

State of California
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

AIR RESOURCES BOARD

STAFF REPORT: INITIAL STATEMENT OF REASONS

PROPOSED AMENDMENTS TO THE DIESEL PARTICULATE CONTROL MEASURE
FOR ON-ROAD HEAVY-DUTY RESIDENTIAL AND COMMERCIAL SOLID WASTE
COLLECTION VEHICLES:

FLEET RULE FOR THE SOUTH COAST
AIR QUALITY MANAGEMENT DISTRICT

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EXECUTIVE SUMMARY

The Air Resources Board (ARB) is the state agency responsible for protecting public health and the environment from the harmful effects of air pollution. The ARB has the sole responsibility for controlling emissions from vehicular sources except as provided by law. The 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 ARB has the sole responsibility for controlling emissions from vehicular sources, except as otherwise provided by law.

The SCAQMD is the sole and exclusive local agency within the South Coast Air Basin and the desert portion of Riverside County in the Salton Sea Air Basin with responsibility for comprehensive air pollution control. The South Coast Air Basin has been designated as a serious nonattainment area for particulate matter (PM) and a severe nonattainment area for ozone. In 1987, the Legislature enacted Health and Safety Code section 40447.5, which authorizes SCAQMD to adopt regulations that require operators of 15 or more public and commercial fleet vehicles, when adding or replacing vehicles, to purchase vehicles that are capable of operating on methanol or other equivalently clean-burning alternative fuel.

Under its Clean Fleets program, the SCAQMD adopted seven fleet rules during 2000 and 2001. These rules were developed to gradually shift public agencies and certain private entities to lower emissions by requiring them to acquire alternative fuel vehicles whenever an operator with 15 or more vehicles purchased or leased vehicles for replacement or addition to its fleet. One of these seven rules is Rule 1193 which addresses solid waste collection vehicles.

Shortly after the District adopted its fleet rules, the Engine Manufacturers (EMA) and the Western States Petroleum Association (WSPA) sued the District in federal court challenging its authority to adopt the rules. In April 2004, the United States Supreme Court ruled that it appears likely that at least certain aspects of the fleet rules were preempted by section 209(b) of the federal Clean Air Act. The Supreme Court remanded the case back to the federal District Court to determine whether some parts of the fleet rules could be characterized as state purchasing decisions and, if so, whether preemption applied. In response to this decision, SCAQMD 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. The ARB requested public comment and consulted with U.S. EPA regarding the legal requirements for obtaining a waiver for a rule adopted by a local government. The ARB staff concluded that the fleet rules, as written and adopted by SCAQMD, would not receive a section 209(b) waiver because these rules have not been adopted by ARB as state regulations (applicable within the boundaries of SCAQMD).

When the State Legislature adopted Health and Safety Code section 40447.5, it intend that SCAQMD have the authority to adopt and implement clean fuel fleet rules. Accordingly, ARB staff has reviewed the information and prepared the present proposal, which through the state rulemaking process, is meant to support the intent of the State Legislature.

Meanwhile, on May 5, 2005, the federal District Court ruled that, under the “market participant” doctrine, the SCAQMD fleet rules are not preempted to the extent they apply to purchasing decisions made by state and local governmental entities. However, the District Court has not yet addressed questions of whether the fleet rules are preempted as they apply to private entities under contract with state or local governments or to used or leased vehicles. It is also possible that EMA or WSPA could appeal the “market participant” decision.

If adopted by the Board, the regulation proposed in this rulemaking would require all owners of solid waste collection vehicles operating in the District, whether owned or operated by public agencies or private companies, to purchase the lowest emitting trucks available. Staff projects that the lowest emitting trucks will be alternative-fueled, most likely natural gas, through the 2009 model year. Subsequently, staff projects emissions from diesel and natural gas vehicles will be equivalent.

The proposal would amend ARB's existing solid waste collection vehicle rule to include a specific purchasing requirement, for SCAQMD jurisdiction only, based on a performance standard of 0.20 grams per brake horsepower-hour (g/bhp-hr) NOx and 0.01 g/bhp-hr PM. The performance standard could be met by a new engine as certified or a new engine plus a verified emission control system. In developing this proposal, staff has worked to obtain current, objective information on the challenges, cost-effectiveness, and emission benefits from the various technology options.

Staff expects a small emissions benefit from this proposal. NOx reductions will be about 0.3 tons per day over the 15-year life of the regulation. The cumulative NOx reduction through the year 2020 amounts to about 1,590 tons, or about 4 percent of the total NOx emissions from District collection vehicles from 2006 to 2020. Staff expects only a very small reduction in PM emissions attributable to this rule, as PM emissions from all new heavy-duty diesel and alternative-fuel engines are required to be the same from the 2007 model year onward.

The cost of the proposal to the District's public and private waste collection vehicle owners through 2020 is approximately \$83 million, based on the use of liquefied natural gas engines for compliance. The cost effectiveness of the rule will be \$52,000 per ton NOx, which is less favorable than other recently adopted state rules. Reductions in PM are negligible, thus staff did not calculate cost effectiveness for PM. Staff expects there will be benefits to those businesses that manufacture natural gas engines and that sell natural gas.

The proposed amendments, as described herein, are consistent with the authority of ARB to control emissions from mobile sources. The proposed amendments to title 13, CCR, section 2021.2, adding subsection 2021.2 (g), are set forth in the proposed Regulation Order in Appendix A. Information on how to access the Technical Support Document for this rule making can be found at the end of this report.

I. INTRODUCTION

The Air Resources Board (ARB or Board) seeks to provide clean, healthful air to the residents of California. The ARB is the state agency responsible for protecting public health and the environment from the harmful effects of air pollution. The 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. The district is designated as a serious nonattainment area for particulate matter (PM₁₀ - particulate matter under 10 microns) and is severe nonattainment area for the eight hour ozone standard. The Coachella Valley, located in the desert portion of Riverside County, is classified as a serious nonattainment area for PM₁₀ and a moderate nonattainment area for ozone.

A. Background for this Rule Proposal

The collection of waste materials obviously has important societal benefits. Indeed, waste collection could be considered one of this nation's first environmental industries, critical to healthy conditions in any area where people gather to live, work, and play. Most waste collection trucks run on diesel fuel, however, and are sources of polluting engine exhaust emissions. Waste collection trucks contribute to these emissions by making multiple runs through California's residential and business communities on trash collection days.

Emissions from diesel trucks that contribute to air pollution include oxides of nitrogen (NO_x), particulate matter (PM), carbon monoxide (CO), and hydrocarbons (HC). NO_x and PM are the primary emissions of concern from diesel engines. NO_x and HC contribute to the atmospheric formation of ozone and fine particles. CO is a colorless, odorless gas that reduces the ability of the body to transport oxygen to cells. Diesel PM is a toxic air contaminant – 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 developed comprehensive strategies for reducing 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 2000b). This plan directs staff to develop measures to reduce

diesel PM emissions from new and in-use diesel-fueled engines and vehicles. Consistent with the plan, the Board has adopted more stringent emission standards for new diesel engines and has required cleaner diesel fuel. The Board has also begun adopting rules requiring the retrofit or modernization of existing diesel engines used in on-road and off-road vehicles and equipment, and stationary engines.

1. ARB's Statewide Solid Waste Collection Vehicle Rule

On September 25, 2003, the Board adopted a measure to reduce diesel PM emissions from on-road heavy-duty residential and commercial solid waste collection vehicles. This rule requires owners to achieve significant PM reduction from their existing in-use trucks that collect solid waste for a fee. Owners are required to apply best available control technology (BACT) to their collection trucks by specified implementation dates. The implementation is phased-in from 2004 through 2010 in groups determined by the age of the engines (engine model years) in each group.

BACT used in the implementation process is defined as one of the following:

- A new diesel engine certified to a 0.01 g/bhp-hr PM standard;
- An existing diesel engine retrofitted with the highest level (most effective) ARB-verified PM control device; and
- An alternative-fuel engine, such as compressed or liquefied natural gas

Owners were required to begin implementation by December 31, 2004, through application of BACT to 10 percent of their 1988 through 2002 model year (MY) engines. Staff will present an update on the progress of implementation to the Board in late 2005.

2. SCAQMD Rule 1193

Under its Clean Fleets Program, the District adopted seven fleet rules during 2000 and 2001 with the goal of gradually shifting 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 under its legislative authority [Health & Safety Code (HSC) section 40447.5(a)], which authorizes the district to regulate public and certain commercial operators of fleets of 15 or more vehicles. The adopted rules apply to transit buses, school buses, solid waste collection vehicles, airport shuttles and taxis, street sweepers, light- and medium-duty publicly-owned vehicles, and heavy-duty publicly-owned vehicles.

One of these rules, Rule 1193 - Clean On-Road Residential and Commercial Refuse Vehicles - applies to the trucks that collect trash from the homes and businesses within the District. Rule 1193 requires an owner of 15 or more waste collection vehicles, including transfer trucks, to acquire only alternative-fuel vehicles when adding additional vehicles to a fleet. District regulations define "alternative fuel" as a heavy-duty vehicle or engine that uses compressed or liquefied natural gas, liquefied petroleum gas,

methanol, electricity, fuel cells, or other advanced technologies that do not rely on diesel fuel. The most commercially available alternative is natural gas.

The rule includes exemption provisions for owners to purchase diesel vehicles if appropriate alternative-fuel vehicles or engines are not available. In addition, the rule provided a limited window of opportunity, the provision sunset on June 30, 2004, for owners to purchase dual-fuel refuse trucks provided that other vehicles were retrofitted with particulate filters. Dual-fuel trucks can operate on both diesel fuel and natural gas.

Implementation of Rule 1193 began on July 1, 2001 for waste collection fleets of 50 or more, and for fleets of 15 or more on July 1, 2002. The District estimates that Rule 1193, as of February 2005, had resulted in the purchase of approximately 1,100 alternative-fuel collection vehicles. By that same date, the District reported receiving exemption requests for 335 diesel vehicles and granting exemptions for the purchase of 241 diesel vehicles.

Of those granted exemptions, 111 were for large, heavy transfer trucks for which no suitable alternative-fuel engine existed, while 130 were for standard curbside collection vehicles and other smaller vehicles. Most of the curbside collection vehicles granted an exemption were for the City of Los Angeles. Los Angeles requested permission to purchase 120 diesel curbside collection vehicles because no suitable alternative-fuel engines meeting the cities bid specifications (11 liter) were available. The District authorized an exemption for 116 diesel vehicles because one manufacturer had offered four alternative-fuel collection vehicles to the City at that power range (SCAQMD 2005).

3. Legal Challenge to the District Fleet Rules

Shortly after the District adopted its fleet rules, 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 it appears likely that at least certain aspects of the fleet rules adopted by the District were federally preempted and 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. The ARB staff completed a thorough review of the comments submitted in response to the notice, and consulted with U.S. EPA regarding the legal requirements for obtaining a waiver of a rule adopted by a local government.

Based on ARB's review, staff concluded that these fleet rules, as written and adopted by the District, might 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 developed this proposed state rule so that all solid waste collection vehicles will remain subject to purchase requirements similar to those specified by the

District Rule 1193. 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. The order, however, noted that it did not address whether other aspects of the District rules may still be subject to preemption. Adoption of this proposal would resolve this uncertainty, assuming U.S. EPA grants the waiver.

On May 26, 2004, the District issued an advisory stating that while the fleet rules remained in force against public entities such as the state, counties, cities and special districts, it would not enforce the rules against private entities and private fleets that contracted to provide waste collection services for public entities such as cities and counties.

4. Proposed Amendments

If adopted by the Board, ARB's existing solid waste collection vehicle rule would be amended to preserve the intent of the District's Rule 1193 as applicable to all owners of solid waste collection vehicles within the district's jurisdiction.

The proposal is to amend ARB's solid waste collection vehicle rule to include a specific purchasing requirement for owners and fleets operating in the District. The purchasing requirement would be based on a performance standard of 0.2 grams per brake horsepower-hour (g/bhp-hr) NO_x and 0.01 g/bhp-hr PM, which can be met by a new engine as certified, or a new engine plus a verified emission control system. In developing this proposal, staff has worked to obtain current, objective information on the challenges, cost-effectiveness, and emission benefits from the various technology options.

B. ARB Regulatory Authority

Under California's air pollution control laws, the control of vehicular sources, except as otherwise provided, is the responsibility of ARB. In 1988, the California Legislature enacted the California Clean Air Act (HSC sections 43013 and 43018), 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 mobile sources. The California Clean Air Act establishes ARB as the state agency that sets standards for mobile sources.

The California Legislature also granted ARB the authority to identify toxic air contaminants and establish airborne toxic control measures to reduce risk.

C. Current Regulations and Voluntary Programs

Both the Federal government and the State of California have adopted rules that reduce PM and NO_x, 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 U.S. EPA in 1970. New engines were subject to PM and NO_x exhaust emission standards beginning with model year (MY) 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

Emissions Standards (g/bhp-hr)		
Model Year	Heavy-Duty Truck	
	NO _x	PM
1988	10.7	0.6
1990	6.0	--
1991	5.0	0.25
1993	--	0.25
1994	--	0.10
1996	5.0	--
1998	4.0	--
October 2002	2.2 ^(a)	--
2004	2.2 ^(a)	--
2007	1.2 ^(b)	0.01
2010	0.2 ^(b)	--

- a. Nominal NO_x value of 2.2 g/bhp-hr is based on emission standards of 2.4 g/bhp-hr for NO_x plus non-methane hydrocarbons (NMHC) or 2.5 g/bhp-hr NO_x plus NMHC with 0.5 g/bhp-hr NMHC cap, which took effect in October 2002 for those engines subject to 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 NO_x standard. Averaging is allowed, and it is expected that most engines will conform to the fleet NO_x average of approximately 1.2 g/bhp-hr.

a. Current Standards

The current federal (and state) PM engine emission standard for on-road heavy-duty diesel trucks is 0.1 g/bhp-hr. The current NOx emission standard for on-road heavy-duty diesel trucks 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 U.S. EPA Consent Decrees and the California Settlement Agreements signed in 1998¹ had to comply with this 2004 standard in October 2002; for all the rest, the requirement began with the 2004 MY engines.

Other than the Federal Urban Bus Retrofit/Rebuild Program, no federal regulations exist that mandate reducing emissions from in-use heavy-duty engines.

b. New Engine Standards for 2007 and Beyond

The particulate standard that takes effect with 2007 MY heavy-duty diesel engines is 0.01 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 by mid-2006.

The NOx standard in 2010 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 MY engine standard. This results in a nominal NOx standard of 1.2 g/bhp-hr from 2007 through 2009. Most engine manufacturers have indicated they 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 to comply.

Beginning in 2010, engine manufacturers may no longer average to meet the NOx standard and thus engines will be required to meet the 0.2 g/bhp-hr standard for all engines produced. 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 of 0.5 g/bhp-hr NOx.

¹ Seven of the largest heavy-duty diesel engine manufacturers will be implementing measures to reduce emissions beginning October 1, 2002, to meet the requirements of the Heavy-Duty Diesel Engine Settlement Agreements reached with the ARB. The Heavy-Duty Diesel Engine Settlements were agreements reached in response to lawsuits brought by the United States Environmental Protection Agency and violations alleged by the ARB pertaining to excess in-use emissions caused by the use of defeat devices and unacceptable algorithms. Navistar signed its Settlement Agreement on October 22, 1998. Cummins, Detroit Diesel Corporation, Caterpillar, Volvo, Mack and Renault signed their Settlement Agreements on December 15, 1998.

2. California Regulations

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

a. New Heavy-Duty Engine Requirements

For new engines, long-term emission reductions are achieved through establishing more stringent new engine standards. Since 1988, California has adopted the same standards for new heavy-duty engines as are adopted by the federal government. The only area of difference is in urban buses, which currently have more stringent California standards. California also has optional reduced-emission standards for heavy-duty vehicles and urban buses (Table 2). In general, vehicles that are eligible for incentive funding, such as the Carl Moyer program, have been certified to these standards.

Table 2. California Optional, Low NO_x 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.
- 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 NO_x offset plans.
- c. Optional emission standards of 1.8 – 0.3 g/bhp-hr are for NO_x plus non-methane hydrocarbons (NMHC). Engines certified to the optional NO_x standard are excluded from participating in the Averaging, Banking, and Trading (ABT) program.

b. In-Use Heavy-Duty Engine Requirements

California has several regulations designed to ensure that heavy-duty trucks and buses comply with in-use smoke standards. 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 (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.

In recent years, California has adopted regulations for in-use diesel buses and trucks operated by transit agencies and for in-use diesel solid waste collection vehicles (as discussed above in Section I.A.1.). Regulations have also been adopted for transportation refrigeration units, portable engines, and stationary 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. This is usually accomplished through retiring or retrofitting the existing engines or repowering with a newer cleaner engine.

California has new 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.

3. Local Regulations

Local Air Pollution Control Districts and Air Quality Management Districts (air districts) have authority to directly regulate stationary sources and some area wide sources. District authority over mobile sources is generally limited to restricting vehicle activity as explained below.

a. General Air District Authority Over Mobile Sources

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 vehicles be repaired.

Air districts also have programs that help to fund transportation-related projects that reduce air pollution. Funds are also available 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 Over Mobile Sources

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. Based on this authority, the District adopted seven fleet rules from 2000 to 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 1193 for collection vehicles, 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.”

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 (ultra low emission vehicle or better) or alternative-fuel vehicles. For transit buses and sweepers, the fleet rules specify the acquisition of alternative fuel vehicles only, based on the assumption that alternative-fueled vehicles have lower emissions than diesel-fueled vehicles. For refuse collection vehicles, the rules provide the choice of acquiring alternative-fuel, pilot ignition, or until July 1, 2004, 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.

In all cases, purchases of diesel vehicles were effectively prohibited, except for exemptions granted by the district. 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 by reducing emissions beyond regulatory requirements. Owners and operators of transit buses, collection vehicles, school buses, and street sweepers may be eligible for available funding for vehicles that go beyond the established requirements such as those in the proposed ARB fleet rules, e.g., if the adopted optional standard is set at 1.8 g/bhp-hr for NO_x and the certified level of an engine was at 1.2 g/bhp-hr NO_x, then that was considered buying better than the standard and qualified for funding. By the same

concession, if alternative fuel engines certify at 0.2 NOx in 2007 while the adopted engine standards are effectively 1.2 NOx, then the purchasing of 0.2 NOx engines may qualify for funding.

a. Federal Incentives

On the federal level, 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.

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 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 provides up to \$140 million a year of long-term incentive funding. The bill also modified the requirements governing the funds. Program modifications include:

- Expanding pollutants from NOx-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 and the additional \$2 dollar per vehicle fee on residents of the air district. In addition, SCAQMD has the authority to impose an additional \$1 dollar per vehicle until January 1, 2010, and has done so.

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 uses a variety of mechanisms to involve the public in its rulemaking efforts. In addition to listening to the opinions of all stakeholders, ARB staff gain valuable information through working with stakeholders regarding costs, feasibility, and availability of technologies used to comply with the proposal.

A. Environmental Justice

On December 13, 2001, the Board approved Environmental Justice Policies and Actions,² 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, 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."³

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.

² Complete information for these programs can be found at <http://www.arb.ca.gov/ch/ej.htm>.

³ Complete information on this program can be found at http://www.arb.ca.gov/ch/public_participation.htm

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 unhealthy 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.

This amendment, if adopted, will provide small air-quality benefits by reducing NOx emissions from solid waste collection vehicles that operate in neighborhoods in the District. NOx emissions contribute to respiratory impacts in children, fine particulate matter, and the formation of ozone, a criteria pollutant, as discussed in Section III.A.

This rule is designed to reduce emissions from collection vehicles that operate in residential neighborhoods and commercial areas in the South Coast air district. All persons come in contact with collection vehicles as they transit our neighborhoods to collect refuse. In some neighborhoods and commercial districts, there may be up to three trips to pick up different types of refuse, household garbage, green waste, and recyclables on waste collection day. By lowering the emissions from collection vehicles, the exposure to toxic air contaminants and ozone smog is reduced. This proposal benefits these individuals and also supports the ARB's Environmental Justice goals.

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. South Coast Fleet Rules

In October 2004, ARB posted on its website a request for public comment concerning the District's fleet rules. 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.

The 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 four fleet rules (the street sweeper rule was later dropped with the District's concurrence), 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. 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.

2. South Coast Collection Vehicle Proposal

As part of outreach efforts for the waste hauler rule proposal, ARB staff conducted one workgroup meeting on March 3, 2005, and one workshop on April 6, 2005; both of which were held in El Monte. The purpose of the workgroup meeting was to introduce the rulemaking to a group of stakeholders who had been meeting as part of SCAQMD's Natural Gas-powered Refuse Vehicle Users Group, along with members of ARB's workgroup for implementation of its statewide collection vehicle rule. Thirty-six people signed in for the meeting, representing natural gas advocacy groups and providers, refuse removal companies, after treatment technology providers, vehicle refurbishers, and consultants to each of these sectors. The SCAQMD provided information on the status of Rule 1193 and the state of natural gas engine technology, and ARB staff provided an overview of our adopted collection vehicle rule along with an introduction to the new rulemaking.

For the April 6, 2005, workshop, attendees included many of the same individuals and companies, plus representatives from environmental organizations, municipalities, waste management companies and service providers, associations, engine manufacturers, oil companies, and other parties interested in residential waste removal. These individuals participated both by providing data, reviewing proposed regulations and by participating in a question-and-answer session during the workshop.

Staff met with a number of stakeholders' groups throughout the rulemaking process. Representatives of the California Refuse Removal Council (CRRC) encouraged their members to cooperate in ARB's data gathering efforts. Waste Management, the state's largest waste hauling company, submitted written comments and made staff members available for numerous telephone and face-to-face interviews. The ARB's staff did face-to-face and telephone interviews and e-mail exchanges with 15 private waste collection firms and 12 municipalities that operated their own collection fleets. Some of the private firms, such as Waste Management, operate multiple collection fleets under various names within the District, and staff tried to interview a number of these fleets. In some cases, staff did multiple interviews with representatives from private and municipal waste hauling groups. The ARB's staff made many site visits to regulated entities, met with stakeholders, and conducted surveys to obtain pertinent information on the challenges and viable options for reducing the fleet vehicle emissions.

On several occasions, over 5,700 emails were sent to provide stakeholders with notification of the workshop, draft regulatory concepts, and proposed draft regulatory language. In addition, hardcopies of the workshop notice and draft regulatory concepts were mailed to 832 addresses, and additional emails were also sent to targeted groups, including all individuals who had participated in the previous rulemaking for solid waste collection vehicles.

To generate additional public participation and to enhance the information flow between ARB and interested persons, staff made the workshop notices, draft regulatory concepts, draft regulatory language, and workshop presentations available on the ARB webpage. The webpage also contains the names, telephone numbers and e-mail addresses of ARB staff involved in the rule. Notices of the rulemaking activity and workshop were also posted on the District's webpage.

III. NEED FOR EMISSION REDUCTIONS

Many regions of California have serious to severe problems with air quality. In particular, the South Coast Air Basin is designated as a serious nonattainment area for PM₁₀ and is a severe nonattainment area for the eight hour ozone standard. The Coachella Valley, which is within the jurisdiction of SCAQMD, is classified as a serious nonattainment area for PM₁₀ and a moderate nonattainment area for ozone.

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.

NO_x is considered an important outdoor pollutant not only because it is an essential precursor in the formation of ground-level ozone, but also because it contributes to the formation of atmospheric acids and secondary particles. In addition, nitrogen dioxide is a reactive gas capable of damaging the cells lining the respiratory tract. The ARB staff is currently reviewing the NO₂ standard for possible revision in 2005.

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. Secondarily 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. Increased PM exposure causes increased cardiopulmonary mortality risk as demonstrated in a validity and causality analysis of 57 epidemiological studies. (Dab, et al. 2001). Significant positive associations exist between lung cancer incidence and the number of days per year that respirable particulates (PM₁₀) exceeded several thresholds (Beeson, et al. 1998). 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 MODIFICATIONS

Owners of solid waste collection vehicles in the District are subject to two rules: ARB's in-use emission reduction rule for solid waste collection vehicles and the District's alternative-fuel purchase requirements for solid waste collection vehicles. These rules are complementary and compliance with the District's rule assists the owner in complying with ARB's rule in that an alternative-fuel vehicle is considered to be a complying vehicle under ARB's rule. Both rules apply to public agencies and private companies.

As previously discussed, however, the legality of the District's fleet rules, including Rule 1193 for waste collection vehicles, was thrown into doubt when the U.S. Supreme Court ruled on April 28, 2004 that the District's fleet rules might be preempted by federal authority, thus necessitating a waiver. The Supreme Court returned the case to the District Court in California for further action. Discussions with U.S. EPA indicated that only the state-adopted rules could be considered for a waiver of federal preemption. Thus ARB began a new rulemaking process on three of the District's fleet rules, including the waste collection vehicle rule.

On May 6, 2005, the U.S. District Court, Central District of California, issued a tentative ruling that the fleet rules are not preempted when they apply to state and local governments. The court, however, specifically said it was not addressing the issues of the fleet rules as they might apply to the federal government, private entities, and used or leased vehicles. As refuse removal in California is performed by local governments, private companies contracting with local governments, and private companies dealing directly with consumers, the court's rulings leave open a situation whereby some operators would be required to comply with the District rule's purchase requirements and others would not. This would create an uneven compliance environment, leaving

owners who did not have to comply with a competitive advantage over those that did have to comply. By developing a state rule that can receive a waiver of federal preemption, all solid waste collection vehicles would be subject to the same requirements.

A. Air Quality In The South Coast District:

Despite significant progress made in reducing harmful air emissions over the past 20 years, the District continues to experience extremely serious air quality problems, primarily from motor vehicle sources. Thus, reductions of emissions from waste collection vehicles would contribute to an overall reduction of motor vehicle emissions in the District.

B. Comparison of Rule 1193 to ARB's Solid Waste Collection Vehicle Rule

As part of continuing efforts to reduce air pollution in the District and throughout the state, ARB on September 25, 2003 adopted a measure to reduce diesel PM emissions from on-road heavy-duty residential and commercial solid waste collection vehicles. The state measure differs from the District rule in several ways:

While the District rule applies to new vehicle purchases or leases, ARB's rule requires PM reduction from existing in-use trucks that collect solid waste. The ARB rule applies to owners operating one or more collection vehicles and includes roll-off vehicles but not transfer trucks. The District's rule applies to fleets of 15 or more and includes transfer trucks. Although transfer trucks are included in the District's rule, owners have been granted exemptions that allow them to purchase diesel transfer trucks because natural gas engines are not available that meet the specifications for these trucks. The ARB's rule gives the owner a menu of choices for the application of best available control technology by specified implementation dates, whereas Rule 1193 forces the purchase of alternative-fuel vehicles. To provide flexibility to owners, the ARB rule has extensions available if no diesel emission control technology is available that allow owners additional time to purchase new vehicles for replacement. Owners can also delay implementation on some of their vehicles if they reduce emissions from at least 50 percent of all vehicles early, if they participate in an experimental program, or if a particular vehicle is within one year of retirement. The District rule has a variance application process for requesting permission to purchase a diesel engine if a suitable alternative fuel engine is not available for particular applications.

V. INVENTORY OF SOLID WASTE COLLECTION VEHICLES AND EMISSIONS

In 2003, staff conducted a statewide survey of solid waste collection vehicles and engines and developed an inventory model for these vehicles. For this rulemaking proposal, staff updated its inventory for engines and emissions specific to the South Coast.

A. Engine Inventory

The ARB staff estimated the total number of affected vehicles and companies in the District based on a combination of information, including ARB's Diesel Retrofit Implementation and Evaluation Database (DRIED) and supplemental data provided by the District. Using a list generated from these data, staff sent a letter to approximately 128 entities identified as being possibly affected by the rulemaking activity. Staff requested that owners send us records concerning the trucks and engines in their fleets as required in title 13, CCR, Section 2021.2 (f), along with additional information on contract and rate status (Appendix C).

Based on these data, ARB estimates the 2005 population of collection vehicles operating in the District covered by this rule to be approximately 5,000. From 2006 through 2009, staff expects that approximately 1,035 new collection vehicles will be purchased, many as replacements for existing vehicles. Staff estimates that by 2009 the population of vehicles in the District covered by this rule will be approximately 5,370. In 2010, all engines are likely to be certified to 0.2 g/bhp-hr NO_x and no significant difference in emissions between available engines is expected. Therefore, purchases of vehicles with post-2009 engines are not considered because the South Coast Fleet Rule would not result in lower emission vehicle purchases from 2010 and thereafter.

Additional details on the composition of the fleet of collection vehicles in the District are provided in Appendix B.

B. Emission Inventory

Staff calculated the baseline collection vehicle emissions inventory for the District for calendar years 2000, 2005, 2010, and 2020 (Table 3). Staff ran the statewide emissions model developed as part of ARB's current collection vehicle rule and scaled down the results by a factor of 39 percent to estimate emissions in the District alone (Appendix B). The baseline inventory assumes that fleet owners are applying BACT to their existing vehicles as required by ARB's current collection vehicle rule, and the inventory also accounts for U.S. EPA 2007 and 2010 new heavy-duty diesel engine standards and 2006 low sulfur diesel fuel regulations.

Table 3. SCAQMD Collection Vehicle Emissions Inventory (tons/day)

Pollutant	2000	2005	2010	2020
NO _x	11.6	10.5	7.3	3.5
PM	0.48	0.35	0.11	0.05
HC	1.64	1.04	0.15	0.12

VI. SUMMARY OF PROPOSED CONTROL MEASURE

The proposed amendments to ARB's collection vehicle rule consist of a performance standard for purchase of new engines by owners of collection vehicles based within the District. The scope of the proposal is the same as ARB's existing Solid Waste Collection Vehicle rule, in that it applies to vehicles that collect solid waste for a fee, does not apply to transfer trucks, and does apply to all vehicles, even those in fleets of fewer than 15 trucks. Staff's proposal would require owners to choose a low emission engine meeting a specific performance standard, when purchasing or leasing collection vehicles, provided that compliant technology is commercially available.

A. Options for Compliance

Staff envisions two basic options that owners may choose from to comply with the requirements as outlined in section B below. First, an owner may purchase a vehicle with a new, compliant California-certified engine that meets the proposed performance standard. The proposal makes no distinction as to the type of fuel the engine uses. Alternatively, an owner may apply a verified diesel emission control system to a California-certified engine such that the resultant emissions meet the proposed performance standard. Whether a given verified diesel emission control system would bring an engine into compliance would depend on the details of that system's ARB verification and whether it meets the emission performance requirements.

B. Purchase Requirements

The rule as proposed would require purchase of collection vehicles with engines that meet specified emissions levels, thus the proposal sets a performance standard.

- 2005 and 2006 MY engines: Owners would be required to purchase vehicles with engines that meet the optional low emission certification standards of 1.8 g/bhp-hr for nitrogen oxides (NOx) plus non-methane hydrocarbons (NMHC) and 0.03 g/bhp-hr for particulate matter (PM) as specified in title 13, CCR, section 1956.8(a)(2)(A). For reference, the basic emission standard for these years is 2.4 or 2.5 g/bhp-hr NOx plus NMHC and 0.1 g/bhp-hr PM.
- 2007 and subsequent model year engines: Owners would be required to purchase vehicles with engines that meet the 2007 and subsequent standards specified in title 13, CCR, section 1956.8 (a)(2)(A), provided the declared NOx Family Emission Limit (FEL) of the engine does not exceed 0.2 g/bhp-hr and the declared PM FEL does not exceed 0.01 g/bhp-hr. For reference, most 2007-09 engines are expected to certify to a FEL of 1.2 g/bhp-hr NOx. In 2010 and beyond most engines will certify to a 0.2 g/bhp-hr FEL for NOx. Beginning in 2007, most engines will certify to a FEL of 0.01 g/bhp-hr PM.

While it may at first seem redundant to include requirements for 2007 and beyond that harmonize with the already adopted 2007 standards, unlike those standards, staff's

proposal makes no allowances for emissions averaging, banking, and trading (ABT) programs. Therefore, the engines (or engine plus retrofit combinations) used to comply with the proposed requirements must actually meet the specified standards and may have lower emissions than other similar engines that use the averaging provisions.

C. Exemptions

Staff's proposal allows an exemption from the purchase requirements under two basic conditions: (1) compliant technology is not commercially available or (2) it cannot be used by an owner. Staff proposes that an owner would have to apply in writing to ARB's Executive Officer for the exemption at least 90 days prior to committing to the purchase of a non-compliant vehicle or engine. While the proposal specifies 90 days for the exemption application, staff notes that it would be prudent for an owner to apply even earlier to avoid delays in purchasing if the Executive Officer has not yet made a ruling on the application.

Under the first condition, the Executive Officer may grant an exemption if the owner demonstrates that no compliant engine and chassis configuration or verified diesel emission control strategy is commercially available. Staff proposes that demonstrating this would require the owner to list the bid specifications for the vehicle to be purchased and submit a list of all manufacturers that the owner solicited with these specifications and all responses the owner received. The owner would also be required to list the manufacturer, model, rated horsepower, rated torque, and fuel type of the non-compliant engines the owner proposes to purchase.

The second condition under which the Executive Officer would consider an exemption is if compliant technology is commercially available but could not be used by an owner. In this case, the owner must describe in detail why the commercially available technology cannot be used, whether it is an alternative-fueled engine, a verified diesel emission control system, or some other product. As under the first condition, the owner must list information on the non-compliant engines it proposes to purchase. As an example, staff envisions reasons that may include the owner's company being too small to have its own fueling station and no public fueling station being available.

VII. ENGINE AVAILABILITY & TECHNOLOGICAL FEASIBILITY

This section discusses the availability and feasibility of engines for collection vehicles during the time periods that would be impacted by current and proposed regulations. The information has been obtained from engine manufacturers and other published sources. We have omitted information that engine manufacturers have indicated is confidential. Further information can be found in the Technical Support Document.

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.

A. Current Engine Availability

Based on a review of certification records and discussions with manufacturers, there are currently no certified diesel engines that meet the proposed 2005-2006 requirements of 1.8 g/bhp-hr NOx plus NMHC and 0.03 g/bhp-hr PM. Engine manufacturers have, however, certified a number of compliant engine families that operate on alternative fuels and which are applicable to collection vehicle usage (Table 4). The engines range from 250 to 320 horsepower and 660 to 1000 foot-pounds torque. The Cummins C Gas Plus and Deere 6081H engines have been in use for a few years, while the L Gas Plus is only now beginning to become commercially available. Mack also has a natural gas engine certified this year, but it is not commercially available. There are no large displacement, high-powered heavy heavy-duty natural gas engines certified, thus eliminating natural gas from use in the heaviest classes of collection vehicles, roll-off vehicles, and transfer trucks. South Coast data shows roll-off vehicles making up approximately 11% of the District fleet while transfer trucks make up approximately 5% of the fleet.

Table 4. MY 2005 Certified Alternative-Fuel Engines for Collection Vehicles

Engine Manufacturer /Displacement	Series	Fuel Type	NOx+NMHC Certification (g/bhp-hr)	PM Certification (g/bhp-hr)
Cummins 8.3L	C Gas Plus	CNG/LNG	1.7	0.01
Cummins 8.9L	L Gas Plus	CNG/LNG	1.2	0.01
Deere 8.1L	6081H	CNG/LNG	1.2	0.01

B. 2007 to 2009 Engine Availability

In 2007 the engine exhaust emission standards for heavy-duty engines drops to 0.2 g/bhp-hr for NOx and 0.01 g/bhp-hr for PM. Recognizing the challenge facing engine manufacturers in meeting this requirement, U.S. EPA rule allows an optional NOx standard phase-in of 50 percent of sales of the 2007 standard and 50 percent of sales of engines meeting the 2004 to 2006 standard for three years (2007 through 2009). This results in a nominal standard for 2007 through 2009 of 1.2 g/bhp-hr for NOx. The PM standard, however, is 0.01 g/bhp-hr from 2007 on.

Most diesel engine manufacturers have indicated that they will use a two-step approach to meeting the NOx standard. They plan to meet the 1.2 g/bhp-hr NOx standard for most 2007 – 2009 MY engines, although some engines will undoubtedly be certified higher or lower. According to U.S. EPA’s second highway diesel progress report (U.S. EPA 2004) and based on ARB staff’s evaluation, manufacturers are on track to meet

the requirements in 2007. Alternative-fuel engine manufacturers, on the other hand, are planning to meet the 0.2 g/bhp-hr standard beginning in 2007. While most manufacturers have released details about their 2007 engines, some have not. Thus the information that follows includes general information where specifics are unavailable for publication. Staff's evaluation includes both publicly available and confidential information.

a. Diesel-fueled Engines

All major manufactures have announced that they will be using exhaust gas recirculation (EGR) to meet the 2007 NOx emission standard and diesel particulate filters to meet the particulate standard. EGR causes a portion of the exhaust gases to circulate through a heat exchanger to cool the exhaust before reintroducing the gases into the engine intake manifold. EGR has been used in some engines since 2003, but engine manufacturers have further refined the systems to allow lower NOx emissions.

Caterpillar, Cummins, and DDC plan to offer a full line of medium- and heavy-duty diesel engines; International focuses on the school bus and collection vehicle engine markets; and Mack/Volvo focuses on engines for collection vehicles.

Dual fuel systems for collection vehicles are no longer available in the U.S., as Clean Air Power, the sole manufacturer of these systems, has concentrated its efforts in Europe. Increased interest in its product may, however, prompt Clean Air Power to develop and certify in California a 2007 product for collection vehicles.

Diesel hybrid-electric systems are another technology that reduces both emissions and fuel use and that will be available in 2007. While not classified by ARB as an alternative-fuel technology, diesel hybrid-electric technology achieves lower emissions and better fuel economy than equivalently sized diesel buses or trucks. Emissions testing studies at ARB and other facilities indicate a fuel consumption reduction of 25 percent and NOx emission reduction of about 50 percent for diesel-fueled hybrid-electric buses (HEBs) compared to conventional diesel transit buses.

The past few years have seen a shift from research and development to production and use of HEBs. In 1998, New York City Transit began a demonstration program with four diesel-fueled HEBs. The success of the program has resulted in New York City Transit ordering an additional 325 diesel-fueled HEBs, which it will receive through 2005 (BAE Systems, 2004). In January 2002, fewer than 100 HEBs were in active service. To date, orders have been placed for approximately 650 additional HEBs throughout the United States. In addition to the New York City Transit order, large orders have been placed by King County Metro in Seattle, Washington (213 diesel HEBs) (General Motors, 2004), and Long Beach Transit in California (27 gasoline hybrid buses) (ISE, 2003). ISE has stated that it intends to have a diesel HEB available in California in 2007.

b. Alternative-fuel Engines

Manufacturers of natural gas engines are likely to be able to meet the upcoming 2007 standard without the use of after treatment. Two engine manufacturers, Cummins, through its joint partnership with Westport Innovations, Cummins Westport Inc., and John Deere will be offering alternative fuel products to meet the 2007 emissions standards. Although we have only preliminary data, it appears that all manufacturers of alternative-fuel engines or systems will certify to the 0.2 g/bhp-hr NO_x and 0.01 g/bhp-hr PM standards.

Compared to diesel offerings, however, customers will not have a wide a range of offering to choose from when searching for engines. ISE currently offers a California-certified gasoline hybrid electric bus and is developing hybrid electric systems with compressed natural gas, diesel, and hydrogen fuels, also for urban buses. While ISE focuses on the urban bus market, it is considering expanding into other vocations that use heavy heavy-duty engines, such as waste collection vehicles.

John Deere currently only certifies urban bus and medium heavy-duty natural gas engines (Appendix A), but is developing a heavy heavy-duty engine that would be suitable for use in waste collection vehicles. John Deere intends to produce a 250-325 horsepower, 9 L natural gas engine meeting the 0.2 g/bhp-hr NO_x level by 2007. This engine could be used in transit buses, school buses, and refuse trucks.

Cummins will be marketing the natural gas engines developed by Cummins Westport Inc. and it intends to offer a full line of products. Although the engines are developed by Cummins Westport Inc., they will be following the "Cummins Value Package Introduction Process," carry the Cummins warranty, and be serviced by Cummins dealers. Cummins is currently providing bids on both diesel and natural gas buses for 2007. Cummins Westport Inc. has partnered with U.S. DOE's NREL to develop a lower emission version of the L Gas Plus (8.9 L) engine for use in medium-duty trucks, refuse trucks, and urban buses. 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.

In 2004, Ford and General Motors stated that they would no longer be producing their smaller CNG engines used in cutaway vehicles. As a result, BAT Technologies, Clean Energy, and Teleflex/GFI Control Systems have jointly proposed a contract with SCAQMD and the state of New York to "develop and certify in California a retrofit system that converts 2005 and subsequent model year gasoline-powered Ford Crown Victoria and E-450 cutaway vehicles to dedicated CNG operation" (South Coast Air Quality Management District, 2004). It is anticipated that once retrofitted, the engines will meet SULEV emission levels. This technology is scheduled to be certified by mid-year 2005.

A heavy-duty pilot ignition (HDPI) engine is a compression-ignition engine that operates on natural gas but uses diesel as a pilot ignition source. Diesel accounts for about six

percent of the fuel consumed. The ARB has defined an HDPI engine in its fleet rule for transit agencies as an engine that uses diesel fuel at a ratio of no more than one part diesel fuel to ten parts total fuel on an energy equivalent basis. Furthermore, the engine cannot idle or operate solely on diesel fuel at any time. An engine that meets this definition and is certified to the lower optional PM standard (0.01 g/bhp-hr) would be classified as an alternative-fuel engine.

In October 2004, Westport Research announced that it has been awarded \$1.5 million (USD) by the U.S. DOE's NREL in a cost-sharing subcontract to develop and deploy the next generation of its HDPI technology in heavy-duty natural gas trucks (Cummins ISXG, 14.9 L) in California. NREL funding is provided through sponsorship from the U.S. DOE FreedomCAR and Clean Cities programs. Westport Research intends to certify this engine to 1.2 g/bhp-hr NO_x by the end of 2005. Westport Research will also begin testing of the ISXG engine to reach a 0.2 g/bhp-hr NO_x emission levels by 2008.

The trucks being deployed in California will be powered by Cummins ISX engines using liquefied natural gas (LNG) fuel systems and are targeted to meet U.S. EPA 2007 emission standards (DieselNet, 2004).

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.

An U.S. EPA research team, with industry partners, is developing a low NO_x diesel engine system called Clean Diesel Combustion (CDC). CDC technology utilizes management of the in-cylinder combustion process as the primary control for NO_x reduction. In laboratory testing, the CDC system has demonstrated very low NO_x emissions without the use of NO_x after-treatment.

CDC technology relies upon in-cylinder NO_x control, where NO_x emissions are reduced in the engine combustion chamber. In-cylinder NO_x control is achieved through advances in technology in the engine's fuel system, boost control, EGR and PM aftertreatment systems. CDC technology may be scaled to both light-duty and heavy-duty applications. The key features of CDC technology include the following:

- ◆ A hydraulically-intensified fuel system to lower PM emissions while improving engine efficiency,

- ◆ A boost system which increases engine power and the efficiency of the combustion process, thus reducing emissions and increasing fuel economy,
- ◆ Cooled low pressure exhaust gas re-circulation which lowers peak combustion temperatures, reducing the formation of NO_x, and
- ◆ After treatment to reduce remaining PM, unburned hydrocarbons, and carbon monoxide in the exhaust.

Several engine and vehicle manufacturers are working to advance this technology with U.S. EPA research team. These industry partners include both automotive manufacturers and heavy-duty diesel engine manufacturers. Detailed test results have been publicly disclosed for small-bore “automotive” sized engines.

Two after treatment technologies that will most likely play a large role in meeting the 2010 NO_x standard are selective catalytic reduction (SCR) and the NO_x adsorber.

SCR catalysts that use ammonia as a NO_x reductant have been used for control of NO_x emissions from stationary sources for a number of years. Urea may also be used as the source of ammonia for SCR catalysts, and such systems are commonly referred to as urea SCR systems. In recent years, considerable effort has been invested in developing urea SCR systems that could be applied to heavy-duty diesel vehicles with low sulfur diesel fuel. Urea SCR systems were introduced in 2003 and 2004 in European passenger cars and will be used to comply with the EURO IV heavy-duty diesel emission standards. The actual introduction dates in some countries will be earlier than the EURO IV implementation requirements because of tax incentives in those countries to promote early technology introduction (United States Environmental Protection Agency, 2004).

Transit agencies that received an alternative NO_x strategy exemption under title 13, CCR, section 1956.2(c)(8) or (d)(9) were required to conduct a demonstration of an advanced NO_x after treatment system that could reduce NO_x emissions by 70 percent or more on buses operating in urban bus revenue service. Staff is monitoring the demonstration of an ammonia SCR system on urban buses being conducted by the seven transit agencies that received the exemption.

Three SCR NO_x after treatment devices were selected, produced and installed by Extengine for demonstration on three urban buses. Initiated in October 2002, VTA conducted baseline and emissions testing prior to placing the buses into revenue service. Preliminary data submitted in January 2004 are favorable and buses continue operating in revenue service (VTA, undated).

Unlike catalysts, which continuously convert NO_x to N₂, NO_x adsorbers are materials that store NO_x under lean conditions and release and catalytically reduce the stored NO_x under rich conditions. NO and NO₂ are acidic oxides and can be trapped on basic oxides. Fuel sulfur can be converted to stable sulfates providing competition with NO_x for storage sites, thus poisoning the catalysts. NO_x adsorber catalysts have a wide operating temperature window and thermal stability consistent with diesel applications

and are capable of providing NO_x conversions in excess of 90 percent over much of the operating range. However, fuel intended for adsorber regeneration is wasted if it reacts with O₂ instead of with NO_x. The additional heat generated by excessive combustion may induce thermal desorption of NO_x.

D. Alternative Fuel Experiences by End-Users

In March and April of 2005, ARB staff surveyed management personnel of waste collection companies and municipalities that collect solid waste in the District through telephone and on-site interviews (Appendix C). The survey's purpose was to gather information from hauling companies that had been operating under the District's Rule 1193 regarding their experiences with using alternative fuel collection vehicles. Staff also used the phone and on-site contacts to elicit records that we required for developing the engine inventory.

Staff ultimately talked with 27 waste collection companies and municipalities. In some cases, however, a single entity operates more than one waste collection fleet within the District. For instance, Waste Management, Inc. operates 11 separate fleets within the District, many operating under names other than Waste Management. The Los Angeles Department of General Services operates more than 700 collection vehicles out of several terminals, or staging yards, in Los Angeles. Thus, through surveying these 27 companies and municipalities, staff was able to survey more than 50 percent of the companies operating in SCAQMD, including the largest companies, for a total fleet survey representing about 4,300 vehicles or approximately 85 percent of the District's collection vehicles.

Since the District's Rule 1193 has been in effect since July 1, 2001, ARB was able to glean from fleet operators actual experiences they have had in converting to and operating alternative-fuel collection vehicles. Staff collected information on the experiences hauling companies have had to date with alternative-fuels and also elicited opinions on what impact the expanded use of alternative fuels would have on these companies.

The results of the survey indicate a wide variety of opinions and experience with alternative-fuel collection vehicles. However, it is fair to say that there is broad dissatisfaction with the older models of natural gas engines. Engines such as the Mack E7G were described as underpowered and very prone to repeated break downs. Waste Management (WM), the state's largest waste collection company, said the Mack E7G engines in their fleet had an average cost of repair more than twice that of comparable diesel engines. The company listed problems with this engine that included multiple failures of electronic components, injector and turbocharger failures, valves breaking, fuel tank vacuum failure and other problems.

WM described better reliability for the Cummins 8.3C engine. However, it was also stated that this engine also lacks the horsepower and torque to perform on any but WM's lightest routes. The new Cummins 8.9L L-Gas Plus engine may provide both the

power and durability waste haulers seek. However, this engine has not been in use long enough to provide a track record by which to judge it.

Other waste haulers also commented on the lack of power and torque with alternative-fuel vehicles as well as a lack of range, saying that they used them mostly on routes that were mainly level and shorter rather than on and longer routes that included hills. Frequent breakdowns and more expensive repairs were common complaints among haulers using alternative fuel vehicles.

Data on costs and fueling infrastructure of natural gas vehicles can be found in the infrastructure appendix.

E. Diesel Emission Control Systems for Collection Vehicles

Staff's proposal envisions one compliance option to be the retrofit of new diesel collection vehicles with verified diesel emission control systems. The primary function of compliant systems would be to reduce emissions of NO_x, but 2005 to 2006 engines would also require diesel PM reductions. The discussion below, therefore, emphasizes NO_x reduction technology, and in particular two leading candidates. A more general discussion is presented in the Technical Support Document.

To qualify as a compliant emission control system, a product must be verified under ARB's Diesel Emission Control Strategy Verification Procedure (title 13, CCR, sections 2700-2710). Although the primary purpose of the Procedure is to verify diesel PM reductions, it can also be used to verify NO_x reductions. A complete and up-to-date list of verified systems and the engine families for which they have been verified can be found on-line at: <http://www.arb.ca.gov/diesel/verifieddevices/verdev.htm>.

1. Lean NO_x Catalyst

While not currently verified for 2005 and 2006 diesel collection vehicles, the lean NO_x catalyst has the potential to help heavy duty diesel engines comply with the proposed requirements for those years. By injecting hydrocarbons (e.g., diesel fuel) upstream of a catalyst in a vehicle's exhaust system the lean NO_x catalyst system is able to reduce NO_x emissions by approximately 25 percent. It does not reduce PM emissions by itself, but can be combined with other controls such as diesel particulate filters.

At present, there is one lean NO_x catalyst system verified for a wide range of on-road 1993 through 2003 diesel engines: the Cleaire Longview. The Longview system includes a particulate filter and has certain exhaust temperature requirements for proper functioning. The duty cycle of some collection vehicles may be such that the exhaust temperature is not sufficient for proper operation of the Longview system. The Longview is verified for 25 percent NO_x reduction, which if applied to an engine certified at 2.0 g/bhp-hr NO_x would comply with this rule during 2005 to 2006. However, it would not provide sufficient NO_x reduction to meet the proposed performance standard for

2007 through 2009 engines and it is uncertain whether they will carry the technology beyond 2003 MY engines.

2. Selective Catalytic Reduction

Selective catalytic reduction (SCR) systems are similar to lean NO_x catalyst systems in that a reductant is injected into the exhaust stream to react with NO_x in the presence of a catalyst. SCR systems use either ammonia or urea and can achieve a wide range of NO_x reductions, as high as 90 percent. As with lean NO_x catalyst systems, SCR systems can be used in conjunction with various PM control strategies, including oxidation catalysts and diesel particulate filters.

Because of its potential for large NO_x reductions, SCR technology would be a good candidate for a retrofit system that could enable 2007-2009 diesel collection vehicles to meet the proposed requirements. About an 80 percent reduction would be required for a 1.2 g/bhp-hr NO_x engine to meet the level of 0.2 g/bhp-hr. Owners of collection vehicles interested in this option would need to ensure a continuous supply of reductant for the system to function properly.

It is uncertain if any SCR retrofit manufacturers will have verified product available for 2007 through 2009 diesel engines. There is, however, one SCR system verified at present: the Extengine ADEC system. The ADEC is verified to achieve an 80 percent NO_x reduction and a 25 percent PM reduction. Although the verification is currently limited to certain off-road engines only, the same basic technology could potentially be effective in on-road applications.

VIII. REGULATORY ALTERNATIVES (No Alternative Recommended)

In order to ensure that a regulatory proposal provides the greatest amount of emission reductions, ARB staff explores several possible options. In this proposal three possible alternatives were evaluated by staff.

A. Do Not Adopt This Regulation

There are approximately 5,000 collection vehicles in the District. Of these, fewer than 1,000 are operated on alternative fuels. The collection vehicles that continue to run on diesel fuel contribute significant amounts of NO_x and PM to the District's air. Rejecting this regulation would mean losing a reduction of 0.3 tons per day of NO_x or less between now and 2020. The magnitude of the NO_x reductions is relatively small; however, the District needs large reductions in NO_x to meet the ozone and fine particle standards.

B. Rely On Voluntary Compliance

Rule 1193 went into effect for fleets of 50 or more on July 1, 2001, and for fleets of 15 or more on July 1, 2002. Since those dates, operators of waste collection vehicles have

shown little inclination to move away from diesel fuel and embrace the use of alternative fuels. Some appear to be hanging on to older diesel collection vehicles for as long as possible to avoid purchasing new vehicles which would have to be alternative fuel under the District's fleet rule. Of the 27 companies and municipalities surveyed by ARB, 15 were using alternative fuels and 12 continue to use only diesel. Of the 12 entities using only diesel, virtually all said they prefer to continue using diesel rather than alternative fuels. Among the 15 currently using alternative fuels, seven said they would be reluctant to expand use of alternative fuel vehicles because of engine unreliability, costs, or lack of sufficient infrastructure. Several said incentive funding should be provided to those willing to expand their use of alternative fuel.

Staff reviewed data from 11 small companies and municipalities with fleets of 14 or fewer vehicles in the District (15 or more vehicles being the point where the District's Rule 1193 applied). One small municipal fleet had purchased two alternative-fuel vehicles while the other ten continued using only diesel fuel.

Staff concludes, therefore, that relying on voluntary actions would not result in purchase of the lowest emitting vehicles available.

C. Adopt a NO_x level of 0.9 g/bhp-hr for 2007-2009 purchases

At the April 2005 workshop, staff solicited input from stakeholders on what might be an appropriate level for the NO_x performance standard for 2007 through 2009 low emission purchases. The draft regulatory language included a range from 0.2 to 0.9 g/bhp-hr that was under consideration.

Most diesels in the 2007 to 2009 timeframe will be certified at the 1.2 g/bhp-hr level. Lean NO_x catalyst retrofit technology that is currently verified to give a 25 percent NO_x reduction could, in principle, reduce NO_x emissions to a 0.9 level. As such, the 0.9 level would make the diesel retrofit compliance option a more concrete possibility than a lower level that required an as-of-yet unverified retrofit technology.

Through the workshop process, staff identified several problems with establishing a 0.9 g/bhp-hr NO_x performance standard. One problem with this option is that although lean NO_x catalyst technology is verified for many on-road engines today, the manufacturer of this retrofit technology indicated that it is not going to pursue the 2007 through 2009 diesel engine market. These engines will be substantially different from today's diesels due to the addition of filters and sophisticated engine management strategies to control both active regeneration and more aggressive exhaust gas recirculation. They will therefore be less amenable to retrofit than today's engines.

Two additional problems with the 0.9 g/bhp-hr NO_x level relate to the size of the expected reductions and cost-effectiveness. A 25 percent reduction from 1.2 g/bhp-hr, itself a small number, would result in relatively small emissions benefits. Based on experience with currently verified NO_x retrofit technology and discussions with NO_x retrofit manufacturers, staff estimates that there would not be a large difference in cost

between the technologies that would be used to meet the 0.9 and 0.2 g/bhp-hr levels. As a result, the cost-effectiveness of the 0.9 g/bhp-hr option is much worse than that of the latter. Therefore, staff has proposed that the performance standard for purchase of new collection vehicles be set at 0.2 g/bhp-hr NOx.

IX. ECONOMIC IMPACT

The proposed amendments would require owners of solid waste collection vehicles who operate in the District to purchase vehicles that meet the proposed emissions requirements. The proposal would affect purchasing decisions primarily between the years 2006 and 2009, involving an estimated 1,035 collection vehicles.

Staff believes that the proposed regulation would impose significant additional costs to owners of collection vehicles in the District, but that it would not cause significant 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 by the proposed regulation include privately-owned solid waste collection companies that operate in the District; manufacturers of diesel engines, alternative-fuel engines, alternative-fuel vehicle system components, alternative-fuel fueling stations, collection vehicles, and emission control system retrofit devices; providers of alternative and diesel fuels; and distributors and installers of emission control systems. Since no heavy-duty engine or collection vehicle manufacturer, either diesel or alternative fuel, is based in California, most impacts to these businesses, both positive and negative, would occur in other states. Several manufacturers and distributors of emission control systems, however, are based in California and could experience market growth as a result of the proposed regulations, were any to verify a system that could allow for retrofitting a diesel engine to meet the requirements.

Most, but not all, waste collection companies are California businesses, but the majority of collection vehicles are owned by companies based in other states. The largest companies that provide waste collection services in the District are Waste Management, which is headquartered in Houston, Texas; Allied Waste Corporation, headquartered in Scottsdale, Arizona; and Republic Industries, Inc. which is headquartered in Fort Lauderdale, Florida. All three are publicly-traded companies.

C. Estimated Costs to Public and Private Collection Vehicle Owners

The proposed regulation would impose costs on both private and public owners of solid waste collection vehicles in the District. It would require owners to purchase vehicles that meet the proposed emission performance standards for NO_x and PM when they add vehicles or replace vehicles in their fleets. Staff expects that the proposed requirements would impose additional costs on owners because they would most likely require the purchase of alternative-fueled vehicles or retrofits for new diesel engines. Both options would be more costly than buying a conventional diesel vehicle alone.

Staff estimated the potential cost to owners by examining the most likely compliance option, which would be the purchase of alternative-fueled vehicles. Factors included in this cost estimate include the capital cost of trucks, operations and maintenance costs (including fuel), and the capital cost of installing fueling stations for alternative fuels. Staff also considered a retrofit compliance option, SCR technology as an example. Specific cost estimates, assumptions, and the economics methodology used are detailed in Appendix D.

Staff estimates that the total additional cost from complying with the proposal would range from \$31.6 million to \$82.7 million over 15 years (2006 through 2020) (Table 5). The high cost estimate assumes the purchase of alternative-fuel (LNG) trucks, and includes differential costs for the vehicle, operations and maintenance, and new fueling stations. Of the \$82.7 million, about \$56 million (or about two thirds) comes from additional capital costs, while the remaining \$27 million comes from additional operations and maintenance costs.

Although there is currently no verified diesel emission control system that would allow owners to meet all of the requirements, staff also considered the potential cost of SCR retrofit systems for comparison (Table 5). This low-cost estimate assumes that all new vehicles purchased are diesels that are retrofitted with an SCR system. The total incremental cost is about \$32 million, which is dominated by capital costs. Operations and maintenance costs are primarily from the required use of a supplemental reactant, either urea or ammonia, which would be required for SCR systems. The assumptions behind the costs in Table 3 are found in Appendix D.

Table 5. Estimated Cost of Compliance with Proposal

Compliance Option	Item	Incremental Cost (2005 \$)
Alternative fuel (LNG collection vehicles)	Capital ^a	\$ 55.6 million
	Operation and Maintenance ^b	\$ 27.1 million
	Total Incremental Cost	\$ 82.7 million
Diesel retrofit (SCR systems)	Capital ^c	\$ 30.5 million
	Operation and Maintenance ^d	\$ 1.1 million
	Total Incremental Cost	\$ 31.6 million

- a. Includes the incremental cost of purchasing 1,035 LNG collection vehicles between 2006 and 2009 and 10 LNG refueling stations.
- b. Includes the incremental cost of LNG fuel and additional maintenance and repair costs.
- c. Includes the cost of 1,035 SCR retrofit systems and another 1,035 replacement units 10 years later.
- d. The incremental cost the cost of supplying urea.

D. Potential Impact on Other Businesses

If adopted, the proposed purchasing requirements could have a positive impact on manufacturers and distributors of alternative-fuel engines, alternative-fuel vehicle components, alternative fuels and fueling stations, and diesel emission control systems. The proposal would expand the market for these manufacturers, in particular over the 2006-2009 timeframe. Diesel-related businesses, such as diesel engine manufacturers and diesel fuel suppliers may experience reduced demand in proportion to the increased demand for alternative-fuel related products. To the extent that diesel emission control systems are used, the diesel-related businesses would not be impacted negatively.

E. Potential Impact on Business Competitiveness

The proposed amendments apply equally to all owners of solid waste collection vehicles that operate within the District regardless of where their companies are based. They have the impact of removing the doubt associated with the District's Rule 1193 over whether private companies that contract for collection services are included within the scope of the rule. Each of California's top three publicly-traded waste collection companies also operate in the District, thus this rule would affect each equally and not give one a competitive advantage over the other. Larger companies in general, however, may be more able to absorb the additional costs than smaller companies. While it can be argued that the advantages of scale exist regardless of the regulatory climate, they may be more pronounced under this proposal because companies that typically purchase used collection vehicles would most likely no longer be able to do so.

There may also be an impact on the competitiveness of California companies relative to out-of-state companies. Large companies that operate in various states would only have increased operating costs for the portion of their fleet in the District. For companies that operate in the District exclusively, their entire fleet would be affected and thus their expenses would be proportionally higher. The same situation could arise relative to companies that operate in multiple air districts within California as well.

Concerning the other businesses addressed previously in "Section B. Affected Businesses", staff does not expect the proposed regulation to impact the ability of those based in California to compete with businesses in other states. All such businesses would be providing goods and services to customers (collection vehicle companies) that were subject to regulations that had no relationship with a business' location.

F. Potential Impact on Employment

Staff expects that the proposed regulations would result in the expanded use of alternative fuels, related technologies, and diesel emission control systems. To meet increased demand for these products, there would likely be job creation. At the same time, employment may decrease somewhat in diesel-related businesses if owners by and large select the alternative fuel route.

G. Potential Impact on Business Creation, Elimination or Expansion

The proposed amendments are expected to have no impact on business creation or elimination. However, limited business expansion may result from increased demand for alternative-fuel related products and diesel emission control systems.

H. Potential Cost to Local and State Agencies

Both public agencies and private companies that own collection vehicles in the District would be required to follow purchasing requirements if the proposal were adopted. Because the purchase rate tends to be higher with publicly owned fleets, however, staff expects that a disproportional amount of the costs would be incurred by public agencies.

Public agencies own about 29 percent of the estimated total 5,000 collection vehicles in the District. The City of Los Angeles alone, which has half of all publicly-owned collection vehicles, purchases about 100 new collection vehicles each year. That is a large fraction of the 260 new vehicles staff estimated would be purchased each year in the District between 2006 and 2009. For the purposes of determining the costs to public agencies with collection vehicle fleets, staff considered public agency purchase rates between 30 and 50 percent of the District total. The results for the alternative fuel compliance option are shown in Table 6 below.

Table 6. Estimated Cost to Public Fleets

Alternative Fuel Compliance Option	Item	Incremental Cost (2005 \$)
30% of all SCAQMD purchases	Capital ^a	\$ 16.7 million
	Operation and Maintenance ^b	\$ 8.2 million
	Total Incremental Cost	\$ 24.9 million
50% of all SCAQMD purchases	Capital ^c	\$ 27.8 million
	Operation and Maintenance ^b	\$ 13.7 million
	Total Incremental Cost	\$ 41.5 million

- a. Includes the incremental cost of 310 LNG collection vehicles between 2006 and 2009 and 3 LNG fueling stations.
- b. Federal excise tax not included in diesel and LNG fuel costs.
- c. Includes the incremental cost of 517 LNG collection vehicles between 2006 and 2009 and 5 LNG fueling stations.

If public fleets were to purchase new collection vehicles at a rate proportional to their size (about 30 percent of District collection vehicles), staff estimates that the cost of compliance under the alternative fuel option through 2020 would be about \$25 million. Because public agencies will likely purchase new vehicles at a greater rate, the second estimate in Table 6 above may be more accurate. Purchasing 50 percent of all new collection vehicles in the District, public agencies would incur an estimated additional cost of \$42 million.

I. Cost to the Average Household Receiving Waste Collection Service

Municipalities or collection vehicle owners directly, may pass on to ratepayers the cost to implement the proposed regulations. Staff estimated the annual expected increased cost of solid waste collection services per household by dividing the total dollar costs that businesses and individuals may incur from the proposed regulation over its lifetime, about \$83 million, by the number of estimated households in SCAQMD.

Statewide, there are an estimated 12.3 million households (ARB 2003). The fraction of households in SCAQMD can be estimated based on the fraction of California's population in Los Angeles, Orange, Riverside, and San Bernardino Counties. Data from the California Department of Finance show that fraction was about 46 percent in 2004 (DOF 2004). Staff therefore estimates that there are about 5.7 million households in SCAQMD. The total cost per household, over the 2006 to 2020 timeframe, would therefore be approximately \$15, or \$1.00 annually. This estimated cost per household includes residential and commercial solid waste and recycling services. By comparison, ARB's existing collection vehicle rule, which focuses on cleanup of vehicles currently in operation, increases per household costs \$12, or \$0.70 annually (ARB 2003).

X. ENVIRONMENTAL IMPACTS AND COST EFFECTIVENESS

The proposed regulation would result in reductions in emissions of NOx from collection vehicles that are purchased in the 2006 through 2009 model years, and reductions in emissions of PM from 2006 model year vehicles. The estimated reductions are small relative to baseline emissions and would be costly to achieve, but nevertheless would provide reductions needed to meet the ozone and fine particle air quality standards. While staff's proposal would not require that these reductions be achieved via the purchase of alternative-fuel vehicles, that is the most likely path to compliance. Staff does not expect significant toxic emissions from these vehicles in light of the effective oxidation catalyst technology that they currently use.

A. Benefits Within the South Coast Air Quality Management District

If adopted, the proposed regulations would result in reduced emissions of NOx of approximately 0.3 tpd each year to 2020 (Table 7). The percent reduction from the baseline ranges from four to nine percent over those years.

Table 7. Collection Vehicle NOx Emissions and Reductions - SCAQMD

NOx	2000	2005	2010	2015	2020
Baseline (tpd)	11.6	10.5	7.3	5.5	3.5
Proposal (tpd)	11.6	10.5	7.0	5.2	3.2
% reduction	0	0	4	5	9

The cumulative NOx reduction through the year 2020 amounts to about 1,590 tons, which is about 4.5 percent of the total NOx emissions from SCAQMD collection vehicles from 2006 to 2020 (Table 7). NOx reductions peak at about 0.3 tons per day following the purchase of the last group of vehicles in 2009. Staff notes that this reduction is quite small compared to the decline in baseline NOx emissions attributed to turnover (7 TPD between and 2020.) Therefore, even a small reduction in new vehicle purchasing (possibly done to avoid or delay purchasing alternative fuel vehicles) could reduce or eliminate these benefits.

Emissions of PM would only be reduced from the collection vehicles purchased in 2006 since all 2007 and subsequent heavy-duty on-road engines, whether diesel or alternative fuel, will meet the same 0.01 g/bhp-hr standard. In addition, reductions in PM emissions from 2006 engines could only be counted for 2006 through 2009 as ARB's existing in-use collection vehicle rule requires that BACT to reduce PM emissions be applied to 2006 model-year engines in the 2009-2010 timeframe. Therefore, staff expects no significant PM reductions relative to district-wide baseline levels.

The situation is similar for non-methane hydrocarbons (NMHC) and carbon monoxide (CO). The proposed requirements set no specific limits for these pollutants. Any changes in their emissions would be incidental and dependent on the particular

technologies chosen by owners. Emissions of both NMHC and CO are expected to be extremely low for 2007 and subsequent diesels, and so like PM, benefits could perhaps be achieved for 2006 vehicles only. Again, staff expects no significant NMHC or CO reductions relative to district-wide baseline levels.

B. Cost-Effectiveness of Proposal

The cost-effectiveness of the proposal is expressed as the total cost of implementation divided by the cumulative emissions of NO_x reduced. For the alternative fuel compliance option, the total cost is about \$83 million. Dividing by the total NO_x reduction of 1,590 tons, cost-effectiveness is about \$52,000 per ton. For the diesel retrofit compliance option, assuming verified retrofit technologies become available which is quite uncertain at this time, the total cost is about \$32 million, giving a cost-effectiveness of \$20,000 per ton. To place the costs in context, most recently adopted mobile source regulations for NO_x or HC have a cost effectiveness of \$10,000 per ton or less.

C. Potential Negative Impacts

1. Toxics from Diesel and Alternative Fuel Engines

Historically diesel engines were perceived as having higher PM and higher toxic emissions than similar natural gas engines. Natural gas engines were typically thought of as “low emission”, as emitting less PM and NO_x, 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 after treatment 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 NO_x, the assumption that natural gas engines are inherently less polluting than diesel equipped with after treatment was called into question.

To address this issue, ARB led a multi-agency research effort to compare emissions from diesel and natural gas engines and transit buses. 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 NO_x, natural gas engines are cleaner until 2010 (assuming a 0.2 g/bhp-hr NO_x 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.

Table 8. Emission Comparison - Diesel Truck vs Natural Gas Truck

Model Year Truck	Truck 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	0.1	50% cleaner	3 times cleaner	Varies
Today (2003 - 2006) (diesel w/ filter and NG w/o catalyst)	~2.2 ¹	0.1	25% cleaner	8 times cleaner	Same
2007 (diesel w/ filter and NG w/ catalyst)	1.2	0.01	Same*	Same	Same
2010 (diesel w/ filter + absorber and NG w/ 3-way catalyst)	0.2	0.01	Same	Same	Same

* A few natural gas engines may comply with the 2010 NOx standard by 2007, in which case they would be ~80% cleaner.

2. Ammonia Slip from Selective Catalytic Reduction

Selective catalytic reduction systems that may be used as retrofits or as part of new engine technology to meet the proposed requirements have the potential for ammonia emissions. A selective catalytic reduction system injects ammonia or urea into the exhaust gas stream to react with NOx in the presence of a catalyst. Such systems, if not carefully designed or calibrated, could potentially release excess ammonia into the atmosphere. In general, the possibility of ammonia slip increases with the desired NOx reduction, as more ammonia must be used to reduce more NOx. However, given the relatively modest percentage reductions expected (80 percent reduction to reduce a 1.2

g/bhp-hr engine to 0.2 g/bhp-hr), highly aggressive SCR systems will likely not be necessary.

Furthermore, careful calibration and use of a clean-up oxidation catalyst can virtually eliminate ammonia slip. To ensure that ammonia emissions do not become a problem, the diesel emission control system verification procedure requires that ammonia slip not exceed 25 parts per million on average. Although there are no SCR systems currently verified for on-road use, there is one verified for off-road use. Several companies have expressed interest in verifying SCR systems for on-road use in the near future.

XI. ISSUES

Over the course of development of this proposal, 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. Proposal is a De Facto Alternative-Fuel Standard

For the 2005 model year, the only new engines certified to the proposed 1.8 g/bhp-hr NOx emission performance standard are alternative fuel engines. Staff projects the same situation for the 2006 model year. No retrofit devices are certified to sufficiently reduce NOx emissions from current diesel engines to meet the proposed performance standard. It is technically possible that manufacturers of currently verified NOx retrofit devices (lean NOx catalyst and SCR) could extend their verifications to these newer engines, but it is not known at this time if they will do so.

For the 2007 through 2009 model years, testimony at workshops indicates that at least two manufacturers of natural gas engines will certify to the proposed 0.2 g/bhp-hr NOx performance standard. No diesel engines are expected to certify to this standard. It is possible a manufacturer of SCR retrofit technology may verify its technology to allow a conventional diesel engine to meet the performance standard, but this remains uncertain at this time.

Beginning in 2010, staff expects both diesel and natural gas engines to certify to the 0.2 g/bhp-hr NOx standard applicable to all heavy duty engines sold in that year.

Thus, between now and 2010 the most likely path of compliance is purchase of natural gas engines. From 2010 on, both natural gas and diesel engines are expected to be available. Based on surveys of waste collection vehicle generators, most would purchase diesel engines once available.

Proponents of natural gas engines state that the proposed rule will provide the incentive for engine manufacturers to continue to develop and certify natural gas engines, allowing the fledgling market to grow. They also believe there is risk that the diesel engine manufacturers will fail to develop the technology to allow the diesel engine to

comply with the national 2010 standards, and this will force a rollback. They point out that natural gas engines will comply with the standard in 2007, three years earlier, and that this is the technology that we can be sure will provide low emissions for the future. Staff agrees that several natural gas engines will likely meet the 0.2 g. standard in 2007.

Engine manufacturers and many fleet operators have stated that the proposed rule will require purchase of natural gas engines for four years, at which time the diesel engines they favor will be compliant. For those not already committed to alternative fuel engines, this could create substantial costs in facilities, training, parts, and fueling infrastructure for a technology they do not plan to continue purchasing beyond 2009. They note that the emission benefits are small, not particularly cost effective and the rule will require considerable process and uncertainty regarding requests for exemptions that they expect will be needed for some vehicle purchases (as has been the case with the current District rule).

Staff believes that the above positions and concerns, although sometimes in stark contrast with each other, have merit. However, staff has not been able to identify an approach that achieves emission reductions similar to the District rule that also addresses the concerns of all the stakeholders. Thus the proposed rule will likely require the purchase of alternative fuel collection vehicles by operators who do not wish to purchase them, for the four years from 2006 to 2009.

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

Some workshop commenters challenged California's authority to adopt and enforce fleet regulations in 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 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 law⁴ 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 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.⁵ Other courts have also frequently noted that Congress consciously chose to permit California to blaze its own trail.⁶

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.

⁴ California Health & Safety Code Division 26.

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

⁶ 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).

It is also noteworthy that, notwithstanding the legal arguments, there is no substantive argument that lead-time or stability is needed. The lead time and stability requirement was added to the Clean Air Act to assure that when new, more stringent emission standards are adopted, adequate time will be provided to allow the development and validation of new technologies, and to prevent the standards from being changed too frequently. The performance standards proposed by staff differ in that they do not require the development and validation of new technologies. Instead, the rule would require the fleet operator to purchase the cleanest of available engines. If no engine meeting the performance standard is available, a higher emitting engine can be purchased. In this context, there is no need for lead time or stability since engine manufacturers are not required by the rule to produce cleaner engines.

C. 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 lead time to develop new knowledge and will be implemented in three to four years. In the case of this proposed rule, 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.

XII. STAFF RECOMMENDATION

The proposed modifications, as described herein, are consistent with the authority of ARB to control emissions from mobile sources. Adoption of this proposal would achieve the emission reductions from collection vehicles envisioned in SCAQMD Rule 1193. Upon approval staff will request a waiver of federal preemption from EPA, which is required to enforce this regulation.

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XIV. AVAILABILITY OF TECHNICAL SUPPORT

An electronic version of the technical support document for the proposal is available at <http://www.arb.ca.gov/regact/scswcv05/scswcv05.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 the **TECHNICAL SUPPORT DOCUMENT: PROPOSED REGULATION FOR THE PROPOSED SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT FLEET RULES** to:

Name: _____

Address: _____

