

Regulating Air Pollution from Diesel Trucks:

A Model Rule for States



STAPPA/ALAPCO • JULY 2001

State and Territorial Air Pollution Program Administrators • Association of Local Air Pollution Control Officials

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**State and Territorial Air Pollution Program Administrators (STAPPA)
Association of Local Air Pollution Control Officials (ALAPCO)**

July 2001

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About STAPPA and ALAPCO

The State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) are the national associations representing state and local air quality officials in 54 states and territories and over 165 major metropolitan areas throughout the country. The members of STAPPA and ALAPCO have primary responsibility for implementing our nation's air pollution control laws and regulations. The associations serve to encourage the exchange of information and experience among air pollution

control officials; enhance communication and cooperation among federal, state and local regulatory agencies; and facilitate air pollution control activities that will result in clean, healthful air across the country. STAPPA and ALAPCO share joint headquarters in Washington, DC.

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The State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) are pleased to provide *Regulating Air Pollution from Diesel Trucks: A Model Rule for States*. The associations developed this model rule as part of a multi-state clean diesel initiative, to assist States in taking advantage of their statutory authority under Clean Air Act section 177 to opt in to onroad heavy-duty diesel engine supplemental testing requirements that have been adopted by California. States that adopt California's regulatory requirements will avoid substantial increases in emissions of oxides of nitrogen, which, in turn, will increase protection of public health and the environment. The associations stress the need for all States to conduct their own thorough review and analysis of California's rules and this model rule and, further, to work closely with their legal counsel to ensure that any provisions adopted are within the framework of applicable State law and procedural and substantive requirements.

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Once again, STAPPA and ALAPCO believe that *Regulating Air Pollution from Diesel Trucks: A Model Rule for States* will serve as a useful and important tool and thank all those who contributed to its development.

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Executive Summary

In December 2000, California issued requirements for new onroad heavy-duty diesel engines (HDDEs) that should result in substantial reductions in emissions of oxides of nitrogen (NO_x) beyond what will be achieved by national diesel engine rules. In particular, the California rules adopt for the 2005 and 2006 (and subsequent) engine model years two types of test procedures that federal rules do not require until the 2007 model year. Ironically, a number of HDDE manufacturers are required to comply with these test procedures before the 2005 model year, under judicial consent decrees negotiated between the affected manufacturers, the U.S. Environmental Protection Agency (EPA), and California, but only for the 2003 and 2004 model years.

The California rules therefore fill a serious two-year gap (in 2005 and 2006) in the regulation of HDDEs. These rules should produce significant environmental benefits for much longer than two years because vehicles equipped with 2005 and 2006 model year engines will remain on the road for a long time. California estimates that, in terms of NO_x reductions, its own rules may represent the equivalent of removing 3 million cars from the road over the lifetime of the engines. Such significant reductions should translate into critical decreases in concentrations of ground-level ozone, one of our nation's most intractable air pollution problems (NO_x is a precursor of ground-level ozone), as well as various other important environmental benefits, including, among others, reduced formation of harmful fine particulate matter in the atmosphere, reduced acid rain, and reduced eutrophication of water bodies.

Other States are free to adopt the California rules, so that

the NO_x reductions (and concomitant environmental benefits) achieved in California should be multiplied. If enough States "opt in" to the California requirements, the diesel engine manufacturers may even produce only engines that meet these stricter mandates. That could result in perhaps over 800,000 tons of additional NO_x reductions over the lifetime of the engines, or the equivalent of removing nearly 30 million cars from the road nationwide. Moreover, these NO_x reductions are inexpensive; in terms of cost-effectiveness, they are much cheaper than reductions achieved through most other stationary and mobile source controls.

The State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) designed the model rules and background information provided in this document as part of a multi-state clean diesel initiative, to simplify the process for States that are contemplating adopting the more stringent California rules. Under section 177 of the Clean Air Act (CAA), other States are allowed to adopt California's motor vehicle and engine standards and associated rules. The States must observe the mandates in section 177, however. In particular, the standards and associated test procedures adopted by another State must be identical to the California rules in terms of stringency. This requirement ensures that auto and engine manufacturers need not produce many different types of motor vehicles and engines.

Most States are eligible to adopt the California rules. CAA section 177 only requires that the State have or had an approved "Part D" state implementation plan (SIP) for at least one pollutant (*i.e.*, an EPA-approved "nonattainment" plan for a criteria pollu-

tant). In addition, section 177 requires that States adopt the California requirements at least two years before commencement of the first affected model year. Therefore, for States wishing to adopt the California requirements beginning with the 2005 model year (which will begin production in 2004), it will be safest to issue rules (or adopt the mandates through legislation) by the end of 2001.

STAPPA/ALAPCO's model rules provide several options for States that wish to opt in to the California rules. First, States need to decide whether to adopt the requirements for (1) only the 2005 and 2006 model years (and thus return to the EPA rules for model year 2007, when the federal rules incorporate the test procedures), or (2) for 2005 and subsequent model years. For States that choose the second option, it will be necessary to check to see that California adopts HDDE rules for 2007 and subsequent model years that are at least as stringent as the corresponding EPA rules. California has not yet taken this rulemaking action, but has announced plans to do so later this year.

Furthermore, States will need to decide whether to "incorporate by reference" any future amendments to the California requirements. Because the rules adopted by other States must be identical in stringency to the California mandates, incorporating by reference any future California rule changes represents the safest and easiest means to opt in to the HDDE requirements. Some States may not wish to follow this course, however, or may be barred from doing so by their administrative procedure laws. For this reason, the model rules provide options that do not incorporate by reference future California program changes. In this case, States will need to be vigilant in tracking such changes. This can be done through the California Air Resources Board (CARB) "mailout" system, which is essentially an e-mail listserv. For States that may not be able to incorporate California rules by reference at all (*i.e.*, not even current California rules), STAPPA

and ALAPCO provide a model rule option that, while quite complicated, will still allow for the adoption of California's requirements. As an alternative to this option, however, a State may wish to seek authority from the State legislature to incorporate by reference.

In addition to the various options for opting in to the California requirements, model enforcement provisions are provided. These are only suggestions; the enforcement provisions need not be identical to California's. In fact, States are not even required to adopt enforcement provisions. The model rules, themselves, bar registration of motor vehicles that do not have engines that are certified by CARB. They also bar the sale, lease, rental, importation, and other transactions involving motor vehicles with such non-certified engines.

This document also outlines procedures that States should follow in adopting and implementing the California rules. The real key is close coordination among the affected parties, including the various State agencies involved. It will be especially important to work closely with legal counsel and the State Division of Motor Vehicles, upon whose shoulders implementation of much of the program will rest.

Be aware, though, that each State will need to adapt the model rules to the particular circumstances presented by its laws and procedures. Still, a State's rules must precisely incorporate California's regulations and test procedures so as to not create a "third vehicle" in violation of the CAA. As discussed in this document, it will be important for each State to work with its legal counsel and others in State government to issue sound, defensible, and workable rules. STAPPA and ALAPCO, therefore, stress the need for all States to conduct their own thorough review and analysis of California's rules and these model rules.

Preamble

Introduction

The State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) developed these model rules and support materials to assist States interested in adopting California's supplemental test procedures for new onroad heavy-duty diesel engines (HDDEs). Adoption of California's requirements provides States with an ideal opportunity to obtain relatively inexpensive reductions in emissions of oxides of nitrogen (NO_x) through a fairly simple rulemaking. As described in this document, by "opting in" to new test procedures and other measures for HDDEs that California already has adopted, States can obtain substantial and cost-effective emission reductions.

This document provides background information for States that wish to "opt in," under Clean Air Act (CAA) section 177, to the California HDDE rules for either (1) only model years 2005 and 2006, or (2) 2005 and subsequent model years (which is the approach California has taken in its rulemaking). It lays out different regulatory options for adopting the California rules. The document also will serve as a guide for the rulemaking process, hopefully answering many questions that face State officials – particularly in States that have never adopted motor vehicle emissions requirements before. At the time this document was published, more than 20 States were pursuing the adoption of the California requirements.

Although trucks and buses powered by HDDEs account for only about 1 percent of all motor vehicles and equipment, they are responsible for nearly a quarter of NO_x emissions. The U.S.

Environmental Protection Agency's (EPA's) final rules requiring significant new emission reductions from these HDDEs do not take effect until the 2007 model year due to federal law constraints. But because California has adopted similar test procedures that will achieve significant NO_x emission reductions beginning in 2005, other States are also free to adopt these California rules for HDDEs starting in 2005. Other States that opt in to the California rules can decide whether to return to the EPA rules beginning with model year 2007, or to stay with the California program – assuming California adopts HDDE rules for the 2007 model year that are at least as stringent as EPA's (California has announced that such rulemaking is currently planned for later this year).

The California rules issued in December 2000 require manufacturers to perform supplemental test procedures in addition to the existing Federal Test Procedure (FTP). The two components of the supplemental tests are known as the Not-To-Exceed (NTE) test and the Euro III European Stationary Cycle (ESC) test. The ESC test also has an associate requirement known as the maximum allowable emission limit (MAEL).¹ The two supplemental test procedures, which (as described in the next section) are currently required only through October 2004 under the federal judicial consent decrees with several major diesel engine manufacturers, result in substantial reductions in NO_x emissions. In some instances compliance with these supplemental test procedures cuts NO_x emissions by more than half. Yet, unless States adopt the California requirements, NO_x emissions from HDDEs may dramatically increase for the 2005 and 2006 model years because there is a two-year "gap" between the 2004 expiration of the test require-

ments under the consent decrees and the 2007 national commencement of the requirements for similar supplemental test procedures under EPA's rules.

The California Air Resources Board (CARB) estimates that NO_x reductions in California due to the December 8, 2000 adoption of the NTE and ESC test requirements for the 2005 and 2006 model years will be equivalent to removing 3 million cars from California's roads over the life of those diesel engines. Since California's onroad HDDE fleet makes up approximately 10 percent of the nationwide fleet, this means that adopting the California requirements on a national basis would be the equivalent of taking about 30 million cars off the road for the life of the engines. Moreover, the technology necessary to reap these enormous benefits already will be demonstrated and operational. If enough States participate in this multi-state clean diesel initiative by "opting in" to the California requirements – as many are allowed to under CAA section 177² – diesel engine manufacturers will likely design all their model year 2005 and 2006 HDDEs to comply with the California requirements. That will result in the significant environmental benefits described in this document.

Given the significant interest on the part of the States in addressing the potential "gap" that will occur in certification testing requirements – and emission reductions – for model year 2005 and 2006 HDDEs, STAPPA and ALAPCO have worked to facilitate a multi-state clean diesel initiative. This initiative will allow those States that wish to pursue remedial action to do so in a coordinated and timely fashion. The model rules and other materials provided in this document are intended to help States adopt the California requirements by the end of 2001. CAA section 177 requires that manufacturers be given a two-year lead time to produce new motor vehicles and engines; thus, adopting the rules by December 31, 2001 should ensure that a State can realize the benefit of the NO_x reductions for both the 2005 and 2006 model years.

Be aware, though, that each State will need to adapt the model rules to the particular circumstances presented by its own laws and procedures. Still, each State's rules must precisely incorporate California's regulations and test procedures so as to not create a "third vehicle" in violation of the CAA. As discussed in this document, it will be important to work with your legal counsel and others in your State government to issue sound, defensible, and workable rules. STAPPA and ALAPCO, therefore, stress the need for all States to conduct their own thorough review and analysis of California's rules and these model rules.

Background on HDDE Regulation, Certification, and the FTP

Highway heavy-duty engines are categorized into diesel-cycle (compression-ignited) and Otto-cycle (spark-ignited) engines. Most diesel-cycle engines are fueled by diesel fuel, but a minor portion of heavy-duty diesel-cycle engines can also be fueled by methanol or natural gas.

In contrast to "light-duty," gasoline-powered vehicle engines, HDDEs have not been subject to many environmental regulations since passage of the Clean Air Act in 1970. EPA's regulation of HDDEs did not begin until 1984, when EPA adopted a NO_x standard of 10.7 grams per brake horsepower-hour (g/bhp-hr). EPA's NO_x emission standard for 1998 to 2003 model year diesel and Otto-cycle heavy-duty engines is 4.0 g/bhp-hr. Because one type of heavy-duty engine may be used in many types of vehicles, EPA currently requires testing of the engine (with emission control systems in place) rather than the entire vehicle. Accordingly, the standards are expressed in units of g/bhp-hr (*i.e.*, grams of emissions per unit of work the engine performs over a period of time), rather than the grams-per-mile unit used for testing passenger cars and light-duty trucks.

Thus, the performance test cycle or cycles for determining compliance with the numerical standards play an important role in determining the stringency of the existing standards. Before being offered for sale, new engines must be certified to compliance with federal emission standards; the performance test serves as the basis for determining this compliance.

Engines are tested for certification using an engine dynamometer. Currently, EPA tests engines to determine compliance with HDDE standards using only the FTP. The FTP, however, only represents a small portion of "real world" driving conditions. For example, the FTP does not include elevated temperatures and highway cruise patterns. Therefore, it is inadequate in limiting emissions under these conditions. Several tests, described below in the following section and in the section on the California requirements, have been developed to represent a wider range of true in-use driving conditions.

Besides certification, engine dynamometer testing is used for "in-use compliance testing" (*i.e.*, determining whether an engine in a highway vehicle is actually complying with the emission standards). But this engine dynamometer testing requires removal of the engine from the vehicle, and transport to a laboratory for the test. Not surprisingly, using a dynamometer for in-use compliance testing is expensive, time-consuming, and often impractical.

Diesel Engine Consent Decrees, New Tests, and EPA Rulemaking

Several years ago the U.S. Department of Justice, EPA, and CARB brought major enforcement actions alleging that seven of the largest HDDE manufacturers (representing approximately 60 percent of HDDE sales and 80 to 85 percent of the vehicle miles traveled by heavy-duty vehicles powered by HDDEs) violated federal and California engine certification regulations by "defeating" or turning off diesel emission control devices during in-use highway driving. The manufacturers employed "defeat devices" in the HDDEs for model years 1988 through 1998. With the defeat devices, emission controls typically were turned off during cruise-

ing conditions to save fuel. This allowed NO_x emissions of as high as three times the emission standard. In 1998 alone, the defeat devices caused approximately 1.3 million tons of excess NO_x emissions – a significant percentage of overall NO_x emissions for that year. Over the life of the engines employing defeat devices, tens of millions of tons of excess NO_x will be emitted.

The federal government and the seven HDDE manufacturers resolved the cases through settlement agreements. In October 1998 they agreed to judicial consent decrees (binding settlement orders) that imposed substantial penalties upon the seven manufacturers and required them to achieve additional emission reductions. These judicial consent decrees, which were lodged with the court in July 1999, remain in effect.

In the consent decrees, the settling manufacturers are required, among other things, to produce HDDEs that comply with prescribed emission standards that are more stringent than those required in current state and federal regulations, as measured by the FTP.³ Specifically, these engines must meet a 2.5 g/bhp-hr standard for non-methane hydrocarbons (NMHC) plus NO_x emissions no later than October 1, 2002. This will require production of new engines that are approximately 50 percent cleaner than current engines.

Six of the seven settling engine manufacturers (Caterpillar, Cummins, Detroit Diesel, Mack Trucks, Renault, and Volvo Trucks) have also agreed to produce engines by October 1, 2002 that meet supplemental certification procedures. Together with the FTP test, the supplemental test procedures will require control of emissions during the majority of real world operating conditions, ensuring that in the future defeat devices will no longer be employed. This will result in significant additional reductions in emissions of NO_x and other pollutants during “real world” conditions. These test procedures are designed to make up for the deficiencies of the FTP test briefly described in the previous section.

The supplemental procedures include the NTE test and the ESC test. As EPA has stated, these supplemental tests “are specifically designed to provide additional certainty that the standards will be met under a wide range of operating conditions.” 65 FR 59895, 59900 (Oct. 6, 2000). The consent decrees require that the settling engine manufacturers comply with these supplemental test procedures for a period of two consecutive years – in other words, for model years 2003 and 2004. At the time the consent decrees were signed, EPA’s upcoming HDDE rule was expected to require the NTE and ESC tests for engines beginning with model year 2004. These rule requirements were subsequently delayed until model year 2007.

The NTE procedures, in the words of EPA, “apply under any conditions that could reasonably be expected to be seen in normal vehicle operation and use, including an expanded range of ambient conditions.” *Id.* Thus, they represent an important supplement to the FTP. The October 20, 2000 CARB Staff Report containing the “Initial Statement of Reasons” for the rulemaking (supplied in electronic form on the CD accompanying this document, and

available on the CARB Web site at <http://www.arb.ca.gov/regact/NTEtest/ntetest.htm>) provides an extensive technical description of the NTE procedures. Basically, though, the NTE test imposes an emissions cap of 1.25 times the applicable FTP standard. Although the emissions cap is less stringent than the standard, the limitation is on maximum emissions that can occur during most in-use operation. This significantly reduces NO_x emissions from HDDEs.

The ESC test simulates cruising conditions better than either the FTP or the NTE procedures. This can help prevent excess emission increases during highway driving. The ESC test includes testing at 13 specific modes of steady-state engine operation, including idle. Each mode has a different speed and power condition. ESC test results at each mode are averaged and compared to the FTP-based emission standard so that cruise emissions are well controlled. As with the NTE test, the CARB Staff Report provides more technical information on the ESC test and its benefits.

Since certifying HDDEs using the NTE and ESC tests produces much greater emission reductions than the reductions achieved when only the FTP is used, EPA issued a proposed rule to adopt these supplemental test procedures for 2004 and subsequent model year HDDEs. See 64 FR 58472 (October 29, 1999). But due to timing constraints that the CAA imposes on EPA, in its October 6, 2000 final HDDE rules EPA stated that HDDE manufacturers will not be required to comply with the NTE and ESC test procedures until the 2007 model year. 65 FR 59896, 59900. As a result, there will be a two-year gap between the expiration of these test requirements for the settling manufacturers following the 2004 model year and the commencement of the test requirements for model year 2007 under EPA’s final rules.⁴

Thus, for two entire model years there may be serious “backsliding” – diesel exhaust emissions could increase significantly above the previous levels mandated by the consent decrees. Note that resulting emission increases and air quality deterioration will continue for much longer than two years – there will be significant excess NO_x emissions as long as the engines manufactured in those two years are on the road.

For this reason, California decided to “fill the gap” by requiring compliance with the NTE and ESC test procedures in addition to the FTP test procedure – and adding several other measures – for the 2005 and 2006 (and subsequent) model years. As described immediately below, these requirements will achieve major NO_x emission reductions in California. However, these environmental benefits are available to other States, as well, if they exercise their authority to opt in to California’s program. Many States have already recognized the benefits of doing so and, therefore, are pursuing adoption of California’s requirements. If a sufficient number of States opt in to California’s requirements, diesel engine manufacturers will likely manufacture these cleaner HDDEs for sale nationwide. That, in turn, will dramatically increase the environmental benefits of utilizing the supplemental test procedures.

California's Rules

As noted above, the most detailed description of the new California HDDE rules, which CARB adopted on December 8, 2000,⁵ is found in the October 20, 2000 CARB Staff Report. Beginning with model year 2005, California will require HDDE manufacturers to comply with the NTE and ESC tests described in the section above. Certification will be based upon these tests, as well as the FTP test. In many important respects the California requirements are nearly identical to the requirements of the consent decrees and the new federal rules adopted by EPA for 2007 and subsequent model year HDDEs. In addition, it will be necessary to show that a vehicle is certified before it can be sold or leased.

Certification will also require compliance with the MAEL currently required under the consent decrees and (for model years 2007 and thereafter) the federal rules. The MAEL requirements can be considered an adjunct to the ESC test because they are utilized during the 12 non-idle test modes of that test. The MAEL specifications will prevent manufacturers from complying with the ESC test using computer programs that "recognize" when the engine is being tested at the specific test points, and then re-calibrating for better fuel economy (*i.e.*, higher emissions) between test points. The MAEL requirements ensure that emissions do not exceed a cap when operating within the non-idle ESC test modes. Once again, more details on the criteria are found in the CARB Staff Report.

Another important aspect of the California rules concerns "in-use" compliance testing for enforcement purposes. As discussed in the "Background" section above, laboratory dynamometer testing for enforcement is time-consuming, expensive, and often impractical. The California rules therefore allow convenient and less costly compliance testing enabled by the various supplemental test requirements. Compliance with these requirements can be verified using chassis testing through either a chassis dynamometer or an on-board emission measurement device.

The California rules contain several exemptions, two of which are extremely notable. Compliance with the supplemental requirements is delayed until model year 2007 (rather than 2005) for two categories: (1) "ultra-small" volume manufacturers, and (2) urban buses. These categories are precisely defined. They are described below in the "Summary of Provisions" section.

In addition, the California rules call for CARB to conduct a "technology review" in 2003. CARB believes that the requirements, as written, can be met by the 2005 model year. However, this review will allow for any adjustments that may be necessary to address concerns from engine manufacturers. States that adopt the California requirements will be subject to any necessary adjustments that CARB makes.

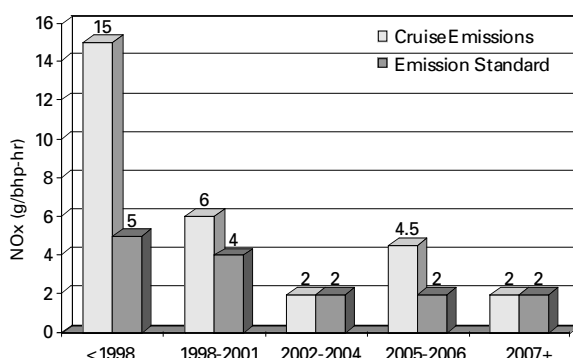
Emission Reductions That Will Be Achieved

The current on-road heavy-duty diesel certification method uses the FTP test cycle. However, this test cycle is not representative of actual, in-use driving, in which operating conditions vary widely. As a result, engine manufacturers may employ less efficient emission control strategies in order to achieve higher fuel efficiency during driving conditions not represented on the FTP test cycle. This will result in significantly higher NO_x emissions during actual driving of vehicles powered by HDDEs, and higher particulate emissions, as well.

Furthermore, the six engine manufacturers with applicable provisions in their consent decrees are required to satisfy the proposed NTE and ESC test procedures for a two-year period beginning in October 2002 (*i.e.*, for model years 2003 and 2004). If States do not opt in to the California requirements that require the NTE and ESC test procedures for model years 2005 and 2006, the marketplace in 2005 may prompt the settling manufacturers to use less efficient emission control strategies to boost fuel economy. (In the absence of any requirements, the non-consent decree engine manufacturers presumably will continue to calibrate their vehicles to maximize mileage and thus increase emissions.) This would result in vastly higher NO_x emissions – perhaps over 800,000 tons over the lifetime of the engines, or the equivalent of nearly an additional 30 million cars on the road. As shown in *Figure 1*, there may be over a 100 percent increase in NO_x cruise emissions from model year 2005 and 2006 HDDEs unless States opt in to the California requirements.

Figure 1

Excess NO_x Emissions* Increase in 2005 and 2006



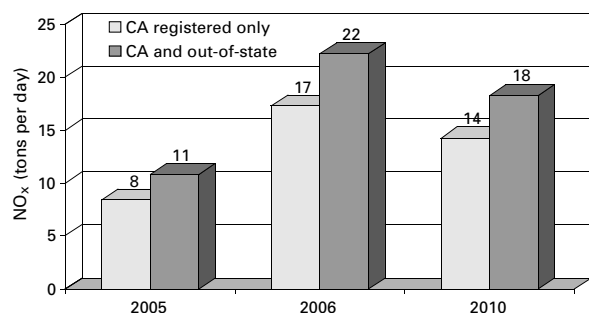
*For Heavy Heavy-Duty Vehicles (33,000K GVWR and over)
Source: CARB, 2001.

For California alone, CARB estimates that in 2006 its new rules will result in 17 tons per day of additional NO_x emission reductions (compared to what would be obtained under the federal

rules) from HDDEs registered in California, as illustrated in *Figure 2*. Over the lifetime of the engines produced in model years 2005 and 2006, the NO_x emission reductions achieved only in California should be the equivalent of removing approximately 3 million cars from the road.

Figure 2

NO_x Reductions in California Beyond Federal Requirements



Source: CARB, 2001.

A number of States have already calculated the NO_x emission reductions that they may achieve by opting in to the California rules. For example, for the 13-state Ozone Transport Region (OTR) extending from Maine to Virginia, the Ozone Transport Commission estimates that the test procedures will result in a decrease of at least 62 tons of NO_x per day in 2006 if all these States take part in the multi-state clean diesel initiative. All 13 States that comprise the OTR have initiated action to pursue adoption of California's requirements.

States can calculate the additional annual NO_x reductions that would result from adopting the California requirements during model years 2005 and 2006 by using the CARB spreadsheet and related instructions and information provided on the CD that accompanies this document. (Instructions are provided in the first tab – “Emissions Calculator” – of the spreadsheet. Other tabs within the spreadsheet provide additional information on how the reductions are calculated.)

Because the technologies needed to achieve the emission reductions will be in use by the time the new California NTE and ESC test procedures are implemented, eligible States should strongly consider participating in the multi-state clean diesel initiative by opting in to these California requirements. If a sufficient number of States take this action, HDDE manufacturers most likely will produce a single “California engine” for these two model years, thus ensuring that an estimated 62,000 tons of nationwide NO_x emission reductions will be achieved in 2006 alone.

Environmental Benefits of Opting In

NO_x reductions of the magnitude described above will play an important role not only in ameliorating ambient levels of ground-level ozone, but in addressing various other serious air quality and environmental problems, as well. States that adopt the California NTE and ESC test procedures will also experience such important environmental benefits as the following:

- Reduced particulate matter levels.** NO_x in the atmosphere is transformed into substances known as nitrates. These nitrates take the form of dangerous fine particulate matter, which is breathed deep into the lungs. By decreasing NO_x emissions, the formation of these harmful fine particles is reduced. Therefore, adopting the California requirements will reduce ambient levels of particulate matter.
- Reduced acid rain.** Through complex atmospheric chemical reactions, some of the NO_x emitted by mobile sources is transformed into nitric acid and compounds known as nitrates. Precipitation causes these harmful substances to wash out of the atmosphere and be deposited on the land and in water bodies. The nitric acid lowers pH levels in lakes and streams and turns many of these water bodies into dead zones. It also damages forests and crops, as well as man-made objects, such as buildings and statues. Lowering NO_x emissions by opting in to the California requirements will reduce these impacts.
- Reduced eutrophication.** Excess NO_x in the atmosphere provides too much nitrogen to lakes, streams, and larger water bodies. This overabundance of nitrogen promotes a proliferation of aquatic plant life (especially algae) in a process known as eutrophication that reduces the dissolved oxygen content of the water, thereby killing other aquatic life. Airborne emissions of NO_x are responsible for much of the eutrophication in the Chesapeake Bay and other important water bodies. Decreased NO_x emissions through adoption of the California NTE and ESC test procedures will reduce these harmful effects.

Opt-In Provisions of CAA Section 177 – An Overview

CAA section 177 (42 U.S.C. §7507) essentially provides an exception to the general rule that only EPA and California can set motor vehicle emissions standards. Section 209 states the general rule. Under section 209(a), States and localities are barred from adopting or attempting to enforce such standards. But EPA may grant a waiver to California motor vehicle emissions standards if those standards are no less protective of public health than the federal

regulations. In 1977, Congress added section 177 to allow other States to promulgate standards identical to those issued by California. This is commonly referred to as “opting in.” Congress amended the provision in the 1990 CAA Amendments. No State utilized this important provision until the 1990s.

Due to its importance, section 177 is worth quoting in full:

Notwithstanding section 7543(a) of this title, any State which has plan provisions approved under this part may adopt and enforce for any model year standards relating to control of emissions from new motor vehicles or new motor vehicle engines and take such other actions as are referred to in section 7543(a) of this title respecting such vehicles if—

(1) such standards are identical to the California standards for which a waiver has been granted for such model year, and

(2) California and such State adopt such standards at least two years before commencement of such model year (as determined by regulations of the Administrator).

Nothing in this section or in subchapter II of this chapter shall be construed as authorizing any such State to prohibit or limit, directly or indirectly, the manufacture or sale of a new motor vehicle or motor vehicle engine that is certified in California as meeting California standards, or to take any action of any kind to create, or have the effect of creating, a motor vehicle or motor vehicle engine different than a motor vehicle or engine certified in California under California standards (a “third vehicle”) or otherwise create such a “third vehicle.”

Thus, basic requirements of section 177 are fairly straightforward:

- The opting-in State’s requirements must be “identical” to the California requirements for which EPA has granted a waiver.
- California and the opting-in State must adopt the requirements “at least two years before commencement of such model year.”
- The opting-in State cannot, directly or indirectly, take any action having the effect of creating a motor vehicle or engine different than that certified in California under the California requirements. Note that this prohibition on forcing the creation of a “third vehicle” is similar to the so-called “identity” mandate found in the first bullet because a third vehicle would not be identical to those certified in California.

It is beyond the scope of this document to summarize the court decisions of the last decade interpreting CAA section 177. Suffice it to say that, as a result of judicial challenges by motor vehicle manufacturers to Massachusetts’ and New York’s adoption

of California’s low-emission vehicle (LEV) and zero-emission vehicle (ZEV) requirements, the courts within the First and Second federal judicial circuits have decided several cases concerning the provision. These decisions go to such issues as what “identical” and a “third vehicle” mean under the CAA. In some cases, the States prevailed; in other cases, the manufacturers prevailed. For those interested, a list of federal courts of appeals opinions under CAA section 177 is included in Appendix A to this Preamble.

Which States May Opt In

Many States, but not all, will be able to opt in to CARB’s NTE and ESC test procedures. CAA section 177 states that “any State which has plan provisions approved under this part” may adopt California’s motor vehicle requirements despite the provisions of CAA section 209(a). Because section 177 is found in Part D of Title I, a State must have had a nonattainment plan approved by EPA at some time (*i.e.*, since Congress adopted Part D in 1977). On its face, section 177 does not require that the approved Part D SIP provisions be for ozone or any other particular pollutant. As long as EPA has approved Part D plan provisions for at least one criteria pollutant for any part of the State, that State is free to opt in to any California motor vehicle requirements. For example, even if in the late 1970s EPA approved a SIP submission for a single particulate matter nonattainment area in a State, that State would be eligible to adopt California’s motor vehicle requirements under section 177.

Note, however, that Section 177 does not permit local air agencies to adopt California requirements. Even if State law allowed a local agency to issue such requirements, Congress did not contemplate “checkerboard” vehicle requirements and sales within a single State.

Basic Statutory Requirements for Rules

As described in the overview of section 177 and other parts of this document, a State that wishes to significantly reduce NO_x emissions by adopting NTE and ESC test procedures for HDDEs must adopt requirements that are “identical” to California’s requirements for which a waiver has been granted. Although this mandate does not require that the two sets of rules contain the exact same language, they cannot diverge in any substantive aspects such that an engine vehicle or engine manufacturer would be required to make a “third vehicle.” Thus, States are also barred from adopting CARB requirements for a model year earlier than California has selected. The so-called “identity” requirement is discussed further in the next section.

In addition, section 177 requires that California and other States adopt the requirements at least two years before the commencement of the model year. Because manufacturing for the 2005 model year can commence as early as the beginning of 2004,

States that wish to adopt the California HDDE requirements must act quickly. To ensure that they are providing the two-year lead time that California has already given the manufacturers, it would be best for States that opt in to issue their final rules by the end of 2001.

Options for Issuing the Test Procedures, and Summary of Provisions

The model rules provided in this document suggest three options for adopting NTE and ESC test procedures for HDDEs, with variations on each of the first two options. (These variations are denoted as Options 1A, 1B, 2A, and 2B.) Each of these approaches should meet all the requirements discussed in the preceding section, with one important caveat. A State electing to opt in to California's HDDE requirements for 2005 and subsequent model years under Options 1B or 2B (rather than just the 2005 and 2006 model years under the other options) will need to determine that California has in fact adopted rules for 2007 and subsequent model year HDDEs that are at least as stringent as EPA's. If California has not taken this action, other States will be required to limit the applicability of their rules to the 2005 and 2006 model years. However, as of the time that this document was published, California had announced plans to adopt such rules for 2007 and subsequent model year HDDEs in the fall of 2001, which clears the way for other States to do so, as well.

Furthermore, State administrative law or other provisions may bar a State from adopting rules that California has not even issued yet. States will need to consult with their legal counsel on this issue. States should also be aware that if at this time they decide to opt in to only the 2005 and 2006 model year rules that California already has adopted, they still could amend their own rules in the future to extend the applicability of the requirements to model years 2007 and beyond. This should be a very simple rulemaking. It could be commenced after California adopted its rules for the 2007 and subsequent model years. States should be careful to complete such a future rulemaking by the end of 2003, however; that should safely provide the two-year lead time required under CAA section 177.

While modifications to the language presented in the HDDE model rules could result in changes to the requirements themselves, it certainly is possible to alter the language in some respects and not run afoul of the CAA section 177 mandates described above. Different States and agencies of course use their own drafting conventions and are constrained by different legal directives. Thus, it is fully expected that States will modify the language found in the various options. It will be important, however, for State policy makers and rule drafters to work closely with their legal counsel in deciding whether their proposals and rules meet the requirements of section 177.

The first of the model rule options is the simplest and recommended approach. In essence, Option 1 requires that heavy-duty vehicles equipped with HDDEs for model years 2005 and

2006 or 2005 and beyond be certified by CARB before being registered, imported, sold, leased, purchased, etc. in the State. This requirement is set out in the first section of Option 1, which also bars a person from assisting in such a transaction. Thus, the State essentially "picks up" the CARB requirements without actually adopting numerical limits and test procedures itself. Engine labels indicate whether the engine has been certified by CARB, and CARB's certification staff can determine whether a particular engine or engine family has been certified. (The engine label can be used as documentation of CARB certification, which is required for motor vehicle registration under the rules.)

The second section of Option 1 picks up the CARB exceptions to the requirements that all 2005 and 2006 model year engines must be certified. Under subsection (a), engines for use in "urban buses" and engines manufactured by "ultra-small volume manufacturers" (both are defined terms) need not be certified until model year 2007. Subsection (b) allows CARB to provide a certification waiver after a technology review it plans to conduct in 2003; this waiver might be granted if CARB concludes that HDDE manufacturers may not be able to comply with the standards by the deadline. In addition, the remaining subsections provide exemptions for unusual circumstances, as well as emergency and military vehicles, where a certification requirement may prove unduly burdensome.

The third section of Option 1 ensures that manufacturers honor emission-related enforcement orders and recalls ordered by CARB. It also ensures that manufacturers honor voluntary recalls under the California rules.

The approach in Option 1 is fairly easy and is the general direction in which some States in the Northeast have moved as they continue to opt in to different CARB motor vehicle requirements. It assures that the requirements – for the certification requirement almost certainly would be deemed "standards" under section 177 – are identical to California's. Because there is almost no chance of requiring a "third vehicle" under this approach, it is also very safe.

Option 2 is similar in effect to Option 1, although the first sections of the two options appear somewhat different. Option 2 expressly "incorporates by reference" the CARB requirements into the adopting State's Code of Regulations – both the existing California requirements and future updates. (The first option essentially acts as an incorporation by reference also, although it does not use those words.) The restrictions on registration, importing, sale, lease, purchase, etc. in the first section of Option 2 are the same as in Option 1. Section 2 is identical under the two options. Once again, a State that uses this second option is fairly safe in adopting requirements that meet the criteria established under CAA section 177.

Some States, however, may be prohibited by their administrative procedure laws from adopting by reference future changes made by another State. Other States may wish to avoid such an approach for non-legal reasons. They can turn to Options 1A and

2A, which incorporate by reference only the existing CARB requirements. Option 1A simply adds a phrase to the first section of Option 1 that accomplishes this result (see the bold, bracketed language). Similarly, Option 2A deletes a phrase from the first section of Option 2.

As explained in the “Follow-Up” section below, States choosing either Option 1A or 2A will need to adopt any future substantive changes to the requirements made by CARB. Otherwise, these State rules likely will contravene the “identity” requirement of section 177.

The first two paragraphs of this section describe how Options 1B and 2B would incorporate by reference not only the NTE and ESC requirements for the 2005 and 2006 model years that California adopted on December 8, 2000, but also future CARB rules for the 2007 and subsequent model years. Obviously, States will need to decide whether they wish to adopt – sight unseen – future California rules. They will also need to determine if they have the legal authority to issue such rules. Finally, if they follow this approach they will need to heed the precautions described in the first two paragraphs of this section and in the language preceding the various options in the model rules.

A third approach to opting in to California’s requirements is represented by Option 3, which does not even incorporate the current CARB HDDE rules by reference. This option, which is the most complicated, requires the adopting State to include laws, regulatory language and test procedures equivalent in stringency (and perhaps other aspects) to the California rules. States utilizing this option will need to be very careful not to adopt rules that require the creation of a “third vehicle,” otherwise, the rules can be successfully challenged in court. Because the California motor vehicle program is complex, it would be very difficult for a State to begin from scratch and adopt its own laws and regulations without creating an illegal “third vehicle.” For this reason, if a State lacks authority to incorporate even existing California rules by reference, obtaining such authority from the State legislature might be preferable to attempting to reproduce all the relevant California laws and rules. Enabling legislation could provide that the relevant State agency has authority to adopt by reference California’s rules relating to the control of emissions from HDDEs and vehicles equipped with such engines. Alternatively, the legislation could itself adopt the California rules by reference.

It is important to note that all of the approaches rely upon certification of HDDEs by CARB. Regardless of whether the existing or future requirements are expressly included in the State’s Code of Regulations, CARB will decide whether the engines conform to the requirements.⁶ This is tremendously convenient because CARB is responsible for allocating the time and resources to the matter, and other States simply piggy-back upon CARB’s technical determinations. This approach is also necessary because conflicting State technical determinations on whether an engine meets the requirements could require manufacturers to produce a “third vehicle” in violation of CAA section 177.

Enforcement Provisions

The principal means for ensuring that diesel engine manufacturers comply with the NTE and ESC procedures is through the vehicle registration procedures. (As noted in the next section, that is why it is critical for State environmental agencies to work closely with their counterparts in the Division of Motor Vehicles during the rulemaking.) Under each of the options, a person wishing to register a new vehicle with a HDDE subject to the rules must present documentation that CARB has certified the engine or the vehicle. Typically, the motor vehicle dealer will take care of registering a new vehicle. Motor vehicle or engine manufacturers should provide such documentation (in some form) to the dealer. This documentation may simply be the engine label, indicating certification by CARB. No certification, no registration.

At the same time, each of the options bars the import, sale, delivery, lease, rental, purchase, receipt or acquisition of a vehicle or engine that has not been certified. But the options themselves do not include enforcement provisions, such as fines for illegal sales or leasing. State officials should recognize that they are not required to adopt enforcement rules. But to promote better compliance with the rules, States may wish to apply current regulatory enforcement provisions to such illegal actions, or may instead wish to adopt new enforcement rules.

Be aware, though, that in either case it may be necessary to obtain legislative authority to adopt enforcement provisions. Each State will need to make this legislative authority determination for itself because the answer will depend upon State law. Moreover, remember that States desiring to rely only upon the registration denial mechanism to assure compliance are free to do so.

It is fairly clear that, under CAA section 177, States may adopt enforcement provisions that differ from California’s. As a general matter, a State may adopt any penalties and procedures as long as they are authorized under State law. Imposing restrictions on interstate commerce, however – such as penalizing uncertified vehicles that are registered or “base-plated” in another state but drive on the adopting State’s highways – most likely would not survive a challenge under the Commerce Clause of the federal Constitution.

Examples of fairly simple enforcement provisions are provided in Appendix B to this Preamble. The first provision calls for a fine for each illegal transaction such as illegal imports, sales, and leases. Thus, under this provision the penalties may be assessed on a “per vehicle” basis. This will increase the deterrence effect. The dollar amount of the penalties has been left blank based upon the assumption that States will wish to make such decisions themselves.

The second example provision allows the State to “enjoin” activities barred under the substantive rules. Thus, an administrative law judge or a court could issue an injunction preventing the manufacturer or dealer from continuing to break the law.

The third and fourth example provisions allow for easier enforcement under the first two sections. They provide for inspec-

tion authority and require manufacturers and dealers to keep relevant records for three years.

States may also wish to consider enforcement strategies to ensure compliance, such as plans for auditing sales of truck dealers. These strategies would not be set forth in rules, though. In considering possible enforcement strategies, States that choose to opt in to the California rules may wish to consult with CARB or the States that already have adopted LEV or ZEV standards.

Recommended Procedures for Opting In

1. **Verify that you have legislative authority to adopt the rules.** In some states, environmental agencies have fairly broad authority to adopt regulations such as HDDE requirements; in other states, the legislature may have to pass a law granting such authority. Each State agency will need to consult with its legal counsel to determine if legislation is needed. If it is, a bill should be introduced soon.
2. **Study the model rules and accompanying materials closely, and circulate them to others involved in setting policy and drafting the rules.** Note, however, that these materials are only the starting point for each State's regulation writing. Procedural and substantive requirements vary by State, and you will need to work within the framework of your State laws. Do not adopt any of the options in these model rules without first concluding that the option – and the rule language – works for your State. Further, as stated earlier, it is important that each State conduct its own thorough analysis of California's rules and the model rules.
3. **Consult with the California Air Resources Board.** Remember that your test procedures must be the same as CARB's; your State cannot require the manufacturers to produce a "third vehicle" (or engine). It is therefore important to fully understand CARB's HDDE rules, and to make sure that you are not deviating from them in any substantive way.
4. **Consult with States that previously opted in under section 177.** Although the HDDE rules certainly present new issues, a number of Northeast and Mid-Atlantic States have adopted other California motor vehicle standards – such as those for low-emission vehicles – under the authority of CAA section 177. These States probably have dealt with several of the policy and legal questions you now face. Tap their expertise and experience.
5. **Decide whether – and how – you can incorporate the California rules by reference.** This will be the easiest way to adopt the requirements. It also will present the fewest headaches down the road, to the extent you can automatically adopt future changes to the CARB rules. But State administrative procedure laws vary, so you will need to consult with your agency's legal counsel to determine what is allowed in your State.
6. **Work closely with your Division of Motor Vehicles.** The Division (or whatever it is called in your State) will be a key player in carrying out and enforcing the rules because denial of motor vehicle registration for non-certified vehicles is the best means for ensuring compliance. That is where "the buck stops." It is critical to involve your colleagues in the Division of Motor Vehicles concerning the importance of the requirements and how they will be enforced. Depending upon how your State's administrative procedures work, you may even need to propose and adopt the rules jointly with the Division.
7. **Work closely with others who will be involved in enforcement.** If the enforcement division of your State environmental agency will be primarily responsible for preventing illegal registrations, sales, and leases, you will need to involve them in writing the rules – particularly any enforcement provisions you may choose to adopt.
8. **Consult early and often with heavy-duty vehicle dealers.** It will be important for the dealers to understand the rules, so they can abide by them. Do not neglect outreach efforts for this important group.
9. **Pursue your rulemaking carefully but quickly.** You have to expect that diesel engine manufacturers will seriously consider challenging your adoption of the NTE and ESC test procedures. Thus, it is important that you work carefully to ensure that your rules meet all procedural and substantive mandates. It will also be important to provide a sound technical justification and to respond thoughtfully to public comments that HDDE manufacturers and others make. At the same time, you must proceed quickly – your State agency must issue the final rules by the end of 2001 to be assured that compliance will be required for model year 2005 engines.
10. **Resist the temptation to modify the stringency of the requirements.** Of course, in a rulemaking a State agency must review public comments and act in response to them. But remember that adoption of the HDDE requirements represents a special kind of rulemaking. If you make the test procedures more or less stringent, or cover additional vehicle or engine types, you could run afoul of the CAA section 177 requirements outlined above.

11. ***Do not reinvent the wheel.*** In addition to these STAPPA/ALAPCO model rules and supporting materials, you have on the accompanying CD an electronic version of the CARB Staff Report supporting the California HDDE rules. This report provides a wealth of technical support (and explanation) for the rules and further background information. Include much of this information in your proposal and final rule preamble as the basis for your State's requirements, but where necessary adapt information, such as the emission figures, to your State's situation.
12. ***Notify EPA after you opt in.*** CAA section 177 does not require that a State opting in to California's motor vehicle requirements provide special notification to vehicle or engine manufacturers. Rather, promulgation of the rules at least two years in advance of the first model year serves as legal notice. Moreover, there is no requirement to notify EPA that the State has issued motor vehicle requirements under the authority of section 177. Nonetheless, you may wish to notify the Director of EPA's Office of Transportation and Air Quality by letter to aid in coordination – even if individuals at EPA may already be aware of your State's efforts in this regard.

Follow-Up Under the Different Options

Under Options 1 and 2, a State probably would not have to change its rules after opting in to the California requirements. For Option 1 (under which an engine or vehicle may not be sold, registered or leased unless it has been certified by CARB), any changes in stringency, procedures, or other aspects made by CARB effectively would be incorporated into the opting-in State's rules. This would preserve the "identity" requirement under CAA section 177, thus ensuring that manufacturers would not need to produce a "third vehicle." The same is true for the slightly more cumbersome Option 2, which expressly incorporates by reference future regulatory changes made by CARB. As discussed above in the section on the various options, States will need to examine their administrative procedure laws to determine if they can follow one of these two simpler approaches.

With Options 1A, 2A, and 3, a State would need to closely follow CARB's rulemaking activities to determine if changes made by CARB might truly affect the requirements. (Minor wording or similar changes by CARB that did not affect the "identity" requirement would not have to be promulgated by the State.) This could prove to be a time-consuming process, and it would necessitate additional rulemaking to make conforming changes. If States do elect to adopt rules similar to these options – in other words, requirements that do not essentially incorporate future CARB changes by reference – it would be helpful to set up mechanisms for coordination.

Absent such coordination mechanisms, a State can track any

changes to the California program by going to the CARB Web site and signing up to be included on the relevant CARB "mailout list." Anyone can subscribe to this electronic listserv by directing his or her Web browser to <http://www.arb.ca.gov/listserv/listserv.htm>. The subscriber should then follow the directions for signing up for the listserv on "Mobile Source Program Mailouts & Manufacturers Advisory Correspondence (MACs)" – known in short as the "ms-mailings" list. Note, however, that this list includes "mailouts" on motor vehicle developments other than those pertaining to heavy-duty diesel engines, so a State will need to sort out the relevant messages.

In addition to the rule changes, the listserv will inform subscribers about emission-related mandatory and voluntary recalls under the California program. Because the model rules require that manufacturers honor such recalls in States that opt in to the California rules, States will want to track these events.

For Options 1B and 2B, a State will need to make sure that California in fact adopts requirements for 2007 and subsequent model years that are at least as stringent as the corresponding rules that EPA has adopted. See the discussion above in the first two paragraphs of the section on "Options for Issuing the Test Procedures, and Summary of Provisions."

Economic Impacts on Engine Manufacturers

The California test requirements fill the regulatory gap between consent decree requirements that apply to 2003 and 2004 model year HDDEs produced by the settling manufacturers and the federal regulations for 2007 and subsequent model year HDDEs. Adoption of these test procedures by additional States would not impose additional costs above the costs to comply with the requirements set forth in the consent decrees for the settling manufacturers, which account for approximately 60 percent of engine sales. Moreover, these manufacturers also are required to comply with the California requirements that fill the gap for 2005 and 2006.

If a State opts in to the California HDDE rules, the non-settling manufacturers will be required to satisfy the NTE and ESC requirements two years earlier than they would under EPA's final rule. These manufacturers will, however, be required to meet these same requirements in California for 2005 and 2006.

Thus, during the next several years the manufacturers will have to carry out the research and engine redesign necessary to meet the California requirements regardless of whether other States opt in to the requirements. Accordingly, for HDDE engine manufacturers the incremental economic impact of States opting in to the California requirements should not be significant.

Cost-Effectiveness

The substantial NO_x reductions to result from adoption of the California rules will be achieved very cost-effectively. CARB based its cost and cost-effectiveness estimates for its rules primarily

upon EPA cost estimates. Despite using worst-case costs in its analyses, CARB concluded that the average lifetime cost of compliance averages slightly under \$800 per vehicle. The estimated cost of complying with the new test procedures will vary depending on the gross vehicle weight rating class. For smaller trucks the cost is somewhat lower than the \$800 figure, and for larger trucks somewhat higher.

CARB calculated that the cost-effectiveness of California mobile source and motor vehicle fuels regulations adopted over the past decade ranges from \$0.17 to \$2.55 per pound of ozone precursors reduced.⁷ The (overstated) cost-effectiveness of the California HDDE test procedures for all heavy-duty vehicles based on predicted California sales is a mere \$0.17 per pound of NO_x reduced for all heavy-duty vehicles. That, of course, is at the very bottom of the California range. This cost-effectiveness is even less expensive than emission reductions achieved from lawnmower engines.

Put in perspective, during the past decade States have adopted stationary source control measures that cost several dollars per pound of NO_x removed. EPA has estimated that the next set of controls identified as available in a number of States will cost over \$2.00 per pound of NO_x removed.⁸ Under the NO_x SIP call, EPA states that regional control measures determined to be cost-effective would cost \$0.75 per pound of NO_x removed – over four times as expensive as the California HDDE rules.⁹ In terms of mobile source measures, reformulated gasoline rules cost over \$2.50 per pound of NO_x removed – approximately fifteen times as expensive as the California HDDE test procedures.¹⁰ Thus, the California HDDE requirements clearly are cost-effective on an absolute or relative basis.

Additional Information

To further assist State efforts, STAPPA and ALAPCO have compiled a set of resources that provide ample additional background information and technical and substantive detail relative to California’s requirements and their implications. These materials, some of which are referenced earlier in this Preamble, are provided electronically on the CD that accompanies this document. The CD also includes an electronic version of this STAPPA/ALAPCO document. A table of contents for the CD follows:

1. STAPPA/ALAPCO, “Regulating Air Pollution from Diesel Trucks: A Model Rule for States,” Executive Summary, Preamble and Appendices A and B (May 2001).
2. STAPPA/ALAPCO, “Regulating Air Pollution from Diesel Trucks: A Model Rule for States,” Model Rule Options and Appendix C (May 2001).
3. California Air Resources Board, “Notice of Public Hearing to Consider Amendments to Adopt Not-To-Exceed and Euro III European Stationary Cycle Emission Test Proce-

dures for the 2005 and Subsequent Model Year Heavy-Duty Diesel Engines” (October 10, 2000 notice of December 7-8, 2000 public hearing).

4. California Air Resources Board, “Staff Report: Initial Statement of Reasons,” for Public Hearing to Consider Amendments to Adopt Not-To-Exceed and Euro III European Stationary Cycle Emission Test Procedures for the 2005 and Subsequent Model Year Heavy-Duty Diesel Engines (October 20, 2000).
5. California Air Resources Board, “Staff Report: Initial Statement of Reasons,” Appendix A – Proposed Regulation Order (October 20, 2000).
6. California Air Resources Board, “Staff Report: Initial Statement of Reasons,” Appendix B – Proposed Amendments to the California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Year Heavy-Duty Diesel Engines and Vehicles (October 20, 2000).
7. California Air Resources Board, “Incremental Excess NO_x Emissions Due to No NTE Standards,” Microsoft Excel spreadsheet with emissions calculator (September 2000).
8. California Air Resources Board, Resolution 00-53 on Agenda Item No. 00-12-5, adopting the supplemental emission test procedures for HDDEs (December 8, 2000).
9. California Air Resources Board, “Supplemental Emission Test Procedures for 2005+ Model Year Heavy-Duty Diesel Engines,” PowerPoint presentation as provided by Greg Ushijima at CARB Public Hearing (December 8, 2000).
10. California Air Resources Board, “Supplemental Emission Tests for 2005+ Model Year Heavy-Duty Diesel Engines,” PowerPoint presentation as provided by Susan O’Connor at STAPPA/ALAPCO NTE Model Rule Workshop (March 20, 2001).
11. California Air Resources Board, example CARB Executive Order certifying model year 2001 heavy-duty diesel engines.
12. California Air Resources Board, example emissions labels for model year 2001 heavy-duty diesel engines.

A Final Word

As described above, adoption of the California HDDE rules by other States should result in significant NO_x emission reductions. That, in turn, should lead to a number of important air quality and environmental benefits, including reductions in ground-level

ozone, fine particulate matter, acid rain, and eutrophication. For this reason, States are strongly encouraged to opt in to the California rules, and to complete their own rulemakings by the end of 2001. Issuing the rules by December 31, 2001 should ensure that vehicles equipped with model year 2005 and 2006 engines must comply with the NTE and ESC test procedures.

STAPPA and ALAPCO hope that these model rules and related information help States in their rulemaking (and possibly legislative) processes to opt in to the California HDDE requirements. State officials with questions are encouraged to contact STAPPA/ALAPCO at (202) 624-7864.

Endnotes

¹ EPA rules will not require manufacturers to perform these test procedures until the 2007 model year. EPA's recently adopted HDDE standards that include the supplemental tests are found at 65 FR 59896 (Oct. 6, 2000). The relevant EPA proposal is found at 64 FR 58472 (Oct. 29, 1999).

² As described below in the "Which States May Opt In" section, any State that has or had an approved Part D state implementation plan for any criteria pollutant may take part in the multi-state clean diesel initiative.

³ During the FTP, an engine operates through a narrowly defined test cycle.

⁴ EPA recently stated that in the interim it will use the NTE and ESC test procedures as screening tools to assist in EPA's certification process, and to monitor compliance with the FTP and the defeat device provisions. See EPA Advisory Circular 24-3, entitled "Implementation of Requirements Prohibiting Defeat Devices for On-Highway Heavy-Duty Diesel Engines" (Jan. 19, 2001). The document also provides guidance to engine manufacturers regarding the use of data generated from supplemental tests to help the

manufacturers determine whether engine devices or design strategies can be considered defeat devices. Note, however, that the Advisory Circular is only a guidance document, and completion of the tests and submittal of the test results are voluntary. Since the supplemental tests will put additional burden on the engine manufacturers and compliance with the Advisory Circular is voluntary, engine manufacturers may not perform the tests or submit needed information. Thus, adopting the California rules is the only true way to fill the two-year gap.

⁵ As of June 2001, CARB had submitted its rules to the State's Office of Administrative Law so that the final steps could be taken to officially make the rules part of the Code of California Regulations. CARB expects that these procedural steps will be completed, and the rules will become State law, by the summer of 2001. In addition, EPA eventually must rule on CARB's waiver request for its HDDE rules – but this EPA action does not have to be taken before other States adopt the California rules. Moreover, California believes that a previous HDDE waiver that EPA granted in 1988 already covers its recent HDDE test procedure rules (see 53 FR 7021 (March 4, 1988)), and that EPA need only determine that the new rules are within the scope of this previous waiver.

⁶ Note that these California requirements allow for certain types of "banking and trading" in the engine certification process. By simply relying upon CARB's certification of an engine, a State that opts in to the California rules essentially adopts these banking and trading provisions.

⁷ October 20, 2000 CARB Staff Report, at p. 41, Fig. 7.

⁸ 63 FR 57356, 57379 (Oct. 27, 1998).

⁹ *Id.*

¹⁰ October 20, 2000 CARB Staff Report, at p. 41, Fig. 7.

STAPPA/ALAPCO Model Rule Options

The model rules provided below offer three options for adopting California’s Not-to-Exceed and Euro III European Stationary Cycle emission test procedures for onroad heavy-duty diesel engines. In addition, several variations on each of the first two options are provided. States should refer to the Preamble to these model rules for additional background and explanation. Further, it is important that each State conduct its own thorough review and analysis of California’s rules and these model rules.

Model Rule Language

APPLICABILITY

[The same applicability section, appropriately tailored as indicated below, can be adopted under all options.]

Section ____. Applicability.

These rules apply to heavy-duty diesel engines produced for the 2005 and [2006] [OPTIONS 1B and 2B – substitute “subsequent” for “2006”] model years, and to new motor vehicles containing such engines.

DEFINITIONS

[The same definitions can be adopted under all options.]

Section ____. Definitions.

- (1) “Executive Order” means a document issued by the California Air Resources Board certifying that a specified engine family or model year vehicle has met all applicable Title 13 CCR requirements for certification and sale in California. **[Note: This definition, which is taken from Massachusetts’ rules on low-emission vehicles, simply provides a formal and concise way to indicate that an engine has been certified by CARB.]**
- (2) “Heavy-duty diesel engine” means a diesel engine that is used to propel a motor vehicle with a Gross Vehicle Weight Rating of 14,001 pounds or greater. **[Note: This definition is adapted from language in the applicability section of the October 20, 2000 CARB “Staff Report: Initial Statement of Reasons,” prepared for the Public Hearing to Consider Amendments to Adopt Not-To-Exceed and Euro III European Stationary Cycle Emission Test Procedures for the 2005 and Subsequent Model Year Heavy-Duty Diesel Engines (Oct. 20, 2000 CARB Staff Report). See page 8, section IV.A. (titled “Applicability”). Also note that the current California definition of this term**

in 13 CCR §1900 is different – but the materials accompanying CARB’s adoption of the NTE and ESC procedures on December 8, 2000 make clear that, for purposes of this rule, “heavy-duty diesel engine” has the meaning provided above.] [Note: Alternatively, a State can simply add “Heavy-duty diesel engine” to the list of terms in (10), which simply references the meanings that CARB gives to the terms.]

- (3) “Heavy-duty motor vehicle” means a motor vehicle with a Gross Vehicle Weight Rating of 14,001 pounds or greater. [Note: See explanation under definition of “Heavy-duty vehicle.”] [Note: Alternatively, a State can simply add “Heavy-duty motor vehicle” to the list of terms in (10), which simply references the meanings that CARB gives to the terms.]
- (4) “Model year” means the manufacturer’s annual production period which includes January 1 of a calendar year or, if the manufacturer has no annual production period, the calendar year. In the case of any vehicle manufactured in two or more stages, the time of manufacture shall be the date of completion of the chassis. [Note: Taken directly from section 39038 of the California Health and Safety Code.]
- (5) “New motor vehicle” means a motor vehicle, the equitable or legal title to which has never been transferred to an ultimate purchaser. [Note: Taken directly from section 39042 of the California Health and Safety Code.]
- (6) “New motor vehicle engine” means a new engine in a motor vehicle. [Note: Taken directly from section 39042.5 of the California Health and Safety Code.]
- (7) “Ultimate purchaser” means, with respect to any new motor vehicle or new motor vehicle engine, the first person who in good faith purchases a new motor vehicle or new motor vehicle engine for purposes other than resale. [Note: Taken from section 39055.5 of the California Health and Safety Code.]
- (8) “Ultra-small volume manufacturer” means any manufacturer with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years. [Note: See Oct. 20, 2000 CARB Staff Report at p. 9, fn. 10.]
- (9) “Urban bus” means a passenger-carrying vehicle powered by a heavy heavy-duty diesel engine, or of a type nor-

mally powered by a heavy heavy-duty diesel engine, with a load capacity of fifteen (15) or more passengers and intended primarily for intra-city operation, i.e., within the confines of a city or greater metropolitan area. Urban bus operation is characterized by short rides and frequent stops. To facilitate this type of operation, more than one set of quick-operating entrance and exit doors would normally be installed. Since fares are usually paid in cash or token, rather than purchased in advance in the form of tickets, urban buses would normally have equipment installed for the collection of fares. Urban buses are also typically characterized by the absence of equipment and facilities for long distance travel, e.g., restrooms, large luggage compartments, and facilities for stowing carry-on luggage. [Note: See Oct. 20, 2000 CARB Staff Report at p. 9, fn. 11. This definition is taken from 13 CCR 1956.2, and was added by CARB’s recently adopted rules regulating emissions from urban buses.]

- (10) “Emergency vehicle,” “Gross Motor Vehicle Rating,” “Military tactical vehicle or equipment,” and “Motor vehicle” shall all have the same meanings as these terms have under the heavy-duty diesel engine program adopted by the California Air Resources Board on December 8, 2000. [Note: Because these terms are not actually defined in the relevant definitions section of the California Code of Regulations (13 CCR §1900) or the California Health and Safety Code and because they also are not defined in the documents accompanying the December 8, 2000 CARB adoption of the heavy-duty diesel engine NTE and ESC rules, this provision simply picks up the usage these terms have under the California rules. Also note that “Authorized emergency vehicle” is defined in section 165 of the California Vehicle Code, but this definition references specific California agencies, bridge and highway districts, etc.]

SEVERABILITY

[Under each option, a severability clause (similar to the following) should be included at the end of the rules.]

Section _____. Severability.

Each section of this [Title or Part or whatever] shall be deemed severable. If any section of this [Title, Part, etc.] is held to be invalid, the remainder shall continue in full force and effect.

OPTION 1

Option 1 simply requires certification by CARB for model year 2005 and 2006 HDDEs. It really acts as an incorporation by reference of the current CARB rule *and any future rule changes* regarding these two model years. **Option 1A** acts as an incorporation by reference of *only the current rule* for these two model years – the State would need to pick up future relevant amendments adopted by CARB. Finally, **Option 1B** provides for opting in not only to the California rules for the 2005 and 2006 model years, but subsequent model years as well. Because California has not yet adopted HDDE rules for 2007 and subsequent model years that are at least as stringent as the federal rules, a State that selects **Option 1B** would need to make sure that California in fact issues such rules. (As of the time this document was published, CARB had announced plans to adopt such rules in the fall of 2001.) Otherwise, the State would have to amend its regulations to return to the EPA rules for 2007 and subsequent model years.

Section ____. Requirements for Vehicle Registration and Transactions.

No new motor vehicle equipped with a 2005 or [2006] [**OPTION 1B – substitute “subsequent” for “2006”**] model year heavy-duty diesel engine may be registered with the [Division of Motor Vehicles] unless the applicant presents documentation showing that the California Air Resources Board has issued an Executive Order for such engine, certifying that the engine complies with the applicable exhaust emission standards under Title 13, section 1956.8 of the California Code of Regulations, [**OPTION 1A – insert here: “as in effect upon October 1, 2001” (or some other date the State may choose)**]. No person who is a resident of this state, or who operates an established place of business within this state, shall sell, lease, rent, import, deliver, lease, purchase, acquire, or receive in this state, or offer for sale, lease, or rental in this state (or attempt or assist in any such prohibited action) any of the following types of motor vehicles or engines that are intended primarily for use or for registration in this state, unless the manufacturer of the engine has received such an Executive Order:

- (a) a 2005 or [2006] [**OPTION 1B – substitute “subsequent” for “2006”**] model year heavy-duty diesel engine;
- (b) a new motor vehicle equipped with a 2005 or [2006] [**OPTION 1B – substitute “subsequent” for “2006”**] model year heavy-duty diesel engine; or
- (c) a motor vehicle with a new 2005 or [2006] [**OPTION 1B – substitute “subsequent” for “2006”**] model year heavy-duty diesel engine.

Section ____. Exemptions and Technology Review.

Notwithstanding section ____ [immediately above], the requirements of this [Title or Part or whatever] shall not apply to:

- (a) a model year 2005 or 2006 heavy-duty diesel engine manufactured by an ultra-small volume manufacturer or intended for use in an urban bus;
- (b) an engine if, following a technology review, the California Air Resources Board determines that it is inappropriate to require compliance for heavy-duty diesel engines of that particular model year and engine family;
- (c) a vehicle acquired by a resident of this state for the purpose of replacing a vehicle registered to such resident which was damaged or became inoperative beyond reasonable repair or was stolen while out of this state; provided that such replacement vehicle is acquired out of state at the time the previously owned vehicle was either damaged or became inoperative or was stolen;
- (d) a vehicle transferred by inheritance, or by a decree of divorce, dissolution, or legal separation entered by a court of competent jurisdiction;
- (e) a motor vehicle having a certificate of conformity issued pursuant to the Clean Air Act (42 U.S.C. §7401 et seq.) and originally registered in another state by a resident of that state who subsequently establishes residence in this state and who, upon registration of the vehicle in this state provides satisfactory evidence to the [Division of Motor Vehicles] of the previous residence and registration;
- (f) an emergency vehicle;
- (g) a military tactical vehicle or equipment; or
- (h) any other vehicles exempted by the California Health and Safety Code, section 43656.

Section ____. Manufacturer Compliance With California Orders and Voluntary Recalls.

(a) Any order or enforcement action taken by the California Air Resources Board to correct noncompliance with any heavy-duty diesel engine requirements adopted by such Board on December 8, 2000 shall be applicable to all such engines and motor vehicles subject to this [Title or Part or whatever], sold, leased, or rented, offered for sale, lease, or rental, or registered in [name of State], except where the manufacturer demonstrates to the [State environmental agency's] satisfaction, within 21 days of issuance of such California Air Resources Board action, that this action is not applicable to such engines or vehicles in [name of State].

(b) Any voluntary or influenced emission-related recall campaign initiated by any manufacturer pursuant to Title 13, sections 2113 through 2121 of the California Code of Regulations shall extend

to all applicable engines and motor vehicles subject to this [Title or Part or whatever], sold, leased, or rented, offered for sale, lease, or rental, or registered in [name of State], except where the manufacturer demonstrates to the [State environmental agency's] satisfaction, within 21 days of approval of the campaign by the California Air Resources Board, that this campaign is not applicable to such engines or vehicles in [name of State].

OPTION 2

Option 2 offers more traditional incorporation language, but really provides the same results as Options 1, 1A, and 1B. Like Option 1, Option 2 includes future rule changes made by CARB. Option 2A – like Option 1A – does not include future changes. And like Option 1B, Option 2B adopts California's rules for the 2005 and subsequent model years, rather than just the 2005 and 2006 model years. (See the explanation for Option 1B above to ascertain the precautions that must be taken if a State follows Option 2B.)

Section _____. Adoption and Incorporation by Reference of California Rules.

[The Department] hereby adopts and incorporates by reference the exhaust emission standards (and associated performance test procedures) for model year 2005 and [2006] **[OPTION 2B: substitute "subsequent" for "2006"]** heavy-duty diesel engines adopted by the California Air Resources Board on December 8, 2000, and any future amendments to these provisions that the California Air Resources Board may promulgate. **[OPTION 2A: Replace the comma in the preceding sentence with a period, and delete the remainder of the sentence.] [OPTION 2B: Delete the "and" following the comma, and at the end of the sentence insert the following: ", and any future rules governing heavy-duty diesel engines that such Board adopt."]** These standards are found in section 1956.8 of Title 13 of the California Code of Regulations, which incorporates by reference the test procedures for determining compliance with the standards.

Section _____. Requirements for Vehicle Registration and Transactions.

No new motor vehicle equipped with a 2005 or [2006] **[OPTION 2B – substitute "subsequent" for "2006"]** model year heavy-duty diesel engine may be registered with the [Division of Motor Vehicles] unless the applicant presents documentation showing that the engine complies with the standards and associated test procedures adopted in section ____ [immediately preceding section]. No

person who is a resident of this state, or who operates an established place of business within this state, shall sell, lease, rent, import, deliver, lease, purchase, acquire, or receive in this state, or offer for sale, lease, or rental in this state (or attempt or assist in any such prohibited action) any of the following types of motor vehicles or engines that are intended primarily for use or for registration in this state, unless the manufacturer of the engine has received such an Executive Order:

- (a) a 2005 or [2006] **[OPTION 2B – substitute "subsequent" for "2006"]** model year heavy-duty diesel engine;
- (b) a new motor vehicle equipped with a 2005 or [2006] **[OPTION 2B – substitute "subsequent" for "2006"]** model year heavy-duty diesel engine; or
- (c) a motor vehicle with a new 2005 or [2006] **[OPTION 2B – substitute "subsequent" for "2006"]** model year heavy-duty diesel engine.

Section _____. Exemptions and Technology Review.

Notwithstanding section ____ [immediately above], the requirements of this [Title or Part or whatever] shall not apply to:

- (a) a model year 2005 or 2006 heavy-duty diesel engine manufactured by an ultra-small volume manufacturer or intended for use in an urban bus;
- (b) an engine if, following a technology review, the California Air Resources Board determines that it is inappropriate to require compliance for heavy-duty diesel engines of that particular model year and engine family;
- (c) a vehicle acquired by a resident of this state for the purpose of replacing a vehicle registered to such resident which was damaged or became inoperative beyond reasonable repair or was stolen while out of this state; provided that such replacement vehicle is acquired out of state at the time the previously owned vehicle was either damaged or became inoperative or was stolen;
- (d) a vehicle transferred by inheritance, or by a decree of divorce, dissolution, or legal separation entered by a court of competent jurisdiction;
- (e) a motor vehicle having a certificate of conformity issued pursuant to the Clean Air Act (42 U.S.C. §7401 et seq.) and originally registered in another state by a resident of that state who subsequently establishes residence in this state and who, upon registration of the vehicle in this state provides satisfactory evidence to the [Division of Motor Vehicles] of the previous residence and registration;
- (f) an emergency vehicle;
- (g) a military tactical vehicle or equipment; or
- (h) any other vehicles exempted by the California Health and Safety Code, section 43656.

Section ____ . **Manufacturer Compliance With California Orders and Voluntary Recalls.**

(a) Any order or enforcement action taken by the California Air Resources Board to correct noncompliance with any heavy-duty diesel engine requirements adopted by such Board on December 8, 2000 shall be applicable to all such engines and motor vehicles subject to this [Title or Part or whatever], sold, leased, or rented, offered for sale, lease, or rental, or registered in [name of State], except where the manufacturer demonstrates to the [State environmental agency's] satisfaction, within 21 days of issuance of such California Air Resources Board action, that this action is not applicable to such engines or vehicles in [name of State].

(b) Any voluntary or influenced emission-related recall campaign initiated by any manufacturer pursuant to Title 13, sections 2113 through 2121 of the California Code of Regulations shall extend to all applicable engines and motor vehicles subject to this [Title or Part or whatever], sold, leased, or rented, offered for sale, lease, or rental, or registered in [name of State], except where the manufacturer demonstrates to the [State environmental agency's] satisfaction, within 21 days of approval of the campaign by the California Air Resources Board, that this campaign is not applicable to such engines or vehicles in [name of State].

OPTION 3

Option 3 is an alternative for States that cannot incorporate by reference at all. However, a State that pursues this option and attempts to reproduce all the relevant California laws and rules (i.e., one that does not incorporate by reference) runs the risk of missing necessary provisions embedded in the California motor vehicle regulatory program. As described in the section of the accompanying Preamble describing mandates

under Clean Air Act section 177, this could result in the illegal requirement to produce a “third vehicle” or “third engine.” For this reason, States that pursue Option 3 are advised to do so with caution. As under Options 1B and 2B, a State attempting to reproduce all the relevant California law and rules would need to track and promulgate amendments made by CARB.

[Note: If a State lacks authority to incorporate even existing California rules by reference, obtaining such authority from the State legislature might be preferable to attempting to reproduce all the relevant California laws and rules. Enabling legislation could provide that the relevant State agency has authority to adopt by reference California's rules relating to the control of emissions from HDDEs and vehicles equipped with such engines. Alternatively, the legislation itself could adopt the California rules by reference.]

Because the following definitions (including acronyms) are used in the NTE and ESC test procedures, a State that actually reproduces the test procedures would need to add at least the following definitions to those found in the definition section above:

- (1) “ARB” means the California Air Resources Board.
- (2) “Executive Officer” means the Executive Officer of the California Air Resources Board.
- (3) “g/bhp-hr” means grams per brake horsepower-hour.
- (4) “NTE” means Not-To-Exceed.

A State pursuing Option 3 probably would need to reproduce the actual emission standards found in 13 CCR 1956.8, as well as the California NTE and ESC test procedures. These test procedures, shown (as in the California adoption) with changes from federal test procedures indicated, are reproduced in Appendix C to these model rules.

APPENDIX A

U.S. Courts of Appeals Cases on CAA Section 177

Association of Int'l Auto. Mfrs. v. Commissioner, Mass. Dep't of Env'tl. Protection, 208 F.3d 1 (1st Cir. 2000)

American Auto. Mfrs. Ass'n v. Massachusetts Dep't of Env'tl. Protection, 163 F.3d 74 (1st Cir. 1998)

American Auto. Mfrs. Ass'n v. Cahill, 152 F.3d 196 (2nd Cir. 1998)

Motor Vehicle Mfrs. Ass'n v. New York State Dep't of Env'tl. Conservation, 79 F.3d 1298 (2nd Cir. 1996)

American Auto. Mfrs. Ass'n v. Commissioner, Mass. Dep't of Env'tl. Protection, 31 F.3d 18 (2nd Cir. 1994)

Motor Vehicle Mfrs. Ass'n of the United States v. New York State Dep't of Env'tl. Conservation, 17 F.3d 521 (2nd Cir. 1994)

APPENDIX B

Example Enforcement Provisions

Section ____. Penalties for Import or Conveyance of Non-complying Engine or Vehicle.

Any person who violates the provisions of [reference to rule provision barring illegal conveyances] shall be subject to a fine not to exceed \$ ____ per engine or vehicle.

Section ____. Injunction Against Sale or Lease of Noncomplying Engine or Vehicle.

The [Secretary or Commissioner or whoever] may issue an injunction prohibiting any of the conveyances and transactions prohibited by [reference to rule provision].

Section ____. Authority to Enter, Inspect, and Copy Records.

The [Secretary or Commissioner or whoever] or a designee may enter and inspect a facility operated by a party subject to the requirements of this [Title or Part or whatever], or any property, premises, or written or electronic records of the facility. Such inspections may take place at all reasonable times, locations, and

hours, and may be unannounced. The [Secretary or Commissioner or whoever] or a designee may also copy any such records or documents, or order that the facility copy and provide such records. The conduct of operations subject to the provisions of this [Title or Part or whatever] is deemed to constitute consent to such inspections and access to records.

Section ____. Retention of Records.

Any heavy-duty diesel engine manufacturer must maintain records concerning the manufacture of model year 2005 and [2006] **[Note: replace 2006 with “subsequent” if you adopt Option 1B or 2B]** heavy-duty diesel engines for at least three years following the creation of such records. Any person who imports, sells, delivers, leases, or rents any engines or vehicles subject to the requirements of this [Title or Part or whatever], or offers such engines or vehicles for sale, delivery, lease, or rental, shall retain records concerning any such transactions for at least three years following the transaction.

APPENDIX C

Amendments to the California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Year Heavy-Duty Diesel Engines and Vehicles

(A State adopting California's rules using Option 3 would need to reproduce the actual emission standards found in 13 CCR 1956.8, as well as the California NTE and ESC test procedures. These test procedures, shown (as in the California adoption) with changes from federal test procedures indicated, are reproduced below.)

NOTE: This document incorporates by reference various sections of the Code of Federal Regulations (CFR), some with modifications. Modifications to portions of paragraphs in the Federal language are indicated by underline for additions and strikeout for deletions. Larger portions of Federal language for a specific section which is not to be included in these procedures are denoted by "DELETE" and larger portions of new California language are indicated by "REPLACE WITH" or "INSERT." The symbols "*****" and "..." mean that the remainder of the Federal text for a specific section, which is not shown in these procedures, has been included by reference, with only the printed text changed. The symbol "#####" means that the remainder of the text of these procedures, which is not shown in this amendment document, has not been changed.

If States do not wish to show modifications with strikeout and underline, they need not do so. In this case, you should delete the sentence that states: "Modifications to portions of paragraphs in the Federal language are indicated by underline for additions and strikeout for deletions."

Amend § 86.004-21, Title 40, Code of Federal Regulations, to read:

**§ 86.004-21 Application for certification.
~~October 21, 1997.~~ October 6, 2000.**

* * * * *

(b)(2) DELETE
REPLACE WITH:

(b)(2) For 1992 and subsequent model-year low-emission and ultra-low-emission vehicles and engines not powered exclusively by diesel, projected California sales data and fuel economy estimates two years prior to certification, and projected California sales data for all vehicles and engines, regardless of operating fuel or vehicle emission category, sufficient to enable the Executive Officer to select a test fleet representative of the vehicles (or engines) for which certification is requested at the time of certification.

* * * * *

(m) DELETE ~~For model years 2004 through 2007, within 180 days after submission of the application for certification of a heavy-duty diesel engine, the manufacturer must provide emission test results from the Load Response Test conducted according to § 86.1380, including, at a minimum, test results conducted at each of the speeds identified in § 86.1380. Load Response Test data submissions are not necessary for carry-over engine families for~~

~~which Load Response Test data has been previously submitted. In addition, upon approval of the Administrator, manufacturers may carry Load Response Test data across from one engine family to other engine families, provided that the carry across engine families use similar emission control technology hardware which would be expected to result in the generation of similar emission data when run over the Load Response Test.~~

(n) Upon request from ARB EPA, a manufacturer must provide to ARB EPA any hardware (including scan tools), passwords, and/or documentation necessary for ARB EPA to read, interpret, and store (in engineering units if applicable) any information broadcast by an engine's on-board computers and electronic control modules which relates in anyway to emission control devices and auxiliary emission control devices, provided that such hardware, passwords, or documentation exists and is not otherwise commercially available. Passwords include any information necessary to enable generic scan tools or personal computers access to proprietary emission related information broadcast by an engine's on-board computer, if such passwords exist. This requirement includes access by ARB EPA to any proprietary code information which may be broadcast by an engine's on-board computer and electronic control modules. Information which is confidential business information must be marked as such. Engineering units refers to the ability to read, interpret, and store information in commonly understood engineering units, for example, engine speed in revolutions per minute or per second, injection timing parameters such as start of injection in degree's before top-dead center, fueling rates in cubic centimeters per stroke, vehicle speed in miles per hour or kilometers per hour. This paragraph (n) does not restrict ARB EPA authority to take any action authorized by Section 208 of the Clean Air Act.

Adopt and amend § 86.007-21, Title 40, Code of Federal Regulations, to read:

§ 86.007-21 Application for certification. October 6, 2000.

Section 86.007-21 includes text that specifies requirements that differ from § 86.004-21. Where a paragraph in § 86.004-21 is identical and applicable to § 86.007-21, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see § 86.004-21."

(a) through (n) [Reserved]. For guidance see § 86.004-21.

(o) ~~For 2005 and subsequent model year diesel~~ heavy-duty ~~diesel~~ engines, the manufacturer must provide the following additional information pertaining to the supplemental steady-state test conducted under § 86.1360-2007:

(1) Weighted brake-specific emissions data (i.e., in units of g/bhp-hr, calculated according to § 86.1360-2007(e)(5) and (6), for all pollutants for which an emission standard is established in § 86.004-11(a);

(2) Brake specific gaseous emission data for each of the 13 test points (identified under § 86.1360-2007(b)(1)) and the 3 ARB EPA-selected test points (identified under § 86.1360-2007(b)(2));

(3) Concentrations and mass flow rates of all regulated gaseous emissions plus carbon dioxide;

(4) Values of all emission-related engine control variables at each test point;

(5) Weighted ~~break~~ brake-specific particulate matter (i.e., in units of g/bhp-hr);

(6) A statement that the test results correspond to the maximum NO_x producing condition specified in § 86.1360-2007(e)(4). The manufacturer also must maintain records at the manufacturer's facility which contain all test data, engineering analyses, and other information which provides the basis for this statement, where such information exists. The manufacturer must provide such information to the Executive Officer Administrator upon request;

(7) A statement that the engines will comply with the weighted average emissions ~~cap standard~~ and interpolated values comply with the ~~Maximum Allowable Emission Limits emission testing caps~~ specified in ~~§86.1360-2007(j) § 86.007-11(a)(3)~~ for the useful life of the engine. The manufacturer also must maintain records at the manufacturer's facility which contain a detailed description of all test data, engineering analyses, and other information which provides the basis for this statement, where such information exists. The manufacturer must provide such information to the Executive Officer Administrator upon request.

(p) (1) The manufacturer must provide a statement in the application for certification that the diesel heavy-duty engine for which certification is being requested will comply with the applicable Not-To-Exceed Limits specified in ~~§86.1370-2007(d) §86.007-11(a)(4)~~ when operated under all conditions which may reasonably be expected to be encountered in normal vehicle operation and use. The manufacturer also must maintain records at the manufacturer's facility which contain all test data, engineering analyses, and other information which provides the basis for this statement, where such information exists. The manufacturer must provide such information to the Executive Officer Administrator upon request.

~~(2) For engines equipped with exhaust gas recirculation, the manufacturer must provide a detailed description of the control system the engine will use to comply with the requirements of § 86.007-11(a)(4)(iii) and § 86.1370 (f) for NTE cold temperature operating exclusion, including but not limited to the method the manufacturer will use to access this exclusion during normal vehicle operation.~~

~~(3)~~ (2) For each engine model and/or horsepower rating within an engine family for which a manufacturer is applying for an NTE deficiency(ies) under the provisions of ~~§86.1370-2007(i) §86.007-11(a)(4)(iv)~~, the manufacturer's application for an NTE deficiency(ies) must include a complete description of the deficiency, including but not limited to: the specific description of the

deficiency; what pollutant the deficiency is being applied for, all engineering efforts the manufacturer has made to overcome the deficiency, what specific operating conditions the deficiency is being requested for (i.e., temperature ranges, humidity ranges, altitude ranges, etc.), a full description of the auxiliary emission control device(s) which will be used to maintain emissions to the lowest practical level; and what the lowest practical emission level will be.

Subpart N, Emission Regulations for New Otto-Cycle and Diesel Heavy-Duty Engines; Gaseous and Particulate Exhaust Test Procedures

Amend § 86.1313-90, Title 40, Code of Federal Regulations, to read:

§ 86.1313-90 Fuel Specifications. April 11, 1989.

* * * * *

(b) Diesel test fuel.

(1) The petroleum fuels for testing diesel engines ... pour depressant, dye, dispersant, and biocide. Fuels specified for emissions testing are intended to be representative of commercially available in-use fuels.

(2) Except as noted below, petroleum fuel for diesel engines ... shall be used. For 1993 and subsequent model-year diesel-fueled engines, the petroleum fuel used in exhaust emissions testing may meet the specifications in Table ~~N98-2 N94-2~~ of 40 Code of Federal Regulations section ~~86.1313-98(b)(2) 86.1313-94(b)(2)~~, as adopted ~~September 5, 1997 August 21, 1990~~, or substantially equivalent specifications approved by the Executive Officer as an option to the specifications in Table N90-2. For 1995 through 2003 model-year medium-duty diesel-fueled engines, and for 1996 and 1997 model-year urban bus engines only, the petroleum fuel used in exhaust emissions testing may meet the specifications listed below, or substantially equivalent specifications approved by the Executive Officer, as an option to the specifications in Table N90-2. Where a manufacturer elects pursuant to this subparagraph to conduct exhaust emission testing using the specifications in Table ~~N98-2 N94-2~~, or the specifications listed below, the Executive Officer shall conduct exhaust emission testing with the diesel fuel meeting the specifications elected by the manufacturer. The manufacturer shall submit evidence to the Executive Officer demon-

strating to the Executive Officer's satisfaction that the test fuel will be the predominant in-use fuel. Such evidence could include such things as copies of signed contracts from customers indicating the intent to purchase and use the test fuel as the primary fuel for use in the engines or other evidence acceptable to the Executive Officer.

Fuel Property	Limit	Test Method ^a
Natural Cetane Number	47-55	D613-86
Distillation Range, °F		Title 13 CCR, §2282(g)(3)
IBP	340-420	
10% point	400-490	
50% point	470-560	
90% point	550-610	
EP	580-660	
API Gravity, degrees	33-39	D287-82
Total Sulfur, wt. %	0.01-0.05	Title 13 CCR, §2282(g)(3)
Nitrogen Content, ppmw	100-500	Title 13 CCR, §2282(g)(3)
Total Aromatic		
Hydrocarbons, vol.%	8-12	Title 13 CCR, §2282(g)(3)
Polycyclic Aromatic		
Hydrocarbons, wt. % max.	1.4	Title 13 CCR, §2282(g)(3)
Flashpoint, °F (max)	130	D 93-80
Viscosity @ 40°F, centistokes	2.0-4.1	D 445-83

^aASTM specifications unless otherwise noted. A reference to a subsection of Title 13, CCR, §2282 means the test method identified in that subsection for the particular property. A test method other than that specified may be used following a determination by the Executive Officer that the other method produces results equivalent to the results of the specified method.

(3) Except as noted below, petroleum fuel for diesel engines meeting the specifications in Table N90-3, or substantially equivalent specifications approved by the ~~Executive Officer Administrator~~, shall be used in service accumulation. The grade of petroleum fuel recommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel fuel, shall be used. For 1993 and subsequent model-year diesel-fueled engines, excluding the 1995 through 2003 model-year medium-duty diesel-fueled engines referenced below, the petroleum fuel used in service accumulation may meet the specifications in Table N94-3 of 40 Code of Federal Regulations section 86.1313-94(b)(3), as adopted August 21, 1990, or substantially equivalent specifications approved by the Executive Offi-

cer as an option to the specifications in Table N90-3. For 1995 through 2003 model-year medium-duty diesel-fueled engines, and for 1996 and 1997 model-year urban bus engines only, diesel fuel representative of commercial diesel fuel which will be generally available through retail outlets shall be used in service accumulation. The manufacturer shall submit evidence to the Executive Officer demonstrating to the Executive Officer's satisfaction that the test fuel will be the predominant in-use fuel. Such evidence could include such things as copies of signed contracts from customers indicating the intent to purchase and use the test fuel as the primary fuel for use in the engines or other evidence acceptable to the Executive Officer.

#####

Adopt § 86.1342-94, Title 40, Code of Federal Regulations, to read:

§ 86.1342-94 Calculations; exhaust emissions. September 5, 1997.

#####

Adopt and amend § 86.1360-2007, Title 40, Code of Federal Regulations, to read:

§ 86.1360-2007 Supplemental steady-state test; test cycle and procedures. October 6, 2000.

(a) Applicability. This section applies to ~~2005-2007~~ and subsequent model year later diesel heavy duty diesel engines.

(b) Test cycle.

(1) The following 13-mode cycle must be followed in dynamometer operation on the test engine:

Mode Number	Engine Speed	Percent Load	Weighting Factor	Mode Length (minutes)
1	Idle	—	0.15	4
2	A	100	0.08	2
3	B	50	0.10	2
4	B	75	0.10	2
5	A	50	0.05	2
6	A	75	0.05	2
7	A	25	0.05	2
8	B	100	0.09	2
9	B	25	0.10	2
10	C	100	0.08	2
11	C	25	0.05	2
12	C	75	0.05	2
13	C	50	0.05	2

(2) In addition to the 13 test points identified in paragraph (b)(1) of this section, ~~ARB EPA~~ may select, and require the manufacturer to conduct the test using, up to 3 additional test points within the control area (as defined in paragraph (d) of this section). ~~ARB EPA~~ will notify the manufacturer of these supplemental test points in writing in a timely manner before the test. Emissions sampling for the additional test modes must include all regulated gaseous pollutants. Particulate matter does not need to be measured.

(c) Determining engine speeds. (1) The engine speeds A, B, and C, referenced in the table in paragraph (b)(1) of this section, and speeds D and E, referenced in § 86.1370-2007 ~~86.1380~~, must be determined as follows:

$$\text{Speed A} = n_{l0} + 0.25 \times (n_{hi} - n_{l0})$$

$$\text{Speed B} = n_{l0} + 0.50 \times (n_{hi} - n_{l0})$$

$$\text{Speed C} = n_{l0} + 0.75 \times (n_{hi} - n_{l0})$$

$$\text{Speed D} = n_{hi}$$

$$\text{Speed E} = n_{l0} + 0.15 \times (n_{hi} - n_{l0})$$

Where:

n_{hi} = High speed as determined by calculating 70% of the maximum power. The highest engine speed where this power value occurs on the power curve is defined as n_{hi} .

n_{l0} = Low speed as determined by calculating 50% of the maximum power. The lowest engine speed where this power value occurs on the power curve is defined as n_{l0} .

Maximum Power = the maximum observed power calculated according to the engine mapping procedures defined in § 86.1332-90.

(d) Determining the control area. The control area extends from the engine speed A to C, as defined in paragraph (c) of this section, and extends from 25 to 100 percent load.

(e) Test requirements.

(1) Engine warm-up. Prior to beginning the test sequence, the engine must be warmed-up according to the procedures in § 86.1332-90(d)(3)(i) through (iv).

(2) Test sequence. The test must be performed in the order of the mode numbers in paragraph (b)(1) of this section. The ~~ARB EPA~~-selected test points identified under paragraph (b)(2) of this section must be performed immediately upon completion of mode 13. The engine must be operated for the prescribed time in each mode, completing engine speed and load changes in the first 20 seconds of each mode. The specified speed must be held to within ~~plus minus~~ plus or minus (+/-) 50 rpm and the specified torque must be held to within plus or minus two percent of the maximum torque at the test speed.

(3) Particulate sampling. One pair of filters (primary and back-up) shall be used for sampling PM over the 13-mode test procedure. The modal weighting factors specified in paragraph (b)(1) of this section shall be taken into account by taking a sample proportional to the exhaust mass flow during each individual mode of the cycle. This can be achieved by adjusting sample flow rate, sampling time, and/or dilution ratio, accordingly, so that the criterion for the effective weighting factors is met. The sampling time per mode must be at least 4 seconds per 0.01 weighting factor. Sampling must be conducted as late as possible within each mode. Particulate sampling shall be completed no earlier than 5 seconds before the end of each mode.

(4) The test must be conducted with all emission-related engine control variables in the highest brake-specific NO_x emissions state which could be encountered for a 30 second or longer averaging period at the given test point and for the conditions under which the engine is being tested.

(5) Exhaust emissions measurements and calculations. Manufacturers must follow the exhaust emissions sample analysis procedures under § 86.1340-90, and the calculation formulas and procedures under § 86.1342-94, for the 13-mode cycle and the 3 ~~ARB EPA~~ selected test points as applicable for steady-state testing, including the NO_x correction factor for humidity.

(6) Calculating the weighted average emissions.

(i) For each regulated gaseous pollutant, the weighted average emissions must be calculated as follows:

$$A_{WA} = \frac{\sum_{i=1}^n [A_{Mi} \times WF_i]}{\sum_{i=2}^n [A_{Pi} \times WF_i]}$$

Where:

A_{WA} = Weighted average emissions for each regulated gaseous pollutant, in grams per brake horsepower hour.

A_M = Modal average mass emissions level, in grams per hour. Mass emissions must be calculated as described in § 86.1342-94.

A_P = Modal average power, in brake horse-power. Any power measured during the idle mode (mode 1) is not included in this calculation.

W_F = Weighting factor corresponding to each mode of the steady-state test cycle, as defined in paragraph (b)(1) of this section.

i = The modes of the steady-state test cycle, as defined in paragraph (b)(1) of this section.

n = 13, corresponding to the 13 modes of the

steady-state test cycle, as defined in paragraph (b)(1) of this section.

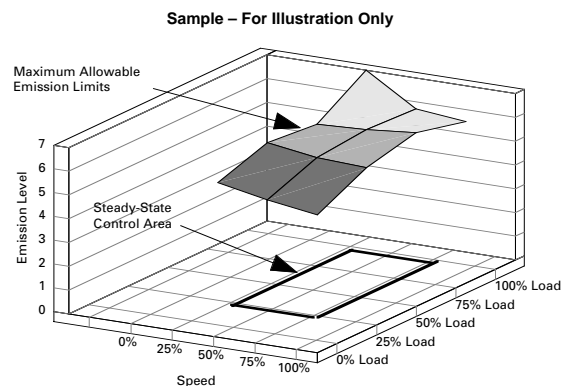
(ii) For PM measurements, a single pair of filters must be used to measure PM over the 13 modes. The brake-specific PM emission level for the test must be calculated as described for a transient hot start test in § 86.1343-88. Only the power measured during the sampling period shall be used in the calculation.

(f) Maximum allowable emission limits.

(1) For gaseous emissions, the 12 non-idle test point results and the four-point linear interpolation procedure specified in paragraph (g) of this section for intermediate conditions, shall define Maximum Allowable Emission Limits for purposes of paragraph (j) of this section § 86.007-11(a)(3) except as modified under paragraph (f)(3) of this section. Each engine shall have its own Maximum Allowable Emission Limits generated from the 12 non-idle supplemental steady state test points from that engine. The control area extends from the 25% to the 75% engine speeds, at engine loads of 25% to 100%, as defined in paragraph (d) of this section. Figure 1 of this paragraph (f)(1) depicts a sample Maximum Allowable Emission Limit curve, for illustration purposes only, as follows:

Figure 1

Maximum Allowable Emission Limits



(2) If the weighted average emissions, calculated according to paragraph (e)(6) of this section, for any gaseous pollutant is equal to or lower than required by paragraph (j) of this section § 86.007-11(a)(3), each of the 13 test values for that pollutant shall first be multiplied by the ratio of the applicable emission standard (under paragraph (j) of this section § 86.007-11(a)(3)) to the weighted average emissions value, and then by 1.10 for interpolation allowance, before determining the Maximum Allowable Emission Limits under paragraph(g)(2) of this section.

(3) If the Maximum Allowable Emission Limit for any point, as calculated under paragraphs (f)(1) and (2) of this section, is greater than the applicable Not-to-Exceed limit (if within the Not-to-Exceed control area defined in § 86.1370-2007(b)), then the Maximum Allowable Emission Limit for that point shall be defined as the applicable Not-to-Exceed limit.

(g) Calculating intermediate test points.

(1) For the three test points selected by ~~ARB EPA~~ under paragraph (b)(2) of this section, the emissions must be measured and calculated as described in paragraph (e)(6)(i) of this section (except that $n = 1$ and $WF = 1$). The measured values then must be compared to the interpolated values according to paragraph (g)(3) of this section. The interpolated values are determined from the modes of the test cycle closest to the respective test point according to paragraph (g)(2) of this section.

(2) Interpolating emission values from the test cycle. The gaseous emissions for each regulated pollutant for each of the control points (Z) must be interpolated from the four closest modes of the test cycle that envelop the selected control point Z as shown in Figure 2 of this paragraph (g)(2).

(i) For these modes (R, S, T, U), the following definitions apply:

- Speed (R) = Speed(T) = n_{RT}
- Speed (S) = Speed(U) = n_{SU}
- Percent load (R) = Percent load (S)
- Percent load (T) = Percent load (U)

(ii) The interpolated value of the brake specific gaseous emissions of the selected control point Z(EZ) must be calculated as follows:

$$E_Z = E_{RS} + (E_{TU} - E_{RS}) * (M_Z - M_{RS}) / (M_{TU} - M_{RS})$$

$$E_{TU} = E_T + (E_U - E_T) * (n_Z - n_{RT}) / (n_{SU} - n_{RT})$$

$$E_{RS} = E_R + (E_S - E_R) * (n_Z - n_{RT}) / (n_{SU} - n_{RT})$$

$$M_{TU} = M_T + (M_U - M_T) * (n_Z - n_{RT}) / (n_{SU} - n_{RT})$$

$$M_{RS} = M_R + (M_S - M_R) * (n_Z - n_{RT}) / (n_{SU} - n_{RT})$$

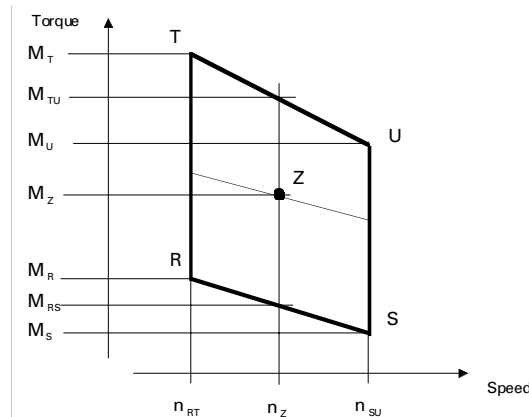
Where:

- E_R, E_S, E_T, E_U = for each regulated pollutant, brake specific gaseous emissions of the enveloping modes adjusted according to the factors in (f)(2).
- M_R, M_S, M_T, M_U = engine torque of the enveloping modes.
- M_Z = engine torque of the selected control point Z.
- n_Z = engine speed of the selected control point Z.

(iii) Figure 2 follows:

Figure 2

Four-Point Linear Interpolation



(3) Comparing calculated and interpolated emission values. The measured brake specific gaseous emissions of the control point Z (X_Z) must be less than or equal to the interpolated value (E_Z).

(h) Test fuel specifications. The test fuel used for supplemental steady-state testing under this section must meet the requirements of § 86.1313-90.

(i) General requirements. Ambient conditions, charge cooling specifications, and intake and exhaust restrictions for supplemental steady-state testing and maximum allowable emission limit testing under this section must meet the requirements of § 86.1330-90.

INSERT

(j) Emission testing caps.

(1) The weighted average exhaust emissions, as determined under paragraph (e)(5) and (6) of this section pertaining to the supplemental steady-state test cycle, for each regulated pollutant shall not exceed 1.0 times the applicable emission standards specified in California Code of Regulations, title 13, §1956.8 (a)(1).

(2) Gaseous exhaust emissions shall not exceed the steady-state interpolated values determined by the Maximum Allowable Emission Limits (for the corresponding speed and load), as determined under paragraph (g) of this section, when the engine is operated in the steady-state control area defined under paragraph (d) of this section, during steady-state engine operation.

INSERT

(k) In-Use Compliance. The procedures for in-use voluntary and influenced recall for heavy-duty diesel engines under this section are described in California Code of Regulations, title 13, sections 2111 through 2140, except as modified by this paragraph for 2005 and 2006 model year engines. In evaluating the scope of the affected population for the purposes of this section, there shall be a rebuttable presumption that the affected population is the engine family to which the tested engines belong. No engine may be used to establish the existence of an emissions exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance.

(1) For the purposes of this section, an exceedance of the emission testing caps occurs when the average emissions of the test vehicles or engines, pursuant to California Code of Regulations, Title 13, Section 2139, for any pollutant exceed the emission threshold. For the purposes of this section, emission threshold is defined as:

(i) for a test using vehicle test equipment (e.g., an over-the-road mobile monitoring device such as "ROVER", or a chassis dynamometer), the applicable maximum NO_x emissions limit plus the greater of 0.5 g/bhp-hr or one standard deviation of the data set established pursuant to paragraph (k)(2) of this section; or

(ii) for a test using an engine dynamometer, the applicable maximum NO_x emissions limit plus 0.5 g/bhp-hr.

(2) Where an engine dynamometer or vehicle test shows an apparent exceedance of the emissions threshold, the party conducting the original test shall repeat such test under the same conditions at least nine times. The mean of the tests shall be used for the averaging of the test vehicle emissions in determining compliance.

(3) If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results. The manufacturer has the option to submit an influenced recall plan in accordance with California Code of Regulations, title 13, sections 2113 through 2121 within 45 days or to proceed with performing the engineering analysis and/or conducting further testing in accordance with paragraphs (k)(4) and/or (k)(5) of this section. Upon the completion of testing conducted in paragraph(s) (k)(4) and/or (k)(5), if the test results indicate that the average emissions of the test vehicles exceeds the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results

and upon receipt of the notification, the manufacturer shall have 45 days to submit an influenced recall plan in accordance with California Code of Regulations, title 13, sections 2113 through 2121.

(4) If the testing conducted under paragraph (k)(1) and California Code of Regulations, title 13, section 2139 was performed using vehicle test equipment, then the engine manufacturer may elect to conduct additional tests of that engine using an engine dynamometer, provided that all environmental and engine operating conditions present during vehicle testing under paragraph (k)(1) and California Code of Regulations, title 13, section 2139 can be reproduced or corrected consistent with paragraph (k)(6) of this section. If the engine manufacturer elects to conduct such additional engine dynamometer tests, it shall provide ARB with at least three business days notice prior to commencement of such testing. If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph (k)(5) of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emissions threshold and the emission levels of the exceeding engines. However, the manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's satisfaction that such analysis alone is sufficient under the circumstances.

(5) Within 60 days of receiving notice of an exceedance under paragraph (k)(3) of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option.

(6) The testing of additional engines under paragraphs (k)(4) and (k)(5) of this section shall be conducted under conditions that are no less stringent than the initial test in terms of those parameters that may affect the result, and, at the manufacturer's option, may be limited to those emission limits and conditions for which apparent exceedances have been identified. Such parameters typically, but not necessarily, include relevant ambient conditions, operating conditions, service history, and age of the vehicle. Prior to conducting any testing, the manufacturer shall submit a test plan to ARB for its review and approval. Within 30 days following ARB's proposed modifications, the manufacturer shall incorporate the proposed modifications and implement the test plan as approved. Special conditioning of test engines shall not be permitted. Where the manufacturer elects to conduct the additional testing utilizing an

engine dynamometer, it shall reproduce relevant engine operating and environmental conditions associated with the initial exceedance, provided, however, that correction factors may be used to reproduce temperature, humidity or altitude conditions that cannot be simulated in the laboratory. Regardless of the testing equipment utilized, the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices.

INSERT

(l) Exemptions.

(1) The requirements set forth in this section do not apply to “ultra-small volume manufacturers” for model years 2005 and 2006. For the purposes of this section, an “ultra-small volume manufacturer” means any manufacturer with California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years.

(2) The requirements set forth in this section do not apply to “urban buses”, as defined in Title 13, California Code of Regulations, Section 1956.2, for model years 2005 and 2006.

Adopt and amend § 86.1370-2007, Title 40, Code of Federal Regulations, to read:

§ 86.1370-2007 Not-To-Exceed (NTE) test procedures. October 6, 2000.

(a) General. The purpose of this test procedure is to measure in-use emissions of 2005 and subsequent model year heavy-duty diesel engines while operating within a broad range of speed and load points (the Not-To-Exceed Control Area) and under conditions which can reasonably be expected to be encountered in normal vehicle operation and use. Emission results from this test procedure are to be compared to the Not-To-Exceed Limits specified in paragraph (d)(1) of this section § 86.007-11(a)(4).

(b) Not-to-exceed control area for ~~diesel~~ heavy-duty diesel engines. The Not-To-Exceed Control Area for ~~diesel~~ heavy-duty diesel engines consists of the following engine speed and load points:

(1) All operating speeds greater than the speed calculated using the following formula, where n_{hi} and n_{lo} are determined according to the provisions in § 86.1360-2007(c):

$$n_{lo} + 0.15 \times (n_{hi} - n_{lo})$$

(2) All engine load points greater than or equal to 30% or more of the maximum torque value produced by the engine.

(3) Notwithstanding the provisions of paragraphs (b)(1) and (b)(2) of this section, all operating speed and load points with brake specific fuel consumption (BSFC) values within 5% of the minimum BSFC value of the engine. For the purposes of this requirement, BSFC must be calculated under the general test cell conditions specified in § 86.1330-90. The manufacturer may petition the Executive Officer Administrator at certification to exclude such points if the manufacturer can demonstrate that the engine is not expected to operate at such points in normal vehicle operation and use. Engines equipped with drivelines with multi-speed manual transmissions or automatic transmissions with a finite number of gears are not subject to the requirements of this paragraph (b)(3).

(4) Notwithstanding the provisions of paragraphs (b)(1) through (b)(3) of this section, speed and load points below 30% of the maximum power value produced by the engine shall be excluded from the Not-To-Exceed Control Area for all emissions.

(5) For particulate matter only, speed and load points determined by one of the following methods, whichever is applicable, shall be excluded from the Not-To-Exceed Control Area. B and C engine speeds shall be determined according to the provisions of § 86.1360-2007(c):

(i) If the C speed is below 2400 rpm, the speed and load points to the right of or below the line formed by connecting the following two points:

(A) 30% of maximum torque or 30% of maximum power, whichever is greater, at the B speed;

(B) 70% of maximum power at 100% speed (n_{hi});

(ii) If the C speed is above 2400 rpm, the speed and load points to the right of the line formed by connecting the two points in paragraphs (b)(5)(ii)(A) and (B) of this section and below the line formed by connecting the two points in paragraphs (b)(5)(ii)(B) and (C) of this section:

(A) 30% of maximum torque or 30% of maximum power, whichever is greater, at the B speed;

(B) 50% of maximum power at 2400 rpm;

(C) 70% of maximum power at 100% speed (n_{hi}).

APPENDIX C: AMENDMENTS TO CALIFORNIA'S STANDARDS AND TEST PROCEDURES

~~(6) For natural gas and other non-diesel fueled diesel cycle engines, the manufacturer may petition the Administrator at certification to exclude operating points from the Not-to-Exceed Control Area defined in § 86.1370 (b)(1) through (5) if the manufacturer can demonstrate that the engine is not expected to operate at such points in normal vehicle operation and use.~~

(c) [Reserved]

(d) Not-to-exceed control area caps limits.

(1) When operated within the Not-To-Exceed Control Area defined in paragraph (b) of this section, diesel engine brake-specific exhaust emissions in grams/bhp-hr (as determined under paragraphs (b) and (c) of this section), for each regulated pollutant, shall not exceed 1.25 times the applicable emission standards Not To Exceed Limits specified in § 86.007-11(a)(4) California Code of Regulations, Title 13, §1956.8 (a)(1) during engine and vehicle operation specified in paragraph (e)(1) of this section, except as noted in paragraph (e)(2) of this section, when averaged over any period of time greater than or equal to 30 seconds.

(2) [Reserved]

(3) For 2005 and subsequent model year heavy-duty engines, operation within the Not-to-Exceed control area (defined in paragraph (b) of this section) must also comply with the following:

- (i) A filter smoke number of 1.0 under steady-state operation, or the following alternate opacity limits:
 - (A) A 30 second transient test average opacity limit of 4% for a 5 inch path; and
 - (B) A 10 second steady state test average opacity limit of 4% for a 5 inch path.

(ii) The limits set forth in paragraph (d)(3)(i) of this section refer to exhaust smoke emissions generated under the conditions set forth in paragraphs (b) and (e) of this section and calculated in accordance with the procedures set forth in §86.1372-2007.

(e) Ambient corrections. The measured data shall be corrected based on the ambient conditions under which it was taken, as specified in this section.

(1) For engines operating within the ambient conditions specified in paragraph (g)(1) of this section §86.007-11(a)(4)(ii)(a);

(i) NO_x emissions shall be corrected for ambient air humidity to a standard humidity level of 50 grains (7.14 g/kg) if the humidity of the intake air was below 50 grains, or to 75 grains (10.71 g/kg) if above 75 grains.

(ii) NO_x and PM emissions shall be corrected for ambient air temperature to a temperature of 55 degrees F (12.8 degrees C) for ambient air temperatures below 55 degrees F or to 95 degrees F (35.0 degrees C) if the ambient air temperature is above 95 degrees F.

(iii) No ambient air temperature or humidity correction factors shall be used within the ranges of 50-75 grains or 55-95 degrees F.

(iv) Where test conditions require such correction factors, the manufacturer must use good engineering judgement and generally accepted engineering practice to determine the appropriate correction factors, subject to ARB EPA review.

(2) For engines operating within the ambient conditions specified in paragraph (g)(2) of this section §86.007-11(a)(4)(ii)(b);

(i) NO_x emissions shall be corrected for ambient air humidity to a standard humidity level of 50 grains (7.14 g/kg) if the humidity of the intake air was below 50 grains, or to 75 grains (10.71 g/kg) if above 75 grains.

(ii) NO_x and PM emissions shall be corrected for ambient air temperature to a temperature of 55 degrees F (12.8 degrees C) for ambient air temperatures below 55 degrees F.

(iii) No ambient air temperature or humidity correction factors shall be used within the ranges of 50-75 grains or for temperatures greater than or equal to 55 degrees F.

(iv) Where test conditions require such correction factors, the manufacturer must use good engineering judgement and generally accepted engineering practice to determine the appropriate correction factors, subject to ARB EPA review.

~~(f) DELETE NTE cold temperature operating exclusion. Engines equipped with exhaust gas recirculation (EGR) whose operation within the NTE control area specified in §86.1370(b) when operating during cold temperature conditions as specified in paragraph (f)(1) of this section are not subject to the NTE emission limits during the specified cold temperature operation conditions.~~

~~(1) Cold temperature operation is defined as engine oper-~~

ating conditions meeting either of the following two criteria:

- (i) Intake manifold temperature (IMT) less than or equal to the temperature defined by the following relationship between IMT and absolute intake manifold pressure (IMP) for the corresponding IMP:

$$P = 0.0875 \times IMT - 7.75 \quad \text{Equation (1)}$$

Where:

P = absolute intake manifold pressure in bars
 IMT = intake manifold temperature in degrees Fahrenheit

- (ii) Engine coolant temperature (ECT) less than or equal to the temperature defined by the following relationship between ECT and absolute intake manifold pressure (IMP) for the corresponding IMP:

$$P = 0.0778 \times ECT - 9.8889 \quad \text{Equation (2)}$$

Where:

P = absolute intake manifold pressure in bars
 ECT = engine coolant temperature in degrees Fahrenheit

(2) [Reserved]

INSERT

(g) Ambient operating regions. For each engine family, the not-to-exceed emission limits must apply during one of the following two ambient operating regions;

(1) The not-to-exceed emission limits apply for all altitudes less than or equal to 5,500 feet above sea-level, during all ambient conditions (temperature and humidity). Temperature and humidity ranges for which correction factors are allowed are specified in paragraph (e) of this section; or

(2) The not-to-exceed emission limits apply at all altitudes less than or equal to 5,500 feet above sea-level, for temperatures less than or equal to the temperature determined by the following equation at the specified altitude;

$$T = -0.00254 \times A + 100$$

Where:

T = ambient air temperature in degrees Fahrenheit
 A = altitude in feet above sea-level (A is negative for altitudes below sea-level)

Temperature and humidity ranges for which correction factors are allowed are specified in section (e).

INSERT

(h) In-Use Compliance. The procedures for in-use voluntary and influenced recall for heavy-duty diesel engines under this section

are described in California Code of Regulations, title 13, sections 2111 through 2140, except as modified by this paragraph for 2005 and 2006 model year engines. In evaluating the scope of the affected population for the purposes of this section, there shall be a rebuttable presumption that the affected population is the engine family to which the tested engines belong. No engine may be used to establish the existence of an emissions exceedance if the engine or vehicle in which it was installed was subject to abuse or improper maintenance or operation, or if the engine was improperly installed, and such acts or omissions caused the exceedance.

(1) For the purposes of this section, an exceedance of the emission testing caps occurs when the average emissions of the test vehicles or engines, pursuant to California Code of Regulations, title 13, section 2139, for any pollutant exceed the emission threshold. For the purposes of this section, emission threshold is defined as:

(i) for a test using vehicle test equipment (e.g., an over-the-road mobile monitoring device such as "ROVER", or a chassis dynamometer), the applicable maximum NO_x emissions limit plus the greater of 0.5 g/bhp-hr or one standard deviation of the data set established pursuant to paragraph (h)(2) of this section; or

(ii) for a test using an engine dynamometer, the applicable maximum NO_x emissions limit plus 0.5 g/bph-hr.

(2) Where an engine dynamometer or vehicle test shows an apparent exceedance of the emissions threshold, the party conducting the original test shall repeat such test under the same conditions at least nine times. The mean of the tests shall be used for the averaging of the test vehicle emissions in determining compliance.

(3) If the average emissions of the test vehicles exceed the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results. The manufacturer has the option to submit an influenced recall plan in accordance with California Code of Regulations, title 13, sections 2113 through 2121 within 45 days or to proceed with performing the engineering analysis and/or conducting further testing in accordance with paragraphs (h)(4) and/or (h)(5) of this section. Upon the completion of testing conducted in paragraph(s) (h)(4) and/or (h)(5), if the test results indicate that the average emissions of the test vehicles exceeds the emissions threshold, the Executive Officer shall notify the manufacturer in writing of the test results and upon receipt of the notification, the manufacturer shall have 45 days to submit an influenced recall plan in accordance with California Code of Regulations, title 13, sections 2113 through 2121.

(4) If the testing conducted under paragraph (h)(1) and California Code of Regulations, title 13, section 2139 was performed using vehicle test equipment, then the engine manufacturer may elect to conduct additional tests of that engine using an engine dynamometer, provided that all environmental and engine operating conditions present during vehicle testing under paragraph (h)(1) and California Code of Regulations, title 13, section 2139 can be reproduced or corrected consistent with paragraph (h)(6) of this section. If the engine manufacturer elects to conduct such additional engine dynamometer tests, it shall provide ARB with at least three business days notice prior to commencement of such testing. If based on such additional tests the engine exceeds the emission threshold, the engine manufacturer may conduct further testing in accordance with paragraph (h)(5) of this section and/or perform an engineering analysis to determine the percentage of the affected population that exceeds the emissions threshold and the emission levels of the exceeding engines. However, the manufacturer may not determine the percentage of the affected population or the emission levels solely on the basis of an engineering analysis unless it demonstrates to the Executive Officer's satisfaction that such analysis alone is sufficient under the circumstances.

(5) Within 60 days of receiving notice of an exceedance under paragraph (h)(2) of this section, the manufacturer may commence testing of not less than ten additional in-service engines. The manufacturer may conduct these tests using vehicle testing equipment, or using an engine dynamometer, at the manufacturer's option.

(6) The testing of additional engines under paragraphs (h)(4) and (h)(5) of this section shall be conducted under conditions that are no less stringent than the initial test in terms of those parameters that may affect the result, and, at the manufacturer's option, may be limited to those emission limits and conditions for which apparent exceedances have been identified. Such parameters typically, but not necessarily, include relevant ambient conditions, operating conditions, service history, and age of the vehicle. Prior to conducting any testing, the manufacturer shall submit a test plan to ARB for its review and approval. Within 30 days following ARB's proposed modifications, if any, the manufacturer shall incorporate the proposed modifications and implement the test plan as approved. Special conditioning of test engines shall not be permitted. Where the manufacturer elects to conduct the additional testing utilizing an engine dynamometer, it shall reproduce relevant engine operating and environmental conditions associated with the initial exceedance, provided, however, that correction factors may be used to reproduce temperature, humidity or

altitude conditions that cannot be simulated in the laboratory. Regardless of the testing equipment utilized, the test results shall be adjusted to reflect documented test systems error and/or variability in accordance with good engineering practices.

INSERT

(i) Deficiencies for NTE requirements.

(1) For model years 2005 through 2007, 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 a 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.

(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.

INSERT

(j) Exemptions.

(1) The requirements set forth in this section do not apply to "ultra-small volume manufacturers" for model years 2005 and 2006. For the purposes of this section, an "ultra-small volume manufacturer" means any manufacturer with

California sales less than or equal to 300 new passenger cars, light-duty trucks, medium-duty vehicles, heavy-duty vehicles, and heavy-duty engines per model year based on the average number of vehicles and engines sold by the manufacturer in the previous three consecutive model years.

(2) The requirements set forth in this section do not apply to “urban buses”, as defined in Title 13, California Code of Regulations, Section 1956.2, for model years 2005 and 2006.

Adopt and amend § 86.1372-2007, Title 40, Code of Federal Regulations, to read:

§ 86.1372-2007 Measuring smoke emissions within the NTE zone. October 6, 2000.

This section contains the measurement techniques to be used for determining compliance with the filter smoke limit or opacity limits in ~~§86.1370-2007 (d)(3)(i) § 86.007-11(b)(1)(iv)~~.

(a) For steady-state or transient smoke testing using full-flow opacimeters, equipment meeting the requirements of subpart I of this part or ISO/DIS-11614 “Reciprocating internal combustion compression-ignition engines—Apparatus for measurement of the opacity and for determination of the light absorption coefficient of exhaust gas” is required. This document is incorporated by reference (~~see § 86.1~~).

(1) All full-flow opacimeter measurements shall be reported as the equivalent percent opacity for a five inch effective optical path length using the Beer-Lambert relationship.

(2) Zero and full-scale (100 percent opacity) span shall be adjusted prior to testing.

(3) Post test zero and full scale span checks shall be performed. For valid tests, zero and span drift between the pre-test and post-test checks shall be less than two percent of full-scale.

(4) Opacimeter calibration and linearity checks shall be performed using manufacturer’s recommendations or good engineering practice.

(b) For steady-state testing using a filter-type smokemeter, equipment meeting the requirements of ISO/FDIS-10054 “Internal

combustion compression-ignition engines—Measurement apparatus for smoke from engines operating under steady-state conditions—Filter-type smokemeter” is recommended. Other equipment may be used provided it is approved in advance by the ~~Executive Officer Administrator~~.

(1) All filter-type smokemeter results shall be reported as a filter smoke number (FSN) that is similar to the Bosch smoke number (BSN) scale.

(2) Filter-type smokemeters shall be calibrated every 90 days using manufacturer’s recommended practices or good engineering practice.

(c) For steady-state testing using a partial-flow opacimeter, equipment meeting the requirements of ISO-8178-3 and ISO/DIS-11614 is recommended. Other equipment may be used provided it is approved in advance by the ~~Executive Officer Administrator~~.

(1) All partial-flow opacimeter measurements shall be reported as the equivalent percent opacity for a five inch effective optical path length using the Beer-Lambert relationship.

(2) Zero and full scale (100 percent opacity) span shall be adjusted prior to testing.

(3) Post-test zero and full scale span checks shall be performed. For valid tests, zero and span drift between the pre-test and post-test checks shall be less than two percent of full scale.

(4) Opacimeter calibration and linearity checks shall be performed using manufacturer’s recommendations or good engineering practice.

(d) Replicate smoke tests may be run to improve confidence in a single test or stabilization. If replicate tests are run, three additional tests which ~~confirm~~ to this section shall be run, and the final reported test results must be the average of all the valid tests.

(e) A minimum of thirty seconds sampling time shall be used for average transient smoke measurements. The opacity values used for this averaging must be collected at a minimum rate of 1 data point per second, and all data points used in the averaging must be equally spaced in time.



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