

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS

**PROPOSED AMENDMENTS TO THE EXHAUST EMISSION STANDARDS FOR 2007-2009
MODEL-YEAR HEAVY DUTY URBAN BUS ENGINES AND THE FLEET RULE FOR
TRANSIT AGENCIES**

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**State of California
California Environmental Protection Agency
AIR RESOURCES BOARD**

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Staff Report

July 29, 2005

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EXECUTIVE SUMMARY

The following provides a summary of policy decisions to be considered by the Air Resources Board (ARB or the Board). The modifications, as described herein, are consistent with the California authority to control emissions from mobile sources.

What vehicles would be impacted?

Staff has developed amendments to the regulations that affect emissions from urban buses owned or operated by transit agencies.

What regulations currently apply to these vehicles?

The ARB has two programs specifically designed to reduce emissions from urban buses. One program establishes emission standards that new urban buses must meet. The other program affects emissions from in-use urban buses that are already in service. In addition, the South Coast Air Quality Management District (SCAQMD or the District) has adopted its own rule related to new transit bus purchases.

Long-term emission reductions are achieved through establishing more stringent new engine standards. California has adopted standards that affect new urban buses which are more stringent than federal new engine standards for urban buses and heavy-duty trucks.

For nearer-term emission reductions, the ARB Fleet Rule for Transit Agencies is designed to reduce emissions from in-use urban buses by increasing turnover and through the application of retrofit particulate filters.

The District has adopted various fleet rules, one of which, Rule 1192, "Clean On-Road Transit Buses," applies only to transit agencies operating in the South Coast air district. Rule 1192 dictates that transit agencies may only acquire alternative-fuel buses when procuring or leasing buses. The rule applies to government agencies and private companies under contract to government agencies.

What regulatory changes are staff requesting the Board consider?

Staff has identified two policy decisions for the Board's consideration, and has developed proposed regulatory amendments to support decisions the Board may make. First, staff is presenting three options for the Board to consider regarding the appropriate emission standards for new urban bus engines in 2007 through 2009. The three options are: 1) keep the current new urban bus emissions standards as they are, 2) change the oxides of nitrogen (NOx) emission standard

for 2007 through 2009 model year new urban buses from 0.2 grams per brake horsepower-hour (g/bhp-hr) to 1.2 g/bhp-hr, which would align it with the equivalent model year heavy-duty truck NOx emission standard, and 3) require all transit agencies to purchase/lease only alternative fuel buses.

The second policy decision for the Board's consideration is whether to require that all transit agencies operating in the South Coast Air Quality Management District follow the alternative-fuel compliance path, as defined in ARB's regulations. Under ARB's current regulations, transit agencies made a non-revocable election to follow either the diesel fuel path or the alternative-fuel path, as of January 1, 2001. Of the 17 transit agencies in the District, 11 chose the alternative-fuel path, and six chose the diesel path. If the Board adopts the new requirement, the six transit agencies in the District currently on the diesel fuel compliance path would be required to change to the alternative-fuel path effective January 1, 2006. This change would lock these transit agencies into purchasing alternative-fuel engines through 2015, consistent with the District's Rule 1192.

FIRST POLICY DECISION: Whether to revise the emission standards for new urban buses

California's current 2007 and beyond NOx requirement for new urban bus engines is 0.2 g/bhp-hr. The California and national heavy-duty truck new engine standard for 2007, which includes urban buses for all but California, is also 0.2 g/bhp-hr, but flexibilities in the heavy-duty truck rule, result in the option of certifying all engines to an average NOx standard of 1.2 g/bhp-hr between 2007 and 2009. This is what engine manufacturers have stated they plan to do, so it is unlikely that diesel engines meeting California's urban bus NOx standard will be available.

Staff Assessment

Staff has assessed urban bus engine availability based on the current 2007-2009 standard versus what could be available if the Board modifies the standard to align with the current 2007-2009 model year heavy-duty truck standards. Without alignment, there are essentially three scenarios that could occur. The first is that manufacturers could certify both diesel and alternative-fuel engines for sale in California in time to meet the standard of 0.2 g/bhp-hr NOx in 2007. Discussions with diesel engine manufacturers, however, have convinced staff that this scenario is highly unlikely.

The second scenario is that manufacturers make only alternative fuel engines available to meet the 0.2 g/bhp-hr NOx standard in 2007. Multiple manufacturers have stated publicly that they intend to produce alternative fuel urban bus engines that meet the California 2007 standard. Staff has reviewed development plans for these engines and agrees these engines will be available in 2007 if all

goes as planned. Therefore, staff believes that there is a reasonable likelihood that one or more urban bus engines using alternative fuels will be commercially available by 2007, although there is some risk that these engines will be delayed or will not be certified and marketed because development of the new technology engines is not complete at this time.

The third scenario is that there will be no diesel or natural gas engines available for California urban buses for 2007-2009. In this case, California transit agencies would not be able to purchase new engines until 2010, at which time staff expects both diesel and alternative fuel engines will meet the 2010 heavy-duty truck NOx standard of 0.2 g/bhp-hr. As noted above, staff's assessment is that no diesel urban bus engines will be available in 2007 through 2009, but is likely alternative fuel urban bus engines will be available.

There are 76 transit agencies statewide that report to ARB under the Fleet Rule for Transit Agencies. The 28 agencies on the alternative fuel path will continue to purchase complying engines in 2007 through 2009, because staff believes complying engines will be available. However, if the current 2007 urban bus emission standards are not modified, the 48 agencies on the diesel path will not be able to purchase new diesel buses until 2010. These diesel path transit agencies operate 62 percent of the California urban buses, and if they continue on the diesel path the result is that these agencies will keep their older diesel buses longer or repower their buses. Emission reductions staff anticipated from the original rule due to fleet turnover will not be realized from diesel path transit agencies.

Staff expects that manufacturers will certify diesel urban bus engines that meet the 1.2 g/bhp-hr NOx level if the Board relaxes the NOx standard to that value for 2007-2009. Staff also expects that, even with Board adoption of alignment, some manufacturers will produce alternative fuel engines that meet the 0.2 g/bhp-hr NOx level in 2007 and that transit agencies on the alternative fuel path will purchase these engines because of their lower emissions and the potential for the availability of incentive funds for the lower emitting engines.

How would the three options impact emissions?

The impact on emissions depends on the emission level of the engines purchased and replaced, and in scenarios where diesel engines are not available, if purchases are deferred or foregone. Staff has concluded that no diesel engines will be available for purchase in 2007 to 2009, and that alternative fuel engines meeting a 0.2 g/bhp-hp NOx standard will be available. For transit agencies required to purchase alternative fuels (those on the alternative fuel path), staff assumes they will purchase these engines. For diesel path agencies, staff assumes they will purchase diesel engines in 2007 to 2009 if the NOx standard is changed to 1.2 g/bhp-hr. If the NOx standard is kept at the current 0.2 g/bhp-hr, staff assumes the diesel path agencies will not buy any engines in

2007-2009, and that they will make up for these deferred purchases in 2010-2012, when diesel engines are again available.

Compared to the option 1 (no change in the standards), option 2 (revise the NOx standard to 1.2 g/bhp-hr) provides emission reductions in each year 2007 through 2010, reaching about 1.6 tons per day (tpd) in 2009. This occurs because 1.2 g/bhp-hr new engines replace higher emitting older engines, whereas in option 1 no new engines are purchased by diesel path agencies until 2010 or later, and higher emitting buses remain in operation. However, once the deferred purchases are made in 2010 and beyond, no change option 1 provides slightly greater reductions than option 2 from 2012 on, reaching up to about 1.2 tpd. This occurs because by deferring purchases until 2010 or after, all purchases are 0.2 g/bhp-hr engines, whereas the buses purchased in 2007-2009 (option 2) have higher emissions (1.2 g/bhp-hr). Staff estimates that by 2025, there will be no difference in emissions because all engines remaining in the fleet are 0.2 g/bhp-hr (i.e. any 1.2 g/bhp-hr engines are over 15 years old and have been replaced).

Option 3 (require all diesel path agencies statewide to switch to the alternative fuel path) provides the lowest emissions. Compared to option 1, option 3 provided emission reductions in each year 2007 through 2011, reaching about 2.6 tpd in 2009. This occurs because staff assumes all agencies will purchase alternative fuel engines emitting at 0.2 g/bhp-hr beginning in 2007, and no deferred purchases will occur. It should be noted that agencies previously on the diesel path will have to invest in new alternative fuel infrastructure, and this could result in deferred or forgone purchases, which would reduce the emission benefit of this option. Compared to option 2, option 3 will provide lower emissions until 2025, reaching a maximum of about 1.0 tpd in 2009. This occurs because option 2 allows for 1.2 g/bhp-hr engines to enter the fleet during 2007 through 2009. However, staff estimates that by 2025, there will be no difference in emissions because all engines remaining in the fleet are 0.2 g/bhp-hr (i.e. any 1.2 g/bhp-hr engines are over 15 years old and have been replaced).

Staff estimates that by 2025, the statewide NOx emissions will be equivalent under all three options because all engines remaining in the fleet will meet a 0.2 g/bhp-hr NOx standard.

What are the costs associated with modifying the statewide urban bus emission requirements as outlined in staff's three options?

Staff has determined there is no additional cost of the option to revise the new urban bus engine emission standards to align with the current truck standards. This option will allow purchase of diesel engines by diesel path agencies in 2007-2009, and may reduce operating and maintenance costs by replacing older engines. If the current standards are retained, diesel path agencies are expected to defer purchases until 2010 and beyond. These engines will cost

more than the engines that could be purchased in 2007-2009 if the standards are aligned.

If the Board chooses to adopt a statewide alternative-fuel purchase mandate, capital and operations and maintenance costs would be increased for those engines now on the diesel path. The Federal Transportation Administration (FTA) provides 80%-83% of the capital cost of new buses, so transit agencies must fund the remainder. As a conservative estimate, staff assumed a 20 percent transit agency share of capital costs, in addition to operation and maintenance costs associated with the bus, fueling facilities, labor and training. Thus, staff estimates a typical incremental total cost of \$76,517 per bus funded by the local transit agency.

In order to determine cost-effectiveness, ARB took the typical total incremental cost of the buses to be purchased, with FTA funding, and divided by the total NOx emission reductions for the life of the regulation. These values were based on NOx emission reductions only. The expected cost-effectiveness ratio is \$119,030 per ton (\$59.51 per pound). These values are much higher than other mobile source regulations, which typically have cost-effectiveness values of \$10,000 per ton, or less.

SECOND POLICY DECISION: Whether to mandate the alternative-fuel path for transit agencies operating in the South Coast Air Quality District?

Shortly after the District adopted its fleet rules, including Rule 1192.2, the Engine Manufacturers Association and the Western States Petroleum Association sued the District regarding its authority to adopt these rules. On April 28, 2004, the United States Supreme Court ruled that the purchase requirements in the District rules were an emission standard that required a waiver of federal preemption prior to implementation. The Court returned the case to the federal district court for further proceedings consistent with its decision. In response to this decision, the District requested that ARB submit the District's rules to the United States Environmental Protection Agency (U.S. EPA) for a waiver of preemption pursuant to section 209(b) of the Clean Air Act. On October 1, 2004, ARB requested public comment on the District's request. ARB staff completed a thorough review of the comments submitted in response to the notice, and consulted with the U.S. EPA regarding the legal requirements for obtaining a waiver of a rule adopted by a local government.

Based on ARB review, staff concluded that these fleet rules, as written and adopted by the District, would not receive a Section 209(b) waiver because these rules have not been adopted by the ARB as state regulations (applicable in the South Coast). For this reason, staff has initiated a state rulemaking process to cover some of the fleets subject to the District rules. This process requires a new

public record that updates relevant information on the effectiveness and costs of these rules.

Meanwhile the federal district court has continued its proceedings on the District rules. On May 5, 2005, the federal district court ruled that the District's authority is not preempted under the market participant doctrine for the aspects of the District fleet rules that relate to purchasing decisions made by state and local governments. Most transit agencies are considered local government. The order, however, noted that it did not address whether other aspects of the District rules may still be subject to preemption.

If the Board chooses to amend the ARB's Fleet Rule for Transit Agencies to mandate that the six diesel path transit agencies in SCAQMD switch to the alternative fuel path, the state rule would achieve the alternative fuel objectives of the District's Rule 1192. The ARB's adoption of a unique fleet requirement for the transit agencies in the District would address concerns that the Court's decision may change or weaken.

Staff has developed amendments that the Board may adopt if the Board wishes to assure that alternative fuel urban transit buses are purchased throughout the District, and determines it wise to provide a backstop to the current District Rule 1192 in case litigation overturns the District rule.

How will the alternative-fuel mandate for transit agencies in the District impact emissions?

Eleven of the transit districts in the District have chosen the alternative fuel path under the ARB transit fleet rule, and this decision is not revocable. Thus the Board's decision affects the remaining six transit districts, who operate 10 percent of the transit buses in the SCAQMD. If the SCAQMD prevails in legal challenges, alternative fuel buses will be purchased by the six transit districts regardless of ARB's action, and no federal waiver would be needed. However, if the SCAQMD's rule is invalidated, several outcomes are possible.

Five of the six transit districts have been planning alternative fuel bus purchases notwithstanding their election of the diesel path under ARB's fleet rule. Thus one outcome is they could continue to purchase alternative fuel buses in the absence of a SCAQMD or ARB rule.

Another outcome is they could also decide to purchase diesel fuel buses. In 2007-2009, these diesel buses would have higher emissions than available alternative fuel buses. (Beyond 2009, emissions of diesel and alternative fuel bus engines are expected to be equivalent.) Note however that purchase of diesel buses in 2007-2009 would only be possible if the Board also acts to align the statewide emission standard for buses. If it chooses not to do this, no diesel buses will be available for purchase in 2007.

To quantify the emission benefit of mandating the six transit agencies change to the alternative fuel path, staff assumed the SCAQMD rule is invalidated, the Board aligns the statewide standard for new bus engines so that diesel engines are available for purchase, and all six transit agencies choose to purchase diesel engines in 2007-2009. Adoption of the ARB rule requiring alternative fuel purchase would prevent purchase of diesel engines by these districts, and staff assumed they would purchase alternative fuel engines in 2007-2009 instead. NOx emissions would be reduced by a small amount - up to 0.02 tons per day. There would be no impact on PM emissions because all engines meet the same PM standard from 2007 on.

What is the cost-effectiveness of the District alternative-fuel path mandate option?

Staff expects that the six transit providers affected by this option will be able to obtain fuel from facilities that are already, or will soon be, available, based on staff's survey of transit agencies. Most transit agencies that plan to purchase compressed natural gas (CNG) buses have already either built a fueling station or have one planned and financed. In addition, transit agencies that are purchasing gasoline hybrid-electric buses (HEBs) will use existing facilities. Staff based the cost-effectiveness analysis on estimates of expected emissions reductions and costs for implementation of an alternative fuel mandate. In order to determine cost-effectiveness, ARB used the typical incremental cost of the buses to be purchased, including FTA funding, and divided by the total NOx emission reductions for the life of the regulation. These values were based on NOx emission reductions only as there is no PM benefit from this option. The cost-effectiveness is \$67,837 per ton (\$33.92 per pound).¹ These values are much higher than other mobile source regulations, which typically have cost-effectiveness values of \$10,000 per ton, or less.

¹ Actual cost-effectiveness values could be higher if the transit agencies choose to purchase alternative fuel buses during 2007 through 2009 with NOx emissions higher than 0.2 g/bhp-hr thereby decreasing the emissions benefits.

I. INTRODUCTION

The Air Resources Board (ARB or Board) seeks to provide clean, healthful air to the residents of California. ARB is the state agency responsible for protecting public health and the environment from the harmful effects of air pollution. ARB oversees all air pollution control efforts in California, including the activities of 35 independent local air districts, and works in cooperation with the districts and the U.S. Environmental Protection Agency (U.S. EPA) on strategies to attain State and federal ambient air quality standards and to reduce air toxic emissions.

The South Coast Air Quality Management District (SCAQMD or District) is the local governmental agency primarily responsible for air quality assessment and improvement in the South Coast Air Basin and the desert portion of Riverside County in the Salton Sea Air Basin. The South Coast Air Basin, which includes Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino Counties, is designated as a serious nonattainment area for particulate matter (PM₁₀ - particulate matter under 10 microns) and an extreme nonattainment area for ozone. The Coachella Valley, located in the desert portion of Riverside County, is classified as a serious nonattainment area for PM₁₀ and a severe nonattainment area for ozone.

A. Background

Public transportation has important societal benefits, including providing access to work and education, reducing traffic congestion, and meeting the mobility needs of the public, including the elderly and disabled. California's transit agencies are responsible for providing basic transportation services for the public. Transit agencies provide both fixed-route service within urban places, such as traditional urban bus and neighborhood routes, and between urban places such as commuter routes, and non-fixed-route services such as paratransit, dial-a-ride and charter services.

Most types of public transportation, however, are also sources of polluting engine exhaust emissions. Significant amounts of both particulate matter (PM) and oxides of nitrogen (NO_x) are emitted from mobile sources, including urban buses. NO_x and hydrocarbons (HC) contribute to the atmospheric formation of ozone and fine particles. NO_x is a reactive, oxidizing gas that contributes to the atmospheric formation of ozone and fine particles, and causes respiratory illness and impaired lung function. Carbon monoxide (CO) is a colorless, odorless gas that reduces the ability of the body to transport oxygen to cells. Diesel PM is classified as a toxic air contaminant (TAC) because it is a cancer-causing pollutant that also has significant short- and long-term negative cardiovascular impacts.

Following the identification of diesel PM as a toxic air contaminant, ARB staff spent two years working with stakeholders to determine the best control measures for diesel PM. The result was the “Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles” (Diesel Risk Reduction Plan, or DRRP), which was approved by the Board in September 2000 (ARB 2000a). This plan directs staff to develop measures to reduce diesel PM emissions from all new and in-use diesel-fueled engines and vehicles. Included are, “new retrofit requirements for existing on-road, off-road, and stationary diesel-fueled engines and vehicles where determined technically feasible and cost-effective.”

The ARB adopted the 2003 State and Federal Strategy for the California State Implementation Plan (SIP) for ozone in September 2003. Most of the existing near-term SIP measures have been adopted, along with additional controls to reduce emissions. The baseline emission inventory in the 2003 SIP reflects the benefits of State and federal measures adopted since the 1994 ozone SIP.

1. ARB's Regulations Affecting Transit Agencies

The ARB has adopted two programs specifically designed to reduce emissions from urban buses. One program affects emissions from new urban buses and the other program affects emissions from in-use urban buses operated by transit agencies (Fleet Rule for Transit Agencies). Long-term emission reductions are achieved through establishing more stringent new engine standards. California has adopted standards that affect new urban buses, which are more stringent than federal new engine standards for urban buses and heavy-duty trucks.

In February 2000, the Board adopted a fleet rule for transit agencies operating urban buses, and more stringent emission standards for new urban bus engines and vehicles (ARB 1999; ARB 2000b). The rules were designed to reduce emissions of NOx and PM by setting fleet emission reduction requirements that require the purchase of cleaner engines and the retrofit of existing engines. By January 1, 2001, transit agencies were required to make a non-revocable decision to follow either a diesel path or an alternative-fuel path, which established purchasing requirements for the transit agencies through 2015.

The rule also promoted advanced technologies by adopting requirements for zero-emission bus (ZEB) demonstrations and acquisition that are applicable to larger transit agencies. New, more stringent mid- and long-term emission standards were also adopted that apply to new urban bus engines, and the rule encourages the purchase of diesel hybrid electric buses from 2004 through 2006 by diesel path agencies. On February 24, 2005, the Board amended the fleet rule for transit agencies to reduce emissions from buses and vehicles not covered by the original fleet rule for transit agencies.

In 2000, the SCAQMD adopted various fleet rules, including Rule 1192, “Clean On-Road Transit Buses” (adopted on June 16, 2000). Rule 1192 requires that public transit agencies with 15 or more public transit vehicles or urban buses operating in the SCAQMD may only acquire alternative-fuel vehicles when procuring or leasing these vehicles (SCAQMD 2000). The rule applies to government agencies and private companies under contract to government agencies. Despite this rule, six transit agencies in the SCAQMD chose the diesel path under ARB's fleet rule for transit agencies.

As a result of the ARB and SCAQMD rules, many transit agencies have made significant changes in their operations to incorporate natural gas and other alternative-fuel buses into their fleets. They have installed natural gas refueling infrastructure and purchased alternative-fuel urban buses; repowered old diesel engines to engines meeting cleaner exhaust emission standards; installed diesel particulate filters on diesel engines; and experimented with developing technologies, such as hybrid-electric buses, NOx aftertreatment systems and cleaner fuels. Many of California’s transit agencies consider themselves to be innovators and incubators for advanced technologies.

2. SCAQMD Rule 1192

Under its Clean Fleets Program, the District adopted seven fleet rules during 2000 and 2001. The rules were developed to gradually shift public agencies and certain private entities to lower emission and alternative-fuel vehicles whenever a fleet operator purchases or leases a vehicle for replacement or addition to a fleet. The District adopted these rules based on legislative authority [Health & Safety Code (HSC) section 40447.5(a)], which restricts the scope of any rules to public and certain commercial operators of fleets of 15 or more vehicles. The adopted rules apply to transit buses, school buses, refuse collection vehicles, airport shuttles and taxis, street sweepers, light and medium-duty publicly owned vehicles, and heavy-duty publicly owned vehicles.

As noted above, one of the fleet rules adopted is Rule 1192 - Clean On-Road Transit Buses. The Rule was developed in an effort to reduce public exposure to air pollution emitted from transit buses, including toxic particulates and ozone precursor emissions. Many of these fleets emit pollutants, including air toxics, into heavily urbanized areas, where improvements in air quality are critical given environmental justice and other concerns.

Shortly after the District adopted its fleet rules, including Rule 1192, the Engine Manufacturers Association and the Western States Petroleum Association sued the District regarding its authority to adopt these rules. On April 28, 2004, the United States Supreme Court ruled that the purchase requirements in the District rules were an emission standard that required a waiver of federal preemption prior to implementation. The Court returned the case to the federal district court for further proceedings consistent with its decision. In response to this decision,

the District requested that ARB submit the District's rules to EPA for a waiver of preemption pursuant to section 209(b) of the Clean Air Act. On October 1, 2004, ARB requested public comment on the District's request. ARB staff completed a thorough review of the comments submitted in response to the notice, and consulted with the U.S. EPA regarding the legal requirements for obtaining a waiver of a rule adopted by a local government.

Based on ARB review, staff concluded that these fleet rules, as written and adopted by the District, would not receive a Section 209(b) waiver because these rules have not been adopted by the ARB as state regulations (applicable in the South Coast). For this reason, staff has initiated a state rulemaking process to cover some of the fleets subject to the District rules. This process requires a new public record that updates relevant information on the effectiveness and costs of these rules.

Meanwhile the federal district court has continued its proceedings on the District rules. On May 5, 2005, the federal district court ruled that the District's authority is not preempted under the market participant doctrine for the aspects of the District fleet rules that relate to purchasing decisions made by state and local governments. Most transit agencies are considered local government. The order, however, noted that it did not address whether other aspects of the District rules may still be subject to preemption.

3. Amendments to be Considered by the Board

The amendments presented in this report modify the ARB rules that affect urban buses owned or operated by transit agencies. Staff has identified two policy decisions to be considered by the Board and has developed proposed regulatory amendments to support decisions the Board may make.

a. Amend the Statewide Urban Bus Emission Requirements

Staff is presenting three options for the Board to consider regarding the appropriate emission standards for new urban bus engines in 2007 through 2009. The three options are: 1) keep the current new urban bus emissions standards as they are, 2) change the NO_x emission standard for 2007 through 2009 model year new urban buses, from 0.2 g/bhp-hr to 1.2 g/bhp-hr, which would align emission standards with the equivalent model year heavy-duty truck NO_x emission standard, and 3) require all transit agencies to purchase/lease only alternative fuel buses.

The amendments provided in this report (set forth in the proposed regulation order in Appendix A) set forth the language necessary to implement the option of aligning the urban bus standards with the heavy-duty truck standards beginning with the 2007 model year. Should the Board favor the option to keep the urban bus standards as they are, no regulatory changes are necessary. Should the

Board decide that all transit agencies statewide should be required to purchase alternative fuel, a 15-day modification to ARB's Fleet Rule for Transit Agencies would be needed to accomplish this (and no change to the urban bus emission standards would be necessary).

b. Alternative Fuel Path Mandate for All Transit Agencies in the District

Staff has also developed an option to mandate that all transit agencies operating in the District be required to follow the alternative-fuel compliance path, as defined in title 13, CCR, section 1956.2.² Under the current regulations, transit agencies made a non-revocable election to follow either the diesel fuel path or the alternative-fuel path, as of January 1, 2001. Of the 17 transit agencies in the District, 11 chose the alternative-fuel path, and six chose the diesel path. Under the new option being presented to the Board for consideration, transit agencies in the District currently on the diesel fuel compliance path would be required to change to the alternative-fuel path effective January 1, 2006. This change would lock these transit agencies into purchasing alternative-fuel engines through 2015.

The scope of this option overlaps with the District's Rule 1192, and ARB has worked closely with the District to craft the amendments. The District has assisted ARB staff in the information gathering process and with other logistics such as stakeholder meetings, identification of affected fleets, and understanding the current District rules. Great efforts have been taken by ARB staff to obtain current, objective information on the challenges, cost-effectiveness, and emission benefits from the various technology options.

B. Regulatory Authority

The California Legislature enacted the California Clean Air Act of 1988, which declared that attainment of state ambient air quality standards is necessary to promote and protect public health, particularly the health of children, older people, and those with respiratory diseases. The Legislature directed that these standards be attained by the earliest practicable date.

The Federal Clean Air Act grants California, alone among the states, the authority to adopt more stringent controls of emissions from new mobile sources. The California Clean Air Act establishes the ARB as the state agency that sets standards for mobile sources. The California Legislature also granted ARB the authority to identify TACs and establish airborne toxic control measures (ATCMs) to reduce risk.

² The existing Fleet Rule for Transit Agencies is located with engine emission standards in title 13, CCR, sections 1956.2-1956.4. At the February 2005 hearing, the Board approved staff's proposal to move the existing sections for the Fleet Rules for Transit Agencies to new sections which cover rules for controlling diesel emissions from existing in-use engines or fleets. As a result, upon final approval by the Office of Administrative Law, section 1956.2 will be moved to section 2023.1.

C. Current Regulations and Voluntary Programs

Both the Federal government and the State of California have adopted rules that reduce PM and NOx, among other pollutants, from on- and off-road vehicles. The following sections briefly describe the existing federal, state, local and voluntary programs that currently apply to diesel-fueled engines and vehicles operating in California.

1. Federal Regulations

Standards for smoke emissions from on-road heavy-duty diesel vehicles were first set by the United States Environmental Protection Agency (U.S. EPA) in 1970. New engines were subject to PM and NOx exhaust emission standards beginning with model year 1988 (Table 1). Over the years, more stringent emission standards have paralleled improvements in control technology. Recent amendments to the on-road standards regulate the heavy-duty vehicle and its fuel as a single system, including diesel-fuel sulfur content requirements.

Table 1. Federal Emission Standards for New Heavy-Duty Trucks and Buses

Emissions Standards (g/bhp-hr)				
Model Year	Heavy-Duty Truck		Urban Bus	
	NOx	PM	NOx	PM
1988	10.7	0.6	10.7	0.6
1990	6.0	--	6.0	--
1991	5.0	0.25	5.0	0.25
1993	--	0.25	--	0.1
1994	--	0.10	--	0.07
1996	5.0	--	5.0	0.05 ^(c)
1998	4.0	--	4.0	--
October 2002	2.2 ^(a)	--	2.2 ^(a)	0.05 ^(c)
2004	2.2 ^(a)	--	2.2 ^(a)	--
2007	1.2 ^(b)	0.01	1.2 ^(b)	0.01
2010	0.2 ^(b)	--	0.2 ^(b)	--

- a. Nominal NOx value of 2.2 g/bhp-hr is based on emission standards of 2.4 g/bhp-hr for NOx plus non-methane hydrocarbons (NMHC) or 2.5 g/bhp-hr NOx plus NMHC with 0.5 g/bhp-hr NMHC cap, which took effect in October 2002 for those engines subject to the U.S. EPA Consent Decrees and the California Settlement Agreements. The Consent Decree-complying engines had to comply with 2004 standards by October 1, 2002.
- b. Between 2007 and 2009, U.S. EPA requires 50 percent of heavy-duty diesel engine family certifications to meet the 0.2 g/bhp-hr NOx standard. Averaging is allowed, and it is expected that most engines will conform to the fleet NOx average of approximately 1.2 g/bhp-hr.
- c. In-use standard or 0.07 g/bhp-hr.

a. Current Standards

The current federal heavy-duty vehicle standards apply to 2004 and subsequent model years. The current federal PM engine emission standard for new on-road heavy-duty diesel truck engines is 0.1g/bhp-hr and the current federal PM emission standard for new urban transit bus engines is 0.05 g/bhp-hr. The current NOx emission standard for both new on-road heavy-duty diesel truck and new urban transit bus engines is 2.4 g/bhp-hr for NOx plus non-methane hydrocarbons (NMHC) or 2.5 g/bhp-hr NOx plus NMHC with 0.5 g/bhp-hr NMHC cap. Only engines subject to the U.S. EPA Consent Decrees signed in 1998 had to comply with this 2004 standard in October 2002; for all the rest the requirement began with the 2004 model year engines.

On April 23, 1993, the U.S. EPA finalized the Urban Bus Retrofit/Rebuild Program to reduce the ambient levels of diesel PM in urban areas. The program was limited to 1993 and earlier model year urban buses operating in metropolitan areas with 1980 populations of 750,000 or more, whose engines are rebuilt or replaced after January 1, 1995. Approximately 40 urban areas are affected. Operators of the affected buses were required to choose between two compliance options: Program 1 set PM emissions requirements for each urban bus engine in an operator's fleet which is rebuilt or replaced; Program 2 was a fleet averaging program that establishes specific annual target levels for average PM emissions from urban buses in an operator's fleet.

Other than the Urban Bus Retrofit/Rebuild Program, no other federal regulations mandate reducing emissions from in-use urban buses or other heavy-duty engines.

b. 2007 and Later Standards

The particulate standard that takes effect with 2007 model year heavy-duty diesel engines is 0.01 grams per brake-horsepower hour (g/bhp-hr), which is a 90 percent reduction from the existing standard. That standard is based on the use of high-efficiency exhaust emission control devices or comparably effective advanced technologies. Because these devices are less efficient when used with the current formulation of diesel fuel, refiners are also required to reduce the level of sulfur in highway diesel fuel by 97 percent to 15 parts per million by weight (ppmw) by mid-2006.

The NOx standard in 2007 for new heavy-duty diesel engines, both trucks and buses, is 0.2 g/bhp-hr. However, between 2007 and 2009, U.S. EPA requires that only 50 percent of the heavy-duty diesel engine family certifications to meet this standard; the remaining 50 percent may meet the applicable 2006 model year engine standard. Through the use of the federal averaging provision, the result is a nominal NOx standard of 1.2 g/bhp-hr from 2007 through 2009. Some engine manufacturers will meet this by producing all or most of their engines to a

NOx standard of 1.2 g/bhp-hr; others will use averaging to produce engines certified to levels both above and below this NOx standard.

Beginning in 2010, there is a family emission limit cap of 0.5 g/bhp-hr NOx. Engines will be required to meet the 0.2 g/bhp-hr standard for all engines produced, however some manufacturers may have accumulated credits in prior years, resulting in some engines being certified above this standard, to as high as the family emission limit cap.

2. California Regulations

California is the only state granted the authority in the Federal Clean Air Act to set standards for new motor vehicles. While its passenger car standards are more stringent than federal standards, in the area of new heavy-duty diesel engines California has generally harmonized with federal rules since 1988.

a. General New Heavy-Duty Engine Regulations

For new engines, long-term emission reductions are achieved through establishing more stringent new engine standards. California has adopted standards that affect new heavy-duty vehicles and urban buses (Table 2).

Table 2. California Emission Standards for New Heavy-Duty Trucks and Buses

Emissions Standards (g/bhp-hr)				
Model Year	Heavy-Duty Vehicles		Urban Bus	
	NOx	PM	NOx	PM
1988	6.0	0.6	6.0	0.6
1990	6.0	--	6.0	--
1991	5.0	0.25	5.0	0.1
1993	--	0.25	--	0.1
1994	--	0.10	--	0.07
1996	5.0	--	4.0	0.05 (c)
1998	4.0	--	4.0	--
October 2002	2.2 (a)	--	2.2 (a)	0.01 (f)
2004	2.2 (a)	--	0.5 (d), 2.2 (e)	--
2007	1.2 (b)	0.01	0.2	0.01
2010	0.2 (b)	--	0.2	--

- a. Nominal NOx value of 2.2 g/bhp-hr is based on emission standards of 2.4 g/bhp-hr for NOx plus non-methane hydrocarbons (NMHC) or 2.5 g/bhp-hr NOx plus NMHC with 0.5 g/bhp-hr NMHC cap, which took effect in October 2002 for those engines subject to the U.S. EPA Consent Decrees and the California Settlement Agreements. The Consent Decree-complying engines had to comply with 2004 standards by October 1, 2002.
- b. Between 2007 and 2009, U.S. EPA requires 50 percent of heavy-duty diesel engine family certifications to meet the 0.2 g/bhp-hr NOx standard. Averaging is allowed, and it is expected that most engines will conform to the fleet NOx average of approximately 1.2 g/bhp-hr.
- c. In use standard of 0.07 g/bhp-hr.
- d. Standard applies to urban bus equipped with diesel-fuel, dual fuel, or bi-fuel engines.
- e. Standard applies to urban bus equipped with alternative-fueled engines. Nominal expected NOx level of 2.2 g/bhp-hr is based on ARB emission standards of 2.4 g/bhp-hr NOx plus NMHC or 2.5 g/bhp-hr NOx plus NMHC with 0.5 g/bhp-hr NMHC.
- f. Standard applies to urban bus equipped with diesel-fuel, dual fuel, or bi-fuel engines. Urban bus equipped with alternative fueled engines may certify to optional standard of 0.03, 0.02, or 0.01 g/bhp-hr.

California also has optional low-emission standards for new heavy-duty vehicles and urban buses. In general, vehicles that are eligible for incentive funding have been certified to an optional low-emission standard (Table 3).

Table 3. California Optional, Low NOx Emission Standards for New Heavy-Duty Trucks and Urban Buses

Model Year	Optional Standards (g/bhp-hr)	Increment (g/bhp-hr)
2000	2.5-0.5	0.5
October 2002	1.8-0.3 ^(c)	0.3
2004-2006 ^(a,b)	1.8-0.3 ^(c)	0.3

- a. For urban buses, emission standards apply only to alternative fueled engines. Diesel-fuel, dual fuel and bi-fuel engines may not exceed 0.5 g/bhp-hr.
- b. For urban buses, engine manufacturers may sell diesel hybrid-electric buses certified at 1.8 g/bhp-hr standard to diesel path transit agencies with approved NOx offset plans.
- c. Optional emission standards of 1.8 – 0.3 g/bhp-hr are for NOx plus non-methane hydrocarbons (NMHC). Engines certified to the optional NOx standard are excluded from participating in the Averaging, Banking, and Trading (ABT) program.

ARB has adopted regulations to ensure compliance with smoke standards, or visible emissions. California’s Heavy Duty Vehicle Inspection and Periodic Smoke Inspection Programs reduce excessive smoke emissions and tampering with diesel-fueled vehicles over 6,000 pounds gross vehicle weight rating (lbs GVWR) traveling within California. The regulations impose limits on the opacity of smoke from diesel engines when measured in accordance with a snap-acceleration test procedure, and have been in effect since 1991, with amendments adopted in 1997.

b. General In-Use Heavy-Duty Engine Regulations

In recent years, California has adopted regulations for in-use buses and trucks operated by transit agencies, in-use solid waste collection vehicles (collection vehicles), transportation refrigeration units and portable engines. California has also developed guidelines establishing criteria for the purchase of new school buses and retrofits of existing school buses called the Lower-Emissions School Bus Program. Emission reductions are achieved through retiring or retrofitting the existing engines or repowering with a newer cleaner engine.

California has also adopted idling limits for buses and heavy-duty trucks. California’s school bus idling requirements became effective July 16, 2003. California limits school bus idling and idling by heavy-duty diesel trucks at or near schools to only when necessary for safety or operational concerns. A driver of a transit bus or other commercial motor vehicle is prohibited from idling more than five minutes at each stop within 100 feet of a school. Idling limits applicable to all other buses and heavy-duty trucks were effective February 1, 2005 and restrict idling, in most cases, to no more than 5 minutes. Examples of some exemptions include buses while passengers are on board and trucks doing work that requires the engine to be idling.

c. In-Use Urban Bus and Transit Fleet Vehicle Regulations

California has adopted specific fleet rules that impact transit agencies. In 2000 the Board adopted the Fleet Rule for Transit Agencies to reduce emissions from urban buses. At the February 24, 2005 hearing, the Board amended the Fleet Rule for Transit Agencies to include transit fleet vehicles.

Statewide Fleet Rule for Transit Agencies - Urban Bus Requirements

The urban bus part of ARB's statewide Fleet Rule for Transit Agencies regulates urban buses that are owned or leased by public transit agencies and meet the definition of an urban bus. An urban bus is a bus that is normally powered by a heavy heavy-duty diesel engine, or of a type that would normally be powered by a heavy heavy-duty diesel engine. These buses are generally 35 feet in length or longer and weigh more than 33,000 lbs GVWR. Urban buses usually operate on a fixed route consisting of frequent stops and starts as passengers are routinely picked up and delivered to their destinations. A transit agency is a public entity responsible for administering and managing transit services.

California's urban bus fleet rule has fleet-wide requirements for urban buses applicable to each transit agency, requiring each transit agency to consider its urban bus fleet as a whole to meet emission reduction goals. Each transit agency was required to select a non-revocable compliance path – either the “diesel” path or the “alternative-fuel” path – by January 1, 2001. Path selection establishes the fuel type for new urban bus purchases or leases through model year 2015 and is a non-revocable election. Transit agencies on either path were required to achieve a maximum NOx fleet average of 4.8 g/bhp-hr as of October 1, 2002. The requirement was typically met by retiring older buses or bus engines.

The rule has a multi-step PM emission reduction requirement that is being met by replacement of older buses and bus engines and retrofit of diesel engines with particulate filters. Additionally, the Fleet Rule for Transit Agencies requires ultra low sulfur fuel to be used in urban buses beginning July 1, 2002 to facilitate the use of particulate filters. For the larger transit agencies, 15 percent of their future bus purchases must be zero-emission buses (ZEBs). Large diesel path agencies are also required to conduct a demonstration of ZEBs prior to implementation of the purchase requirement.

Statewide Fleet Rule for Transit Agencies - Transit Fleet Vehicle Requirements

On February 24, 2005, the Board amended the Fleet Rule for Transit Agencies to expand its scope.³ Per the amendments, a transit fleet vehicle is defined as an

³ This rule amendment has not been finalized as of the date of this staff report.

on-road vehicle greater than 8,500 lbs GVWR powered by a heavy-duty engine fueled by diesel or alternative-fuel, owned or operated by a transit agency, and which is not an urban bus. These vehicles include small buses and trolleys, paratransit, dial-a-ride vehicles, large commuter buses, and non-revenue generating trucks. A commuter service bus is defined as a bus that would otherwise meet the definition of an urban bus except that its operations include very little of the stop-and-go operations of an urban bus. Gasoline-powered vehicles operated by transit agencies are not subject to the amendments.

The amendments establish a fleet average NOx standard and PM emission reduction requirement for transit fleet vehicles owned or operated by transit agencies. The rule requirements implement in two steps. For the fleet average NOx standard, transit agencies must meet an average of 3.2 g/bhp-hr NOx by December 31, 2007 and 2.5 g/bhp-hr by December 31, 2010 (Table 4). Transit agencies will likely meet the fleet average NOx standards through fleet turnover, purchasing alternative-fuel vehicles, repowering older trucks, or retrofitting with a verified diesel emission control strategy (DECS) that reduces NOx.

Table 4. Fleet NOx Average Requirements for Transit Agencies (g/bhp-hr)

Fleet Type	Compliance Date		
	October 1, 2002	December 31, 2007	December 31, 2010
Urban Buses	4.8	---	---
Transit Fleet Vehicles	---	3.2	2.5

A transit agency is also required to reduce diesel PM emissions from its transit fleet vehicles by 40 percent as of December 31, 2007 and 80 percent as of December 31, 2010, compared to total emissions as of January 1, 2005 (Table 5). Transit agencies will achieve these reductions by purchasing new, cleaner transit fleet vehicles, retrofitting with a particulate filter, or repowering with a cleaner engine.

Table 5. Fleet Diesel PM Reduction Requirements for Transit Agencies

Fleet Type	Baseline Year	Percent Reduction From Baseline				
		2004	2005	2007	2009	2010
Urban Buses						
Alternative Path	2002	20	40	60	85 ¹	---
Diesel Path	2002	40	60	85 ¹	---	---
Transit Fleet Vehicles	2005	---	---	40	---	80 ¹

1. In the final year of compliance and beyond the transit agency can meet a fleet average of 0.01 g/bhp-hr times the number of vehicles in the fleet.

3. Local Regulations

Local Air Pollution Control Districts and Air Quality Management Districts (air districts) have authority to regulate stationary sources and some area wide sources, but also participate in programs to reduce emissions from mobile sources.

a. General Air District Authority

Air districts participate with local transportation agencies to develop and implement transportation control measures aimed at reducing vehicle activity and emissions. Some air districts have developed model ordinances to reduce idling of trucks and buses, to encourage the purchase of low-emission vehicles for public fleets, and to require public agency contracting that is "green." Other air districts have reduced the number of smoking vehicles by mailing letters to the registered owners to request that the vehicle be repaired.

Air districts also have programs to distribute revenue to cities and counties to fund transportation-related projects that reduce air pollution. Funds are also available for the air districts to distribute to private business and public agencies that use heavy-duty vehicles to defray the costs of new lower emission technologies for diesel engines. These monies are available to projects, such as cleaner transit buses, trash trucks, school buses, and street sweepers, that go beyond established regulatory requirements.

Public outreach is an important component of the air districts' programs to reduce emissions from mobile sources. Public outreach can include forums to present new technologies, programs, and opportunities to reduce emissions. These opportunities might also include encouraging bicycle use and exchanging gasoline lawn mowers for electric lawn mowers, in addition to programs that provide funding for purchases of cleaner engines and vehicles.

b. Specific South Coast Air Quality Management District Authority

The District implements many of the programs identified above. Additionally, to reduce both toxic and smog-forming air pollutants, the Legislature granted the District special authority to adopt fleet rules, as was discussed earlier, in Health and Safety Code Section 40447.5. Based on this authority, the District adopted seven fleet rules during 2000 and 2001. The rules were developed to gradually shift public agencies and certain private entities to lower emission and alternative-fuel vehicles and apply whenever a fleet operator with 15 or more vehicles purchases or leases a vehicle for replacement or addition to its fleet.

The District defines alternative fuels slightly differently in each of its rules, but generally follows the definition adopted by ARB, in its fleet rule for transit agencies. In Rule 1192 for transit buses, alternative fuel is defined to include

“compressed or liquefied natural gas, liquefied petroleum gas, methanol, electricity, fuel cells, or other advanced technologies that do not rely on diesel fuel.” A more detailed description of the Rule 1192 is provided in Section IV.B of this report.

There is variation among the District fleet rules due to the different functional demands and accompanying circumstances for each type of fleet vehicle. For light and medium-duty vehicles and commercial airport ground access vehicles, the fleet rules require the acquisition of low-emitting gasoline or alternative-fuel vehicles. For transit buses and sweepers, the fleet rules specify the acquisition of alternative fuel vehicles only. For refuse collection vehicles, the rules provide the choice of acquiring alternative-fuel, pilot ignition, or for a limited time frame, dual-fuel vehicles. For heavy-duty public fleet vehicles, the rule provides the option of acquiring alternative-fuel, dual-fuel, or dedicated gasoline vehicles. For school buses, many compliance options are available depending on the fleet size, bus type, and availability of funding.

It is critically important to note that each rule also provides specific exemptions and alternative compliance or offsetting options. For several rules, the requirements also vary depending on the availability of incentive funding. Additionally, each fleet rule has alternative compliance provisions for cases in which the requirements are demonstrated to be technically infeasible.

4. Voluntary and Incentive Programs

Voluntary efforts play a key role in helping to achieve air quality goals. Incentives can induce vehicle owners to reduce vehicle emissions prior to compliance deadlines or to reduce emissions beyond regulatory requirements. Owners and operators of transit buses, collection vehicles, school buses, and street sweepers are eligible for available funding for vehicles that go beyond the established requirements.

a. Federal Incentives

On the federal level, the U.S. EPA established a Voluntary Diesel Retrofit Program in 2000 to address pollution from diesel construction equipment and heavy-duty on-highway vehicles. This program allows fleet operators to choose appropriate, U.S. EPA-verified technologies that will reduce the emissions of the vehicles and engines in their fleets and identify potential funding sources to assist air quality planners and fleet operators as they create and implement retrofit programs. The program assists air quality planners in determining the number of State Implementation Plan credits produced by their retrofit projects. The U.S. EPA has also established a program to fund school bus retrofits and replacements from penalty revenues.

Additionally, the Federal Transit Administration (FTA) pays 80 to 83 percent of the purchase cost of a new urban bus. The remaining cost can be made up from local and state transportation funds.

b. State Incentives

In 1998, the Governor and Legislature appropriated \$25 million to implement the Carl Moyer Memorial Air Quality Standards Program (Carl Moyer Program.) Administered by the ARB and the local air districts, the program provides grants to local air districts to fund the extra capital cost of cleaner-than-required diesel-powered heavy-duty vehicles and equipment. During the first five years, the Carl Moyer Program received budget appropriations totaling \$153 million.

In 2000, the Legislature approved new funds to reduce emissions from school buses. The ARB, in coordination with the California Energy Commission and the local air pollution control districts, established guidelines for the Lower-Emissions School Bus program. The goal of this incentive program is to reduce the exposure of school children to both cancer-causing and smog-forming compounds. This program utilizes two strategies to attain these goals: pre-1987 model year school bus replacement and in-use controls for later model year diesel-fueled school buses. Over fiscal years 2000/2001 and 2001/2002, program funding was \$66 million total.

Voters approved Proposition 40, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002, which granted additional funding to reduce diesel emissions. The measure provides about \$50 million over two years to ARB, 20 percent of which is to be spent for the acquisition of “clean, safe, school buses for use in California’s public schools.” The remainder is allocated to the Carl Moyer Program.

In 2004, the Governor and the Legislature approved Assembly Bill (AB) 923 that provided up to \$140 million a year of long-term incentive funding. The bill also modified requirements governing the funds to include:

- Expanding pollutants from NO_x-only to include particulate matter (PM) and reactive organic gases (ROG).
- Adjusting Smog Check, tire, and Department of Motor Vehicle (DMV) fees to provide an ongoing source of funding through 2015.
- Including fleet modernization, light-duty vehicle projects, and an expanded agricultural assistance program as projects eligible for incentive funds.

c. Local Funding

The revenue that air districts distribute to cities, counties, public agencies, and businesses to fund projects that reduce air pollution comes from DMV fees and the incentive programs previously discussed. State law authorizes districts to

impose a registration surcharge of \$4 dollar per vehicle upon adoption of a resolution that provides for both the fee and the program to reduce air pollution from motor vehicles and for related planning monitoring, enforcement and technical studies. The DMV collects the fees at the request of the district.

AB 923 allows some local districts to vote to approve an additional \$2 dollar per vehicle fee in addition to the \$4 dollar per vehicle DMV fee. These funds can be used for Carl Moyer Program projects, Lower-Emission School Bus Program purchases, accelerated vehicle scrap, and some agricultural projects.

The SCAQMD has imposed the \$4 dollar per vehicle fee (as provided under AB 2766) and adopted the additional \$2 dollar per vehicle fee (as provided in AB 923) for the south coast air district. In the South Coast, the \$4 dollar per vehicle fee is distributed 30 percent to the district's general fund, 40 percent to cities and counties, and 30 percent to the Mobile Source Reduction Review Committee (MSRC) to contribute a funding match towards qualifying projects. MSRC has funded \$42 million dollars for school buses, transit buses, street sweepers, and refuse trucks since the 1995-1996 fiscal year. The cities and counties portion of the DMV fees has funded some infrastructure needs for alternative-fuel school buses.

The SCAQMD anticipates \$22 million dollars annually from the \$2 dollar increase in DMV fees in the South Coast district. Over the next 18 months (to the end of calendar year 2006), the district has designated \$14 million dollars for Clean On-Road School Buses, \$4 million dollars for accelerated vehicle scrap, \$11 million for Carl Moyer projects, and \$4 million for agricultural sources. The SCAQMD has distributed approximately \$28 million dollars of Carl Moyer funding to transit buses, refuse trucks, and street sweepers. The Carl Moyer Program has not been a significant source of funding for school buses due to the very low mileage of those vehicles contributing to a higher cost effectiveness. Funding for alternative school buses, cleaner diesel school buses, and diesel school bus particulate trap retrofits have come from the Lower-Emissions School Bus Replacement Program and the SCAQMD Governing Board school bus initiatives.

South Coast Rule 2202 - Air Quality Investment Program (AQIP) allows employers with 250 or more employees to participate in an air quality investment program in order to meet their emission reduction target. An employer may elect to participate in the program by investing annually \$60 per employee or triennially \$125 per employee into an AQMD administered restricted fund. Since 2000, over \$1.6 million dollars from AQIP has funded alternative fueled street sweepers and refuse trucks.

II. PUBLIC OUTREACH

The ARB is committed to ensuring that all California communities have clean, healthful air by addressing not only the regional smog that hangs over our cities

but also the nearby toxic pollution that is generated within our communities. The ARB works to ensure that all individuals in California, especially the children and elderly, can live, work and play in a healthful environment that is free from harmful exposure to air pollution.

A. Environmental Justice

On December 13, 2001, the Board approved Environmental Justice Policies and Actions,⁴ which formally established a framework for incorporating environmental justice into the ARB's programs, consistent with the directives of State law and policy (ARB 2001). "Environmental justice" is defined as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. These policies apply to all communities in California, but environmental justice issues have been raised more in the context of low-income and minority communities because of past land use policies and the cumulative impact of a concentration of emitting facilities in some neighborhoods.

To achieve this ambitious goal, the ARB established a Community Health Program and emphasized community health issues in our existing programs. To provide people with the basic tools and information needed to understand and participate in air pollution policy planning, permitting, and regulatory decision-making processes, ARB has published "The Public Participation Guide to Air Quality Decision Making in California."⁵

In addition, at its April 28, 2005, public meeting, the Board adopted the "Air Quality and Land Use Handbook: A Community Health Perspective" This document was developed to provide technical information to local land use and transportation agencies for considering impacts of local sources of air pollution in the land use decision-making process.

The Environmental Justice Policies are intended to promote the fair treatment of all Californians and cover the full spectrum of ARB activities. Underlying these Policies is a recognition that we need to engage community members in a meaningful way as we carry out our activities. People should have the best possible information about the air they breathe and what is being done to reduce unhealthful air pollution in their communities. The ARB recognizes its obligation to work closely with all stakeholders; communities, environmental and public health organizations, industry, business owners, other agencies, and all other interested parties to successfully implement these Policies. Our outreach efforts, described below, facilitate this objective.

⁴ Complete information for these programs can be found at <http://www.arb.ca.gov/ch/ej.htm>.

⁵ Complete information on this program can be found at http://www.arb.ca.gov/ch/public_participation.htm

The amendments presented in this report for the Board's consideration may provide air-quality benefits by reducing NOx and diesel PM emissions from urban buses that operate in neighborhoods in the District. NOx emissions contribute to respiratory impacts in children, to the formation of fine particulate matter, and to the formation of ozone, a criteria pollutant, as discussed in Section III.A. Diesel PM has been identified as a TAC and is discussed in Section III.B. The actions we have taken in applying these policies in our rulemaking reflect the Board's commitment to the fair treatment of all people throughout California.

B. Outreach Efforts

Consistent with ARB's environmental justice policy for strengthening our outreach efforts in all communities, staff utilized many avenues to engage stakeholders in the rulemaking effort.

1. Amend the Statewide Urban Bus Emission Requirements

Staff conducted six public workshops and additional focused meetings to discuss modifying the statewide urban bus emission requirements (Table 6). Those workshops held in Sacramento were webcast for individuals who could not travel to the meeting locations. Notices for the workshops were mailed to more than 3,700 individuals and companies and were posted to ARB's Public Transit Agencies web site⁶ and e-mailed to subscribers of ARB's electronic listserves related to this item.

⁶ <http://www.arb.ca.gov/msprog/bus/bus.htm>

Table 6. Workshop Locations and Times.

Date	Location	Time	Topics Discussed
December 2, 2003	El Monte	1:30 – 3:00 PM	Statewide Rule
December 3, 2003	Sacramento	1:30 – 3:00 PM	Statewide Rule
March 29, 2004	Sacramento	1:30 – 3:00 PM	Statewide Rule
March 30, 2004	El Monte	1:30 – 3:00 PM	Statewide Rule
April 7, 2005	El Monte	1:30 – 4:00 PM	Statewide Rule/ District Rule
April 27, 2005	Sacramento	1:00 – 4:00 PM	Statewide Rule/ District Rule

Attendees of the workshops included representatives from environmental organizations, transit agencies, engine manufacturers, bus manufacturers, air pollution control districts, cities and counties, the California Association for Coordinated Transportation, Regional Council of Rural Counties, Manufacturers of Emission Control Association, Engine Manufacturers Association, California Department of Transportation, California Natural Gas Association, California Energy Commission, consultants, and other parties interested in urban bus emissions.

Staff also met with a number of stakeholders in focused meetings throughout the rulemaking process to get feedback on modifying the current emission requirements. These stakeholders included manufacturers of engines and buses; natural gas advocates; and environmental organizations. Staff attended and made presentations at the California Transit Association conference in November 2003 and 2004 and the California Association for Coordinated Transportation conferences in April and September 2004, and April 2005.

2. Alternative Fuel Path Mandate for all Transit Agencies in the District

In October 2004, ARB posted a request for public comment concerning the District's fleet rules on its website. We requested comment on whether ARB should submit the District's fleet rules to U.S. EPA for a waiver of preemption, pursuant to section 209(b) of the Clean Air Act.

ARB received thousands of comments, including over 4,800 electronic submittals. After a thorough review of the comments and consultation with U.S. EPA, staff made a decision to pursue a new rulemaking process for some

fleet rules, as discussed earlier, with the generation of a new public record that would update relevant information on the effectiveness and costs of these rules.

Staff generated a webpage dedicated to the rulemaking effort.⁷ On this webpage, ARB provided notice of the rulemaking process with relevant background and contact information. Then staff generated a list serve from all those who had provided electronic comments. Along with those on ARB's mobile sources listserve, over 5,700 emails were sent to inform stakeholders of the rulemaking activity.

Staff conducted one public workshop in El Monte and one in Sacramento to discuss urban bus fleet requirements in the South Coast Air Basin (see Table 6 above). These workshops also covered modifying the statewide urban bus emission requirements. Notices for these workshops were mailed to more than 2000 individuals and companies and were posted to ARB's Fleet Rules for the South Coast Air Basin web site, as well as e-mailed to over 5,000 list serve subscribers.

With regard to the requirement that all transit agencies operating in the District be required to follow the alternative-fuel compliance path, staff also met with over fourteen stakeholders in focused meetings throughout the rulemaking process. These stakeholders included manufacturers of engines and buses and natural gas advocates. In addition, staff conducted telephone interviews with the transit agencies operating in the District to discuss the amendments presented in the report and obtain specific fleet information.

To generate additional public participation and to enhance the information flow between ARB and interested persons, staff made all documents, including workshop presentations, available via the Public Transit Agencies web site and/or the Fleet Rules for the South Coast Air Basin web site. In addition, these web sites provide background information and serve as portals to other web sites with related information.

III. NEED FOR EMISSION REDUCTIONS

Many regions of California have serious to severe problems with air quality. In particular, the South Coast Air Basin, which includes Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino Counties, is designated as a serious nonattainment area for PM₁₀ (particulate matter under 10 microns) and a severe nonattainment area for ozone. The Coachella Valley, located in the desert portion of Riverside County, is classified as a serious nonattainment area for PM₁₀ and a severe nonattainment area for ozone.

⁷ <http://www.arb.ca.gov/msprog/scfleet/scfleet.htm>

A. Ozone

Ground-level ozone is created by the photochemical reaction between NO_x and reactive organic gases (ROG). Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, shortness of breath, and congestion. It can worsen bronchitis, emphysema, and asthma. Ozone can also reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. The elderly, children, and people with compromised respiratory systems are among those persons who may be most affected by exposure to ozone.

Ground-level ozone also damages vegetation and ecosystems. It leads to reduced agricultural crop and commercial forest yields, reduced growth and survivability of tree seedlings, and increased susceptibility to diseases, pests, and other stresses such as harsh weather. Ground-level ozone also damages the foliage of trees and other plants, affecting the landscape of cities, parks and forests, and recreational areas.

B. Particulate Matter (PM)

PM emissions result primarily from incomplete combustion of fuel in the cylinder and lubrication oil that has entered the cylinder incidentally. Secondly produced diesel PM is formed as a result of atmospheric reactions with diesel NO_x emissions. The majority of diesel PM, approximately 98 percent, is smaller than ten microns in diameter. Diesel PM is a mixture of materials containing over 450 different components, including vapors and fine particles coated with organic substances. More than 40 chemicals in diesel exhaust are considered TACs by the State of California.

Diesel PM has been linked to a wide range of serious health problems. Particles that are deposited deep in the lungs can result in lung cancer, increased hospital admissions; increased respiratory symptoms and disease; decreased lung function, particularly in children and individuals with asthma; alterations in lung tissue and respiratory tract defense mechanisms; and premature death. Long-term ambient concentrations of PM₁₀ are associated with increased risks of all natural-cause mortality in males, mortality with any mention of nonmalignant respiratory causes in both sexes, and lung cancer mortality in males (Abbey, et al., 1999; McDonnell, et al., 2000).

IV. NEED FOR A POLICY DECISION BY THE BOARD TO AMEND ARB'S CURRENT REGULATIONS

Public transportation has important societal benefits, providing access to work and education, reducing traffic congestion, and meeting mobility needs of the public. However, this service is generally performed by heavy-duty urban buses that run on diesel fuel and make multiple trips with frequent start/stop operation

through residential and business communities. Since diesel exhaust has been identified as contributing to both toxic PM and ozone-generating NOx emissions it remains in society's best interest to reduce diesel emissions to the maximum feasible extent.

A. Amend the Statewide Urban Bus Emission Requirements

One of the major strategies used to reduce emissions of both NOx and PM from urban buses is the acceleration of bus replacement with newer buses. While transit agencies may receive funding to replace urban buses once they are 12 years old, staff has found that transit agencies will keep these buses in the fleet years longer. Fleet turn over – that is, transit agencies replacing their older buses with new buses using cleaner engine technologies – reduces emissions.

The California market for new urban bus engines is small, and meeting the California 2004 and 2007 NOx urban bus engine exhaust standards proved to be technologically challenging for diesel engines. In addition, the U.S. EPA adopted new heavy-duty engine standards for trucks and urban buses that were less stringent than the urban bus standards previously adopted by ARB. As a result, diesel engine manufacturers decided not to attempt to comply with California's new urban bus engine standards but instead to work towards achieving the less stringent, but still technologically challenging, national heavy-duty truck engine standards.

At the time the Board adopted California's rule, engine manufacturers told ARB they would not certify engines to meet the 2006 engine exhaust emission standards. In response, the Board adopted an alternative strategy that transit agencies could use to purchase urban bus engines certified to the 2002 emission standards so long as they reduced fleet NOx emissions as if they had purchased engines certified to 0.5 g/bhp-hr NOx. Only seven transit agencies completed the application process and qualified for the "alternative NOx strategy exemption."

In June 2004, staff, with concurrence of the Board, postponed a decision on a staff proposal to align the urban bus engine standards with the California 2007 heavy-duty standard because of an ongoing evaluation of available 2007 urban bus engine technology. Of particular interest to the Board was if natural gas engines would comply with the 2007 urban bus NOx emission standard.

B. Alternative Fuel Path Mandate for All Transit Agencies in the District

On June 16, 2000, the SCAQMD adopted Rule 1192 - Clean On-Road Transit Buses. Rule 1192 requires public transit fleets operating in the SCAQMD to acquire alternative-fuel vehicles when procuring or leasing transit fleet vehicles. The rule applies to government agencies and private companies under contract to government agencies, with fleets of 15 or more public transit vehicles or urban

buses that are providing passenger transportation services including intra- and intercity shuttle services. The scope of the rule includes: 1) vehicles having a GVWR of at least 14,000 pounds but no greater than 33,000 pounds, that are used for the express purpose of transporting passengers; and 2) buses having a GVWR greater than 33,000 and defined by ARB as "urban buses." Paratransit vehicles, as defined in Sections 226 and 462 of the California Vehicle Code, are excluded from Rule 1192.

SCAQMD defines an alternative-fuel heavy-duty vehicle as one that uses compressed or liquefied natural gas, propane, methanol, electricity, fuel cells, or other advanced technologies that do not rely on diesel fuel, and meets the emission requirements of title 13, CCR, section 1956.1, as adopted February 24, 2000. Rule 1192 does not consider diesel-based hybrid-electric and dual-fuel vehicles that use diesel fuel to be alternative-fuel vehicles.

Fleet operators of 15 or more transit vehicles or urban buses, except for municipal or included municipal operators with fewer than 100 transit vehicles or urban buses, were required to meet the requirements of Rule 1192 beginning July 16, 2000. This implementation deadline was July 1, 2001, for fleet operators that are considered municipal operators or included municipal operators with 15 or more, but less than 100 transit vehicles or urban buses. SCAQMD allowed additional lead time for the smaller fleets to identify funding sources as well as to construct the necessary infrastructure to support the operation of alternative-fuel transit vehicles. SCAQMD also provided an exemption for vehicles for which purchase or lease contracts existed prior to June 16, 2000.

In this rulemaking, the Board will have the option of amending the ARB's Fleet Rule for Transit Agencies to mandate that the six diesel path transit agencies in SCAQMD switch to the alternative fuel path, in order to have the state rule achieving the alternative fuel objectives of the District's Rule 1192. The ARB's adoption of a unique fleet requirement for the transit agencies in the District would have the effect of addressing the Court's decision regarding preemption while reflecting the Legislature's intent that SCAQMD be authorized to establish an alternative fuel fleet rule for transit districts within the District.

The Board may adopt the District fleet requirement presented in this report if the Board wishes to assure that alternative fuel urban transit buses are purchased throughout the District, and determines it wise to provide a backstop to the current District Rule 1192 in case litigation overturns the District rule.

V. ASSESSMENT OF THE POLICY DECISION TO BE PRESENTED TO THE BOARD

This report presents two policy decisions to be considered by the Board.

A. Amend the Statewide Urban Bus Emission Requirements

Staff has assessed urban bus engine availability based on the current 2007-2009 model year standard versus what could be available if the Board modifies the standard to align with the current 2007-2009 model year heavy-duty truck engine standards. There are essentially three scenarios that could occur. The first is that manufacturers could certify both diesel and alternative-fuel engines for sale in California in time to meet the standard of 0.2 g/bhp-hr NO_x in 2007.

Discussions with diesel engine manufacturers, however, have convinced staff that this scenario is unlikely. Since 2001 the Engine Manufacturer's Association (EMA) has been warning ARB that the major urban bus engine manufacturers would not meet California's 2007 NO_x standard of 0.2 g/bhp-hr and requested that ARB align its 2007 urban bus standards with the federal 2007 standards, adopted in 2001. More recently, the engine manufacturers have reiterated their position in verbal and written comments at the various public workshops for this rulemaking. Engine manufacturers have informed ARB that they plan to produce diesel engines nationwide that meet a nominal 1.2 g/bhp-hr NO_x standard and that they do not plan to produce diesel engines meeting the 0.2 g/bhp-hr NO_x standard until 2010.

The second scenario staff assessed is that manufacturers will make alternative fuel engines available to meet the 0.2 g/bhp-hr NO_x standard. Multiple manufacturers have stated publicly that they intend to produce natural gas or other alternative fuel urban bus engines that meet the California 2007 standard (CalNGV News 2004; Cummins-Westport 2005). Therefore, staff believes that there is a reasonable likelihood that one or more urban bus engine will be commercially available by 2007 for users of alternative fuels. There is some risk that these engines will be delayed or will not be certified and marketed, as these are all engines that require new technology.

The third scenario is that there will be no diesel or natural gas engines available for California urban buses for 2007-2009. In this case, California transit agencies would not be able to purchase new engines until 2010, at which time staff expects all engines, both diesel and alternative fuel, will meet the 2010 heavy-duty truck NO_x standard of 0.2 g/bhp-hr. As noted above, staff's assessment is that no diesel urban bus engines will be available in 2007 through 2009, but it is likely alternative fuel urban bus engines will be available.

There are 76 transit agencies statewide that report to ARB under the Fleet Rule for Transit Agencies. The 28 agencies on the alternative fuel path will still continue to purchase complying engines in 2007 through 2009, because staff

believes complying engines will be available. However, if the current 2007 urban bus emission standards are not modified, the 48 agencies on the diesel path will not be able to purchase new diesel buses until 2010. These diesel path transit agencies operate 62 percent of the California urban buses, and if they continue on the diesel path the result is that these agencies will likely keep their older buses longer or repower their buses until complying diesel buses are available in 2010. Emission reductions staff anticipated from the original rule will not be realized from diesel path transit agencies.

There is the potential that, with no diesel buses available in 2007 through 2009, a transit agency on the diesel path could purchase alternative fuel engines. However, based on their workshop comments and purchasing practices as reported to ARB annually, most agencies are unlikely to voluntarily replace their existing diesel buses with alternative-fuel engines for two reasons. The first is that the diesel path agencies expect there to be diesel engines available no later than 2010, and they have stated that they have the ability to forgo purchasing new buses until 2010. The second reason is that switching to alternative fuel requires a significant investment in infrastructure, training, and modifications to facilities. Transit agencies are unlikely to make these investments and changes in order to purchase buses for a short, three-year period. Therefore, it is unlikely that leaving the 2007 through 2009 model year urban bus NO_x standard at 0.2 g/bhp-hr would cause diesel path transit agencies to switch to the alternative fuel path.

Staff expects that manufacturers will certify diesel urban bus engines that meet the 1.2 g/bhp-hr NO_x level if the Board relaxes the NO_x standard for 2007 through 2009 model years. Staff also expects that, even if the Board changes the NO_x standard to 1.2 g/bhp-hr for 2007, some manufacturers will offer alternative fuel engines that meet the 0.2 g/bhp-hr NO_x level in 2007. Staff believes this to be the case because these manufacturers profess to have the technology to meet the 0.2 g/bhp-hr level, and will be required to meet this level by 2010. Thus, to avoid another design cycle and to capture sales resulting from incentive funds available for early-introduction engines, it is likely that some manufacturers will instead opt to produce 0.2 g/bhp-hr engines early.

Within these various scenarios, staff believes the most likely outcome for the 2007 through 2009 model years is that there will be 0.2 g/bhp-hr NO_x alternative fuel engines available, and that transit agencies on the alternative fuel path will purchase these engines. By aligning the 2007 through 2009 model year NO_x standard to the heavy-duty truck standard, diesel path agencies will also be able to purchase new engines in 2007 through 2009. If a requirement were adopted that required all transit agencies to follow the alternative fuel path, staff believes transit agencies would be forced to purchase alternative fuel engines in 2007 and later.

B. Alternative Fuel Path Mandate for All Transit Agencies in the District

As discussed earlier, there are 17 transit agencies that fall under Rule 1192 in the District (Table 7). All but one of these transit agencies operates urban buses and is subject to ARB's Fleet Rule for Transit Agencies. One transit agency, Commerce, has fewer than 15 buses and is therefore not subject to Rule 1192, but is subject to ARB's current transit fleet rule.

Of the 17 transit agencies in the District subject to ARB's Fleet Rule for Transit Agencies, eleven are on the alternative fuel path and under current state law must continue to purchase alternative fuel buses through 2015. These agencies represent 90 percent (4120 buses) of the transit buses in the District. Under ARB's Fleet Rule for Transit Agencies, the six transit agencies on the diesel path have the ability to purchase diesel engines, although Rule 1192 prohibits them from doing so.

Table 7. Transit Agencies in the SCAQMD

Transit Agency	Urban Buses ¹
Commerce ²	9
Culver City	46
Foothill Transit	306
Gardena Municipal Bus Lines ³	47
Glendale	26
Long Beach Transit ³	191
Los Angeles County MTA	2473
Los Angeles DOT	142
Montebello ³	72
Norwalk ³	30
Omnitrans	176
Orange County Transportation Authority	612
Pasadena ⁴	0
Riverside Transit Agency	114
Santa Clarita Transit ³	64
Santa Monica Big Blue Bus	174
Sunline Transit Agency	42
Torrance Transit System ³	53
Total	4577

¹ Based on annual reports to ARB and March 2005 survey of SCAQMD transit agencies.

² Commerce's fleet is below the 15 bus limit and is thus not subject to Rule 1192.

³ Agencies on the diesel compliance path.

⁴ Pasadena operates no urban buses; all of its buses are transit fleet vehicles regulated under ARB's February 24, 2005, amendments to the Fleet Rule for Transit Agencies.

In February and March of 2005, staff contacted each transit agency in the District on the diesel path to determine their future purchasing plans. Based on the

survey, staff estimates that all but one transit agency, Torrance, plans to purchase alternative-fuel buses (CNG or gasoline hybrid-electric).

Gardena expects to complete a new facility with a CNG refueling station by the end of 2006, but is currently purchasing gasoline hybrid-electric buses (gHEB). Santa Clarita has contracted to purchase 14 CNG buses, but obtained a waiver from the SCAQMD for purchasing diesel-fueled commuter buses.

Long Beach Transit and Montebello are purchasing gHEBs and neither agency intends to upgrade its facility to handle CNG. Norwalk is purchasing gHEBs, and may update its facility to accommodate CNG in the future. Both Montebello and Norwalk are interested in diesel hybrid-electric buses, however under Rule 1192 they cannot be purchased.

Thus, staff expects that without Board adoption of an alternative fuel requirement in the District, five of the six agencies on the diesel path will purchase alternative fuel buses, regardless. However, these agencies would have the ability to purchase diesel buses, and therefore staff's analysis assumes that, without an alternative fuel mandate in the District, all six of these transit agencies will purchase diesel buses if available.

VI. Inventory of Urban Buses and Emissions

This section discusses the inventory for urban buses and their emissions.

A. Inventory of Urban Buses

As part of the Fleet Rules for Transit Agencies, transit agencies must submit an annual report to ARB listing all their urban buses, including fuel use. Based on these reports, the statewide 2004 population was 9,845 urban buses, of which 3,764 were operated by transit agencies on the alternative-fuel path and 6,081 were operated by transit agencies on the diesel fuel path (Table 8). Note that alternative-fuel path agencies operate diesel buses, which are mostly older diesel. Also, some diesel path agencies operate alternative-fuel buses; these are mainly transit agencies located in the District. Most of the electric buses are operated by San Francisco MUNI, which is on the diesel path.

Table 8. Reported California Urban Bus Inventory as of January 1, 2005, by the Selected Fuel Path of the Transit Agency

Fuel Type	Statewide		SCAQMD	
	Alt Fuel Path	Diesel Path	Alt Fuel Path	Diesel Path
Diesel	1947	3758	1321	452
LNG	269	0	269	0
Propane	175	2	41	0
CNG:H2	2	0	2	0
CNG	3378	55	2477	0
Electric	5	366	0	0
Gasoline HEB	19	0	2	0
Diesel HEB*	2	4	2	2
Total	5657	4187	4114	454

*Operating with an urban bus engine or with an experimental permit, not certified as an HEB.

The major manufacturers of urban bus engines currently in operation are Cummins and Detroit Diesel, although Caterpillar and John Deere have also recently begun to enter the urban bus market. ARB provides a website to obtain information on California certified engines for use in urban buses. For the current 2005 model year, the web address is:
<http://www.arb.ca.gov/msprog/onroad/cert/mdehdehdv/2005/2005.htm>

B. Emission Inventory for Urban Buses

The California on-road vehicle emission inventory data consists of two elements: emissions-related and activity-related. The emissions-related data reflect new vehicle testing information and the latest vehicle registration data from the DMV. The activity-related data are updated by the regional transportation agencies that estimate of the daily vehicle miles of travel, the distribution of travel by speed, and the number of starts per vehicle per day by year. The on-road emission inventory is then derived using the EMFAC model (Appendix C).

ARB staff calculated the urban bus emission inventory using a model developed from EMFAC specifically incorporating the turnover rates from their reports and emission factors for urban buses. Gasoline vehicles were not included in the emissions analysis.

Under California’s current urban bus emission standards from 2004 through 2009, staff assumed urban bus turnover in most diesel path transit agencies to be almost non-existent. Transit agencies that repower existing diesel buses will use engines meeting the same engine standards as the existing engine. The

consequence of this mismatch between California's urban bus engine exhaust emission standards and the statements by the major urban bus engine manufacturers is that emissions from California's urban buses will remain high for many years. Transit agencies on the diesel path are unwilling to purchase alternative fuel buses to turn over their old diesel buses, but instead are waiting to purchase new, cleaner emission diesel urban buses in 2010.

At the June 24, 2004, and February 24, 2005, hearings, the Board adopted modifications to the standards for diesel HEBs. The modifications enabled manufacturers to certify diesel HEBs for 2004 through 2006. With prior approval from the executive officer, these buses are available for purchase or lease to transit agencies on the diesel path. Seven agencies have already qualified for the "alternative NOx strategy exemption" and a total of ten diesel path agencies have applied to purchase a total of approximately 190 diesel HEBs for 2006. These diesel HEB buses will meet a standard of 1.8 g/bhp-hr NOx and 0.01 g/bhp-hr PM. In addition, approximately seventeen ISE Corporation (ISE) gasoline HEBs are on order for Central California transit agencies, and approximately 70 are on order for South Coast fleets.

Modeling these assumptions suggests that California's urban bus engine exhaust emission standards for 2007 through 2009 have the unintended consequence of keeping urban bus emissions artificially high. The predicted emission reductions as a result of the 2000 rule are unlikely to be achieved. Staff estimates that there will be a shortfall between the NOx reductions expected if engine manufacturers had produced diesel urban bus engines meeting California's standards from 2004 through 2009 of 2.06 tpd in 2010; 1.31 tpd in 2015; and 0.72 tpd in 2020 (Table 9). For particulate matter (PM), the predicted emission reduction shortfall is 80 pounds per day (lbs/day) in 2010; 30 lbs/day in 2015; and 24 lbs/day in 2020 (Table 10). The baseline emissions for urban buses gradually decline over time because of turnover from dirtier engines to cleaner engines, along with the NOx and PM reductions mandates in the Fleet Rule for Transit Agencies. See Appendix C for an explanation of the emissions inventory methodology.

Table 9. NOx Statewide Diesel Emissions Inventory (tpd)

	2010	2015	2020
2000 Regulation Projected	5.87	2.41	0.65
Current Estimate – No Turnover ¹	7.93	3.72	1.37
Shortfall	-2.06	-1.31	-0.72

¹ Assumes no turnover of diesel engines from 2004-2009.

Table 10. PM Statewide Diesel Emissions Inventory (lbs/day)

	2010	2015	2020
2000 Regulation Projected	240	112	76
Current Estimate – No Turnover ¹	320	142	100
Shortfall	-80	-30	-24

¹ Assumes no turnover of diesel engines from 2004-2009.

VII. SUMMARY OF THE CONTROL MEASURES TO BE CONSIDERED BY THE BOARD

Staff has identified two policy decisions for the Board's consideration and has developed proposed regulatory amendments to support these decisions the Board may make. First, staff is presenting three options for the Board to consider regarding the appropriate emission standards for new urban bus engines in 2007 through 2009. The three options are: 1) keep the current new urban bus emissions standards as they are, 2) change the NOx emission standard for 2007 through 2009 model year new urban buses from 0.2 to 1.2 g/bhp-hr, which would align it with the equivalent model year heavy-duty truck NOx emission standard, and 3) require all transit agencies to purchase/lease only alternative fuel buses. The rulemaking documents prepared in connection with this report contain amendments to title 13, CCR, sections 1956.1, 1956.8 and 2023.1 (Appendix A), and set forth the following:

- Language to implement the option to align the 2007 and later emission standards for new urban buses with the 2007 and later emission standards that apply to new heavy duty trucks (for NOx this results in an average level of 1.2 g/bhp-hr in 2007 and 0.2 g/bhp-hr in 2010);
- Language to require that transit agencies operating within the jurisdiction of SCAQMD follow the alternative-fuel compliance path under Title 13, CCR, Section 2023.1.

The amendments provided in this report (set forth in the proposed regulation order in Appendix A) set forth the language necessary to implement the option of aligning the urban bus standards with the heavy-duty truck standards beginning with the 2007 model year. Should the Board favor the option to keep the urban

bus standards as they are, no regulatory changes are necessary. Should the Board decide that all transit agencies statewide should be required to purchase alternative fuel, a 15-day modification to ARB's Fleet Rule for Transit Agencies would be needed to accomplish this (and no change to the urban bus emission standards would be necessary). The language modifying the fleet rule for transit agencies applies to the purchase of urban buses by transit agencies operating in the District, and assures that alternative fuel transit buses are purchased throughout the District.

A. Scope and Applicability

Staff is requesting the Board to consider regulatory amendments that affect urban buses and transit agencies. California's standards for urban buses are set forth in title 13, CCR, section 1956.1 and the fleet requirements for urban buses are covered under Fleet Rules for Transit Agencies - Urban Bus Requirements title 13, CCR, sections 1956.2 – 1056.4 [to be recodified as 2023.1, per Board action on February 24, 2005].

B. Amend the Statewide Urban Bus Emission Requirements

Staff is presenting three options for the Board to consider regarding the appropriate emission standards for new urban bus engines in 2007 through 2009. The three options are: 1) keep the current new urban bus emissions standards as they are, 2) change the NOx emission standard for 2007 through 2009 model year new urban buses from 0.2 to 1.2 g/bhp-hr, which would align it with the equivalent model year heavy-duty truck NOx emission standard, and 3) require all transit agencies to purchase/lease only alternative fuel buses.

Should the Board favor the first option, to keep the current standards as they are, no regulatory changes are needed.

Should the Board favor the second option, to align the California urban bus engine exhaust emission standards with the current California truck engine exhaust emission standards for the 2007 through 2009 model years, the corresponding urban bus regulations and heavy-duty truck regulations will need to be modified. The truck engine regulations include standards for NOx, PM, carbon monoxide and non-methane hydrocarbons. Currently the standards for urban buses are located in title 13, CCR, section 1956.1. Specifically, the 2007 and later model year standards for urban buses are provided in subsection (a)(12). The heavy-duty engine and vehicle standards are located in title 13, CCR, section 1956.8. Paragraph (a)(12) of section 1956.1 would be deleted. Section 1956.8 would concurrently be modified to include urban buses for the 2007 and later model years. Thus, 2007 and later model year urban bus engines would be certified as heavy-duty engines.

Should the Board decide that all transit agencies statewide should be required to purchase only alternative fuel buses, language would need to be included into the ARB's Fleet Rule for Transit Agencies (section 1958.2) mandating this requirement. The requirement would mandate that 85 percent of a transit agency's annual purchases must be alternative fuel through 2015.

C. Alternative Fuel Path Mandate for All Transit Agencies in the District, Amend Section 1956.2

As discussed earlier, there are currently 17 transit agencies operating in the District that are subject to ARB's Fleet Rule for Transit Agencies (see Table 7). The amendments developed by staff are designed to increase the number of alternative-fueled urban buses operating in the District by requiring all of the transit agencies on the diesel path to change to the alternative-fuel path. This requirement mandates that 85 percent of a transit agency's annual purchases be alternative fuel through 2015. Those six transit agencies on the diesel fuel path must change to the alternative-fuel compliance path effective January 1, 2006. Multiple manufacturers have stated that they intend to have alternative fuel buses available in 2007 that meet a 0.2 g/bhp-hr level for NOx. Therefore, staff believes that this requirement will likely result in the purchase of buses meeting a 0.2 g/bhp-hr NOx level beginning in 2007 by the six transit agencies on the diesel path. However, because of the alignment option outlined above, alternative fuel buses meeting a 1.2 g/bhp-hr NOx level or higher may also be available.

D. Comparison of ARB's Fleet Rule for Transit Agencies and Rule 1192

While SCAQMD's Rule 1192 and ARB's fleet rule for transit agencies, for the most part, affect the same set of vehicles, there are some differences between them. Pasadena's fleet is not subject to ARB's Fleet Rule for Transit Agencies because Pasadena does not operate any urban buses, although it is subject to the new requirements for transit fleet vehicles. Pasadena does, however, have a large enough fleet of buses over 14,000 pounds GVWR that it falls under the authority of Rule 1192. Commerce, which is on the alternative-fuel path under ARB's rule, is not included under Rule 1192 because it has fewer than the fleet minimum of 15 vehicles.

In addition, Rule 1192 only affects vehicles at or above 14,000 pounds GVWR.⁸ The Board amended the Fleet Rule for Transit Agencies on February 24, 2005, to expand its scope to all heavy-duty buses and vehicles (greater than 8,500 lbs GVWR) owned or operated by a transit agency. ARB's rule also includes vehicles not included in Rule 1192, such as paratransit and non revenue producing vehicles. As a result, over 35 additional fleets operating in the District

⁸ SCAQMD adopted an additional rule, Rule 1191, "Clean On-Road Light- and Medium-Duty Public Fleet Vehicles" which includes requirements for transit fleets operating trucks and buses below 14,000 pounds GVWR.

are subject to ARB's fleet rule. These fleets, consisting primarily of non-urban buses, would not be subject to the alternative-fuel purchase requirement.

VIII. ENGINE TECHNOLOGY AND AVAILABILITY

This section discusses the current and expected availability of engines for urban buses. The information was obtained from engine manufacturers and other published sources. We have omitted information that engine manufacturers have indicated is confidential. A more in-depth discussion is included in the Technical Support Document for this rule. Information on how to access the Technical Support Document for this rule making can be found at the end of this report.

Conventional diesel engines use compression-ignition to generate power, whereas engines that operate on an alternative fuel, such as compressed natural gas (CNG), liquefied natural gas (LNG), and liquid petroleum gas (LPG), are typically spark-ignited. In the heavy-duty engine market, CNG and LNG are the most commonly used alternative fuels. Diesel hybrid-electric, dual fuel and bi-fuel trucks and buses are not considered to be alternative-fueled, although they can have significantly lower emissions than a straight diesel engine. Alternative-fueled engines are typically certified to lower engine exhaust emissions than same model year diesel-fueled engines, although a diesel engine equipped with exhaust aftertreatment may have emissions comparable to an alternative-fuel engine.

A. Current Engine Availability

Manufacturers have been able to meet the current heavy-duty truck engine exhaust standards without the use of aftertreatment technologies, relying instead on modifications to engine and combustion-related components. Engine modifications include such changes as improved electronic controls, improved turbocharger systems, and improved exhaust gas recirculation. Combustion modifications include improved engine timing, improved fuel injection systems, and improved cylinder design.

1. Diesel Fueled Engines

California has no urban bus diesel engine certified to its standards of 0.5 g/bhp-hr NO_x and 0.01 g/bhp-hr PM for the 2004 to 2006 model year. California regulations provide for an exception to this standard for the seven transit agencies that applied for and received a so-called "alternative NO_x strategy exemption." Engine manufacturers can certify urban bus diesel engines to the standards for 2003 in the 2004 to 2006 model year for sale to those transit agencies only. There is one diesel urban bus engine family, the Caterpillar C9 that is certified to 2.3 g/bhp-hr NO_x + NMHC and 0.004 g/bhp-hr PM, via the alternative NO_x strategy exemption.

In 2004 California adopted new engine standards of 1.8 g/bhp-hr NO_x and 0.01 g/bhp-hr PM for diesel hybrid-electric buses (dHEB), applicable only to the 2004 to 2006 model year. Transit agencies on the diesel path were allowed to apply for permission to purchase these buses, subject to certain requirements. Based on conversations with manufacturers, the staff expects that there will be one or more engine families certified and available for purchase in 2006, thus providing some transit agencies with an additional option for a diesel engine purchase.

2. Alternative Fuel Engines

For urban buses, there are currently two natural gas engine families certified by Cummins, two certified by DDC, and one certified by John Deere.

The outlook for natural gas urban bus engine availability in 2006 is the same as for 2005. However, Deere is currently involved in a demonstration project with U.S. DOE's National Renewable Energy Laboratory (NREL) and the SCAQMD to certify an oxidation catalyst equipped engine for use in urban buses to the 1.2 g/bhp-hr NO_x standard. Deere intends to have this product available by October 2005.

B. Mid-term Future Engine Availability (2007 – 2009)

The California diesel urban bus engine particulate emission standard is 0.01 g/bhp-hr, which applies to engines produced after October 1, 2002. Urban buses equipped with alternative fuel engines may certify to optional standards of 0.03, 0.02, or 0.01 g/bhp-hr. However, beginning in 2007, these engines must also meet the particulate standard of 0.01 g/bhp-hr. All alternative fuel urban bus engines currently are certified at a 0.01 g/bhp-hr level. The current NO_x standard for urban bus engines is 0.2 g/bhp-hr for 2007 and beyond.

While most manufacturers have released details about their 2007 engines, some have not. Thus the information that follows is necessarily incomplete and includes general information where specifics are unavailable for publication. Staff's evaluation includes both publicly available and confidential information.

1. Diesel Fueled Engines

As mentioned above, manufacturers have indicated that they do not intend to make diesel urban bus engines available that meet the 0.2 g/bhp-hr NO_x level until 2010. It is also unlikely that any dHEB would be able to meet this standard.

2. Alternative Fuel Engines

Two engine manufacturers, Cummins, through its joint partnership with Westport Innovations, Cummins Westport Inc.; and John Deere plan to offer alternative fuel urban buses that meet the 2007 emissions standards of 0.2 g/bhp-hr NO_x

and 0.01 g/bhp-hr PM. John Deere intends to produce a 250-325 horsepower, 9 liter natural gas engine. Cummins Westport Inc. has partnered with NREL to develop a lower emission version of the L Gas Plus (8.9 L) natural gas engine. This engine is scheduled to be commercially available in early-2007. The SCAQMD is also currently sponsoring a project with Cummins to commercialize the C Gas Plus engine (8.2 L) to 0.2 g/bhp-hr NO_x by 2007.

C. Long Term Engine Availability (2010 and beyond)

In 2004, U.S. EPA published its second review outlining the status and progress of engine and vehicle technology toward meeting the federal 2007 standards for heavy-duty diesel vehicles (U.S. EPA 2004). In its report, U.S. EPA concluded that manufacturers will meet the 2007 and 2010 standards in a two step process and that "engine manufacturers' 2007 compliance plans are a building block for the technology package they plan to use to meet the 0.20 g/bhp-hr NO_x standard in 2010." Thus, it is likely that selective catalytic reduction (SCR) and NO_x adsorbers for NO_x reduction, along with further improvements in engine technology, such as Clean Diesel Combustion, will play a large role for diesel technology in 2010 and beyond. Additional information on long-term engine availability is found in the Technical Support Document for this rule.

IX. END-USER EXPERIENCE: ALTERNATIVE FUELS

In March 2005, ARB staff surveyed maintenance managers of all 11 transit agencies in the District that operate all or a portion of their fleets on alternative fuel and that are subject to the ARB's Fleet Rule for Transit Agencies. The survey collected information on the experiences transit agencies have had to date with buses operating on alternative fuel. The cost data collected by this survey was used in the cost analysis and is discussed in Appendix D. Electric buses were not included in this survey.

A. Description of the Survey

Questions 1 through 4 were designed to elicit specific information on the number of buses in the fleet by fuel type, how long various fuels had been used, and whether the ability existed to re-fuel buses in the field. Questions 5 through 9 dealt with issues of maintenance and maintenance facilities for alternative fuel vehicles and additional staff training that might be needed to deal with maintenance of these vehicles. Question 10 was open-ended, asking for any additional comments the respondent wanted to make in connection with topics mentioned or not mentioned in the survey. A copy of the survey can be found in Appendix B.

B. End-User Experience with Alternative Fuels

Transit agencies rely mainly on three types of alternative fuels to power their buses: CNG, propane, and LNG. Many transit agencies will be purchasing gasoline HEBs that are arriving in 2005 through 2007. Since the gasoline HEB is a new technology, there was no in-use experience available at the time of the survey.

1. Propane

Only one transit agency in the survey was using propane or liquefied petroleum gas (LPG) to fuel their buses. Of their 189 buses, only 45 met the definition of urban bus. The transit agency contracts out for fuel and therefore had no experience with the maintenance or cost of the fueling equipment. The transit agency did not express any concerns or issues and plans to purchase over 50 more buses in the next 3 years.

2. Compressed and Liquefied Natural Gas (CNG/LNG)

In-use experience with alternative fuels, primarily CNG, was initiated in the mid-1990's. Of those surveyed, experience with CNG ranged from 3 to 11 years and LNG five years.

a. Fueling

Nine of the eleven transit agencies maintain their own fueling stations on site, of which four are expanding their fueling sites. Fueling times are based on the equipment available. On-site operations can "quick fill" a bus in 8 to 15 minutes, or choose to slow fill a bus over night (6 hours). One facility uses an off-site station operated by the city, where fueling can take up to an hour per bus. The operator uses this time to clean the vehicles while waiting for the vehicle to fuel. Another facility contracts to private operations to provide their fuel.

Of the nine transit agencies with fueling stations, four reported that fuel storage was more complex and expensive with alternative fuel. One transit agency reported that CNG storage took six times the space as diesel, but one transit agency reported that fuel storage for diesel and CNG were about the same.

b. Maintenance Shop Modifications for Alternative Fuel Vehicles

Transit agencies must upgrade their maintenance facilities when working with gaseous or "lighter than air" fuels to meet fire code and safety regulations. These facilities require modification of the structure to prevent "pockets" where gases can pool, installation of sensors to detect buildup of gas and fire alarm systems, and up-grading air circulation systems. Specialized tools are also required for working on alternative fuel vehicles. Facilities that do not modify repair shops

must work on alternative fuel vehicles outside in the open air or send them to other repair facilities. Eight of the 11 agencies have modified their facilities; the other three contract out their maintenance work.

c. Maintenance and Down Time for Alternative Fuel Vehicles

Seven of the 11 transit agencies reported increased maintenance time and downtime with alternate fuels (six with CNG; one with LNG). Two transit agencies reported 15 to 20 percent increases in maintenance time. One transit agency stated that by increasing the maintenance schedules, downtime was close to what they experienced with diesel buses. Two transit agencies reported no difference between CNG and diesel. One transit agency experienced significant breakdowns with CNG buses. Two transit agencies stated that CNG technology has improved over the years to be equivalent to diesel buses.

As a result of increased maintenance, two transit agencies stated that they maintain a higher spare parts and bus ratio. Four transit agencies reported that parts for CNG fueled buses were more expensive.

d. Training Staff for Alternative Fuel Vehicles:

Nine of the 11 transit agencies that use alternative-fuel buses said staff must receive special training to operate and/or service these vehicles. Mechanics must be certified every 3 to 5 years. Drivers require specific training on alarms and manual shut off systems. One transit agency that contracts out for the work requires a demonstration of experience with CNG. Five of the 11 transit agencies reported ongoing training annually.

3. Conclusion

Strong opinions exist regarding the use of alternative fuels. For those transit agencies that have embraced the technology, they consider any increased maintenance or costs as marginal or a part of doing business and have adjusted their practices to meet any operational changes. Engine reliability issues appeared to be focused on older engine models, where the newer models are more reliable. For fueling and maintenance facilities, all the transit agencies consider diesel easier and less expensive.

X. REGULATORY ALTERNATIVES

Staff has provided three options for the Board's consideration regarding potentially amending the statewide urban bus emission requirement. Therefore staff has not evaluated any additional alternatives for the Board to consider.

With regard to the District specific fleet rule staff evaluated an alternative to not require transit agencies in the District to follow the follow the alternative-fuel path.

This alternative, in conjunction with Board adoption of statewide alignment of the urban bus and heavy-duty truck emission standards, would allow transit agencies on the diesel path, including the six in the District, to purchase diesel engines in 2007 through 2009. If the SCAQMD Rule 1192 were to be invalidated, the six transit agencies on the diesel path located in the District would be able to purchase diesel urban buses. There is some benefit associated with this alternative because of the turnover of older diesel engines to new, cleaner engines. However, this alternative would not provide the additional benefit in the District of mandating the purchase of alternative fuel buses for the six transit agencies currently on the diesel fuel path. It is worth noting that staff expects that without Board adoption of an alternative fuel requirement in the District, five of the six agencies on the diesel path will likely purchase alternative fuel buses, regardless. However, these agencies would have the ability to purchase diesel buses, and therefore, staff's analysis assumes that, without an alternative fuel mandate in the District, these transit agencies will eventually purchase diesel buses if available.

It should also be noted that this alternative is only viable if the Board chooses to also adopt the statewide alignment of the urban bus emission standards with the heavy-duty truck emission standards. If the Board chooses to leave the state urban bus standards as they are, or if the Board chooses to require all transit agencies statewide to follow the alternative fuel path, then Board adoption of a specific alternative fuel purchase requirement in the District is not necessary.

XI. ECONOMIC IMPACT

Staff is presenting to the Board for its consideration a requirement that transit agencies operating in the jurisdiction of the SCAQMD be mandated to follow the alternative-fuel compliance path, under section 2023.1, title 13, CCR. Six transit agencies operating in the District are currently on the diesel compliance path, and therefore would be required to change to the alternative-fuel compliance path.

In addition, staff is presenting to the Board for its consideration amendments that would modify the urban bus new engine standards or require the use of alternative fuel buses statewide.

Staff believes that the regulatory amendments presented here for Board consideration would cause no noticeably adverse impacts in California employment, business status, or competitiveness.

A. Legal Requirement

Sections 11346.3 and 11346.5 of the Government Code require state agencies proposing to adopt or amend any administrative regulation to assess the

potential for adverse economic impact on California business enterprises and individuals. The assessment shall include consideration of the impact of the proposed regulation on California jobs; on business expansion, elimination, or creation; and on the ability of California businesses to compete in other states.

State agencies are also required to estimate the cost or savings to any state or local agency or school district in accordance with instructions adopted by the Department of Finance. This estimate is to include nondiscretionary costs or savings to local agencies, and the costs or savings in federal funding to the state.

B. Affected Businesses

Businesses that may be affected as a result of the regulatory amendments presented in this report include manufacturers of diesel urban bus engines and alternative fuel technologies such as CNG, LNG, dual-fuel and hybrid-electric urban bus engines, manufacturers of urban buses, alternative fuel providers, and distributors and installers of bus engines. Most manufacturers of buses, trucks, and engines are located outside of California. One manufacturer of hybrid-electric systems is located in California. There is at least one company in California that specializes in conversions of standard diesel buses to alternative fuel buses.

C. Potential Impact on Businesses

The statewide alignment option should have a positive impact on engine and bus manufacturers by allowing them to certify and sell their products in California in 2007 through 2009. This regulatory modification does not impose a mandate but would open up the market for diesel and diesel hybrid-electric urban buses, benefitting engine manufacturers, bus manufacturers, and system integrators.

The statewide alternative fuel mandate option could impact engine manufacturers that only produce diesel engines. These manufacturers would need to produce alternative fuel buses or risk losing urban bus engine sales in California. Currently, only one manufacturer that certifies engines for use in urban buses, Caterpillar, does not produce alternative fuel engines for urban buses. Caterpillar is headquartered outside of California.

Should the Board elect to require the alternative fuel path for all transit agencies in the District the amendment is expected to have a positive impact on the alternative fuel engine and bus manufacturers. Any negative effect on the sales volume of diesel engines would be negligible.

D. Potential Impact on Business Competitiveness

The regulatory options presented in this report would have no significant impact on the ability of California urban bus engine and vehicle manufacturers to

compete with manufacturers of similar products in other states. This is because all manufacturers that produce urban bus engines and vehicles for sale in California are subject to the emission requirement regardless of their location. Furthermore, all of the engine manufacturers, and most of the vehicle manufacturers, are located outside of California.

E. Potential Impact on Employment

The statewide alignment option is expected to benefit manufacturers, who will be able to produce and sell diesel urban buses outside of the District in 2007 through 2009.

The statewide alternative fuel mandate option could impact engine manufacturers that only produce diesel engines. These manufacturers would need to produce alternative fuel buses or risk losing urban bus engine sales in California. Currently, only one manufacturer that certifies engines for use in urban buses, Caterpillar, does not produce alternative fuel engines for urban buses. Caterpillar is headquartered outside of California.

Should the Board elect to require the alternative fuel path for all transit agencies in the District there may be some impact on employment for those transit agencies currently following the diesel compliance path in the District, however the impact is expected to be small. Five of the six agencies currently on the diesel path are already intending to purchase alternative-fuel vehicles. In addition, any added costs are expected to be recovered through appropriate fare increases.

F. Potential Impact on Business Creation, Elimination, or Expansion

The regulatory options presented in this report are expected to have no impact on business creation, elimination or expansion.

G. Estimated Costs to Local Transit Agencies

This section discusses the costs that transit agencies may occur as a result of the regulatory options presented in this report.

1. Cost Estimates for Statewide Alignment

Staff has concluded that there are no significant adverse fiscal impacts on any state or local agencies. The statewide alignment option should have a positive impact on transit agencies outside the District by allowing the purchase of new diesel buses in California in 2007 through 2009 that are typically cheaper than comparable alternative-fuel buses. Therefore this option should result in a cost savings to a transit agency.

2. Cost Estimates Associated With the Alternative Fuel Path Mandate for All Transit Agencies, Statewide

This requirement would impact the 48 transit agencies currently on the diesel path. These agencies will be required to purchase or lease alternative fuel buses in place of diesel buses. The higher cost of alternative fuel buses along with costs associated with infrastructure modifications may result in a decreased budget for other operations.

3. Cost Estimates Associated With the Alternative Fuel Path Mandate for All Transit Agencies in the District

This requirement would have some impact on the six transit agencies operating in the District that are currently following the diesel fuel compliance path. These agencies will be required to purchase or lease alternative fuel buses in place of diesel buses. The higher cost of alternative fuel buses may result in a decreased budget for other operations. However, since five of the six affected transit agencies are already planning to purchase alternative fuel buses, the impact of this amendment will be minimal.

XII. ENVIRONMENTAL IMPACTS AND COST-EFFECTIVENESS

Described in this section are the air quality benefits and the cost-effectiveness of the regulatory options staff is requesting the Board to consider.

A. Benefits within the District and Statewide

The implementation of California's existing new engine standards and urban bus fleet requirements has resulted in a drastic decrease in the state and local fleet average NOx levels. On January 1, 2001, the statewide and the District median urban bus fleet average NOx emissions were 5.16 and 5.28 g/bhp-hr, respectively. As of January 1, 2005, the statewide and the District median urban bus fleet average NOx emissions have dropped to 3.63 and 3.53 g/bhp-hr, statewide and in the District, respectively. This represents a decrease in the statewide and District urban bus fleet average NOx emissions of 30% and 33%, respectively.

1. Impacts on the Air Quality Management Plan

Staff's analysis shows that the weighted average NOx fleet levels of agencies on the diesel-fuel compliance path are much higher (well over 1.0 g/bhp-hr higher) than those on the alternative-fuel compliance path (Table 11). Therefore, there has been an emission benefit associated with having fleets comply using the alternative-fuel path.

Table 11. Diesel Versus Alternative Fuel Path NOx Fleet Averages for Agencies in the District (g/bhp-hr)

Rule	Path	Ave.
1192	Alt. Fuel	3.01
	Diesel	4.26
ARB (Includes more Transit Agencies)	Alt. Fuel	3.14
	Diesel	4.26

2. Emission Benefits

The emission benefits of the policy decisions staff is requesting be considered by the Board are discussed in this section.

When the emission standards for new urban bus engines were adopted in 2000, staff believed diesel engines meeting these standards would be available for purchase. For NOx, the standard dropped from 2.4 g/bhp-hr HC+NOx (about 2.2 g/bhp-hr NOx) to 0.5 g/bhp-hr NOx in 2004-2006, and to 0.2 g/bhp-hr NOx in 2007 and beyond. As discussed earlier, engine manufacturers are not offering for sale diesel urban buses that meet the 2004-2006 standards, and will not offer diesel engines that meet the 0.2 g/bhp-hr standard until 2010. Thus no diesel engines have been available for purchase, and will not be available until 2010. As a result, little or no fleet turnover has occurred for diesel path transit agencies. (Seven agencies received an exemption to buy higher emitting diesel engines through 2006, and have been doing so. These agencies took other steps to reduce their fleet average NOx emissions).

Figures 1 and 2 show the urban transit emissions of diesel path agencies⁹ staff expected as a result of the original rule, and an updated analysis that reflects the unavailability of diesel engines for purchase. Emissions are higher than had been expected, and will remain so even after purchases of diesel engines resumes in 2010.

⁹ The following four figures show emissions for only those transit agencies on the diesel path. Staff assumes that transit agencies on the alternative fuel path will continue to purchase alternative fuel engines.

Staff has also estimated the emissions of the diesel path agencies should the board decide to change the statewide requirements and/or require the six SCAQMD diesel path agencies to switch to the alternative fuel path.

Figure 1. NOx Emissions – Original Estimate and Current Estimate

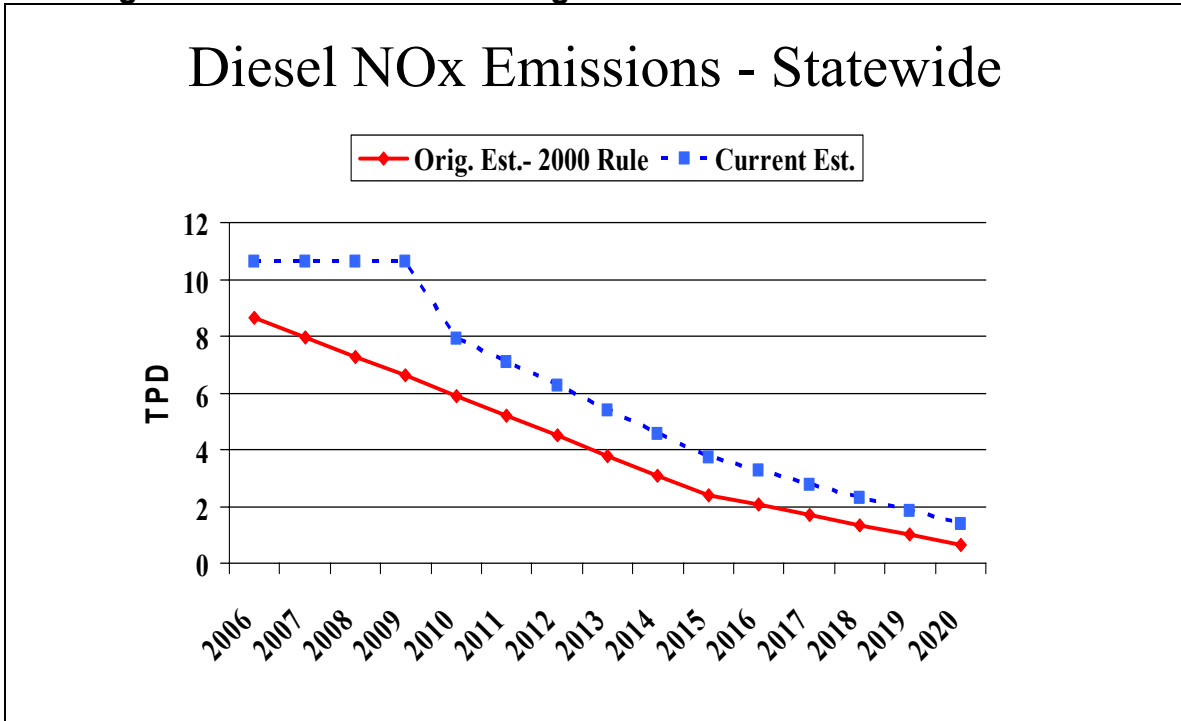
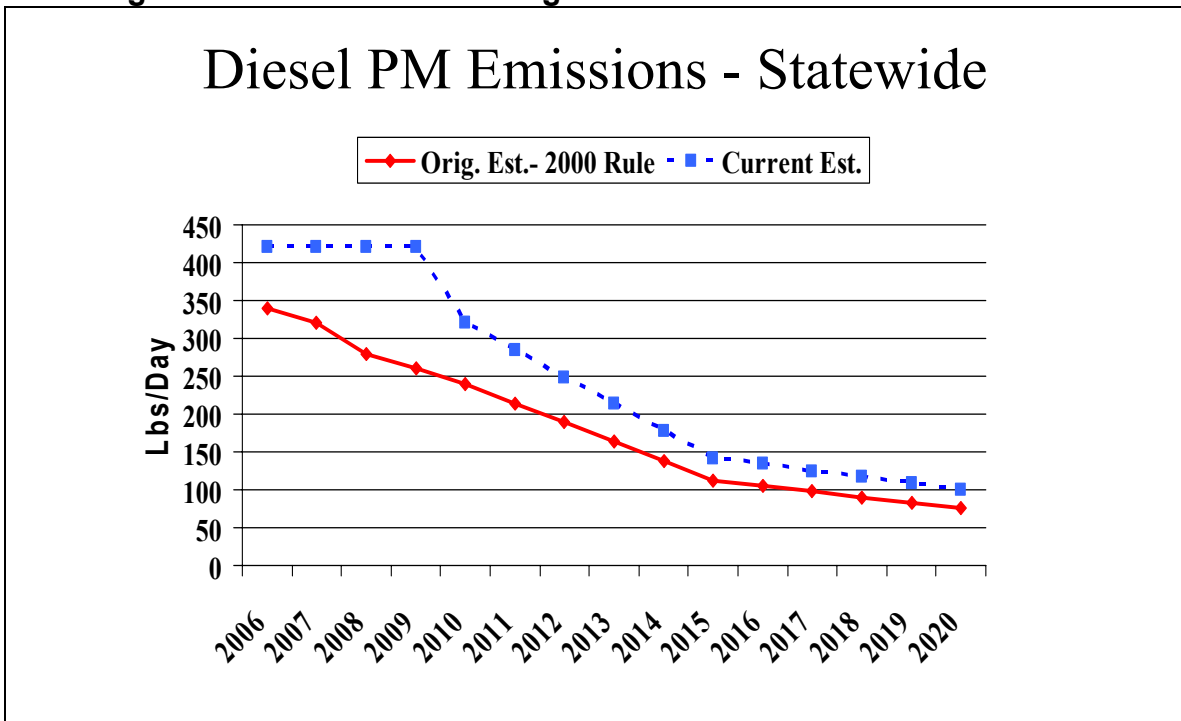


Figure 2. PM Emissions – Original Estimate and Current Estimate



a. Statewide Alignment

This option relaxes the NOx standard in 2007-2009 to align with the current diesel trucks standard. This will result in the availability of diesel bus engines in 2007-2009 that emit at 1.2 g/bhp-hr NOx. As a result purchases of diesel bus engines will resume in 2007, replacing older, dirtier engines. Emissions will be lower by up to about 1.6 tpd NOx and 80 pounds per day PM in 2009, compared to retaining the current 0.2 g/bhp-hr NOx standard.

In determining the emissions resulting if the Board does not change the current emission standard, staff assumed that funds that would have been used to purchase diesel buses in 2007-2009, had diesel engines been available, will be saved and deferred purchases will be made, in addition to normal purchases, beginning in 2010. Thus all new purchases of diesel buses will comply with the 0.2 g/bhp-hr NOx standard, whereas if the standards are aligned in 2007, some buses purchased in 2007-2009 will emit 1.2 g/bhp-hr. As a result, the no change option results in greater NOx emission reductions beginning in 2012 (by up to about 1.2 tpd NOx). Staff estimates that by 2025, emissions will be the same for both scenarios because the 1.2 g/bhp-hr NOx engines from the alignment option have been retired. Figures 3 and 4 illustrate these findings.

b. Alternative Fuel Path Mandate for All Transit Agencies, Statewide

Staff analyzed the emissions benefit of requiring diesel path transit agencies statewide to follow the alternative fuel path. This option would result in slightly lower tons per day NOx emissions than the option to align the standards. Emissions will be lower by up to about 1.0 tpd NOx 2009. This occurs because transit agencies would be purchasing buses that meet a 0.2 g/bhp-hr NOx standard beginning in 2007, as opposed to a 1.2 g/bhp-hr NOx level under the alignment option. This emissions benefit will continue, past 2020, until the entire fleet of 1.2 g/bhp-hr engines are turned over to new engines meeting the 0.2 g/bhp-hr level. However, should the Board decide to require that all transit agencies follow the alternative fuel path, some agencies currently on the diesel path may defer replacing their diesel engines while they prepare fueling infrastructure. If this occurs, there would be a short-term emission disbenefit to this option as compared to the alignment option until these engines are replaced.

In the short-term this option would also result in lower emissions than if the Board decides to retain the current urban bus standards. Emissions will be lower by up to about 2.5 tpd NOx and 80 pounds per day PM in 2009. This occurs because if the current standards are retained, diesel path agencies would defer purchasing new buses until 2010, thereby keeping older, more polluting buses in their fleet.

However, after 2010, once the engines whose replacement was deferred are replaced, the emissions associated with these two options will be similar.

Figure 3. NOx Emissions – Comparison of Options

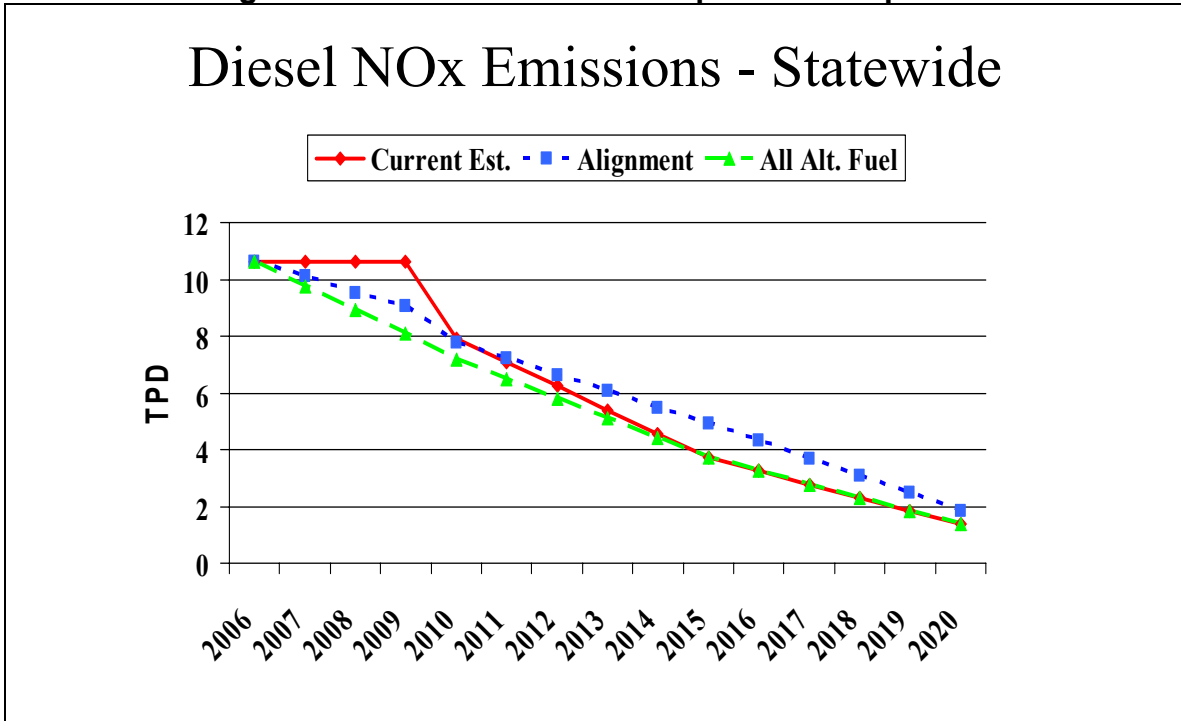
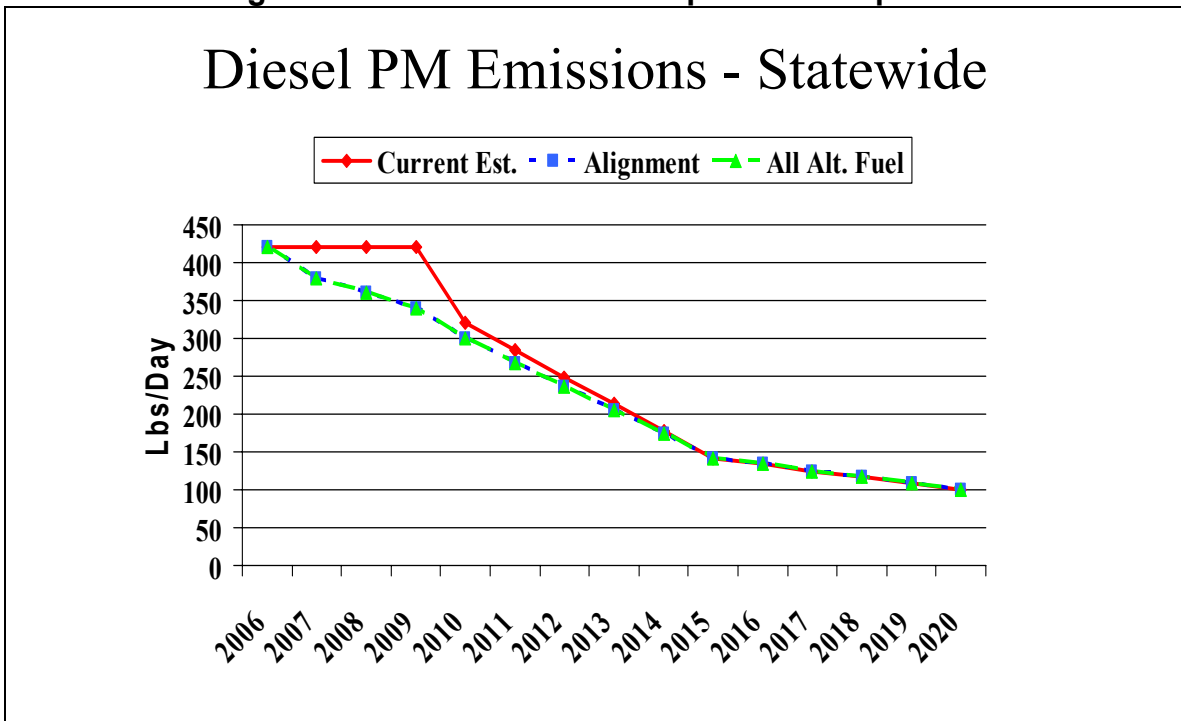


Figure 4. PM Emissions – Comparison of Options



c. Alternative Fuel Path Mandate for All Transit Agencies in the District

Small emission reductions of NOx will be achieved if the six transit agencies on the diesel path purchase cleaner, alternative fuel buses beginning in 2006 (Table 12). This assumes that the District cannot implement its current Rule 1192, and the six agencies would have switched to purchasing dirtier diesels in the absence of an ARB rule forcing them onto the alternative fuel path. If the District rule can be implemented, as now appears to be the case, no additional emission reductions would be achieved from adopting this requirement.

Several manufacturers have stated that they intend to have alternative fuel buses available in 2007 that meet a 0.2 g/bhp-hr level for NOx. Staff believes it is very likely that transit agencies on the alternative fuel path will purchase these engines. Therefore, staff's emission analysis assumed that the District alternative fuel requirement will result in the purchase of buses meeting a 0.2 g/bhp-hr NOx level beginning in 2007 by the six transit agencies currently on the diesel path. The benefits presented here are the incremental benefits of requiring the purchase of alternative fuel buses, assumed to meet a 0.2 g/bhp-hr NOx level, instead of purchasing diesel engines meeting 1.2 g/bhp-hr NOx level (as would be allowed with alignment and no District rule were in place) for the six transit agencies.

Table 12. NOx Emission Benefits (tpd) in the District - Mandatory Alternative Fuel Path

Year	Baseline	Alt. Fuel Mandate	Reduction
2010	7.37	7.36	0.01*
2015	5.86	5.84	0.02*
2020	3.34	3.34	0

*If the Board adopts the statewide alignment option, and if the six transit agencies chose to purchase alternative fuel buses that meet the 1.2 g/bhp-hr NOx level during 2007 through 2009, there would be no benefit associated with purchasing alternative fuel buses over diesel buses. Therefore, actual benefits could range between zero and the tons per day shown here.

Requiring transit agencies in the District to switch to the alternative fuel path will result in NOx benefits, but will not result in any change in PM emissions. A PM emission standard of 0.01 g/bhp-hr for diesel urban bus engines has been in effect in California for engines produced after October 1, 2002, all current alternative fuel urban bus engines are certified at a 0.01 g/bhp-hr level.

B. Cost and Cost-Effectiveness

The following section discusses the cost-effectiveness associated with each decision the Board may consider.

1. Amend the Statewide Urban Bus Emission Requirements

Staff is proposing three options for the Board to consider. There is no cost associated with the option to keep the emissions standards as they are. The other two options have been analyzed separately, and presented below.

a. Statewide Alignment

Staff has determined there is no additional cost of the option to revise the new urban bus engine emission standards to align with the current truck standards. This option will allow purchase of diesel engines by diesel path agencies in 2007-2009, and may reduce operating and maintenance costs by replacing older engines. If the current standards are retained, diesel path agencies are expected to defer purchases until 2010 and beyond. These engines will cost more than the engines that could be purchased in 2007-2009 if the standards are aligned.

b. Alternative Fuel Path Mandate for All Transit Agencies, Statewide

This option would mandate that at least 85 percent of a transit agency's annual purchases be alternative fuel through 2015. This requirement should have no cost impact on those transit agencies already on the alternative fuel path. However, transit agencies on the diesel path will be required to switch to alternative fuel. The additional cost to these transit agencies would include the incremental cost increase of alternative fuel bus compared to a diesel bus as well as the cost to upgrade infrastructure.

Staff estimated the incremental cost of this option by determining the difference between the capital and operations and maintenance costs of diesel urban buses and alternative-fuel urban buses. Staff estimates the total per bus cost increase to be \$76,517. A discussion of the cost breakdown follows.

The FTA provides 80%-83% of the capital cost of new buses, so transit agencies see only a portion of the per-bus additional capital cost. As a conservative estimate, staff assumed a 20 percent transit agency share, although the cost to society is the full incremental cost difference. Thus, staff estimates a typical incremental purchase cost of for a CNG bus is \$10,000 funded by the local transit agency.

If a transit agency does not already have an alternative fuel fueling facility, this option may make it necessary for the transit agency to upgrade its fueling facility

to handle alternative fuel. Staff assumed that half of the natural gas fueling facilities constructed would be L/CNG stations (gasification) at a cost of \$25,000 per bus and that half would be CNG (compression) stations at a cost of \$36,712 per bus. Upgrades to bus maintenance facilities for handling CNG buses are also required at the cost of \$23,870 per bus.

Staff believes that maintenance costs for natural gas buses are likely to be somewhat higher than for diesel buses. Staff estimates the extra maintenance costs to be about \$4,300 per year. In addition, there are cost associated with the maintenance of fueling facilities at a cost of \$2,245 per bus per year.

Labor costs for natural gas buses and gasoline HEBs are expected to increase modestly over typical diesel bus costs. Initial training costs, and ongoing training associated with regular recertification of technicians for natural gas maintenance, are primarily responsible for expected minor increases in labor costs of about \$18 per year per bus.

The estimated incremental bus cost does not include any costs associated with the difference between the cost of alternative fuel versus diesel fuel. Fuel cost differences are economically highly uncertain over the life of the regulation. Although at present natural gas is less expensive than diesel, it is impossible to be certain about fossil-fuel market conditions between now and 2020. To explore the sensitivity of fuel cost, staff analyzed both a lower and higher natural gas fuel cost relative to diesel. The result is that purchase incremental per bus costs could range from \$28,227 (low cost) to \$107,141 (high cost) per bus.

In order to determine cost-effectiveness, ARB took the typical total incremental cost of the buses to be purchased, with FTA funding, and divided by the total NOx emission reductions for the life of the regulation. These values were based on NOx emission reductions only. The expected cost-effectiveness ratio is \$119,030 per ton (\$59.51 per pound).

2. Alternative Fuel Path Mandate for All Transit Agencies in the District

As with the option to mandate alternative fuel statewide, for the option to require the District agencies to switch to the alternative fuel path, staff based the cost-effectiveness analysis on estimates of expected emissions reductions and of costs for implementation of this option.

Staff estimated the incremental cost of this option by determining the difference between the capital and operations and maintenance costs of diesel urban buses and alternative-fuel urban buses. Staff estimates the total per bus cost increase to be \$26,745. This cost is different than the per bus incremental cost given above for the statewide alternative fuel mandate for the following reasons.

Staff surveyed the six transit fleets on the diesel path and requested their purchasing plans for 2005 to 2009. The results showed that a majority of the buses that would be purchased would be gasoline HEBs. Staff estimates that gasoline HEBs have an incremental purchase cost of \$24,546.

In addition, staff expects that the six transit providers affected by this option will be able to obtain fuel from facilities that are already, or will soon be, available, based on staff's survey of transit agencies. Most transit agencies that plan to purchase CNG buses have already either built a fueling station or have one planned and financed. In addition, transit agencies that are purchasing gasoline HEBs will use existing facilities. Therefore, this analysis does not include capital costs of new fueling facilities.

In order to determine cost-effectiveness, ARB took the typical incremental cost of the buses to be purchased, with FTA funding, and divided by the total NOx emission reductions for the life of the regulation. These values were based on NOx emission reductions only. The expected cost-effectiveness ratio is \$67,837 per ton (\$33.92 per pound)¹⁰

C. Toxics from Diesel and Alternative Fueled Engines

Historically diesel engines were perceived as having higher PM emissions and other deleterious compounds known to have adverse health effects than similar natural gas engines. Natural gas engines were typically thought of as "low emission", as emitting less PM and NOx, than their diesel counterparts (Ahlvik et al 2000; Clark et al 1995; Clark et al 1999; Ayala et al 2002). However, with the advent of aftertreatment technologies such as diesel oxidation catalysts and diesel particulate filters, and the fact that vehicle exhaust is a complex composition of many compounds, not just PM and NOx, the assumption that natural gas engines are inherently less polluting than diesel equipped with aftertreatment was called into question.

To this end the ARB led a multi-agency research effort to compare emissions from diesel and natural gas engines. The study evaluated natural gas (NG) and diesel bus engines with and without exhaust aftertreatment. Summarized in Table 13 is a comparison of emissions based on this study. For NOx, natural gas engines are cleaner until 2010 (assuming a 0.2 g/bhp-hr NOx engine is certified in 2007). Beginning in 2002, diesel bus engines were equipped with a particulate filter, and natural gas engines utilized an oxidation catalyst. As a result, PM emissions are equivalent. Since both the oxidation catalyst and the diesel particulate filter oxidize most toxic compounds, natural gas bus engines since 2002 have roughly equivalent toxic emissions as diesel engines.

¹⁰ Actual cost-effectiveness values could be higher if the transit agencies choose to purchase alternative fuel buses during 2007 through 2009 with NOx emissions higher than 0.2 g/bhp-hr thereby decreasing the emissions benefits.

Table 13. Emission Comparison - Diesel Bus vs Natural Gas Bus

Model Year Bus	Bus Emission Standards (g/bhp-hr)		Natural Gas, Compared to Diesel, Is Typically:		
	NOx	PM	NOx	PM	Other Toxics
Mid-1990s to 2002 (diesel w/o filter and NG w/o catalyst)	4	0.05	50% cleaner	40% cleaner	Varies
Today (2003 - 2006) (diesel w/ filter and NG w/o catalyst)	~2.2 ¹	0.01	25% cleaner	Same	Same
2007 (diesel w/ filter and NG w/ catalyst)	1.2	0.01	80% cleaner ²	Same	Same
2010 (diesel w/ filter + absorber and NG w/ 3-way catalyst)	0.2	0.01	Same	Same	Same

1) NOx standard applies to alternative fuel engines and diesel engines available to seven transit agencies that provided NOx offsets. In 2004 through 2006, for transit agencies without an offset plan, the bus NOx emission standard is 0.5 g/bhp-hr - no diesel bus engines have been certified to this level.

2) Several natural gas bus engines are expected to comply with the 2010 0.2 g/bhp-hr NOx standard by 2007, in which case they would be about 80% cleaner. For other natural gas bus engines the NOx emissions will likely be the same as diesel.

XIII. ISSUES

Over the course of development of the regulatory options presented in this report, staff has met many times with various stakeholders and received written and verbal comments. Although staff has considered each comment, not all issues could be resolved. The following is a discussion of major outstanding issues.

A. Statewide Alignment

Staff has included an option for Board consideration to change the NOx emission standard for new urban bus engines from its current 0.2 g/bhp-hr to align it with the California new diesel truck engine standard of 1.2 g/bhp-hr. The benefit of this change is diesel engines will become available for purchase. Without this change diesel engines will be unavailable until 2010. Changing the standard will allow new diesel engine purchases and retirement of older, higher emitting engines, during these years, thus agencies on the diesel path favor this option.

During the public process, staff received comments from environmentalists and natural gas providers that ARB should keep the current standard. They stated a relaxation of the standard would send a signal that California did not want or value natural gas engines. As a result investment in developing a 0.2 g/bhp-hr CNG engine for 2007 might be in jeopardy. Their position also seemed to be based on a belief that in the absence of new diesel engines being available for purchase in 2007-09, transit agencies on the diesel path would choose to purchase natural gas engines, resulting in greater emission reductions than if the Board aligned the standards. However, as discussed previously, information provided to staff by transit agencies on the diesel path indicates they are prepared to forgo purchases of new buses until 2010 if the only bus engine available is alternative fueled. In 2010 diesel engines meeting the current standard will be available.

Regarding whether investment in low emission natural gas engine development will continue, staff points out that transit districts on the alternative fuel path account for nearly 60% of all California transit buses, and they will provide a continuing demand for natural gas and other alternative fuel engines through at least 2015.

B. Alternative Fuel Path Mandate for All Transit Agencies, Statewide

Another option for the Board's consideration is to require all transit agencies, including those currently on the diesel path, to purchase alternative fuel buses. Transit agencies currently on the diesel path, particularly those in the Bay Area, strongly oppose this option because they believe the use of alternative fuel buses results in less reliable service, and diesel buses that are as clean as alternative fuel buses will be available in 2010 for purchase. They also point out they were

allowed to make a choice of fuel type when the ARB Fleet Rule for Transit Agencies was adopted in 2000, and they should not be forced to change now at great cost and disruption, for little air quality benefit. Smaller transit agencies in less urbanized areas have expressed concern about the cost of alternative fuel engines, and the lack of alternative fuel availability. Proponents of alternative fuel strongly favor this approach because it creates a growing demand for their products and a strong incentive to develop new engines.

C. Alternative Fuel Path Mandate for All Transit Agencies in the District

The Board is also being asked to consider requiring the six transit agencies in the SCAQMD to switch from the diesel path to the alternative fuel path. This action would assure that the goal of District Rule 1192 is implemented regardless of the outcome of pending court actions.

Staff received comments from transit agencies that the ARB rules should be uniform statewide. Commenters suggested that requiring transit agencies in the SCAQMD to purchase alternative fuel is not fuel neutral, a policy they suggest the state has and should continue to practice. They also suggested that purchasing alternative fuel buses is not the most cost effective expenditure of transit district funds.

Staff points to legislation authorizing the district to implement rules requiring the use of alternative fuel vehicles as an important consideration. The effect of ARB adoption of a unique fleet requirement for the transit agencies in the District has the effect of addressing the Court's decision while remaining true to the Legislature's intent. Staff acknowledges that at this point in the court process, it appears that the District has the authority to implement Rule 1192 because the affected agencies are all local governments and the court has ruled that the District may impose requirements that affect local government purchasing choices. Although ARB adoption would remove any uncertainty regarding the final outcome of legal action, it does bring with it a new uncertainty regarding obtaining a waiver of federal preemption from U.S. EPA.

Regarding fuel neutral policy, it is true that most ARB regulations are performance based and do not favor one fuel over another. There are exceptions, however. In the past special light-duty vehicle emission standards were adopted for diesel engines. The ZEV mandate clearly favors electricity and hydrogen over petroleum fuels. Recommendations in the AB 2076 "Reducing Petroleum Dependency" report to the legislature suggest greater use of alternative, non-petroleum fuels has benefits for California. Given these examples, staff does not believe there is a hard fast rule that dictates no regulation should favor a specific fuel, and believes that the Board should look at each situation and the objective being sought in deciding whether fuel neutrality should be a guiding consideration.

One final consideration is, of the 17 transit agencies in the District, 16 are using and/or purchasing alternative fuel buses, including five of the six agencies on the diesel path. This is a result of ARB's fleet regulations and District Rule 1192. Thus the adoption of this regulatory amendment will have little effect on the status quo, and will serve mainly as a backstop to prevent any of the six agencies from purchasing higher emitting diesel engines during 2007 through 2009 should the District's authority be invalidated.

D. Issues Related to Federal Clean Air Act Waiver of Preemption

Some workshop commenters challenged California's authority to adopt and enforce fleet regulations in the SCAQMD based on federal statutory preemption. Federal Clean Air Act (CAA) section 209(a) preempts states and localities from adopting or enforcing any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines. Notwithstanding this general preemption of state authority for new engines and new vehicles, CAA section 209(b) expressly authorizes the U.S. EPA's Administrator to waive the preemption for California.

One challenge is based on the view that ARB will not be able to obtain a waiver of preemption for state standards under CAA section 209(b) because the Board's regulations are subject to the requirements of CAA section 202(a)(3)(C). Section 202(a)(3)(C) requires that in adopting standards, U.S. EPA's Administrator is to provide specified periods of lead-time and stability to classes or categories of new heavy-duty vehicles or engines. As the text of the provision itself dictates, the provision is not applicable to California:

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

The text states that "standards promulgated or revised under this paragraph," that is, under CAA section 202(a), must provide the specified lead-time and stability. In the person of the Administrator, U.S. EPA prescribes standards under 202(a). Clearly the provisions apply to U.S. EPA.

California, however, does not promulgate its standards under the grant of authority in section 202(a). California promulgates vehicular emission standards under grants of authority in state law¹¹ and under the waiver of federal preemption of state standards contained in CAA section 209(b). Since section 202(a)(3)(C) is only applicable to standards promulgated under section 202(a) and since California does not promulgate its standards under 202(a), the

¹¹ California Health & Safety Code Division 26.

provision does not apply to California. And, if the provision does not apply, its specified lead-time and stability requirements do not apply to California.

The inapplicability of CAA section 202(a)(3)(C) to the standards that California promulgates is also consistent with the legislative history of the CAA and the waiver of federal preemption. The legislative history of the waiver provision has emphasized that California is to have “the broadest possible discretion in selecting the best means to protect the health of its citizens.” H.R.REP No. 95-294, at 302-02, quoted in Motor and Equipment Manufacturers Association, Inc. v. Environmental Protection Agency.¹² Other courts have also frequently noted that Congress consciously chose to permit California to blaze its own trail.¹³

A second challenge is based on the view that U.S. EPA will need to grant waivers of preemption under CAA section 209(b) prior to the enforcement of any aspect of the proposals. ARB already has waivers of preemption for all of the types of emissions and categories of new engines and new vehicles to which the proposed regulations would apply. For this reason, any new waiver would be needed only for those aspects of the regulations for which California has never before been granted a waiver of preemption. For any aspect of the regulations for which waivers have already been granted, ARB’s practice has been to request confirmation that the regulations are within the scope of the previous waivers and to pursue enforcement against new engines and vehicles already covered by the waiver of preemption. For those aspects of the proposal that apply to in-use engines and vehicles, no waiver of preemption is needed since the preemption applies only to new vehicles and new vehicle engines.

E. Waiver Process Will Delay Rule Implementation and Reduce Benefits Achieved

When the U.S. Supreme Court ruled that a purchase requirement is in fact an emission standard under the federal Clean Air Act, implementation of the District rule required a waiver of federal preemption. The ARB determined that only the state can request a waiver of federal preemption, and that the rule subject to the request must be adopted by the state. This is the principle reason for this proposal being brought before ARB for consideration.

Stakeholders have pointed out that it can take several years following board adoption before a waiver is received from U.S. EPA. This does not usually create a problem because most requests for a waiver involve a regulation that includes

¹² 627 F.2d 1095, at 1110 (D.C.Cir. 1979).

¹³ Ford Motor Co. v. EPA, 606 F.2d 1293, at 1297 (D.C.Cir. 1979); Engine Manufacturers Association v. U.S. EPA, 88 F.3d 1075, at 1080 (D.C.Cir. 1996), Motor and Equipment Manufacturers Association, Inc. v. Nichols, 142 F.3d 449, at 463 (D.C.Cir. 1998).

lead time to develop new knowledge and will be implemented in three to four years. In the case of the District rule outlined in this report, the benefits of the rule accrue only from now until the end of 2009. If the waiver process takes several years, much of the benefit of the rule will be lost.

The ARB staff believes the rule qualifies as "within the scope" of a previous waiver. In such instances, ARB can implement the rule immediately. However, the Engine Manufacturers Association disagrees with the staff's position, and may challenge our waiver request. Discussions with U.S. EPA also have not resulted in a definitive picture of how it will approach ARB's waiver request. Thus, there is uncertainty regarding when the rule, if adopted, can be implemented, and any substantial delay will reduce the emission reductions achieved.

XIV. STAFF CONCLUSION

Staff has identified two policy decisions for the Board's consideration and has developed proposed regulatory amendments to support these decisions. First, staff is presenting three options for the Board to consider regarding the appropriate emission standards for new urban bus engines in 2007 through 2009. The three options are: 1) keep the current new urban bus emissions standards as they are, 2) change the NOx emission standards for 2007 through 2009 model year new urban buses from 0.2 to 1.2 g/bhp-hr, which would align it with the equivalent model year heavy-duty truck NOx emission standard, and 3) require all transit agencies to purchase/lease only alternative fuel buses. The amendments provided in this report (set forth in the proposed regulation order in Appendix A) set forth the language necessary to implement the option of aligning the urban bus standards with the heavy-duty truck standards beginning with the 2007 model year. Should the Board favor the option to keep the urban bus standards as they are, no regulatory changes are necessary. Should the Board decide that all transit agencies statewide should be required to purchase alternative fuel, a 15-day modification to ARB's Fleet Rule for Transit Agencies would be needed to accomplish this (and no change to the urban bus emission standards would be necessary).

Staff has also developed for the Board's consideration a new requirement that all transit agencies operating in the District follow the alternative-fuel compliance path, as defined in ARB's regulations. Under this new requirement, the six transit agencies in the District currently on the diesel fuel compliance path would be required to change to the alternative-fuel path effective January 1, 2006. This change would lock these transit agencies into purchasing alternative-fuel engines through 2015, consistent with the District's Rule 1192.

If the Board wishes to assure that alternative fuel urban transit buses are purchased throughout the District, and determines it wise to provide a backstop to the current District Rule 1192 in case litigation overturns the District rule, the

amendments provided in this report (set forth in the proposed regulation order in Appendix A) include regulatory language that would amend ARB's Fleet Rule for Transit Agencies to require diesel path transit agencies in SCAQMD to switch to the alternative fuel path.

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XVI. AVAILABILITY OF TECHNICAL SUPPORT DOCUMENT

An electronic version of the technical support document for this report is available at <http://www.arb.ca.gov/regact/sctransit/sctransit.htm>. If you would like a hard copy of these documents please fill out this form and mail or fax it to:

Public Information Office
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
Fax: (916) 445-5025

Please send or fax the **TECHNICAL SUPPORT DOCUMENT: PROPOSED REGULATION FOR THE PROPOSED SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FLEET RULES** to:

Name: _____

Address: _____
