that the useful life is the projected useful life of the general engine family, not the particular engine, as that information is not available to heavy-duty engine manufacturers.

IV. **Legal Discussion**

The proposed amendments to the heavy-duty OBD regulations – and specifically the provisions of proposed sections 1971.5 and 1971.1(i)(2.3) – are beyond the limits of ARB's statutory authority and, as a result, are unlawful. The HD OBD regulations exceed ARB's limited delegated statutory authority because they: (i) unlawfully impose onerous in-use emissions testing obligations on engine manufacturers with respect to non-new engines that have been sold into commerce and are beyond manufacturers' custody and control; (ii) unlawfully fail to provide sufficient leadtime with respect to the new HD OBD standards; and (iii) unlawfully impose mandatory engine recall obligations without first requiring proof that there has been any actual exceedance of an engine emission standard in-use. For all of these reasons, and as explained in further detail below, ARB should not approve and adopt the invalid HD OBD regulations at issue.

A. ARB Lacks Statutory Authority To Impose Mandatory In-Use Testing Obligations On Engine Manufacturers

As discussed at length in the previous section, ARB is seeking to impose an excessively burdensome set of in-use OBD testing obligations on heavy-duty engine manufacturers under section 1971.5(c) and 1971.1(i)(2.3). ARB has no statutory authority to impose such unreasonable in-use testing burdens on engine manufacturers.

The relevant California statutes are very specific with respect to the engine emissions testing that engine manufacturers may be required to undertake. More specifically, under Health and Safety Code ("HSC") section 43104, ARB is authorized to adopt test procedures for manufacturers to follow for the certification of "new motor vehicles or new motor vehicle engines." Those authorized test procedures cover the prescribed test methods (based on federal test procedures) necessary to determine whether new motor vehicles and engines are in compliance with the emission standards that ARB has established as a precondition to their sale and distribution into commerce. In that regard, a "new motor vehicle" is a motor vehicle "the equitable or legal title to which has never been transferred to an ultimate purchaser." HSC § 39042. It is conclusively presumed that the equitable or legal title to a motor vehicle has been transferred to an ultimate purchaser if the vehicle has an odometer reading of 7,500 or more. HSC § 43156(a).

ARB also is authorized under HSC section 43202 "to conduct surveillance testing of emissions of new motor vehicles at [the manufacturer's] assembly facilities, or at any other location where the manufacturer's assembly line testing is performed and assembly line testing records are kept." See also HSC § 43210. Again, the statutorily authorized emissions testing is limited to "new motor vehicles."

Thus, the only statutory authority that ARB has to compel engine manufacturers to conduct engine emissions testing is in connection with the certification and manufacture of *new motor vehicle engines.* Inasmuch as the HD OBD manufacturer in-use testing requirements at issue are specifically directed at non-new motor vehicle engines with accumulated mileage ranging from 304,500 to 348,000 miles (and in the case of the prescribed deterioration testing, from 185,000 to 435,000 miles) -- well beyond 7,500 miles -- it is clear that those heavy-duty engines are no longer "new." It is equally clear, therefore, that ARB has no statutory authority to compel engine manufacturers to test those non-new heavy-duty engines. As a result, the in-use testing provisions of the proposed HD OBD regulations (and specifically, the provisions of proposed regulatory sections 1971.5(c) and 1971.1(i)(2.3)) are unlawful and invalid.

That ARB would seek to adopt and impose on engine manufacturers such plainly unlawful in-use testing requirements is especially troubling in light of the recently concluded litigation between EMA and ARB, the result of which is a pending writ of mandate against ARB to withdraw other unlawful test procedures that ARB had improperly sought to link to engine recall liability. See EMA v. ARB, BS114066, Sup.Ct., County of Los Angeles, consolidated with and into, Automotive Service Councils of Ca. v. ARB, BS112735 (Dec. 1, 2008). In that case (hereinafter, the "EWIR

Amendments Litigation"), the Superior Court issued a detailed opinion, the following portion of which applies with equal force to this matter:

> The court agrees with ARB that it has wide discretion to create the test procedure under [HSC] section 43104 to determine whether vehicles/engines are in compliance with emission standards. But the discretion must be exercised in creating a test procedure for the purpose of certification. ARB does not have discretion to include vehicle performance in a test procedure for certification…. ARB's contention that certification testing continues throughout the useful life of the vehicle, and the operation of all of a manufacturer's vehicles and engines is just one long certification test, is unsupportable. (Slip op. at 12-13.)

In light of the directly applicable precedent clearly spelled out as a result of the EWIR Amendments Litigation, and further considering the unambiguous terms of the relevant underlying statutes, EMA urges ARB not to move forward with the proposed HD OBD amendments. See also, EMA v. ARB, 05CS00386, Sup.Ct., County of Sacramento (Oct. 2006) (writ of mandate issued to invalidate unlawful ARB regulation seeking to compel engine manufacturers to provide for the retrofit of non-new heavy-duty vehicles and engines). ARB also should take note of the fact that its response to the pending writ of mandate in the EWIR Amendments Litigation is due to the Superior Court on June 1, 2009, just four days after the scheduled Board hearing relating to the unlawful test procedure requirements at issue here. ARB's Board certainly should seek to avoid taking any action that could be perceived as constituting contempt of court.

ARB staff has attempted to justify the otherwise clearly unlawful proposed in-use OBD testing requirements by citing to existing regulations pursuant to which manufacturers utilize portable emissions measurement systems ("PEMS") to test a sample of in-use heavy-duty vehicles to assess their compliance with the applicable not-to-exceed ("NTE") emission standards. Those regulations, however, are entirely inapposite. They stem from a settlement agreement relating to a series of federal lawsuits challenging the validity of the NTE standards, one result of which was, in essence, a contractual agreement by engine manufacturers to implement a limited in-use NTE testing program with PEMS. (See Statement of Agreement and Accord, dated as of July 11, 2003, and entered into by and among CARB, EMA, and certain heavy-duty engine manufacturers.) Such a settlement agreement, however, cannot and does not expand CARB's otherwise limited statutory authority. As the Superior Court directly held in the EWIR Amendments Litigation, "[t]he limits of an agency's rulemaking authority are defined in its enabling statutes, not by contract." (Slip op. at 14, citing Morris v. Williams, 67 Cal.2d 733, 748-49 (1967).) "A settlement agreement cannot expand an agency's rulemaking authority." (Slip op. at 21.)

B. Insufficient Leadtime Is Being Provided For The New HD OBD Enforcement Standards

In addition to establishing unlawful in-use testing requirements, the HD OBD regulations also provide insufficient leadtime for the new enforcement standards that ARB proposes to use to determine: (i) whether an engine rating shall be considered nonconforming due to an artificially-engineered OBD system nonconformance; and (ii) whether a mandatory engine recall shall be ordered as a consequence of such an artificially-engineered nonconformance. The new standards that ARB seeks to establish for a finding of OBD system nonconformance (hereinafter, the "Nonconformance Standards") range from 2.0 times to 1.0 times the applicable OBD malfunction criteria. See Proposed Section 1971.5(b)(6). The new standards that ARB seeks to establish as a trigger to a mandatory engine recall action (hereinafter, "Mandatory Recall Standards") range from 3.0 times to 2.0 times the applicable OBD monitor malfunction criteria. See Proposed Section 1971.5(d)(3).

The HD OBD regulations would set the 2010 model year -- which begins no later than January 1, 2010 -- as the effective date for the Nonconformance Standards and the Mandatory Recall Standards. Inasmuch as approval of the HD OBD regulations by the California Office of Administrative Law could easily come after January 1, 2010, ARB is providing what amounts to negative leadtime for the new HD OBD-related standards. That is unlawful.

Pursuant to section 209(b) of the federal Clean Air Act ("CAA"), 42 U.S.C. §7543(b), ARB must obtain a preemption waiver from the U.S. EPA in order to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines. One prerequisite to any such preemption waiver is a finding that the ARB standards -- in this case, the Nonconformance Standards and the Mandatory Recall Standards -- are consistent with section 202(a) of the CAA, which requires four years of leadtime for any standard applicable to classes or categories of heavy-duty vehicles or engines. See 42 U.S.C. §7543(a)(3)(C).

Here, as noted above, ARB is providing no leadtime whatsoever -- let alone four years' leadtime -- for the proposed Nonconformance Standards and the proposed Mandatory Recall Standards. That is fundamentally unfair and unlawful. Manufacturers need sufficient time (i.e., four years) to design and build the new engine components to meet the new proposed HD OBD-related standards. Even ARB notes in the ISOR that the Mandatory Recall Standards will impact the design and manufacture of heavy-duty engines, and so comprise the very type of standards for which leadtime is most critical:

> By specifying minimum performance levels, below which a system would be considered nonfunctional and in need of recall, the Executive Officer would be providing manufacturers with clear notice and direction as to what the ARB considers to be a totally unacceptable system. With such knowledge, manufacturers can better plan and design their product lines and perform necessary

> internal testing to assure proper performance of the HD OBD systems that they manufacture and distribute. (ISOR, p. 80.)

Accordingly, since ARB has failed to provide the requisite leadtime for the HD OBD regulations -- leadtime which even ARB concedes is necessary -- the regulations at issue are invalid and unlawful on this basis as well.

C. The HD OBD Regulation Would Establish Unlawful Mandatory Engine Recall Liability

As noted above, the core of the proposed HD OBD enforcement regulations is a program (albeit an unlawful program) pursuant to which heavy-duty engine manufacturers must remove non-new, well-used engines from vehicles in commerce; reconfigure those uninstalled engines with deteriorated or defective OBD system components; and then conduct extensive dynamometer testing of those reconfigured and artificially defective engines to assess whether an OBD component failure can be engineered and generated in an engine test cell before the appropriate MIL is illuminated. If such an artificial failure of the new OBD system standards (i.e., 3.0 times decreasing to 2.0 times the applicable major monitor malfunction criteria) can be created in an engine test cell with a deliberately degraded engine, then ARB will order a mandatory engine recall.

In essence, therefore, the new HD OBD enforcement regulations would premise mandatory engine recall obligations on a triple hypothetical proposition, to wit: *if* a well-used engine is configured not with its own engine parts but instead with defective OBD components, and *if* that engine is tested not in-use in a vehicle as intended but instead uninstalled on an engine dynamometer in a test cell, and *if* that uninstalled engine as reconfigured with defective parts can be made to operate in a test cell in a manner that causes an exceedance of an emissions threshold without the relevant MIL being illuminated, then it can be *assumed* for recall liability purposes that the engine with its original non-defective components in place, and installed and operating in a properly maintained vehicle that is free from tampering, *might* produce actual excess emissions in-use sufficient to constitute an actual violation of emission standards and an actual OBD nonconformance, similar if not identical to the artificial nonconformance engineered in the test cell.

The relevant California statute does not permit the imposition of actual engine recall liability on the basis of such a triple-hypothetical, potential violation of an emission standard. More specifically, HSC section 43105 provides in relevant part, as follows:

> No new motor vehicle, new motor vehicle engine, or motor vehicle with a new motor vehicle engine required pursuant to this part to meet the emission standards established pursuant to Section 43101 shall be sold to the ultimate purchaser, or registered in this state *if the manufacturer has violated emission standards* or test procedures and has failed to take corrective action, which may include recall of vehicles or engines, specified by the state board in

> accordance with regulations of the state board. (HSC §43105.) (Emphasis added.)

The operative question under the governing recall statute, therefore, is whether the manufacturer "has violated emission standards" in-use, not whether it might be postulated or assumed based on non-representative results using a non-representative engine that an emissions exceedance might occur sometime in the future. An engine recall, along with its attendant costs to manufacturers as well as vehicle owners, is an extraordinary remedy that the applicable statute reserves only for actual violations of emission standards that produce actual adverse impacts on air quality from the actual operation of motor vehicles in-use.

Inasmuch as the proposed HD OBD regulations would impose such recall liability based solely on an artificially engineered failure of a MIL, and without any showing of an actual violation of emission standards in-use, the proposed regulations are violative of HSC section 43105. Stated differently, simply because an engine can be deliberately reconfigured with defective parts to produce non-representative excess emissions without a MIL illuminating, does not mean that the engine as originally configured and operating in a vehicle will ever produce excess emissions in violation of any applicable standard in-use. Accordingly, and for this additional reason, the proposed HD OBD regulations are unlawful and invalid.

D. The Proposed Amendments Must Be Feasible, Be Cost-Effective, And Provide Sufficient Leadtime and Stability

Many of the proposed HD OBD amendments under consideration constitute new emission standards that engine manufacturers must meet before introducing their products for sale into commerce. Because the Board is adopting new standards, it is subject to clear mandates both by the U.S. Congress in the federal Clean Air Act and by the California legislature in state law. Any mobile source emission standards adopted by the ARB for on-highway engines and vehicles from over 8,500 lbs. GVWR require a waiver of federal preemption from EPA and must be technologically feasible, must be cost-effective, and may be implemented only if the requisite leadtime and period of stability are provided to manufacturers.

1. ARB Must Adopt HD OBD Requirements That Are Technologically Feasible

Under CAA Section 209(b), which authorizes California to adopt emissions standards for mobile sources only if certain conditions are met, California's emission standards must be consistent with CAA Section 202(a). Section 202(a) requires, among other things, that emission standards for heavy-duty engines must be technologically feasible:

> [S]tandards must reflect the greatest degree of emission reduction achievable through the application of technology … determine[d to] be available for the model year to which such standards apply,

> giving appropriate consideration to cost, energy, and safety factors associated with the application of such technology.

CAA Section 202(a)(3); 42 U.S.C. §7521. *See Motor & Equip. Mfrs. Ass'n v. Nichols*, 142 F.3d 449, 463 (D.C. Cir. 1998) ("In the waiver context, section 202(a) 'relates in relevant part to technological feasibility and to federal certification requirements.'") (citing *Ford Motor Co. v. EPA*, 606 F.2d 1293, 1296 n. 17 (D.C. Cir. 1979)); *see also Motor & Equip. Mfrs. Ass'n v. EPA*, 627 F.2d 1095, 1111 (D.C. Cir. 1979) (consistency with the CAA requires standards to be " technologically feasible").

California law also requires that emission standards be justified and technologically feasible. Under the California Health & Safety Code, ARB "may adopt and implement motor vehicle emission standards … which [ARB] has found to be necessary, cost-effective, and technologically feasible." Cal. Health & Safety Code, §43013. Staff has failed to justify the technological feasibility of many of the proposed requirements.

2. <u>ARB Must Demonstrate That The Proposed Amendments Are Cost-Effective</u>

ARB must demonstrate that its proposed control measures are cost-effective under both federal and state law. Section 202(a) of the CAA requires the Board to consider cost and other related factors in setting new heavy-duty engine and vehicle emission standards. The California Health & Safety Code establishes a similar mandate for ARB, requiring the Board to adopt emissions standards which will result in the most cost-effective combination of control measures on motor vehicles and fuel. And the California Government Code requires the Board to assess the proposal's economic impacts (Section 11346.3 and 11346.5).

Staff has not met the burden of showing the proposed amendments are cost-effective. Staff has both underestimated the costs to engine manufacturers and vehicle owners and has not fully analyzed the cost-effectiveness (the costs v. the emission benefits).

ARB's cost-effectiveness and emissions benefit discussion in the ISOR for the proposed amendments points to ARB's previous analysis of cost-effectiveness from the 2005 adoption of the OBD rule. ARB relies on past analysis for its current rulemaking. The extent of ARB's analysis is to conclude that, based on the 2005 numbers and ARB's assumptions, a new heavy-duty diesel engine will cost only $132.39 additional due to the OBD requirements of this rule. It is not realistic to assume that heavy-duty manufacturers will meet the extremely complex, ever-more-stringent OBD requirements and increase engine durability while holding down the cost of new products as ARB estimates.

Furthermore, despite having proposed to add significant new requirements to the OBD rule, ARB has completely failed to assess the cost impact and anticipated benefits of such requirements. Indeed, EMA questions whether ARB could justify any of those

requirements if it were to properly analyze and assess the OBD rule and its costs against the emissions benefits anticipated from it. ARB must conduct a thorough, updated and focused analysis on the proposed amendments to determine their true costs for manufacturers and for consumers, as well as their true benefit to air quality.

3. ARB Must Provide Sufficient Leadtime And Period Of Stability

As detailed above, engine manufacturers need sufficient time to develop OBD technology that is feasible and practical. California law requires that standards must be adopted within reasonable time frames (Cal. Health & Safety Code, Section 43013). Section 202(a) of the CAA also requires the ARB to assure that it provides sufficient leadtime and period of stability for any new heavy-duty engine or vehicle standard:

> Any standard promulgated or revised under this paragraph and applicable to classes or categories of heavy-duty vehicles or engines shall apply for a period of no less than 3 model years beginning no earlier than the model year commencing 4 years after such revised standard is promulgated.

In other words, any new emission standards may go into effect only four or more full model years after the year in which they were promulgated. And those new standards must stay in effect for at least three full model years before ARB may establish another standard. Unless California meets those requirements, it has no authority to adopt emissions standards for on-highway heavy-duty engines.

Section 209(b) of the CAA requires that ARB's emission standards must be consistent with Section 202(a) for EPA to waive federal preemption and allow California to enforce its own emission standards. Unless ARB demonstrates that the standards are technologically feasible and cost-effective, and provides sufficient leadtime and stability to engine manufacturers, California cannot obtain the necessary preemption waiver from EPA.

V. Next Steps

A. ARB Must Undertake A Timely And Thorough Biennial Review

California law requires that ARB conduct biennial rulemaking reviews to evaluate manufacturers' progress toward meeting the standards established by ARB. It is crucial that such biennial reviews be conducted in a timely manner in order to provide manufacturers some degree of certainty with respect to the standards they are being asked to meet. As manufacturers work toward achieving the aggressive OBD threshold standards that ARB has proposed, they will learn more and become smarter about just what is possible and technologically feasible. But ARB's review of technology and any changes to requirements during a biennial review cannot wait until the last minute, when manufacturers have already invested their limited resources in meeting regulatory requirements and are under time constraints to certify their products. As discussed above, manufacturers need certainty so they may use their limited resources most

effectively – certainty in knowing what standards they must meet and the time frame in which to meet them.

It also is crucial that biennial reviews be a true review of the current and expected technological capability and progress of manufacturers toward meeting the regulations previously established, including an updated assessment of the expected costs associated with the requirements. A biennial review is not meant to be – nor should it be – ARB's opportunity to increase the stringency of the regulations to make them more difficult to meet. In many cases, as time progresses, the technology development needed to meet the new requirements may not have progressed as expected, resulting in higher costs, increased uncertainty, and potentially less capable systems than ARB assumed during the previous rulemaking. Timely and thorough biennial reviews are essential.

B. **ARB Must Support A Meaningful Waiver Process**

ARB must ensure that its actions with respect to the proposed amendments support a meaningful federal preemption waiver process. In other words, ARB should not delay in submitting the proposed amendments to EPA for review, and ARB must refrain from enforcing any new or more-stringent requirements than those contained in the existing rule until EPA has taken action on the waiver request.

Indeed, as discussed above, it is already far too late to submit a waiver request and obtain EPA approval for the new requirements that would be applied to heavy-duty diesel engines for model year 2010. In that regard, ARB must refrain from enforcing the new and more-stringent threshold standards and other requirements that are contained in the proposed amendments until at least the 2013 model year. Any other approach would render the requirements of the federal Clean Air Act and California law meaningless.

VI. **Conclusion and Recommendations**

OBD regulations are complex, far-reaching, and highly technical. Many of the proposed amendments would establish extremely technology-forcing thresholds that manufacturers do not know how they will meet. A number of changes are necessary to the proposed amendments to make them technologically feasible, cost-effective, and in line with leadtime and stability requirements. EMA urges the Board to direct Staff to work further with engine manufacturers to make the necessary changes to address the issues raised in these comments and in our ongoing discussions with Staff. Specifically, ARB must:

- Eliminate the manufacturer self-testing in-use enforcement provisions from the rule.
- Revise the aftertreatment aging demonstration requirements and eliminate duplicative and costly data collection requirements from in-use vehicles.
- Eliminate IRAF requirements from the proposed amendments or, at a minimum, provide written guidance to manufacturers with regard to good engineering analysis used to meet the requirements.

- Revise the 2010 monitoring requirements and thresholds
    - Revise the NOx catalyst and NOx sensor thresholds to NOx std+.60 (4x std).
    - Revise the NMHC converting catalyst monitor threshold to 4x the NMHC std.
    - Revise the PM filter threshold to .09 and evaluate sensor technology in the next biennial review to determine whether durable, reliable and accurate PM sensors are available to meet the .03 threshold.
    - Clarify multiple misfire provisions to indicate 50% of total misfires.
    - Remove or, at a minimum, greatly simplify, the requirements to submit aging and monitoring plans for multiple EGR coolers and charge air coolers.
    - Eliminate hybrid component monitoring requirements.
    - Add an optional way to handle readiness status for mobile PTO operation.
    - Eliminate the requirement to monitor the wait-to-start lamp for circuit malfunctions.
    - Eliminate output shaft vehicle speed sensor monitoring requirements.
    - Eliminate vague "other emission control strategy" monitoring requirements.
    - Eliminate "best available monitoring technology" as a compliance criterion.
    - Allow pending fault codes to be erased or retained.
    - Revise denominator incrementing specifications.
- Revise certain 2013 monitoring thresholds and requirements.
    - Eliminate, or delay at least until 2016, any requirement compelling manufacturers to provide a "smart" component for tolerance compensation matching.
    - Eliminate, or delay at least until 2016, idle control/fuel injection quantity monitoring requirements under comprehensive component monitoring.
- Eliminate the requirement to monitor and declare a thermostat fault when engine coolant temperatures drop after they have initially been reached.
- Eliminate the proposed EI-AECD tracking requirements from the final rule.
- Delete service information requirements from the OBD provisions.
- Limit demonstration engine test requirements.

- Revise the medium-duty OBD regulations (1968.2) to assure consistency with the heavy-duty OBD rule.
- Revise numerous elements of the heavy-duty enforcement regulation.
- Assure cost-effectiveness and sufficient leadtime and period of stability for all the OBD standards.

The Board also must direct Staff to conduct timely and meaningful future biennial reviews to evaluate whether technology is progressing as ARB predicted and whether manufacturers can meet the requirements of the heavy-duty and medium-duty OBD rules. Engine manufacturers need certainty and stability – they need to know the requirements well in advance and know they are not changing – so that they can work productively and cost-effectively toward the goals that are set. Manufacturers should not be required to expend time and effort on attempting to develop costly monitoring strategies that are not feasible. Without certain changes in this rule, that is exactly what will happen. ARB must make the recommended changes and support engine manufacturers in their efforts and take all steps possible to ensure a timely, cost-effective, and feasible rule.

Respectfully submitted,

ENGINE MANUFACTURERS ASSOCIATION