State of California
AIR RESOURCES BOARD

**Final Statement of Reasons for Rulemaking,
Including Summary of Comments and Agency Response**

PUBLIC HEARING TO CONSIDER ENGINE MANUFACTURER DIAGNOSTIC SYSTEM REQUIREMENTS FOR 2007 AND SUBSEQUENT MODEL YEAR HEAVY-DUTY ENGINES

Public Hearing Date: May 20, 2004
Agenda Item No.: 04-5-4

I. GENERAL

The Staff Report: Initial Statement of Reasons ("ISOR" or "Staff Report") for Rulemaking, entitled *Engine Manufacturer Diagnostic System Requirements for 2007 and Subsequent Model Year Heavy-Duty Engines* released April 2, 2004, is incorporated by reference herein.

Following a public hearing on May 20, 2004, the Air Resources Board ("Board" or "ARB") by Resolution 04-16 approved, with modifications, the adoption of section 1971, title 13, California Code of Regulations (CCR). Upon becoming operative, section 1971 would establish engine manufacturer diagnostic ("EMD") requirements for 2007 and subsequent model year on-road heavy-duty engines and vehicles produced for sale in California that have a gross vehicle weight rating greater than 14,000 pounds. Resolution 04-16 is incorporated by reference herein. At the hearing on May 20, 2004, in response to comments received, the staff presented the Board with modifications to the regulatory language originally proposed in the Staff Report. The changes included:

1) Clarification that engine manufacturers would be responsible for the EMD system (section 1971(a)).
2) Clarification that the proposed regulation would apply only to gasoline and diesel-fueled heavy-duty engines (section 1971(b)).
3) Addition of definitions for "engine" and "engine manufacturer" (sections 1971(c)(3) and (c)(4)).
4) Modification of the definition of "on-road heavy-duty engine" to include "related aftertreatment components" (section 1971(c)(9)).
5) Deletion of all references of "powertrain" in the regulation (sections 1971(e)(4)(A) and (f)(2)).
6) Change of all references of "manufacturer" in regulation to "engine manufacturer."

Within the resolution, the Board directed the Executive Officer to incorporate the approved modifications into the proposed regulatory text, along with such other conforming modifications as may be appropriate, and to make such modifications

available for public comment. These modifications were made available for public comment in the ARB's Notice of Public Availability of Modified Text (15-Day Notice) on July 26, 2004. The 15-Day Notice is incorporated by reference herein.

Economic and Fiscal Impacts. Any business involved in manufacturing, purchasing, or servicing heavy-duty engines and vehicles could be affected by the proposed regulation. There are 21 engine manufacturers and 3 transmission and other powertrain-related manufacturers that would be affected by the regulation. None of these businesses are located in California. Of these businesses, two of the engine manufacturing companies are assumed to be "small businesses" (i.e., selling less than 150 engines per year based on California certification data). There are approximately eight major assemblers of complete heavy-duty vehicles that are sold in the California market, but staff has been unable to estimate the total number of manufacturers that assemble and sell complete heavy-duty vehicles (i.e., truck builders or coach builders) in California. Staff has thus been unable to determine how many of these companies are located in California and how many are considered "small businesses." However, it is assumed that for these manufacturers, the regulation would impose little, if any, cost.

Engine manufacturers are currently developing substantially redesigned emission control systems to meet the 2007 emission standards. Along with that redesign, manufacturers are adding hardware for proper control of the new emission components. Accordingly, the costs for the additional hardware and new emission controls have already been accounted for in the costs to comply with the 2007 emission standards. Further, this very same hardware will be used to meet the proposed EMD system requirements. As such, the proposed heavy-duty EMD regulation is not expected to result in additional hardware costs for manufacturers.

In regards to software, engine manufacturers are also currently increasing computer memory space to accommodate the needed software algorithms for proper emission control. Given the limited scope of the proposed EMD requirements for fuel system, exhaust gas recirculation (EGR) system, and particulate matter (PM) trap monitoring and because the requirements are structured around detecting a fault when the system is operating outside of the manufacturer's control limits, the cost for additional software (if any) would be negligible. For the other emission-related electronic components, the proposed EMD monitoring requirements are very similar to the level of diagnostics manufacturers currently implement to aid service technicians and to ensure the engine and control system is robust in monitoring failures that may occur in-use. As such, it is anticipated that there will be negligible or no additional cost for software to meet the proposed EMD requirements.

The Board has determined that this regulatory action will not result in a mandate to any local agency or school district the costs of which are reimbursable by the state pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code.

Alternatives. For the reasons stated in the Staff Report, the Board has determined that no alternative considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board.

II. SUMMARY OF COMMENTS AND AGENCY RESPONSE

At the May 20, 2004 hearing, oral testimony was received in the following order from:

Mr. Jed Mandel, Engine Manufacturers Association (EMA)
Mr. Robert Clarke, Truck Manufacturers Association (TMA)

The written comments were received during the 45-day comment period prior to the hearing from:

Mr. Jed Mandel and Ms. Lisa Stegink, EMA
Mr. John Duerr, Detroit Diesel Corporation (DDC)

No comments were received in response to the 15-Day Notice.

No comments were submitted by the Office of Small Business Advocate.

Below is a summary of each objection or recommendation made regarding the specific regulatory actions proposed, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or the reasons for making no change.

COMMENTS IN SUPPORT

1. Comment: We are able to support the EMD regulation. (EMA)

2. Comment: We feel the scope of the EMD regulation is generally appropriate. (DDC)

3. Comment: The EMD regulation can, with some revisions, be accommodated into the 2007 model year without jeopardizing the success of meeting the stringent 2007 emission standards. (DDC)

4. Comment: The EMD regulation addresses major truck builders' concerns about meeting the stringent 2007 emission standards by allowing engine and truck manufacturers to focus their resources on developing engines and vehicles that meet these standards. (TMA)

5. Comment: We will commit to working with ARB and the United States Environmental Protection Agency ("U.S. EPA") on the implementation of EMD

and future on-board diagnostic ("OBD") requirements for the heavy-duty engine industry. (EMA)

Agency Response to Comments 1-5: We appreciate your comments.

MEETING 2007 EMISSION STANDARDS

6. Comment: The implementation of any EMD or OBD program for 2007 and subsequent heavy-duty engines cannot interfere with or burden manufacturers' compliance with the more stringent 2007 emission standards, to which manufacturers are devoting enormous resources. Engine and truck manufacturers are also focused on meeting their customers' expectations for a durable and reliable product. (EMA)(TMA)

7. Comment: Any diagnostic system requirements that add workload or costs may adversely affect these goals. ( )

   Agency Response to Comments 6-7: The staff believes the EMD regulation will result in negligible costs and minimal additional workload. As stated in the Staff Report, the EMD requirements build on the basic diagnostic system heavy-duty engine manufacturers are currently using on their engines to provide diagnostic capability for the most important emission control systems. In other words, almost all engine manufacturers are already currently meeting the EMD requirements. Thus, the requirements are expected to result in no additional hardware and little, if any, software changes. To that end, the staff believes the EMD regulation satisfies the requirements of the commenters.

HARMONIZATION WITH U.S. EPA

8. Comment: The adoption of the EMD regulation and any additional OBD requirements should be in coordination with U.S. EPA to assure a harmonized nationwide program. It is important to have a single set of OBD requirements applicable nationwide for all heavy-duty engines. (EMA)(DDC)

9. Comment: Without harmonized regulations, manufacturers may be forced to provide unique products for the California market, which would result in additional costs and burdens, possible confusion among customers and operators, and diminishment of the overall effectiveness of EMD or OBD. (EMA)

10. Comment: It is also imperative to have a harmonized program for the "OBD II" (the level of requirements now applicable to light- and medium-duty vehicles) requirements that ARB will adopt. (DDC)

    Agency Response to Comments 8-10: As stated in the Staff Report, ARB and U.S. EPA are committed to working together to develop a harmonized program regarding OBD system requirements for heavy-duty engines. While each agency has separate rulemaking processes and thus, cannot guarantee such

harmonization with absolute certainty, both agencies acknowledge the benefits of a harmonized program and continue to work towards achieving it.

11. Comment: To ensure a harmonized program, ARB and U.S. EPA should work together as coequal partners. The alternative approach in which ARB or U.S. EPA takes the lead and then requires the other authority to choose between the program adopted by the lead agency or one that it perceives as superior risks disharmonization and must be avoided. (DDC)

    Agency Response: As stated in the previous response, both agencies have separate rulemaking processes that mandate separate action. It is not practical nor feasible to have both agencies simultaneously and in complete unison adopt identical regulations. Accordingly, it is very likely that one agency will end up adopting a rulemaking before the other, but that does not mean that one agency is the lead agency nor does it mandate a non-harmonized program. Both agencies have indeed adopted harmonized programs in the past through non-simultaneous separate rulemakings including items such as the recently adopted heavy-duty engine exhaust emission standards. Again, also as stated above, both agencies are committed to working together as partners to achieve a harmonized program and will continue to do so.

LIMITING EMD REQUIREMENTS TO JUST ENGINE MANUFACTURERS

12. Comment: The scope of the EMD regulation should be limited to just those components the engine manufacturer has control over: the engine and the aftertreatment systems. (EMA)(TMA)(DDC)

13. Comment: The EMD regulation should explicitly exclude any monitoring requirements for transmission or other powertrain components, since engine manufacturers have no control over these other powertrains. The engine manufacturer may not even have any business relationship at all with the supplier of other powertrain components. (EMA)(DDC)

14. Comment: The term “manufacturer” is broadly defined in the EMD regulation as producers of engines, transmissions, other powertrain components, chassis or coaches, and seems to recognize the non-integrated nature of the heavy-duty industry. However, the regulation does not explicitly state which entity has responsibility for meeting the requirements (instead, it simply indicated it is required to be met by the “manufacturer”). Since EMD stands for “engine manufacturer diagnostics,” it can be assumed that engine manufacturers are responsible, which is not reasonable. ARB should either clearly define the responsibilities of each entity (and make sure an entity is not responsible for a requirement that is not under its design control) or delete all provisions applicable to non-engine powertrain components. (DDC)

15. Comment: “Engine” must be defined to refer to only the engine and related aftertreatment system components. ( )

16. Comment: The definition of “manufacturer” should be revised to clarify that engine manufacturers are not responsible for non-engine system components or equipment. (EMA)

17. Comment: The reference to “other powertrain components” in section (a) of the regulation should be deleted. (DDC)

    Agency Response to Comments 12-17: The staff modified the regulation by deleting all references to “powertrain,” including the reference “other powertrain components” in section (a) of the EMD regulation. The staff also added the term “engine” to section (c) with the definition “for the purpose of this regulation means on-road heavy-duty engine,” and modified the definition of “on-road heavy-duty engine” to mean “an engine and related aftertreatment components certified to the requirements of title 13, CCR sections 1956.1 or 1956.8.” The staff also deleted the term “manufacturer” and its definition from section (c) of the regulation. In its place, the term “engine manufacturer” has been defined to be the manufacturer that is “the holder of the Executive Order for the engine family.” All references to “manufacturer” in the regulation have been modified to “engine manufacturer” to make it clear that the engine manufacturer is the party responsible for meeting the requirements. The modifications were made in the 15-Day Notice at the request of the commenters.

18. Comment: In the definition of “on-road heavy-duty engine” in section (c), the phrase “or a powertrain component designed for use with such an engine” should be deleted. (DDC)

    Agency Response: Staff deleted this phrase in the 15-Day Notice as requested by the commenter.

19. Comment: The “redefinition” of the term “engine” in section (b) of the regulation (where it is referred to as “powertrain components (e.g., engine, transmission, hybrid) that are utilized in heavy-duty vehicles”) flies in the face of the common understanding of the word engine, and should be deleted. (DDC)

    Agency Response: Staff deleted this reference in section (b). The modification was made in the 15-Day Notice.

20. Comment: ARB has not demonstrated any need or justification for extending the EMD regulation beyond engines (including aftertreatment) to non-engine components. (EMA)

21. Comment: In-use emissions from heavy-duty vehicles are primarily a function of the engine and related aftertreatment systems. ARB has not provided any information showing that imposing diagnostic requirements on heavy-duty vehicle manufacturers and non-engine powertrain component suppliers will result in any real world emission benefits. ( )(DDC)

22. Comment: Non-engine powertrain components have no direct effect on the brake-specific emission performance of the engines. (DDC)

    Agency Response to Comments 20-22: As shown in the Agency Response to Comments 12-17, the staff made changes to the EMD regulation that would limit the EMD requirements to the engine and related aftertreatment components and made these changes available in the 15-Day Notice. Thus, the comments above have been addressed.

23. Comment: The regulation should clearly indicate that the engine manufacturer is only responsible for providing diagnostics for malfunctions of the emission-certified engine emission control system and for the integrity of inputs to the engine from non-engine vehicle sensors that are supplied or specified by the engine manufacturer and have the capability of altering the engine's brake specific emissions or affecting the engine's EMD system performance. (DDC)

    Agency Response: With the 15-Day Notice, the regulation was modified to make it clear that the engine manufacturer is the only one responsible for meeting the requirements of the entire regulation. Further, section (e)(4)(A) of the regulation provides clear direction that the engine manufacturer is responsible for providing diagnostics that are defined by the engine manufacturer as emission-related or are used by the engine manufacturer as part of the diagnostic strategy for another component within the EMD system. With the latter part of this definition, the staff believes it provides more clarity than the commenter's suggestion of "affecting the engine's EMD system performance." With regards to the suggested "altering the engine's brake specific emissions," the EMD regulation simply requires components designated by the manufacturer itself as "emission-related" to be monitored, which should provide more flexibility to engine manufacturers in meeting the regulation than the approach suggested by the commenter. Lastly, the commenter requested that the regulation discriminate between inputs to the engine control computer that are from sensors supplied or specified by the engine manufacturer versus output components or input components that don't meet that stated criteria. The commenter's suggested approach, however, is not warranted. The regulation does not discriminate based on input versus output or the supplier of the input component and requires monitoring of either one if they indeed meet the criteria of being defined by the engine manufacturer as emission-related or are used by the engine manufacturer as part of the EMD system. The engine manufacturer has complete control over which components it decides are emission-related and which components it designs its EMD system to use. To the extent that the manufacturer in its comments implies that it should only be responsible for defining which components are emission-related or are used as part of its EMD system but have no responsibility for diagnosing malfunctions of that component undermines the entire principle of a diagnostic system.

24. Comment: Including provisions that are not under the engine manufacturer's control (e.g., transmission) means that ARB should have involved the manufacturers responsible for meeting these provisions in the rulemaking and notified them of the regulation, which they have not done. (EMA)(DDC)

25. Comment: This regulation would involve substantial time and resources from both industry and ARB and should be undertaken only after careful consideration from everyone involved. (DDC)

Agency Response to Comments 24-25: Even though the EMD regulation made available in the 15-Day Notice does not include any requirements for non-engine manufacturers (such as truck manufacturers, coach builders, and other powertrain component manufacturers), they have taken part in the rulemaking process and/or have been notified of the regulation. Staff has been in contact with several transmission manufacturers via phone, email, and in person, and supplier representatives have been present at ARB workshops and other related meetings. The ARB has made every effort to identify truck manufacturers and coach builders that would be potentially affected by this regulation. To the extent that they have been identified, the ARB has provided notice to such manufacturers and they have been involved in the regulatory process.

26. Comment: If the intent of ARB is to include non-engine requirements in the EMD regulation, then ARB needs to establish certification and enforcement protocols for those previously unregulated parties (e.g., heavy-duty powertrain component suppliers and vehicle manufacturers). ( )(DDC)

Agency Response: Refer to previous agency responses. As modified in the 15-Day Notice, the regulation only applies to engine manufacturers and the engines that they produce, so the arguments made in the comments are no longer applicable. Nonetheless, staff's previous proposal, which did impose requirements on non-engine manufacturers, already did include establishment of certification procedures for other powertrain component suppliers (e.g., transmission or hybrid component suppliers) with the exact same level of specification as that required for the engine manufacturers. Further, staff had indicated at the time that an enforcement regulation for both the engine manufacturers and the non-engine manufacturers would be established at a later date.

NEED FOR OBD SYSTEMS

27. Comment: ARB's unsupported assertion in the Staff Report that "most emission problems occur as vehicles age and accumulate high mileage" is highly questionable with regard to heavy-duty diesel engines. Our experience would indicate that this is not true, since fairly extensive durability testing has shown that emission control systems exhibit minimal deterioration at high mileage. ARB has even recently acknowledged heavy-duty diesel engines are highly durable with a life to overhaul that is greater than originally estimated. Since the

emission control systems tend to be integral to the engine design, deterioration of the emission control system is often associated with the loss of engine performance and thus is likely to be detected and corrected in a timely manner. ARB should perform detailed studies of current and future emission control systems and establish diagnostic requirements only for malfunctions that are likely to occur in-use, will result in a meaningful increase in emissions, and that are unlikely to be detected or corrected without an OBD indicator. (DDC)

Agency Response: The staff's assertion is not unsupported as the commenter suggests, and the commenter's position that it is wrong defies common knowledge and basic engineering principles.

The commenter seems to believe that durability of an engine is the same as maintaining proper emission control, but these are clearly two distinct items. An engine may indeed be durable and go for long intervals before rebuilding is necessary to restore adequate fuel economy and performance levels, yet emissions can greatly increase over time due to malfunctioning emission control components or changes in engine control components that do not adversely impact durability. While the commenter seems to acknowledge that his experience is primarily based on engines with essentially zero emission controls (and thus, no components to deteriorate over time), the commenter's company is already selling vehicles with emission controls such as EGR systems and PM traps that do indeed become less effective over time. Common examples include deterioration of the EGR system (such as restricted flow) or the PM trap (such as a crack that allows PM emissions to go untrapped), neither of which will adversely affect engine durability but both of which will obviously result in increased emissions.

The commenter's position that most failures of the emission control system will also result in reduced engine performance that will prompt repair is incorrect. While some failures will undoubtedly affect the performance of the engine severely enough to prompt repair, it is unlikely that this subset is anywhere near the majority of the failures. Failures of emission controls like EGR or PM trap cracks will often not affect engine performance (they may actually increase it and/or increase fuel economy).

It is also important to note that diagnostic systems are not designed to detect multiple emission control components that are partially deteriorated yet cumulatively result in very high emissions. Diagnostic systems are blind to such synergistic effects. To account for this, the systems are designed to comprehensively monitor every component that has a measurable emission impact and to monitor each component for proper operation within design specifications. When any one component deteriorates to a point where it, by itself, is performing outside the manufacturer's design specifications, a malfunction is required to be identified. This singular, but comprehensive, approach helps mitigate the inability of the system to comprehend synergistic effects and minimizes the chance for high emitters to go undetected.

Accordingly, the commenter's suggestions that the diagnostic requirements be designed to only identify malfunctions that are most "likely to occur in-use," have a "meaningful increase" in emissions, and are "unlikely to be corrected" would only serve to reduce the system's effectiveness and increase the number of high emitters that go undetected.

Lastly, diagnostic systems are designed to ensure every single vehicle is performing properly and identify individual vehicles that have a problem. Designing the system to identify only the most common failure modes or the ones that have the biggest emission impact would undermine the purpose of the system, reduce the benefits of the program, and allow high emitters to go undetected. Designing the system to detect a fault whenever the component is operating outside of its design limits, irrespective of whether it is due to a perceived "likely" failure or an "unlikely" failure mode, results in a much more robust system that doesn't rely on predictions of what may or may not "likely" occur in the field.

28. Comment: The EMD regulation should not apply to alternative-fueled heavy-duty engines. (EMA)(DDC)

29. Comment: In contrast to conventional-fueled heavy-duty engines The software development costs associated with meeting the EMD requirements will be significant for alternative-fueled heavy-duty engines, which are of a relatively small volume. The costs for conventionally-fueled engines can be spread over the large sales volumes of these engines. It will generally not be possible for engine manufacturers to carry over diagnostic systems developed for conventional-fueled engines to alternative-fueled engines, so unique diagnostic systems will have to be developed, which will result in high costs. This would result in reduced availability of these engines in California. (EMA)(DDC)

30. Comment: Requiring alternative-fueled engines to meet the regulation may threaten the future commercial viability of these engines and thus reduce availability. It also would not only have a negative impact on the niche users that depend on having these engines available, but could also have an undesirable effect on air quality. ( )

    Agency Response to Comments 28-30: The staff modified the regulation to explicitly state that the EMD regulation applies only to gasoline- and diesel-fueled engines. This modification was made in the 15-Day Notice. See Agency Response to Comments 38-39 for discussion on costs.

LEADTIME AND STABILITY ISSUES

31. Comment: The EMD regulation is to take effect for the 2007 model year, which does not provide the four years of leadtime that is required under federal law. (EMA)(DDC)

32. Comment: The EMD requirements constitute emission standards that engine manufacturers are required to comply with in order to obtain engine diagnostic system certification. Thus, the regulation is subject to the leadtime and stability requirements of the federal Clean Air Act (CAA) (Section 202(a)), which requires any emission standard to go into effect four or more model years after the year in which they were promulgated. Leadtime is measured by full model years. "Model year" is defined by EPA to include January 2 of the preceding year through December 31 of the model year date, so the model year for 2007 can begin as early as January 2, 2006. Even if the EMD regulation was adopted today, it is too late to provide four full years' leadtime for implementation of the proposed regulation in 2007. ( )

33. Comment: Section 209(b)(1) of the CAA states that California has no authority to adopt emission standards for on-highway heavy-duty engines unless those standards meet the leadtime and stability requirements of Section 202(a). Further, California's Health and Safety Code Section 43013 requires the standards to be adopted within feasible timeframes. (EMA)

Agency Response to Comments 31-33: The commenter's concern that the proposed regulation does not provide manufacturers with at least four years of lead time or three years of stability as required under CAA section 202(a)(3)(C) is misplaced. First, the commenter specifically stated at the hearing that the EMD regulation is "another example of an ARB rule that EMA and its members are able to support." (Testimony of Jed Mandel at the May 20, 2004 Public Hearing, Tr: at p. 59.) At the time of Mr. Mandel's statement of support, he and his member companies were well aware that the EMD regulation was scheduled to go into effect with the 2007 model year. It would be disingenuous for EMA to claim that they were not aware of, or had forgotten, the provisions of CAA section 202(a)(3) at the time of Mr. Mandel's testimony in support of the regulation. The above-referenced comments, which were part of EMA's written comments to the regulation, were made on the same day that EMA gave its statement of support.

Second, the ARB does not believe that conformance with the federal 4-year lead time requirement is required for California to qualify for a waiver of preemption. Since 1970, U.S. EPA has typically applied a "2-pronged" test of whether California standards are consistent with CAA section 202(a) as required by section 209(b)(1)(C). The standards first must be technologically feasible in the lead-time provided considering the cost of compliance, and second must be compatible with the federal test procedures so that a single vehicle could be subjected to both tests. No more should be required.

This is in accord with the legislative history of section 209. When the California waiver provisions and the "consistent with section 202(a)" language were first placed in the CAA in 1965, section 202(a) consisted of just one sentence requiring adequate lead time in consideration of technological feasibility and economic costs. In the 1977 CAA amendments, Congress amended section 209 "to afford California the broadest possible discretion in selecting the best means

to protect the health of its citizens and the public welfare." (H. R. Rep. No. 294, 95th Cong., 1st Sess. 301 (1977), reprinted in 4 Leg.Hist., at 2768.) At the same time, Congress expanded section 202(a) to add several directives to U.S. EPA regarding its adoption of emission standards, including the four-year lead time requirement for heavy-duty vehicles. (Emphasis added.) Given Congress's expressed intent to *strengthen* the waiver provisions, it is unlikely Congress intended to apply the specific four-year requirement to California, which would effectively narrow the deference provided to the state.

This is especially true in the case of OBD requirements. Congress clearly did not intend the OBD requirements to be subject to the lead-time and stability provisions of CAA section 202(a)(3)(C). First, as indicated above, those requirements were first enacted in 1977 and specifically applied to heavy-duty vehicle emission reductions, which at that time solely consisted of tailpipe and evaporative emission standards that Congress directed U.S. EPA to implement for new heavy-duty vehicles. (1977 CAA, section 202(3)(B).)

It was not until the 1990 CAA amendments, that Congress enacted an entirely new provision, section 202(m), which directed the Administrator to adopt regulations to implement OBD requirements. Under the new provision, Congress directed the Administrator to promulgate regulations for new light-duty vehicles and light duty trucks within 18 months of enactment. (CAA section 202(m)(1).) Additionally, at the Administrator's discretion, Congress provided U.S. EPA with equivalent authority to adopt OBD requirements for new heavy-duty vehicles. (*Id.)* The federal CAA further provided that the effective date for those regulations initially adopted under section 202(m) shall be the model year 1994, unless the Administrator postpones application for certain classes and categories of vehicles until the 1996 model year. The Administrator could decide to delay implementation for reasons that the OBD requirements were infeasible or to be consistent with the policies adopted by the ARB. (CAA section 202(m)(2).) Thus, theoretically, under the provisions of CAA section 202(m), the Administrator had effective authority to promulgate and implement OBD requirements for heavy-duty vehicles as early as the 1994 model year. Assuming that such requirements were adopted in June 1992 (18 months after the enactment of the CAA), Congress would have provided less than the requisite time allowed for implementation under CAA section 202(a)(3)(C). Accordingly, it would be appropriate to infer that Congress never intended that the OBD requirements be subject to the lead-time provisions of section 202(a)(3)(C).

This is confirmed by the administrative actions of U.S. EPA. Although the Administrator chose initially not to adopt OBD requirements for heavy-duty vehicles (58 Fed.Reg.9485 (February 19,1993)), OBD requirements were subsequently adopted and applied to medium-duty passenger vehicles (a subclass of heavy-duty vehicles). (64 Fed.Reg.23925 (May 4, 1999).). Adopted federal regulations provide, "Except as otherwise indicated, the provisions of this subpart apply to new 2001 and later model year Otto-cycle and diesel cycle light-

duty vehicles, light-duty trucks, medium-duty passenger vehicles ["MDPVs"] . . ." (40 Code of Federal Regulations ("CFR"), subpart, S §86.1801-01. Emphasis added.) Under the Administrator's adopted definition, a heavy-duty vehicle is defined as "any motor vehicle rated at more than 8,500 pounds GVWR [gross vehicle weight rating] or that has a vehicle curb weight of more than 6,000 pounds or that has a basic vehicle frontal area in excess of 45 square feet. (40 CFR 1803-01.) MDPV is defined as "any heavy-duty vehicle . . . with a [GVWR] of less than 10,000 pounds that is designed primarily for the transportation of persons." (*Id).* The specific OBD requirements were set forth in section 86.1806-01 of the same regulation and provide that certain MDPVs, as well as light-duty vehicles and trucks, are required to meet the OBD standards set forth therein. An exception applied to diesel-fueled, chassis-certified MDPVs and engine-certified diesel engines used in MDPVs, but no exception exists for Otto-cycle MDPVs, which are subject to the requirements of section 1806-01. (40 CFR 1806-01(a)(2). These vehicles were only subject to the requirements if the exhaust emission certification of the applicable test group is being carried across from a California configuration to which California OBD II requirements are applicable.) The OBD provision does not provide for a separate and distinct implementation date for MDPVs to meet the OBD requirement. Accordingly, under the terms of section 1806-01, the 2001 and later model year implementation requirements would deem to be applicable to the OBD requirement. In such a case, the lead-time provided under the regulations would be less than two years from the May 4, 1999 initial promulgation date of the regulation.

Section 1806-05, which establishes OBD requirements for heavy-duty vehicles weighing 14,000 pounds GVWR or less, including diesel-powered MDPVs, provides a similarly abbreviated lead-time period. (68 Fed.Reg. 35800, June 17, 2003, 40 CFR section 1806.05.) The regulations were adopted in June 2003 and apply to 2005 and later model year vehicles. The lead-time again is well below the minimum four years of lead-time required under section 202(a)(3)(C). For the foregoing reasons, the only reasonable inference is that Congress did not intend that the provisions of CAA section 202(a)(3)(C) apply to OBD requirements and specifically not to California adopted OBD requirements.

Third, the commenter's reference that the EMD requirements are somehow not technologically feasible and therefore inconsistent with the Board's obligations under Health and Safety Code section 43013(a) is totally without merit. As set forth in the Staff Report and in these responses, the regulation requires manufacturers to do no more than they are presently doing or, in the case of particulate traps, planning on doing by 2007. Moreover, for those requirements manufacturers currently may not be meeting (e.g., emission-related electronic component monitoring), the regulation explicitly requires monitoring only "where determined by the engine manufacturer to be feasible given existing hardware and software." Given the above, the technologies are clearly feasible and will be available for implementation by 2007.

34. Comment: The CAA further states that the new standards must stay in effect for at least three full model years before ARB can establish another standard. New heavy-duty engine emission standards went into effect in California with the 2004 model year, and newer emission standards are set to go into effect with the 2007 model year. Thus, ARB cannot adopt the next new round of emission standards for heavy-duty engines until 2010 at the earliest. (EMA)

35. Comment: We understand and agree that it is appropriate to consider a "second generation" OBD regulation for heavy-duty engines at some point in the future. In general, four years of leadtime are required for a new regulation, especially where complex designs are concerned. Thus, the new regulation should be finalized no later than 2005 as ARB has suggested. ( )

    Agency Response to Comments 34-35: Regarding the applicability of the stability requirements of CAA section 202(a)(3) in the adoption of the EMD requirements, please see Agency Response to Comments 31-33. To the extent that the comment is referring to the adoption of future OBD regulations, as stated in the Staff Report, staff has already begun development of heavy-duty OBD requirements analogous to the light-duty OBD II requirements. It is presently the staff's intent to present this proposal to the Board for consideration in 2005 with final adoption in 2005. This regulation would apply to 2010 and subsequent model year heavy-duty engines.

36. Comment: In order to develop "second generation" OBD requirements to apply to the 2010 model year engines, it is necessary to have an understanding of the emission control systems that are going to be used then. Engine manufacturers currently have not finalized this and will probably not do so by 2005, since they are currently concentrating on meeting the 2007 emission standards. Adopting the 2010 OBD requirements in 2005 may be unnecessary and expensive and may even create unintended barriers for the use of promising emission control technologies. Thus, ARB should delay adoption of this "second generation" OBD regulation until the emissions control technologies to be used to meet the 2010 standards are sufficiently well understood. (DDC)

    Agency Response: The staff disagrees with the need for a delay in development and adoption of a second-generation system until after the manufacturers have settled on their exact designs. Staff, like the manufacturers, is aware of the various technologies that currently exist and are being pursued by the engine manufacturers. Additionally, the regulation will be structured to account for all known technologies as well as include a placeholder for as yet unidentified technologies. By covering all of the known technologies, the regulation will not be dependent on what technologies (or more likely, combination of technologies) each individual engine manufacturer ultimately decides on. Further, by having the monitoring requirements clearly defined well in advance, manufacturers have more ability to consider the monitoring requirements during the development of various technologies (instead of as an afterthought) and make whatever modifications are necessary during development to make the technology

amenable to monitoring. This is a much more cost-effective and efficient method to get to the final product than developing the technology independent of monitoring and attempting to then retrofit the monitor to the technology.

The commenter's suggestion that adoption of the requirements in 2005 may be unnecessary or expensive is unfounded. Conversely, not adopting the monitoring requirements in that time frame could indeed cause engine manufacturers added expense because they may pursue development of alternate emission control technologies where they are unable to meet the monitoring requirements and then be forced to redesign their system to replace those emission controls with ones that can be monitored.

MONITORING REQUIREMENTS

37. Comment: The EMD regulation should not require manufacturers to detect faults where there is excessive backpressure of the particulate matter (PM) trap. Increased backpressure does not generally result in increased emissions; it may even slightly increase the PM trapping efficiency. We already currently monitor for excessive backpressure to ensure that commercial requirements for engine performance and fuel economy are met in-use and warn drivers when backpressure limits are exceeded, and we intend to continue this practice in the future. We object to including this monitoring requirement in the EMD regulation because we want to retain the flexibility to implement this monitor in a manner that best meets the needs of our customers without any impediments created by regulatory restraints. (DDC)

Agency Response: The staff did not make the suggested changes. The current regulation provides an abundant level of flexibility in how a monitor for excessive backpressure is implemented and should not constrain the manufacturer in any way. Further, the commenter's assertion that excessive backpressure is not, by itself, a failure that immediately causes increased emissions is not substantiated. Staff's experience through retrofit applications is that increased backpressure can indeed cause immediate increases in emissions as the exhaust gas looks for alternate paths to escape including around the edges of the PM-trap substrate and directly out the exhaust system. Excessive backpressures also clearly indicate operation outside of the manufacturer's design and control and can very often indicate an impending catastrophic failure. Excessive backpressure is typically caused by a failure of the system to regenerate. Thus, the excessive PM loading, when and if regeneration finally does occur, can cause uncontrolled regeneration, extreme temperatures, and cracking or other catastrophic failure of the substrate.

COSTS

38. Comment: The EMD regulation would require heavy-duty engine manufacturers to, for the first time, meet mandatory, comprehensive engine diagnostic requirements. So in order to meet these requirements, engine manufacturers

would have to devote substantial time and resources to the development of the necessary diagnostic monitoring systems and software, so the cost to comply with the regulation would be significant. (EMA)

39. Comment: ARB underestimated the costs of the EMD regulation in the Staff Report. We do not expect the costs of the EMD regulation to be excessive if the requirements for non-engine components are removed from the regulation. Nevertheless, we do not agree with ARB's assessments in the Staff Report that the regulation will result in no additional hardware or software costs, that there will be no impact of the profitability of heavy-duty powertrain suppliers, that there will be no costs to vehicle manufacturers, and that there will be no impact on new vehicle prices. These assessments can only be true if the EMD regulation does not result in any changes to the monitoring systems manufacturers are already using or planning to use in 2007. But if this were the case, then the EMD regulation serves no purpose and should be abandoned on this basis alone. The EMD regulation does necessitate additional hardware and new software, and there will be costs involved in the development and validation of this new hardware and software. In particular, significant effort and costs will be needed in the development of rationality checks for all sensory inputs to the engine control system. All these changes will result in higher vehicle prices and reduced profitability. ( )

Agency Response to Comments 38-39: The staff disagrees with the commenters. The EMD regulation does not contain "comprehensive" engine diagnostic requirements. The EMD regulation was developed to ensure that engine manufacturers would make very few or no changes to their existing monitoring systems. Specifically, the staff designed the regulation to be based on what engine manufacturers are currently doing on their engines in order to minimize additional work engine manufacturers must do in order to comply with the regulation. Engine manufacturers are currently meeting almost all the requirements.

For example, the requirements (as presented during the 45-Day Comment period) for the malfunction indicator light allows manufacturers to use an "existing warning light(s)" and to illuminate the light in accordance with the engine manufacturer's "existing practices for notifying vehicle operators and service technicians." Moreover, for those requirements manufacturers currently may not be meeting (e.g., emission-related electronic component monitoring), the regulation explicitly requires monitoring only "where determined by the engine manufacturer to be feasible given existing hardware and software." So the commenter's statement that the EMD regulation would necessitate additional hardware and new software and his/her example regarding the effort and costs needed to develop rationality checks for "all sensory input to the engine control system" is not accurate.

Given the above, the staff's estimates for the cost to comply with the regulation are accurate and will not be significant.

OTHERS

40. Comment: The term “emission-related” is used in the regulation, but is not defined in section (c). It should be understood to refer to factors that influence the engine emissions as expressed on a grams per horsepower-hour basis. (DDC)

    Agency Response: The only references to “emission-related” in the regulation are in section (e)(4), which are the requirements for “emission-related electronic component monitoring.” Section (e)(4)(A) states that electronic components that are “defined by the engine manufacturer as emission-related” are to be monitored for malfunctions. With this language, the staff has placed the responsibility on engine manufacturers to determine its own definition of “emission-related.” As such, for the purposes of the EMD regulation, an engine manufacturer is free to use any definition it wants including the one proposed by the commenter if it so wishes. For other (or future) regulations, staff does not agree with the commenter’s position that emission-related must be defined as something that influences engine emissions on a grams per brake horsepower-hour basis. Many things can cause increased emissions of criteria pollutants in-use without an associated increase in grams per brake horsepower-hour emissions including, as just one example, gasoline evaporative emission controls.

41. Comment: In section (e)(1)(B), the term “fuel pressure” should be changed to “fuel injection pressure” or “fuel pressures that are proportional to the fuel injection pressure” to make it clear that it is not necessary to monitor the fuel supply pressure or fuel pressure at points in the fuel system that are unrelated to the injection pressure. (DDC)

    Agency Response: The staff did not make the proposed change. In the context of this regulation, engine manufacturers are only responsible for monitoring fuel pressure in cases where the engine has feedback control of the pressure. In that regard, manufacturers are indeed responsible for monitoring all portions of the fuel system that have feedback control of pressure, regardless of whether they are related to injection pressure. If the manufacturer has gone to the effort and added expense of installing a feedback control system on a portion of the fuel system, it is very likely that such control is important for proper emission performance.

42. Comment: Under section (e)(3), the engine manufacturer should be responsible for PM trap monitoring only if the PM filter is part of the engine manufacturer’s certified engine system. They should not be responsible if the PM filter is retrofitted to the engine or supplied by an independent third party. (DDC)

    Agency Response: The EMD regulation only applies to engines certified and introduced into commerce as new engines and engine manufacturer is defined

as the holder of the Executive Order for the engine family. Accordingly, the EMD requirements do not apply to PM filters that are retrofitted to the engine after certification and introduction into commerce. Any PM filter used by the engine manufacturer to meet the emission standards and included as part of the certification to receive the Executive Order for the engine family would, however, be subject to monitoring regardless of the manufacturer or supplier of the PM filter.