

# SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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## Staff Report

### Proposed Rule 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles

October 2000

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# **SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**

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## EXECUTIVE SUMMARY

The South Coast Air Quality Management District (AQMD or District) is proposing a series of standalone fleet vehicle rules, called the Clean Fleets Program, to reduce population exposure to air toxics and improve air quality through increase use of cleaner burning or alternative-fuel vehicles. Proposed Rule (PR) 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles – is a part of these individual actions and would require public fleet operators to purchase alternative-fuel, dual-fuel, or gasoline heavy-duty vehicles when replacing or adding vehicles to their fleets. Alternative fuels currently being used to power heavy-duty vehicle engines are compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG or propane). Other alternatives currently powering heavy-duty buses (exempt from PR 1196) are electricity and fuel cells, and have included some use of methanol and ethanol. PR 1196 requirements would become effective for purchases, leases, or contracts made after June 30, 2002. The full text of PR 1196 is provided in Appendix A.

Under current PR 1196 provisions, a fleet operator may be able to purchase or lease a diesel-powered vehicle if AQMD approves a Technical Infeasibility Certification request for that purchase. AQMD approval of a Technical Infeasibility Certification request can only be based on a demonstration that no alternative-fuel heavy-duty vehicles are commercially available for those specific operations. Additionally, approval of a Technical Infeasibility Certification request would require the fleet operator to procure a Rule 1196-certified heavy-duty vehicle powered by low-sulfur diesel fuel with all exhaust vented through California Air Resources Board (ARB)-approved control device(s) that meet PR 1196 requirements. These control devices could include particulate traps and/or NO<sub>x</sub> control devices, if available.

Year 2010 PR 1196 emission reductions have been estimated at 74 tons per year for NO<sub>x</sub> and 8.2 tons per year for PM. Key issues identified through the rule development process include funding, alternative-fuel and vehicle availability, and the need to keep a minimal number of conventionally-fueled vehicles for emergency purposes.

## INTRODUCTION

Despite the significant progress that has been made in reducing both mobile and stationary source emissions over the past twenty years, the South Coast Air Basin (Basin) continues to experience poor air quality, dominated by motor vehicle pollution. The Basin is still the only area in the country classified by U.S. Environmental Protection Agency (EPA) as an extreme nonattainment area for ozone. In addition, the Basin is classified as serious nonattainment for the federal air quality standard for particulate matter (PM<sub>10</sub>). Based on the latest information available, on-road motor vehicles contribute more than half of all hydrocarbons, oxides of nitrogen, and carbon monoxide to the entire emissions inventory. In addition, on-road motor vehicle pollution, specifically from diesel-powered vehicles, has been identified as the principal source of public exposure to air toxics, based on recent work conducted by the AQMD and other agencies. Fleet heavy-duty vehicles in particular emit ozone and PM<sub>10</sub> precursor pollutants and toxic air contaminants into the air of heavily urbanized areas, where improvements in air quality are critical given environmental justice and other concerns.

## BACKGROUND

The AQMD is the local government agency responsible for air quality assessment and improvement. The Basin, which includes Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino Counties, is designated by U.S. EPA as an extreme nonattainment area for ozone and a serious nonattainment area for PM<sub>10</sub>. The Air Quality Management Plan (AQMP) shows that mobile sources emit significant amounts of both particulate matter and oxides of nitrogen (NO<sub>x</sub>, a precursor to ozone and PM<sub>10</sub>).

In August 1998, the California Air Resources Board (ARB) identified particulate matter from diesel engine exhaust as a surrogate for all toxic air contaminant (TAC) emitted from the exhaust. The AQMD's Multiple Air Toxics Exposure Study II (MATES II) conducted locally identified mobile sources, particularly diesel exhaust, as the overwhelming contributor to local air toxic risk levels. Based on the results of the MATES II study, the AQMD Governing Board in March 2000 adopted the Air Toxic Control Plan (ATCP), which included an early action control measure now known as the Clean Fleets Program.

The development of the Clean Fleets Program, and PR 1196 in particular, is based on these regulatory research findings and the need for further criteria pollutant reductions. In addition, the development of the proposed rule is affected by recent state and federal rulemaking actions that are intended to, or have resulted in, lowering motor vehicle emissions by reducing tailpipe emissions and requiring the purchase of alternative fuel vehicles. These are summarized below. Information is also provided regarding federal alternative-fuel policies for fleets and the AQMD's Clean Fleets Program.

### ARB Identification of Diesel Particulate as a Toxic Air Contaminant

In the early 1980's, the ARB established one of the nation's first comprehensive state air toxic programs – the California Air Toxics Program. Its goal is to protect public health by reducing air toxic emissions that pose the highest risk to residents. As part of its risk assessment, the ARB identified the highest risk substances called TACs. To reduce potential risk, the ARB and local air pollution control districts evaluate and adopt measures requiring air toxics sources to minimize risk to public health.

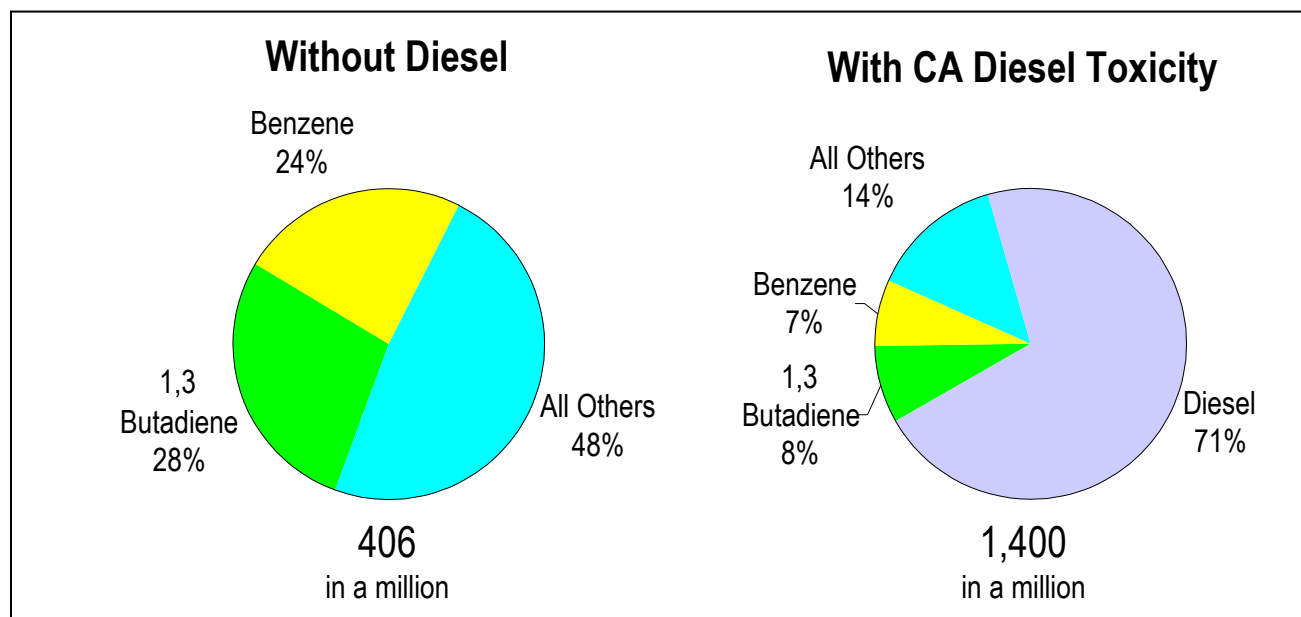
There are approximately 200 substances on the TAC list. More than 30 of these are found in diesel exhaust. After a near-decade long scientific investigation into the health effects of exposure to the fine particles and other pollutants in diesel exhaust, the ARB on August 27, 1998 included particulate emissions from diesel engines as a surrogate for all TACs emitted from diesel exhaust. ARB's identification of diesel exhaust particulate matter as a TAC was incorporated in the analysis the AQMD conducted as part of its MATES II Study.

### MATES II

The AQMD's MATES II program began in 1998 with local air toxic monitoring and emission analysis. The objectives of this study were to monitor and evaluate urban air toxics, update the toxics emission inventories for the Basin, and conduct air toxic dispersion modeling to simulate the monitored data. It was during the course of the study that the ARB

listed diesel particulate emissions as a TAC. In March 2000, the AQMD Governing Board approved the release of the final report of the MATES II study. The study included an analysis of the potential air toxic impacts associated with diesel emissions. The study was one of the most comprehensive air toxics programs ever conducted in an urban environment. It included the monitoring of more than 30 toxic air pollutants at 24 sites over a one-year period ending in the spring of 1999. The AQMD collected more than 4,500 air samples and together with the ARB performed more than 45,000 separate laboratory analyses.

The findings of this study indicated that the cancer risk from some air toxics in the Basin has declined by as much as 75 percent over the last decade. However, it also showed that based upon more extensive monitoring of the variety of toxic compounds in the air, the current cancer risk from toxic air pollution averages about 1,400 in a million in the region. The study found that 71 percent of this cancer risk is attributable to diesel particulate, as shown in Figure 1. Of the remaining 29 percent, 1,3 butadiene, benzene, and carbonyls (such as formaldehyde and acetaldehyde), generated by gasoline and diesel mobile sources and stationary sources alike, contribute 8, 7, and 3 percent of the risk, respectively.



**Figure 1**  
**Estimated Average South Coast Air Basin Toxic Risk Contributions**  
**Based on Findings from the MATES-II Study**

Based on the results of the MATES II study, the AQMD Governing Board adopted an Air Toxic Control Plan (ATCP) in March 2000. The ATCP includes AT-MBL-01, "Clean On-Road Vehicle Fleet Rules for Governments and Certain Private Fleets," as an early Action Control Strategy. One of the primary objectives of the proposed Clean Fleets program, which includes PR 1196, is to reduce TAC emissions, primarily diesel particulate, by accelerating the implementation of commercially available alternative-fuel engines. Less-polluting alternative-fuel heavy-duty engines are commercially available for heavy-duty vehicle applications.

## U.S Energy Policy Act Requirements

The 1992 U.S. Energy Policy Act (EPAAct), administered by the U.S. Department of Energy (DOE), is designed to reduce domestic dependence on foreign oil supplies and increase the use of alternative-fueled vehicles. By passing this legislation, Congress recognized that fleets are uniquely suited for introducing new fuel and vehicle technologies. Beginning in 1997, federal, state, and alternative-fuel provider fleet operators have been required to acquire new alternative-fueled light- and medium-duty vehicles as a percentage of new vehicle acquisitions. This percentage began at 10 to 33 percent depending on fleet type, with stipulated increases over time. By 2002, at full implementation, the EPAAct alternative-fuel vehicle purchase requirement will be at 75 percent for federal and state fleets, and 90 percent for fuel provider fleets. Under EPAAct fleet operators may also purchase alternative-fueled heavy-duty vehicles and use these purchases as credit towards meeting the light- and medium-duty vehicle acquisition requirements. In addition, municipal and private fleet operator participation in EPAAct is currently under consideration in the rulemaking process. If these fleets are also included in EPAAct, alternative-fueled vehicle purchase requirements for these fleet operators would begin in 2002. However, alternative programs are also being considered for municipal and private fleets that would more directly address their amount of usage and replacement of petroleum fuels.

EPAAct has set a regulatory precedent by requiring large-scale purchases of alternative-fuel vehicles by government and certain private fleets. The 1992 regulation has affected a significant proportion of vehicle fleets operating in the AQMD, which has resulted in their gaining significant experience in the operation of light- and medium-duty alternative-fuel vehicles. Most importantly for heavy-duty vehicle fleet rules, such as PR 1196, EPAAct has also effected an increase of the alternative-fuel infrastructure for government fleets. Both the rule-affected agencies and AQMD staff recognize that fueling availability is a key requirement for the success of the Clean Fleets Program. In essence, the District's proposed fleet rule builds upon the federally mandated alternative-fuel fleet requirements that have been in place for nearly a decade.

## Legislative Authority

The California Clean Air Act requires the Districts to develop attainment plans in consideration of "the full spectrum of emission sources and focus particular attention on reducing the emissions from transportation and area-wide emission sources." (Health & Safety Code section 40910) In this respect, Districts with "serious," "severe," or "extreme" air pollution "shall, to the extent necessary to meet the requirements of the plan" include in their attainment plans "[m]easures to achieve the use of a significant number of low-emission motor vehicles by operators of motor vehicle fleets." [HSC Sections 40919(a)(4) and 40920.5(a)] This section of the Health and Safety Code does not specify a specific class of motor vehicles such as light- or medium-duty versus heavy-duty. HSC Section 39037.05 provides criteria for low-emission vehicles. In addition, the ARB Motor Vehicle Control Program provides various levels of exhaust emission standards for all classes of motor vehicles.



In recognition of the substantial contribution of motor vehicles to the critical air pollution problem in the region, the AQMD is authorized also under HSC Section 40447.5 to require operators of public and commercial fleet vehicles of 15 or more vehicles, when adding vehicles to or replacing vehicles in an existing fleet or purchasing vehicles to form a new fleet, to purchase vehicles which are capable of operating on methanol or other equivalently clean-burning alternative fuel and to require that these vehicles be operated, to the maximum extent feasible, on the alternative fuel.

## **AQMD Clean Fleets Program**

In response to the above toxics studies, the technology and infrastructure driven by vehicle regulations and fleet programs, and the legal authority given to reduce the public's exposure to toxic air contaminants and criteria pollutants, the AQMD proposed a Clean Fleets Program. This program consists of a series of independent rules or proposed rules that would require government fleets and certain private fleets to purchase cleaner burning or alternative-fuel vehicles when adding or replacing vehicles to their vehicle fleets. Fleets affected by the proposed rules in this program are those operated by: federal, state, county, and city agencies; providers of passenger on-road transport from commercial airports; and special districts such as school and transit districts. The Clean Fleet Program rules are:

- Rule 1191 – Clean On-Road Light- and Medium-Duty Public Fleet Vehicles  
(Adopted June 16, 2000)
- Rule 1192 – Clean On-Road Transit Buses (Adopted June 16, 2000)
- Rule 1193 – Clean On-Road Residential and Commercial Refuse Collection Vehicles  
(Adopted June 16, 2000)
- Rule 1194 – Commercial Airport Ground Access (Portions Adopted August 18, 2000)
- PR 1195 – Clean On-Road School Buses
- PR 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles
- Rule 1186.1 – Alternative-Fuel Sweepers (Adopted August 18, 2000)

Proposed Rule 1196 (PR 1196) covers heavy-duty vehicles (heavy-duty vehicles) in public fleets that are not covered by Rules 1192 (transit buses), 1193 (refuse trucks), 1194 (airport passenger shuttles), 1195 (school buses), or 1186.1 (street sweepers). For the purposes of these rules, a heavy-duty vehicle is a vehicle having a Gross Vehicle Weight Rating (GVW or GVWR) of 14,000 pounds and greater, as defined by the ARB.

All of the rules in the Clean Fleets Program are based on one or more of the Health and Safety Code Sections cited in the "Legislative Authority" section above. Specifically, Health and Safety Code Section 40447.5 allows the District to require operators of public and commercial fleets, consisting of 15 or more vehicles operating substantially in the AQMD, to purchase vehicles powered by methanol or other equivalently clean burning alternative fuel, when adding or replacing vehicles to their fleet. Emergency vehicles are specifically exempted from this requirement, unless the AQMD Governing Board determines that sufficient refueling stations are available to the extent that their emergency response capabilities are not impaired. For the purposes of the Clean Fleet rules, emergency and rescue vehicle fleets will be exempt from rule compliance. In addition, Health and Safety

Code Section 40919 allows certain nonattainment districts (those that are designated serious and above for ozone) to adopt measures requiring fleets to use a significant number of low-emission vehicles.

Although the District's fleet rule authority could potentially affect nearly all public and private fleets consisting of 15 or more vehicles, the current proposal applies to government fleets only. Government fleet vehicles represent a particularly important opportunity to reduce emissions, because of their universal use of centralized refueling and their limited geographic and highly urbanized areas of operation. None of these attributes applies universally to commercial fleets. Additionally, EPA's Act, beginning in 1992, set a precedent for applying fleet requirements initially to government agency fleets.

As the main effort to reduce public exposure to toxic particulate and ozone precursor emissions emitted from heavy-duty vehicles, PR 1196 is one of the proposed Clean Fleets rules that affect vehicle fleet operations in the AQMD. The AQMD's objective is to promote the application of less polluting vehicle technologies to select fleets. Depending on the Clean Fleets Program's implementation effectiveness the AQMD may expand the scope of these rules, as feasible, to further maximize the benefits of clean vehicle operation within the AQMD's four-county jurisdiction.

Public fleets of heavy-duty vehicles are especially suited to use alternative-fuel technology since the fleets are typically centrally fueled, and are primarily operated in localized service areas. Several government agencies operating heavy-duty vehicle fleets have taken a leadership position in utilizing the cleanest vehicle technologies. These government fleets have implemented policies that promote the use of clean alternative-fuel vehicles in an effort to improve air quality in their area of operation. For example, the City of Santa Monica adopted its alternative-fuel policy in December of 1993 and a sustainable city program in September 1994. These policies direct future equipment purchases, including heavy-duty vehicles, to be alternative-fueled. The City of Cypress has been using propane-fueled heavy-duty vehicles since 1979. Sunline Transit Agency has instituted similar policies and is currently utilizing alternative-fuel heavy-duty vehicles in certain applications in the Coachella Valley. The purpose of PR 1196 is to increase the number of alternative-fuel or gasoline heavy-duty vehicles used by fleet operators providing public services in the AQMD's jurisdiction to reduce air toxic and criteria pollutant emissions.

## **CONTROL TECHNOLOGY**

PR 1196 identifies alternative-fuel heavy-duty vehicles engines as those powered by compressed or liquefied natural gas (CNG/LNG), liquefied petroleum gas (LPG or propane), methanol (M100), electricity, fuel cells, or other advanced technologies certified by the California Air Resources Board (CARB). There are CNG and propane heavy-duty vehicles currently being used by local fleet operators. For those special purpose vehicles where manufacturers must typically remove the existing diesel engine and fuel system that the chassis/engine manufacturers provide before they can install an alternative-fuel engine and fuel system, there is an increased incremental purchase cost for fleet operators requiring such vehicles in their fleet. The additional purchase cost incremental of an alternative-fuel vehicle, which is used in the cost analysis, could be up to \$35,000. Funding is currently

available to help offset the additional cost of alternative-fuel heavy-duty vehicles (see Funding section).

The following sections discuss some of the alternative fuel technologies that would be considered rule compliant at this time. In addition, PR 1196 considers dual-fuel technology as rule compliant because it allows the use of alternative fuels to the maximum extent feasible as set forth in HSC Section 40447.5(a). For illustrative purposes, Appendix C provides a partial list of ARB-certified heavy-duty engines that would be compliant with PR 1196. It is expected that by 2002, the list of compliant heavy-duty engines will be greatly expanded as engine manufacturers produce new heavy-duty engines to meet tighter emission standards.

### **CNG-Powered Heavy-Duty Vehicles and Fuel Availability**

Jurisdictions that presently use CNG-powered heavy-duty vehicles include the cities of Placentia, Santa Monica, and Sunline Transit Agency. In addition, some private fleets also use CNG heavy-duty vehicles. There are many alternative-fuel heavy-duty engine models available today that would comply with PR 1196 provisions. As additional models become commercially available, AQMD staff will update this information and make it available to local jurisdictions. Based on input received from engine manufacturers, CNG engines are available for applications up to about 400 horsepower.

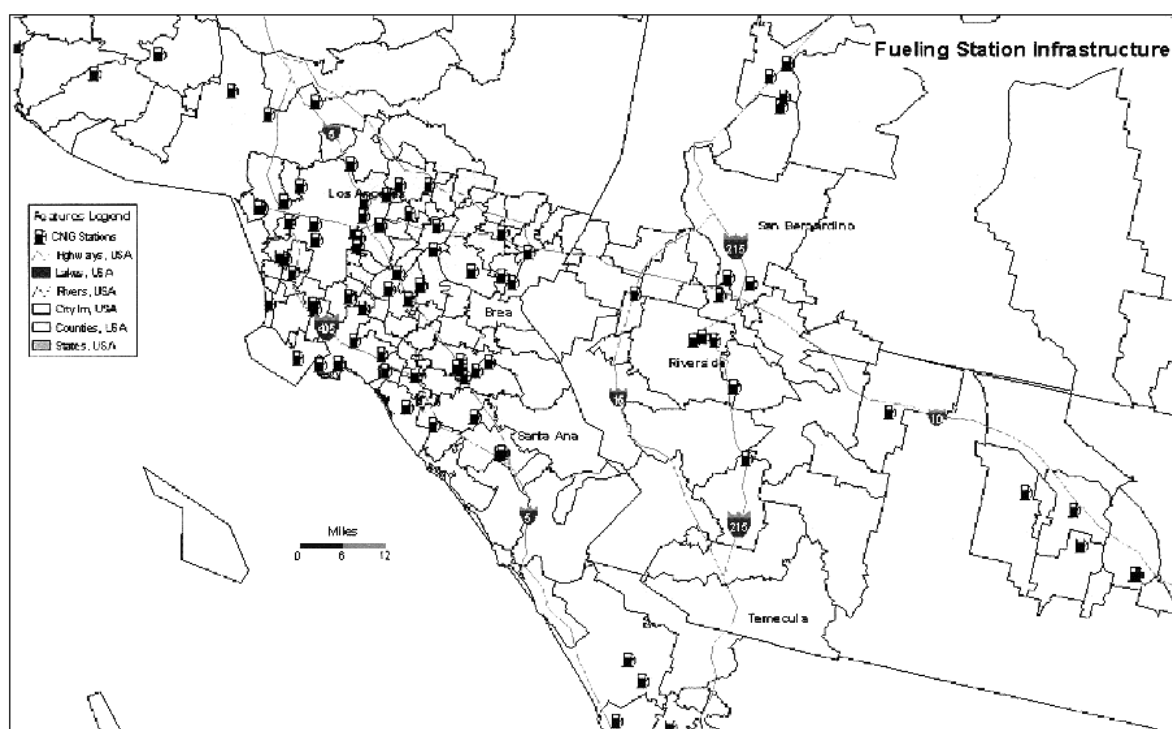
CNG is available at many stations throughout the AQMD's jurisdiction. Some agencies have dedicated CNG fueling stations and over 60 publicly available CNG stations are currently listed at [www.cleancarmaps.com](http://www.cleancarmaps.com). (The web site [www.cleancarmaps.com](http://www.cleancarmaps.com) gives locations and status of a variety of alternative-fuel fueling stations, including driving directions to the nearest stations.) Alternative-fuel providers have indicated that they will be installing additional fueling stations in the near future. (Additional information on projected CNG fueling stations can be found in the AQMD Final Program Environmental Assessment for the Proposed Fleet Rules.) Also, alternative-fuel provider companies currently offer capital lease packages where the provider installs and maintains fueling stations and the end user pays a small premium on the fuel price to pay for the station and accompanying maintenance costs. Funding is available for construction of alternative-fueling stations (see Funding section).

Currently there are an estimated 100 alternative-fuel refueling facilities operating in the South Coast Air Basin. These totals are characterized by fuel and type of access in Table 1. In addition, Figure 2 shows the location of current CNG fueling stations in the Basin.

**Table 1**  
**Estimated Number of Refueling /Recharging Stations in the SCAQMD**

<b>Fuel Type</b>	<b>Number of Stations</b>	<b>Type of Access</b>
Compressed Natural Gas (CNG)	37	Public; no restrictions
CNG	3	Public; limited times
CNG	46	Government personnel only
CNG	11	Private; no public access
<b>Total CNG Stations</b>	<b>97</b>	
Liquefied Natural Gas (LNG)	2*	Business access by contract

\* 5 stations are planned to function in near future



Source: The Gas Company

**Figure 2**  
**Map of CNG Fueling Sites in the South Coast Air Basin**

### Compressed Natural Gas (CNG)

The types of CNG fueling systems currently in use in the SCAQMD are described as follows: vehicle refueling appliance, slow-fill, fast-fill, portable compressor station, and tube trailers. Natural gas is widely used and domestically produced. But the capital cost of a CNG refueling station varies widely, depending on the size and type of the fleet served and the fuel throughput required, as well as site preparation, and equipment and installation costs. The AQMD Staff is currently collecting further data on other CNG refueling stations of various capacities and design capabilities.

### Liquefied Natural Gas (LNG)

There are at least two LNG refueling stations in the SCAQMD. A typical cost for a refueling station with a 13,000 to 15,000 gallon tank is approximately \$500,000.

## **Propane-Powered Heavy-Duty Vehicles and Fuel Availability**

The City of Cypress has been using propane-powered heavy-duty vehicles since 1979. Propane is a liquid fuel, and the fuel tank size is comparable to diesel fuel tanks, both of which are smaller than the CNG tanks that are necessary to ensure adequate range. Although the incremental cost differential for propane heavy-duty vehicles is comparable to CNG heavy-duty vehicles, maintenance and fueling requirements, as well as fueling availability, are comparable to diesel. Some jurisdictions already have on-site propane tanks for other

equipment or to power emergency generator systems. Additionally, propane is commercially available at many gas stations and home maintenance sites, which sell propane for recreational vehicles and barbecues. (Many of these sites are listed on [www.cleancarmaps.com](http://www.cleancarmaps.com)). Similar to CNG fuel providers, propane distribution companies will install and service a fueling station provided that a minimum number of dedicated propane vehicles are in the fleet. Maintenance training for propane heavy-duty vehicles has been straightforward, and the fleet operator has noted that maintenance costs are lower compared to diesel heavy-duty vehicles.

## Dual-Fuel Engine Technology

PR 1196 allows the acquisition of vehicles powered by dual-fuel engines, provided that the dual-fuel engine is certified to an optional NO<sub>x</sub> emission standard and achieves particulate matter emission levels similar to alternative-fueled engines. Dual-fuel engines are defined as a diesel-based engine that uses an alternative fuel such as natural gas or LPG in combination with diesel fuel to enable compression ignition. Dual-fuel engines commercially available are powered by diesel and natural gas, with natural gas typically supplying 85 percent of total engine fuel requirements. Development of a dual-fuel engine operating on LPG and diesel is currently underway. For the 2000 model year, natural gas/diesel dual-fuel Caterpillar engines have been approved for sale in California for engines with the following displacements: 7.2L, 10.3L, and 11.9L, with horsepower ratings ranging from 190 HP to 410 HP. Table 2 lists the engine models commercially available for the 2000 model year. Dual-fuel engines have been advertised to be suitable in heavy-duty vehicles used in public works applications, which is an area that would be affected by PR 1196. Other vehicle applications that are potentially suitable for dual-fuel engine use include school buses and refuse collection vehicles, as well as grocery, food, and beverage trucks. Dual-fuel engine technologies are allowed under Rule 1193 – Clean On-Road Residential and Commercial Refuse Collection Vehicles. However, in some specific applications where the vehicle duty cycle is such that diesel fuel is used more than the alternative fuel (specifically, applications where the vehicle is in multiple “stop and go” modes), Rule 1193 limits the purchase of vehicles with dual-fuel engines. For PR 1196, there are no time limitations placed on purchases of dual-fuel vehicles since the majority of the heavy-duty vehicle applications are such that the vehicle spends most of its time travelling to a specific destination.

**Table 2**  
**Model Year 2000 Dual-Fuel Engines**

<b>Engine Manufacturer</b>	<b>Engine Family</b>	<b>Engine Model</b>	<b>Horsepower</b>	<b>Torque lb-ft</b>
Power Systems Associates/ Caterpillar	YPSXH0442EGJ	3126B Dual-Fuel (7.2L)	190, 250	550, 660
	YPSXH0629E6J	C10 Dual-Fuel (10.3L)	305	1050
	YPSXH0729E6J	C12 Dual-Fuel (11.9L)	410	1250

## **Heavy-Duty Gasoline Engines**

Gasoline-fueled heavy-duty engines certified for Model Year 2000 generally have emission levels that are much lower than the applicable heavy-duty engine certification standards. For many of these engines, the certification levels are at least twice as low as the applicable certification standards. In addition, several heavy-duty gasoline engines have certified emission levels that are at least twice the applicable hydrocarbon emission standard. Since many of the heavy-duty gasoline engine certification levels are twice as low as the applicable certification standards, these engines meet the requirements of HSC Section 39037.05(c) and would be considered “low-emission vehicles”.

### **Minimal-Control Option If Alternative-Fuel Requirement Is Not Technically Feasible**

Alternative-fuel engines to comply with the rule are currently commercially available for many typical heavy-duty vehicle applications. In the development of PR 1196, the goal is that fleet operators will be able to procure rule compliant heavy-duty vehicles powered by alternative fuels by the applicable implementation date. However, if a fleet operator demonstrates to the AQMD that the procurement of an alternative-fuel heavy-duty vehicle that must meet the technical specifications of the fleet operator’s application is technically infeasible, the fleet operator may purchase or lease an heavy-duty vehicle that is powered by low-sulfur diesel and equipped with an ARB-certified control devices (e.g. particulate traps and/or NOx catalysts).

A fleet operator may purchase or lease a conventionally fueled heavy-duty vehicle with approved exhaust control devices, if the AQMD certifies that it is technically infeasible for a fleet operator to purchase or lease an alternative-fuel heavy-duty vehicle. Control technology manufacturers have indicated that particulate traps are currently available and improved traps would be available well in advance of PR 1196’s applicable implementation date. As ARB continues its implementation and equipment certification efforts, fleet operators would be required to purchase heavy-duty vehicles that include the latest control technology certified by ARB. While heavy-duty diesel vehicles with control devices have not demonstrated the emission benefits of engines powered by alternative fuels, requiring particulate traps and NOx catalysts will help reduce emissions in the near term as the types of alternative-fuel heavy-duty vehicle models increase and alternative-fueling stations become more available. Eventually, alternative-fuel heavy-duty vehicles should be available for almost all applications.

### **Low Sulfur Diesel Fuel**

Low-sulfur diesel fuel, defined as diesel fuel with a maximum sulfur content of 15 parts per million (ppm), is required by many of the current and proposed diesel exhaust control technologies. (The fuel also reduces SOx emissions in diesel exhaust, which are precursors to PM<sub>10</sub>). As such, PR 1196 specifically requires the use of low-sulfur diesel fuel if the fleet operator uses an ARB certified control device on the heavy-duty diesel vehicle. Low-sulfur diesel fuel is currently available from some local refineries. The AQMD has adopted amendments to Rule 431.2, “Sulfur Content of Liquid Fuels,” as part of its overall Clean

Fleets program and the amendments to Rule 431.2 would expand the availability of the low-sulfur diesel fuel. U.S. EPA recently announced that it is proposing a national 15-ppm sulfur standard for diesel fuel beginning in 2006 and ARB is also considering requiring low sulfur diesel fuel beginning in 2005 or 2006. Staff will continue to monitor these rulemaking efforts to assess the availability of low-sulfur diesel fuel.

## SUMMARY OF RULE REQUIREMENTS

The purpose of PR 1196 is to reduce air toxic and criteria pollutant emissions from heavy-duty vehicles within the jurisdictional boundaries of the AQMD, which includes Orange county, the non-desert portions of Los Angeles and San Bernardino counties, and most of Riverside county. The following is a brief summary of the PR 1196 requirements. A complete version of the proposed rule is included in Appendix A.

- Applicable fleets include those operated by federal, state, county, city, special district, and regional government departments or agencies, and joint-power authorities. Applicable to all such government agency fleets with 15 or more heavy-duty vehicles. [PR 1196 (b)]
- Exempt vehicles include those subject to other fleet rules, such as Rules 1192, 1193, 1194, 1195, or 1186.1; those privately owned that service a government agency; emergency and rescue vehicles; up to ten manufacturer's evaluation/test vehicles per fleet; military vehicles used for tactical operations, vehicles that transport materials in and out of the District, vehicles housed and operated by state agencies or special districts that are located in the Riverside County portion of the Mojave Desert Air Basin, vehicles that are leased by the U.S. Postal Service during the winter holiday season, vehicles typically housed outside of the District but may be operated or housed on a temporary basis by public entities that have jurisdiction over areas outside of the District, and when the remainder of the heavy-duty vehicle fleet is rule compliant, up to three vehicles if the remainder of the fleet consists of rule compliant vehicles or three per location for larger fleets. Larger fleets may deploy these vehicles as they see fit to meet emergency response needs. [PR 1196 (f)]
- Requires all new vehicle or engine purchases or leases to be of alternative-fuel, dual-fuel, or gasoline heavy-duty vehicles or engines, beginning July 1, 2002. [PR 1196 (d)(1), (d)(2), and (d)(3)]
- Provides a Technical Infeasibility Certification request that may delay the procurement of a rule-compliant heavy-duty vehicle and allow the purchase or lease of a heavy-duty diesel engine or vehicle, which must be powered by low-sulfur diesel fuel and outfitted with an ARB-approved particulate matter control device(s). [PR 1196 (d)(4)]
- AQMD approval of a Technical Infeasibility Certification request must be based on a demonstration that no rule-compliant engine-chassis configuration is commercially available for the fleet operator's specific application or that a rule-compliant vehicle cannot meet the fleet operator's specific application; demonstration that no alternative-fuel refueling station needed to operate a rule-compliant vehicle is available within five miles of the vehicle storage or maintenance yards; or demonstration that the cost-

effectiveness of the rule compliant vehicle is not within the cost-effectiveness criteria established for the Carl Moyer Program or MSRC, whichever is the greater. [PR 1196 (e)(1)]

- Approval of a Technical Infeasibility Certification request would allow the fleet operator to procure a conventionally fueled vehicle equipped with an ARB-approved control device(s). [PR 1196 (d)(4)]
- Agencies may be required to demonstrate compliance with PR 1196 provisions by providing purchase, lease or other records created to comply with rule requirements. [PR 1196 (g)]

## **HEAVY-DUTY VEHICLE POPULATION ANALYSIS**

Appendix B summarizes the vehicle population profile of public fleets potentially affected by the proposed rule. These data have been compiled using various sources of information, including direct surveying of public fleets, existing reports which include information on fleet vehicle population characteristics from associations/organizations that represent public fleets, and public agencies including the California Department of Motor Vehicles, California Energy Commission, ARB, U.S. EPA Region IX, and the U.S. Department of Energy.

There are many hundreds of locally based fleets operating substantially within the SCAQMD involving a variety of applications. Public agency fleets include postal, utility, and municipal fleets, with functions regarding water supply/runoff, electric power supply, public works, and other city maintenance departments. There are also many local state and federal fleets, including local Caltrans fleets. As shown in Appendix B, there are approximately 6,800 heavy-duty vehicles in fleets with 15 or more heavy-duty vehicles that would potentially be affected by PR 1196.

## **EMISSION BENEFITS**

### **Criteria Pollutants**

The goal of the proposed fleet rule is to reduce PM and NOx emissions through the introduction and use of less polluting vehicles. These emission benefits are expected to primarily consist of reduced toxic exposure to diesel particulate matter and reduced emissions of nitrogen oxides. With regard to criteria pollutants, PR 1196 is specifically based on achieving emission reductions beyond the mandatory U.S. EPA and ARB heavy-duty engine emission standards. The emission benefits for PR 1196 are primarily based on public fleet operators purchasing heavy-duty alternative-fuel vehicles instead of heavy-duty diesel vehicles. However, a fraction of the current heavy-duty vehicle population consists of gasoline vehicles. The replacement of these vehicles is assumed to be with newer gasoline-powered vehicles.



Based on the general application of the following assumptions to heavy-duty vehicles in the proposed fleet rule, emission reduction estimates for the year 2010 would be 8.2 tons per year of PM and 74 tons per year of NOx. The following formula and assumptions are utilized to calculate the emission reductions for PR 1196.

$$\text{Annual ER} = (\text{Number of vehicles}) * (\text{Annual Fuel consumption, gal}) * \\ (18.5 \text{ bhp-hr/gal}) * (\text{Mandatory std} - \text{Optional std}) / \text{Useful life}$$

Assumptions:

1. Incorporates adopted ARB and U.S. EPA emission standards, to ensure surplus emission reductions only.
2. Emission benefits accrue beginning with the July 1, 2002 implementation date.
3. Only adopted ARB and U.S. EPA emission regulations are considered in PR 1196's emission benefit calculation methodology.
4. PR 1196 will affect approximately 4,068 out of a total of 5,396 miscellaneous heavy-duty diesel-powered vehicles of various model years over ten years of useful life. Half of the current diesel-powered vehicles are assumed to be replaced with alternative-fueled vehicles; one-quarter will be replaced with gasoline-powered vehicles and the remaining diesel vehicles are assumed to be under the Technical Infeasibility Certification. No additional emission reductions benefits are assumed when an existing gasoline-powered vehicle is replaced with a newer gasoline-powered vehicle. However, it is expected that newer gasoline-powered engines would have lower emissions compared to older existing engines.
5. Diesel fuel consumption equals 1,667 gallons per vehicle per year (based on average annual vehicle miles traveled (AVMT) of 10,000 miles per year and 6 mi/gal per vehicle).
6. The nominal NOx emission rate for heavy-duty diesel vehicles is 2.0 g/bhp-hr, based on the ARB mandatory NMHC+NOx emission standard of 2.5 g/bhp-hr for heavy-duty diesel vehicles (effective beginning October 2002) and on ARB staff input.
7. The NOx emission rate for alternative-fuel heavy-duty vehicles is 1.4 g/bhp-hr, based on discussions and concurrence with ARB technical staff regarding the appropriate nominal NOx emission level that is expected to correspond with the NMHC+NOx certification level of 1.8 g/bhp-hr for heavy-duty alternative-fuel engines beginning October 2002.
8. For the NOx emission benefit calculation, a conversion factor of 2.5 bhp-hr/mi is utilized, which is the standard conversion factor ARB specifies for heavy-duty engine applications.
9. PM standard for diesel heavy-duty engines is based on 0.1 g/bhp-hr emission standard.
10. For alternative fuels (e.g., natural gas), the PM level is 0.03 g/bhp-hr, based on ARB input and certification data for heavy-duty engines. Also, this emission level is consistent with the PM standard for the alternative-fuel path in the recently adopted ARB Urban Bus Fleet Rule.

Based on the methodology and assumptions above, Table 3 details the emission reductions on a yearly basis for the years 2002 through 2010.

**Table 3**  
**Proposed Rule 1196 Emission Reduction Estimates**  
(Tons per year)

Year	Oxides of Nitrogen		Particulate Matter	
	Current	Cumulative	Current	Cumulative
2002 – 2003	7	7	0.5	0.5
2003 – 2004	8	16	1.0	1.5
2004 – 2005	8	24	1.0	2.4
2005 – 2006	8	32	1.0	3.4
2006 - 2007	8	40	1.0	4.4
2007 - 2008	8	49	1.0	5.3
2008 - 2009	8	57	1.0	6.3
2009 - 2010	8	65	1.0	7.3
2010 - 2011	8	<b>74</b>	<b>1.0</b>	<b>8.2</b>

## Air Toxics

### Estimated Relative Toxicity of Diesel, Gasoline, and Natural Gas Powered Heavy-Duty Vehicles.

The relative air toxic risks of diesel, gasoline, and corresponding natural gas heavy-duty vehicles were estimated using an approach based on determining risk weighted emission factors for the two fuels under consideration. The risk weighted emission factor is determined by multiplying the individual toxic constituents of the exhaust by their respective cancer potency factor, and then proportionately adjusting these values by an estimated annual mass emission rate of particulate matter (PM) and non-methane hydrocarbon emissions (NMHC). The purpose of this analysis is to use these risk weighted emission factors to estimate the number of natural gas powered heavy duty vehicles roughly equivalent to one diesel powered heavy-duty vehicle based on toxic risk.

For the purposes of this analysis, the toxic component analyzed for diesel powered heavy-duty vehicles is limited to total PM emissions. This is because ARB has indicated that the toxic risk factor for diesel PM already incorporates toxic risks from all other constituents in diesel exhaust. For gasoline and natural gas heavy-duty vehicles, the relative toxic risk was estimated based on the PM contribution of nickel and hexavalent chromium emissions, and the NMHC emissions of formaldehyde, acetaldehyde, benzene, and 1,3 butadiene. ARB speciation profiles were used to develop nickel and hexavalent fraction of the gasoline and natural gas PM exhaust. Hydrocarbon speciation profiles from ARB are used for gasoline engines. With regard to NMHC components of CNG vehicles, a paper from West Virginia University (SAE paper 972971) was used to develop the benzene and 1,3 butadiene NMHC fractions, and an ARB speciation profile from an industrial natural gas-powered internal combustion engine was used to develop the formaldehyde and acetaldehyde NMHC fractions. (The West Virginia University paper provided speciation data generated from a

CNG-powered engine used in on-road vehicle applications, but did not specifically include formaldehyde and acetaldehyde data.)

For the purposes of this specific analysis, the annual PM emission rates for diesel and natural gas powered heavy-duty vehicles were developed using similar assumptions contained in the criteria pollutant benefit methodology. These assumptions include diesel heavy-duty vehicle PM emissions of 0.1 g/bhp-hr for 2000 and subsequent years, and natural gas heavy-duty vehicle PM emissions of 0.03 g/bhp-hr for 2000 and beyond. The annual mass emission rate of NMHC emissions for natural gas engines is highly variable based on input received by engine manufacturers, as evidenced by ARB certification data for natural gas engine families approved for sale in California. For the purposes of this analysis, a range of NMHC emissions was estimated using this certification data. Using this range, which corresponds to 0.3 g/bhp-hr to 0.8 g/bhp-hr, for the 2000-to-9/2002 time period and 0.3 to 0.5 g/bhp-hr for the 10/2002-and-later time period, assumed conversion factor of 2.5 bhp-hr/mi for heavy-duty vehicles, and an assumed annual mileage accumulation of 10,000 miles per year, annual NMHC emissions were determined. For heavy-duty gasoline engines, a 1.4 multiplying factor is used to convert the total hydrocarbon emissions in units of g/bhp-hr to gm/mile. On average, heavy-duty gasoline engine hydrocarbon emissions is approximately 0.3 g/bhp-hr and PM emissions are approximately 0.036 g/bhp-hr.

Table 4 shows the annual PM and NMHC mass emission rates, risk-weighted emission factors for PM and NMHC exhaust components, and the overall risk-weighted emission factor. Since the estimated risk-weighted emission factor for heavy-duty gasoline engines is within the range for the CNG heavy-duty engines, a comparison between diesel and CNG engines was made. Based on these overall risk-weighted emission factors, Table 5 shows the number of CNG heavy-duty vehicles that is roughly equivalent to one corresponding diesel-powered heavy-duty vehicle. The number is equal to the overall risk-weighted emission factor for the diesel powered heavy-duty vehicle divided by the corresponding value for the natural gas powered heavy-duty vehicle. Different time frames are utilized in this analysis to account for more stringent NMHC emission standards that are implemented in the overall time frame being analyzed.

Based on this analysis, significant toxic emission benefits will occur on a per vehicle basis from the use of a natural gas powered or gasoline powered heavy-duty vehicle versus a diesel powered heavy-duty vehicle. Depending on the time frame, one diesel powered heavy-duty vehicle is estimated to have the same toxicity as up to 81 corresponding natural gas powered heavy-duty vehicles, as shown in Table 5. Depending on the availability of particulate traps that are still under development by control device and engine manufacturers, this ratio may be expected to decrease.

**Table 4**  
**Estimated Relative Toxicity-Weighted Emissions**

POLLUTANT	COMPOUND	10/2000 & LATER		
		DIESEL	CNG	Gasoline
PM (lb/yr)		5.4	1.62	1.1
NMHC (lb/yr)		----	16-27	8.1

**Resultant Toxicity-weighted Emission Factors**

	<b>DIESEL PM<sup>1</sup></b>	16.2	----	----
	<b>METALS<sup>2</sup></b>	----	0.06	0.04
	<b>NMHC<sup>3</sup></b>	----	0.14-0.23	0.17
<b>OVERALL RISK-WEIGHTED EMISSIONS</b>		16.2	0.20-0.29	0.21

1. Based on ARB input, the unit risk factor associated with diesel PM includes toxic risk contributions for all other compounds in exhaust.
2. Toxic risk for PM exhaust in CNG vehicles based on nickel and hexavalent chromium (Cr<sup>+6</sup>).
3. Toxic compounds in NMHC exhaust emissions for CNG vehicles included in this analysis are formaldehyde, acetaldehyde, benzene, and 1,3 butadiene.

**Table 5**  
**Estimated Vehicle Risk-Weighted Emissions Ratio<sup>1</sup>**

TIME PERIOD	RISK-WEIGHTED RATIO	
	MINIMUM	MAXIMUM
10/2002 and later	56	81

1. Number of CNG vehicles equal to one equivalent diesel vehicle based on toxic risk.

## **COST ANALYSIS**

### **Clean Fleets Program Economic Assessment**

The AQMD document entitled "Draft Economic Assessment, Assumptions, Funding Sources, and Socioeconomic Report Proposed Rule 1190 Series – Clean On-Road Vehicles" (dated April 25, 2000) identifies the assumptions and analytical methods used to discern the cost/benefits, funding availability, and socioeconomic implications for the Clean Fleets Program. The document includes a preliminary cost-effectiveness assessment of these rules based on direct and indirect costs and the anticipated emission reductions. Direct cost includes vehicle miles traveled (VMT), size of vehicle fleets, type of vehicles used, fuel type

and infrastructure development costs. The indirect costs, such as job impacts, are analyzed by application of the REMI model.

The final “Economic Assessment, Assumptions, Funding Sources, and Socioeconomic Report for the Proposed Rule 1190 Series – Clean On-Road Vehicles”, based on public comments, was prepared and circulated on June 8, 2000. The revised economic assessment includes information on total costs and available funding for each of the Clean Fleet rules. Based on the assumptions used in that document, the annualized cost of PR 1196 from 2002 to 2015 is approximately \$33.9 million. In the best-case funding scenario, \$7.2 million is allocated from the MSRC fund and \$22.9 million was allocated from AB 2766 (vehicle registration) funding. In the worst-case funding scenario, only \$1 million in AB 2766 funding was allocated.

### PR 1196 Cost-Effectiveness Assessment

Based on the number of heavy-duty vehicles affected by PR 1196 and assuming a differential capital cost of up to \$35,000 per vehicle to purchase a rule compliant vehicle, the cost effectiveness of PR 1196 is estimated to be \$165,043 per ton of combined NOx and particulate matter emissions reduced with an annualized cost of \$10.5 million. To estimate the cost-effectiveness of PR 1196 of the three funding scenarios discussed above, it is assumed that the funding levels for the worst-case funding is the same as provided in the Economic Report. However, more recent actions by the MSRC indicate that approximately \$1.6 million in incentive funding would be available to public entities for heavy-duty vehicles. Since a portion of the MSRC funds would be used for heavy-duty vehicles covered by other SCAQMD fleet rules, \$0.5 million of the \$1.6 million is assumed for the most-likely funding scenario and \$1.0 million is assumed for the best-case funding scenario. AB 2766 funding levels are assumed to be lower than the amounts used in the Economic Report analysis. A summary of the funding scenarios is provided in Table 6. In addition to the capital and operational and maintenance costs, it is assumed that ten additional refueling stations will be built as part of the proposed rule implementation.

**Table 6**  
**Cost and Funding by Funding Scenario**

	Best Case	Most Likely Case	Worst Case
MSRC	\$1,000,000	\$500,000	\$0
AB2766	\$12,00,000	\$8,000,000	\$1,000,000
Cost Effectiveness	Fully Funded	\$31,760	\$149,363
Annual Shortfalls	\$0	\$2,025,466	\$9,525,466

Based on these funding scenarios, the cost-effectiveness of PR 1196 is estimated to be \$31,760 per ton of combined emissions reduced under the most-likely funding scenario. The cost-effectiveness ranges from no costs to \$149,363 per ton of combined pollutant emissions reduced in the best-case funding scenario to the worst-case funding scenario. The estimated

funding shortfalls relative to the proposed rule's implementation cost under the three scenarios are from zero to \$9.5 million.

## **Incremental Cost-Effectiveness Assessment**

Health and Safety Code Section 40920.6 requires an assessment of incremental cost-effectiveness for proposed regulations relative to ozone, CO, SO<sub>x</sub>, NO<sub>x</sub>, and their precursors. Incremental cost-effectiveness is defined as the difference in control costs divided by the difference in emission reductions between two potential control options that can achieve the same emission reduction goal of a regulation. For the incremental cost-effectiveness analysis, public fleets with less than 15 heavy-duty vehicles are assumed to be subject to PR 1196. This assumption is made based on the authority under HSC Section 40919(a)(4). An estimated 832 heavy-duty vehicles would be subject to PR 1196. In addition, to fuel these vehicles it is assumed that an additional five alternative-fuel refueling stations would be needed in more remote areas of the District. Compared to Proposed Rule 1196, incremental cost-effectiveness is \$258,562 per ton of combined pollutants assuming no funding is available.

## **Funding Programs**

Several agencies have commented that their support of the proposed Clean Fleets program depends on identifying funding that could be used to meet the rules' requirements. Various federal, state, and local funding programs may be available to assist agencies in the acquisition and operation of alternative-fuel HDTs. These are described generally below; however, a more detailed discussion of these funding sources is included in the Draft Economic Assessment, Assumptions, Funding Sources, and Socioeconomic Report Proposed Rule 1190 Series – Clean On-Road Vehicles document. It should be noted that policy and, in some cases, legislative changes may be necessary to make some of these funds available or to augment existing program funds for use in complying with adopted regulations.

*Local Government Subvention Funds:* Forty percent of the funds collected each year from the vehicle registration surcharge goes to local governments based on a pro-rated share of population and must be used to reduce mobile source emissions. Local governments can use these funds to pay the incremental premium costs in the purchase alternative-fuel vehicles or engines. Funds not expended carry over from year to year. The AQMD staff contacts are Larry Rhinehart (AQMD) at 909-396-3780 and Oscar Abarca (AQMD) at 909-396-3242.

*MSRC Discretionary Funds:* Thirty percent of the funds collected each year from the vehicle registration surcharge is administered by the Mobile Source Air Pollution Reduction Review Committee (MSRC) to be used to implement programs to reduce mobile source emissions. Managers of the program have apportioned the available funding into several technology-specific categories, including: heavy-duty vehicles; zero- and ultra-low-emission vehicles; research, development and demonstration of advanced low-emission transportation technologies; transportation control measures; and intelligent transportation systems. The AQMD contact is Ray Gorski (MSRC Technical Advisor) at 909-396-2479.

Carl Moyer Memorial Air Quality Standards Attainment Program: The Carl Moyer Program was established by ARB in 1998 to provide incentives to encourage implementation of the cleanest commercially available heavy-duty engines, as a way to assist California to meet its air quality obligations under the State Implementation Plan (SIP). The incentives are grants for offsetting the higher costs of primarily alternative-fuel engines, and for supporting the fueling infrastructure. The ARB has established overall program requirements and allocates funds to local air districts, including AQMD, for local program administration.

Primarily intended to reduce emissions from vehicles and equipment traditionally powered by heavy-duty diesel engines, the current program funds the incremental cost of cleaner heavy-duty vehicles and equipment from the following categories: on-road motor vehicles over 14,000 pounds GVW rating; off-road equipment over 50 horsepower; marine vessels; locomotives; stationary agricultural pump engines; forklifts; and airport ground support equipment. The program is not intended to fund engine research and development, certification testing, training, or operational controls.

The first two years of the Carl Moyer Program have been funded on a year-by-year basis. Assembly Bill 1571 (Villaraigosa, Brulte) codified the program criteria and created the Carl Moyer Program Advisory Board. The adopted legislation specifically prohibits the use of the Carl Moyer Program funds to meet regulatory mandates. However, ARB has stated that engines that meet ARB's optional low emission standards would be eligible for Carl Moyer funds. The Advisory Board is responsible for recommending a source and amount of continued funding for the program. The Advisory Board has recommended annual funding of \$100 million through the year 2010.

The statewide FY 1998-99 appropriation for the Carl Moyer Program totaled \$25 million. CARB allocated \$11.3 million to the AQMD in April 1999. Governor Davis and the Legislature placed \$19 million in CARB's FY 1999-2000 budget to continue this incentive program for low-emission heavy-duty vehicles and \$2 million in the California Energy Commission's (CEC) budget to support fueling infrastructure specific to the Carl Moyer program. The AQMD received \$8.55 million from CARB and \$900,000 from CEC, for a total of \$9.45 million for the current fiscal year. For Fiscal Year 2000-2001, an estimated \$22 million would be available under the Carl Moyer Program. The AQMD contact is the Technology Advancement Office.

Air Quality Investment Program (AQIP): The AQMD uses AQIP funds to obtain emission reduction or air quality benefits that are equivalent to the total Emission Reduction Target (ERT) for all participating employers in the AQIP. The AQMD continually accepts proposals for the disbursement of AQIP funds. The amount of emission reductions required to demonstrate equivalency and the amount achievable under each proposal is evaluated. The Executive Officer then recommends to the AQMD Governing Board, on a quarterly basis, the most cost-effective proposals that achieve equivalent emission reductions. Since its inception in July 1995, employers have invested over \$9.5 million in this program. The AQMD contact is the Transportation Programs office at (909) 396-3271.

Congestion Mitigation and Air Quality Improvement Fund: The federal Congestion Mitigation and Air Quality Improvement Program (CMAQ) authorizes \$8.1 billion for six

years of Transportation Equity Act for the Twenty-First Century (TEA-21) funding and provides a flexible funding source to state and local governments for transportation projects and programs that meet Clean Air Act requirements. CMAQ will fund programs that incorporate transit improvements, travel demand management strategies, traffic flow improvements, and public fleet conversions to cleaner fuels. Approximately \$1 billion over the six years of authorization has been allocated to the AQMD under CMAQ, specifically: Los Angeles County – \$110,040,981 per year; Orange County – \$30,696,885 per year; San Bernardino – \$14,473,885 per year; and Riverside – \$115,111,211 per year.

California Energy Commission: The California Energy Commission (CEC) has the following potential sources of funding available: \$6 million to establish a clean fuels infrastructure for public agencies, including cities, counties, school districts and transit districts; \$5 million to establish an incentive program for the lease or purchase of hybrid electric and fuel cell vehicles; and, \$1 million to develop a hydrogen fuel cell infrastructure.

Infrastructure Construction Funding Opportunities: Several gaseous-fuel providers have stated that they would contract to build fueling stations at no capital cost to the users by means of a long-term contract if a minimum level of throughput could be guaranteed. According to one CNG fuel provider, the minimum necessary throughput would be equivalent to 600 gallons of CNG daily. This amount of throughput equates to fill-up of: 10 transit buses, or 15 refuse collection vehicles, or 20 large school buses, or 50 light-duty vehicles. If a facility is not able to guarantee the minimum throughput, construction costs may be offset by grants, or other private funds and in-kind services. For instance, if one million dollars of financing is available, a throughput of only 400 gallons daily may be sufficient for facility construction and operation by a private fuel provider.

State Energy Program: The State Energy Program is the result of the consolidation of two formula grant programs – the State Energy Conservation Program and the Institutional Conservation Program. The State Energy Program includes provisions for competitively awarded financial assistance for a number of state-oriented special project activities, including alternative fuels. In addition to funding for special project activities, states may choose to allocate base formula funds to program activities to increase transportation efficiency, including programs to accelerate the use of alternative transportation fuels for government vehicles. For more information, contact the State Energy Office or the DOE Regional Office for this region, listed under the Points of Contact section for California, or contact Ron Santoro at DOE Headquarters at (202) 586-8296.

## **COMPLIANCE AUDITING AND ENFORCEMENT**

PR 1196 will require that affected public agencies keep sufficient vehicle data records to document rule compliance, and that these records be maintained for a minimum of two years. The AQMD intends to audit these records, either at the vehicle fleet location or by requesting appropriate documents to be submitted to the AQMD for review. The specific data to be kept for each new vehicle will include the DMV Certificate of Title and registration, vehicle manufacturer, model-year, model, engine family number, and fuel type. If a public agency is found to be in non-compliance with rule requirements, then the public agency will be subject



to penalties specified in Health and Safety Code Division 26, Part 4, Chapter 4, Article 3. The AQMD also plans to develop an enforcement guideline document that will stress the implementation of corrective actions by public fleets rather than punitive monetary penalties during the initial years of rule implementation, for first time violators.

## PUBLIC COMMENTS

The following summarizes public comments and staff responses regarding the development of Proposed Rule 1196 – Clean On-Road Heavy-Duty Public Fleet Vehicles. The AQMD received comments from representatives of federal, state, and local agencies, as well as fuel suppliers, engine manufacturers, and environmentalists. Many of these comments were provided as part of the initial fleet vehicle rule development of Proposed Rule 1190 (dated December 1999).

Comment 1. The proposed rule takes away a government agency choice in vehicle purchasing.

Response 1. Proposed Rule 1196 requires affected public fleets to purchase the cleanest vehicles being offered by heavy-duty engine and vehicle manufacturers. The stringency of the proposed takes into account the AQMD's goal of maximizing emission reductions and at the same time allowing for sufficient model availability to ensure that affected government agencies can procure vehicles that would meet their performance standards with little or no cost impact. In addition, if an alternative-fueled engine/vehicle cannot be used in a specific application, the fleet operator could apply for a Technical Infeasibility Application.

Comment 2. Model availability for the heavy-duty vehicle sector may be problematic since PR 1196 would disallow the purchase of diesel powered vehicles, and many specialty vehicles normally purchased by public fleets are powered with diesel engines.

Response 2. Proposed Rule 1196 contains provisions that allow the purchase of non-compliant vehicles due to model unavailability. In this situation, a Technical Infeasibility Certification Request would have to be submitted to and approved by the Executive Officer.

Comment 3. It is not clear why the PR 1196 focuses on Public Fleets.

Response 3. Based on fleet vehicle population data, the public sector fleets represent about 25 percent of the total fleet population. In addition, public fleet vehicles tend to operate in highly urbanized areas where the benefits of clean vehicle technologies will be maximized. Finally, EPACT (established in 1992) set a precedent for applying fleet requirements initially to government agency fleets.

- Comment 4. AQMD's legal authority to regulate fleets may be preempted by the Clean Air Act.
- Response 4. PR 1196 is not a rule setting motor vehicle emission standards as contemplated by the Clean Air Act's preemption provision, but is a requirement that fleets purchase the cleaner of available vehicles. Staff believes that such fleet requirements are consistent with the Clean Air Act.
- Comment 5. AQMD does not have the legal authority to allow affected fleets to use diesel vehicles and still comply with the rule.
- Response 5. The AQMD has the authority to allow alternative equivalent methods of compliance as it has in many rules. Even without this language, staff believes the AQMD has the inherent authority to allow exemptions where there is a rational basis for them. In addition, California Health and Safety Code Section 40447.5 provides that the AQMD can require fleets "to purchase vehicles which are capable of operating on methanol or other equivalently clean burning alternative fuel and to require that these vehicles be operated, to the maximum extent feasible, on the alternative fuel." The use of the term "maximum extent feasible" allows alternative methods of compliance. In addition to Section 40447.5, Health and Safety Code Section 40919, allows the AQMD to require fleets to use a "significant number of low-emission vehicles," but does not require all vehicles to be low-emission vehicles.
- Comment 6. The proposed rule should be fuel neutral and compliant vehicles should be based on a methanol standard. In addition, advanced diesel technologies utilizing low sulfur diesel fuel should be added as a compliance option under the definition of "alternative fuel vehicles".
- Response 6. For the purposes of compliance flexibility and consistency with Health and Safety Code Section 40919, the proposed rule requires that compliant alternative-fuel powered or low-emitting vehicles are purchased. Diesel powered vehicle purchases are not allowed, unless a Technical Infeasibility Certification Request is approved by the Executive Officer.
- In addition, in the AQMD Governing Board Adoption Resolution, the AQMD Governing Board directed staff to amend Rule 1196 upon demonstration that a diesel technology is certified by ARB and meets a 54 percent reduction in nitrogen oxide emissions and 71 percent reduction in particulate matter emissions, and that a demonstration be made that the toxic risk levels from the diesel engine be equivalent to alternative-fueled vehicles.
- Comment 7. The proposed fleet rule will eliminate MSRC and Carl Moyer monies as potential funding sources to help pay for the increased costs associated with implementation of the proposed rule.

- Response 7. With regards to MSRC, this committee has chosen to commit substantial resources to supporting the fleet rules in the upcoming work program. With regards to Carl Moyer, AQMD staff has been evaluating this issue with ARB. Based on CARB's comments, the proposed rule, as crafted, will not eliminate these funding sources from being utilized by affected fleets to help pay for rule implementation costs. This is because the proposed rule does not specify the alternative-fuel engine emission compliance level. This level can be designated by MSRC and Carl Moyer for funding justification purposes.
- Comment 8. The AQMD should adopt a voluntary program in lieu of the current mandatory rule and acquire all funds necessary for the program.
- Response 8. During the past several years, AQMD staff has been actively involved in attempting to secure the maximum amount of available public funding for use in these voluntary programs. With regard to the proposed rule, AQMD's goal is to achieve further air quality benefits beyond current voluntary efforts by requiring certain fleets to use commercially available clean vehicle technology, that is already being successfully demonstrated within the District. With regard to acquiring all funds necessary for program implementation, as mentioned previously, the AQMD strives towards achieving appropriate public funding to help pay for air quality programs. Lastly, this rule is not different from the AQMD's stationary source rules, which impose some costs on affected sources.
- Comment 9. Government should assert leadership in the campaign to clean air and support alternative fuels and other clean technologies.
- Response 9. Staff agrees and this is the primary reason why the proposed rule focuses on public agency heavy-duty vehicle fleets. Since public funds are primarily being used to support the operation of these fleets, and these fleets are used in highly urbanized areas where there is significant public exposure to their emissions, government agencies should take a leadership position in using clean vehicle technologies.
- Comment 10. Diesel vehicle pollution should be reduced through the use of clean fuel vehicles. They are available and cost-effective, and there are significant public monies to help make the transition to cleaner fuels. The use of green diesel technologies is problematic, since in-use testing demonstrates that the add-on technologies, for which clean and green diesel technologies depend, deteriorate more rapidly, and are therefore considered less durable than the engines that burn cleaner without the use of add-on technologies. Also, green diesel technology is not certified by ARB and diesel PM is a toxic air contaminant.

- Response 10. AQMD staff agrees in that clean-fuel technologies are inherently clean, commercially available, currently being successfully demonstrated in the District, and should be used to the maximum extent feasible by public fleets operating in the District. Green diesel technology is a promising technology, but the concern, as identified in the comments, is that ARB has not fully certified its use in California. In addition, green-diesel technology, unlike clean-fuel technology, will not result in NOx reductions.
- Comment 11. The term alternative fuel includes reformulated gasoline and diesel.
- Response 11. Under the federal Clean Air Act, Section 241(2) does have a definition of clean alternative fuel that includes reformulated gasoline and diesel. However, the Code of Federal Regulations, Section 86.000-02 explicitly excludes gasoline and diesel. Under state law, Title 13, Section 2290 of the California Code of Regulations lists alternative fuels explicitly and does not include gasoline or diesel. The AQMD's authority in Section 40447.5 is to require "equivalently clean burning alternative fuel". Diesel is not equivalently clean burning and thus does not meet this test. However, several heavy-duty gasoline engines are certified at emission levels at least twice as low as the applicable certification standard for model year 2000. These gasoline engines would meet the provisions under Section 39037.05(c) and would be considered low-emission.
- Comment 12. The U.S. Postal Service uses long-haul trucks that move mail in and out of the District. There would be limited available alternative-fuel infrastructure for the refueling of PR 1196 compliant vehicles. In addition, some public entities such as water districts and state agencies whose jurisdiction may cover areas outside of the South Coast Air Basin may operate vehicles in and out of the Basin.
- Response 12. Relative to these vehicles, staff concurs that alternative-fuel refueling infrastructure could be limited outside of the District. As such, the most current version of PR 1196 provides an exemption for heavy-duty vehicles that are used to move materials in and out of the District. In addition, the most current version of PR 1196 provides an exemption for heavy-duty vehicles that are temporarily housed or garaged within the District.
- Comment 13. Due to limited alternative-fuel refueling infrastructure, heavy-duty vehicles that operate in more remote areas of the District may not be able to refuel.
- Response 13. The latest version of PR 1196 provides an exemption to state agencies and special districts such as sanitation and water districts that operate heavy-duty vehicles in the Riverside County portion of the Mojave Desert Air Basin and these vehicles are housed in these remote areas to purchase

conventionally-fueled heavy-duty vehicles for operation in the areas east of the Coachella Valley.

Comment 14. Staff should consider allowing a fleet to keep a minimal number of conventionally-fueled vehicles in their fleet for emergency purposes.

Response 14. When asked of the Commentor on what a minimal number would be, the Commentor indicated that perhaps two or three vehicles would be sufficient. The Commentor did not indicate a percentage level that would be sufficient. To address this comment, the latest version of PR 1196 provides that up to three conventionally-fueled heavy-duty vehicle may be kept and maintained for emergency purposes after such time that the remainder of the fleet consists of rule compliant heavy-duty vehicles. For public fleets with 100 or more vehicles and multiple maintenance yards, PR 1196 would allow up to three conventionally-fueled heavy-duty vehicles be kept at each yard.

Staff believes that the need to have conventionally-fueled vehicles during emergency events would be a greater concern when the majority of the heavy-duty vehicle fleet consists of rule compliant vehicles. As such, this issue would become a greater concern around the 2006 and later time period (given that rule implementation is proposed to begin July 1, 2002). Staff would monitor the implementation of PR 1196 and report to the Governing Board on the availability of alternative-fuel for emergency events.

Comment 15. By not requiring private operators who provide contract services to government agencies, raises a competitiveness issue between a public entity affected by PR 1196 who provides such service and private entities who provide the same service but is not subject to PR 1196. As an example, PR 1196 would require the City of Los Angeles Department of Water and Power to begin purchasing rule compliant vehicles but private energy suppliers would not be subject to PR 1196. In a couple of years, DWP would be competitively bidding for electric services and may not be able to provide the comparable rates due to the increased costs of operating and maintaining PR 1196 rule complaint vehicles.

Response 15. Staff recognizes that there may be some competitiveness issues with the current PR 1196 proposal. However, due to the wide variety of contract services by public agencies, it is unclear if a rule proposal targeted at certain contract services is appropriate or feasible. As such, the AQMD will monitor the implementation of PR 1196 to determine if competitiveness issues exist and would propose potential amendments to Rule 1196. In addition, AQMD staff will evaluate the potential expansion of Rule 1196 to private fleet operators.

Relative to energy suppliers, staff is proposing that the AQMD develop a

schedule for either amendments to Rule 1196 or new proposals to expand Rule 1196 implementation to private utilities and fuel providers.

Comment 16. AQMD staff indicated that there is an evaluation of allowing fleet averaging provisions in PR 1196. Such provisions may not be feasible to implement by fleet managers whose primary goal is to purchase vehicles and ensure that vehicles in the fleet are operating condition.

Response 16. AQMD staff concurs that averaging proposals are more complex for fleet administrators to implement. Several fleet operators commented to AQMD staff that such an approach would not be workable for fleet operators since it would involve having to keep track of the certified emission level of the engine in each vehicle in the fleet, calculating a fleetwide average, and developing a plan to demonstrate how specified emission reductions would or could occur, each time the fleet operator decides to purchase new vehicles to add or replace vehicles in a fleet.

To address this comment, staff met with several operators of public fleets of varying sizes. Some of the operators agreed that in concept such an approach could be workable and would make sense economically. Other operators, however, indicated that such an approach could be “gamed” such that there would be minimal emission benefits even though targeted reduction levels could be demonstrated. Staff believes that such an averaging approach is not necessary or appropriate given the amount of flexibility in the rule proposal. In addition to the potential gaming of the approach, staff believes that double counting with other control measures and accounting for natural fleet turnover are additional concerns. For example, as part of the Statewide Diesel Control Plan, ARB is developing programs to reduce emissions from existing on-road and off-road diesel combustion sources. Many of these programs will involve retrofitting or repowering of existing diesel engines. These programs to address existing engine emissions would reduce any potential emission benefits from an averaging approach. Also, engine manufacturers have entered into a settlement with U.S. EPA and ARB relative to mitigating past excess in-use emissions which presents another emissions accounting issue. Therefore, staff is not recommending the inclusion of a fleet averaging concept in PR 1196 at this time.

Comment 17. The U.S. Postal Service leases vehicles during peak wintertime holiday periods to assist in the transport of mail and packages. The draft rule proposal would require the Postal Service to lease rule compliant vehicles that may travel to areas with limited refueling infrastructure. In addition, EPA and the Clean Air Act exempts leased vehicles from alternative fuel vehicle requirements if the lease is 120 days or less.

- Response 17. The current version of PR 1196 provides an exemption to the U.S. Postal Service to lease heavy-duty vehicles during peak winter holiday periods for no more than 120 days.
- Comment 18. The time periods for the submittal of the Technical Infeasibility Certification and subsequent action to approve or disapprove the request are too long and should be shortened.
- Response 18. The current version of PR 1196 proposes that Technical Infeasibility Certification requests be submitted no later than 60 days prior to planned purchase or lease of vehicles. In addition, the AQMD would take action on the request within 45 days from the date of submittal of the request.
- Comment 19. The implementation date of July 1, 2002 should be moved to 2001.
- Response 19. The July 1, 2002 date is proposed recognizing that many public entities operate on fiscal year calendars that generally begin in July. Many public entities have begun or have approved budgets for the fiscal year beginning July 1, 2001. Given that public entities would need to identify funds to cover potential additional costs to comply with PR 1196, the July 1, 2002 implementation date is proposed.
- Comment 20. Two comments were made regarding demonstration vehicles. One comment recommended that the number of demonstration vehicles be reduced and be counted as part of the 15 or more vehicles. Another recommended a greater number of demonstration vehicles for larger fleets.
- Response 20. Staff believes that allowing up to 10 vehicles for testing and demonstration purposes is appropriate. Staff does not envision many fleet operators purchasing or leasing large number of vehicles simply for testing and evaluation given the wide variety of applications and the additional capital costs of such vehicles. Heavy-duty vehicles such as solid waste collection vehicles or transit vehicles are covered under other fleet rules and should not be counted under PR 1196. To ensure that fleets are properly captured, the current version of PR 1196 would affect public fleets with 15 or more heavy-duty vehicles excluding emergency and rescue vehicles and heavy-duty vehicles used by private operators under contract to public entities. Demonstration vehicles would be part of the fleet vehicle count.
- Comment 21. Are truck tractors that consist of a flat bed used to haul other equipment or materials considered heavy-duty vehicles if the truck tractor weighs less than 14,000 pounds?
- Response 21. PR 1196 applies to heavy-duty vehicles that have a gross vehicle weight of 14,000 pounds or greater. The definition of "gross vehicle weight" is based on the vehicle manufacturer's maximum designed loaded weight of

the vehicle (40 CFR 86.082-2). Therefore, even though the truck tractor may weigh less than 14,000 pounds unloaded, it is designed to carry a load that would have a gross weight over 14,000 pounds.

- Comment 22. PR 1196 provides a fleet operator to keep up to three heavy-duty vehicles at a facility when the remainder of the fleet consists of rule compliant vehicles. However, “much greater flexibility would be offered by allowing public agencies to marshal their conventionally-fueled fleet as best suits their emergency response needs. It makes sense to keep a greater number of vehicles at the larger and more centralized locations (where manpower is more readily available and where maintenance can be performed and fueling is available) and a fewer number of vehicles at less accessible locations. The total number of exempt vehicles under this approach would remain the same as AQMD’s.”
- Response 22. The latest revisions to PR 1196 allows a public fleet operator with more than 100 heavy-duty vehicles deploy these conventionally-fueled vehicles to any one vehicle storage or maintenance yard if the public fleet operator submits a plan demonstrating that a proportionate number of such vehicles is reduced at other facilities operated by the fleet operator.
- Comment 23. Comments were made that the economic costs associated with purchasing a rule compliant vehicle need to be considered in the Technical Infeasibility Certification process. The National Association of Fleet Administrators, Inc. recommended that a waiver be provided upon demonstration that the cost of a compliant vehicle that otherwise meets the fleet’s requirements is at least 25 percent greater than the cost of an equivalent diesel fueled vehicle, after the application of any government rebates, tax credits and financial incentives.
- Response 23. Staff reviewed information regarding the capital, maintenance and operational costs associated with purchasing alternative fueled vehicles compared to conventionally-fueled vehicles. However, due to the wide variety of heavy-duty vehicle applications, alternative-fueled heavy-duty vehicles under PR 1196 may not be as cost-effective relative to other vehicles covered under the Carl Moyer Program or MSRC. Therefore, staff is proposing that PR 1196 provide for the purchase of a conventionally-fueled vehicle if a demonstration is made that the cost-effectiveness of the rule compliant vehicle is not within the cost-effectiveness criteria established for the Carl Moyer Program or MSRC, whichever is greater.
- Comment 24. Similar to Rule 1186.1, PR 1196 should consider allowing as a technical infeasibility criteria, the availability of alternative-fuel refueling stations within five miles of a vehicle storage or maintenance yards.



- Response 24. Staff believes that for the majority of heavy-duty vehicles affected by PR 1196, sufficient alternative-fuel infrastructure will be available. However, since many of the heavy-duty vehicles are unique and only a limited number of vehicles are owned or operated by a public entity, staff believes that the five mile limit for available refueling stations should be allowed. As such, the current version of PR 1196 provides (as part of the Technical Infeasibility Certification) an exemption to purchase a conventionally-fueled vehicle if a demonstration is made that there are no alternative-fuel refueling station within five miles of the vehicle storage or maintenance yards.
- Comment 25. The AQMD should consider a “pre-bid” process as part of the Technical Infeasibility Certification application to streamline the process. In addition, staff should reevaluate the cost associated with an application submittal.
- Response 25. Staff believes that such a process would greatly benefit the application process. However, the details of the process can be developed prior to rule implementation. As such, staff is recommending that this approach along with other approaches be considered in developing the Technical Infeasibility Certification application form during the first six months after rule adoption.
- Relative to the costs associated with the application form submittal, staff will evaluate the costs and propose amendments to Regulation III along with the AQMD’s Fiscal Year 2001-02 Budget, scheduled for May 2001.
- Comment 26. The sunset date of July 1, 2004 for the Technical Infeasibility Certification should be removed. It is not guaranteed that there will be rule compliant vehicles available after that date.
- Response 26. Staff believes that due to the uniqueness of many of the heavy-duty vehicle applications, there may be instances where a rule compliant vehicle could not be made available. Therefore, the current version of PR 1196 does not contain a sunset date for the Technical Infeasibility Certification process.

## PRELIMINARY DRAFT FINDINGS AND COMPARATIVE ANALYSIS

Proposed Rule 1196 is part of the AQMD's strategy to attain federal and state ambient air quality standards. Long-term air quality benefits are expected from attaining and maintaining the ambient air quality standards for particulate matter, nitrogen dioxide, and ozone. Improved air quality will ultimately reduce negative public health impacts from these criteria pollutants and toxic air contaminants.

Proposed Rule 1196 is technologically feasible and cost-effective when funds from various incentives programs are made available, while reducing particulate matter and nitrogen dioxide emissions from diesel-powered vehicles; and the proposed rule addresses concerns raised by the public, wherever possible. Therefore, staff recommends the adoption of Proposed Rule 1196.

These findings are being made in compliance with state law requirements.

### Draft Findings Required by the California Health and Safety Code

Health and Safety Code (HSC) Section 40727 requires the AQMD to adopt written findings of necessity, authority, clarity, consistency, non-duplication, and reference.

**Necessity** - The emission reductions associated with Proposed Rule 1196 are needed for the following reasons:

- a) State and federal health-based ambient air quality standards for particulate matter and ozone are regularly and significantly violated in the South Coast Air Basin. The reduction of particulate matter and nitrogen dioxide emissions from diesel powered vehicles through the implementation of Proposed Rule 1196 is needed to meet federal and state air quality standards.
- b) By exceeding state and federal air quality standards, the health of people within the South Coast Air Basin is impaired.
- c) By exceeding state and federal air quality standards, the quality of life is reduced in the South Coast Air Basin in numerous respects.
- d) The California Clean Air Act (HSC Section 40910 et seq.) requires that the air districts make every effort to attain federal and state ambient air quality standards as soon as practicable. Proposed Rule 1196 makes progress toward that goal. Section 40919 requires air districts to include measures in their plans to achieve the use of a significant number of low-emission vehicles in fleets.
- e) About 71 percent of cancer risk from air toxins is attributed to diesel particulate emissions, which would be reduced by the proposed rule.

**Authority** - The AQMD Board obtains its authority to adopt, amend, or repeal rules and regulations from HSC Sections 40000, 40001, 40440, 40441, 40447.5, 40463, 40702, 40725 through 40728, and 40910 through 40920.5, inclusive.

**Clarity** - The AQMD Board determines that Proposed Rule 1196 is written or displayed so that its meaning can be easily understood by persons directly affected by it.

**Consistency** - The AQMD Board determines that Proposed Rule 1196 is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions, or regulations.

**Non-Duplication** - Proposed Rule 1196 does not impose the same requirements as any existing state or federal regulation and is necessary and proper to execute the powers and duties granted to, and imposed upon, the AQMD.

**Reference** - In adopting this proposed rule, the Board references the following statutes which the AQMD hereby implements, interprets, or makes specific: HSC Sections 40001 (rules to achieve ambient air quality standards), 40440(a) (rules to carry out AQMP), and 40447.5(a) (rules to require fleets of 15 or more vehicles operating substantially in the AQMD to purchase vehicles powered by methanol or other equivalently clean-burning alternative fuel when adding or replacing vehicles), and 40919(a)(4) (measures to achieve the use of a significant number of low-emission motor vehicles by operators of motor vehicle fleets).

## **Draft Comparative Analysis**

Health and Safety Code Section 40727.2 requires a written comparison of a proposed rule with existing federal and local regulations imposed on the same source. Based on available information, there are no State or local air pollution regulations or monitoring/recordkeeping/reporting requirements regarding jurisdiction procurement of alternative-fuel vehicles. However, some jurisdictions subject to the EPCRA may elect to purchase alternative-fueled heavy-duty vehicles as credit towards meeting the light- and medium-duty alternative-fuel vehicle requirements and would potentially have some recordkeeping requirements.



**APPENDIX A**

**RULE LANGUAGE**

**PROPOSED RULE 1196 IS PROVIDED IN AN EARLIER PART OF  
THE BOARD PACKAGE AND WILL BE INSERTED HERE UPON  
ADOPTION BY THE AQMD GOVERNING BOARD**



## **APPENDIX B**

### **HEAVY-DUTY VEHICLE POPULATION PROFILE**

**Summary of Heavy-Duty Vehicles in Public Agency Fleets  
Potentially Affected by Proposed Rule 1196**

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
Cities	398	3,615	0	1,338	2,504	0	26	60	57	28
Counties	0	1,269	0	132	1137	0	0	0	0	0
State	8	770	0	179	594	0	1	4	0	0
Federal	0	657	0	0	657	0	0	0	0	0
School Districts	292	222	0	296	211	3	2	2	0	0
University/Colleges	30	28	28	15	15	0	0	0	0	0
Special Districts	104	305	0	128	278	0	3	0	0	0
<b>Total</b>	<b>832</b>	<b>6,866</b>	<b>28</b>	<b>2,088</b>	<b>5,396</b>	<b>3</b>	<b>32</b>	<b>66</b>	<b>57</b>	<b>28</b>





GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>City</b>										
El Segundo		18		6	12					
Fontana	0									
Fountain Valley		15			15					
Fullerton		17		1	15		1			
Garden Grove		20			20					
Gardena <sup>3</sup>	---									
Glendale		39			39					
Glendora	14				14					
Grand Terrace	1			1						
Hawaiian Gardens	3			3						
Hawthorne <sup>3</sup>	---									
Hemet	0									
Hermosa Beach	6			6						
Hidden Hills <sup>3</sup>	---									
Highland	1				1					
Huntington Beach		47		6	41					
Huntington Park <sup>3</sup>	---									
Indian Wells <sup>3</sup>	---									
Indio	0									
Industry	4				4					
Inglewood <sup>3</sup>	---									
Irvine <sup>3</sup>	---									
Irwindale	3				3					
La Canada Flintridge	0							0		
La Habra	11			6	5					
La Habra Heights	0									
La Mirada	2				2					
La Palma	2				2					
La Puente	2			1	1					
La Quinta <sup>3</sup>	---									
La Verne <sup>3</sup>	10			7	3					
Laguna Beach	---									
Laguna Hills	---									
Laguna Niguel	0									
Laguna Woods <sup>3</sup>	---									
Lake Elsinore <sup>3</sup>	---									
Lake Forest	0									
Lakewood	4			2	1			1		
Lawndale	0									
Loma Linda	12			8	4					
Lomita <sup>3</sup>	---									
Long Beach	8							8		
Los Alamitos	0									
Los Angeles		2,453		964	1,400			6	57	26
Lynwood <sup>3</sup>	---									
Malibu	0									
Manhattan Beach	10				10					
Maywood	4			4						
Mission Viejo	0									
Monrovia	9			6	3					

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>City</b>										
Montclair	0				0					
Montebello	5				5					
Monterey Park	3			3	0					
Moreno Valley	12				12					
Murietta	1				1					
Newport Beach	0									
Norco	0									
Norwalk	0									
Ontario		34		18	2		7	7		
Orange		23			23					
Palm Desert	1			1	.			0		
Palm Springs	14			14	0			0		
Palos Verdes Estates	1			1						
Paramount	10				10					
Pasadena		74		52	22					
Perris	0									
Pico Rivera		16			16					
Placentia	7				6			1		
Pomona		22		8	14					
Rancho Cucamonga		44			44					
Rancho Mirage	0									
Rancho Palos Verdes	0									
Redlands		40			40					
Redondo Beach	12				12					
Rialto <sup>3</sup>	---									
Riverside		122		81	41					
Rolling Hills <sup>3</sup>	---									
Rolling Hills Estates	0									
Rosemead	0									
San Bernardino		133			128		5			
San Clemente	9				9					
San Dimas	3			3						
San Fernando	8			3	5					
San Gabriel	7			1	6					
San Jacinto	1				1					
San Juan Capistrano <sup>3</sup>	---									
San Marino	2			2	0					
Santa Ana <sup>3</sup>	---									
Santa Clarita	9				9					
Santa Fe Springs		18			18					
Santa Monica		45			9			36		
Seal Beach	8				8					
Sierra Madre	6				6					
Signal Hill <sup>3</sup>	---									
South El Monte	0				0					
South Gate	7			0	7					
South Pasadena	10			5	5					
Stanton <sup>3</sup>	---									
Temecula <sup>3</sup>	---									
Temple City	2				2					

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV

**City**

Torrance		55			55					
Tustin	6				6					
Upland		23		15	8					
Vernon	0									
Villa Park	0				0					
Walnut	0									
West Covina	13			6	7					
West Hollywood	2			2						
Westlake Village	0									
Westminister	14			4	10					
Whittier		38		20	18					
Yorba Linda	0									
Yucaipa	2				2					
<b>City Totals</b>	398	3,615	0	1,338	2,504	0	26	60	57	28

**County**

Los Angeles		753	0	128	625					
Orange <sup>1</sup>		260			260					
Riverside	0	16		4	12					
San Bernardino <sup>1</sup>		240			240					
<b>County Totals</b>	0	1,269	0	132	1137	0	0	0	0	0

**State Agency**

CA Conservation Corps		44		34	10					
CA State Lottery	0									
Department of Health Services	0									
Reg. Water Quality Control Board	4			4						
State Compensation Insurance Fund	0			0						
Department of Toxic Substances Control	4			2				2		
CA Department of Water Resources		30			30					
CA Department of Transportation		696		139	554		1	2		
<b>State Agency Totals</b>	8	770	0	179	594	0	1	4	0	0



GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>School District</b>										
Fountain Valley Elementary SD	4			3	1					
Fullerton Elementary SD	7				7					
Fullerton Joint Union SD	5			5						
Garden Grove Unified SD		16		10	6					
Garvey Elementary SD	0									
Glendale Unified SD	6			1	4	1				
Glendora Unified SD	0									
Gorman Elementary SD	0									
Hacienda-La Puente Unified SD	4			2	2					
Hawthorne Elementary SD	0									
Hemet Unified SD	10			10						
Hermosa Beach City SD	0									
Hughes-Elizabeth Lakes SD	0									
Huntington Beach Elem. SD	3			1	2					
Huntington Beach Union HSD	9			3	6					
Inglewood Unified SD	0									
Irvine Unified SD	0									
Jurupe Unified SD	0									
Keppel Elementary SD	0									
La Canada Unified SD	0									
La Habra City Elementary SD	0									
Laguna Beach Unified SD	0									
Lake Elsinore Unified SD	0									
Las Virgenes Unified SD	4			1	3					
Lawndale Elementary SD	0									
Lennox Elementary SD	0									
Little Lake City Elementary SD	0									
Long Beach Unified SD	53			13	40					
Los Alamitos Unified SD	3			3	0					
Los Angeles Unified SD	0									
Los Nietos Elementary SD	0									
Lowell Joint Elementary SD	1			1						
Lynwood Unified SD	0									
Magnolia Elementary SD	0									
Manhattan Beach Unified SD	0									
Manifee Union Elementary SD	1			1						
Monrovia Unified SD	0									
Montebello Unified SD	3				3					
Moreno Valley Unified SD	0									
Mountain View Elementary SD	0									
Mountain View SD	0									
Mt. Baldy Joint SD	0									
Murrieta Valley Unified SD	0									
Newhall Elementary SD	0									
Newport-Mesa Unified SD	9			5	4					
Norwalk-La Mirada Unified SD		15			15					
Nuvview Union Elementary SD	0									
Ocean View Elementary SD	4			4						
Ontario-Montclair SD	0									
Orange Unified SD		16		4	12					

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>School District</b>										
Palm Springs Unified SD		29		28	1					
Palos Verdes Unified SD	0									
Paramount Unified SD	1				1					
Pasadena Unified SD	10			10						
Perris Elementary SD	0									
Perris Union High SD	0									
Placentia-Yorba Linda Uni. SD	10			10						
Pomona Unified SD	0									
Redlands Unified SD	4			3	1					
Redondo Beach Unified SD	1			1						
Rialto Unified SD	0									
Rim of the World Unified SD	0									
Riverside Unified SD	0									
Romoland Elementary SD	0									
Rosemead Elementary SD	0									
Rowland Unified SD	8				8					
Saddleback Valley Unified SD	0									
San Bernardino City Unified SD		39		36	3					
San Gabriel Unified SD	0									
San Jacinto Unified SD	0									
San Marino Unified SD	0									
Santa Ana Unified SD	0									
Santa Monica-Malibu Uni. SD	8			8						
Saugus Elementary SD	0									
Savanna Elementary SD	0									
South Pasadena Unified SD	0									
South Whittier Elementary SD	1			1						
Sulfur Springs Elementary SD	0									
Temecula Valley Unified SD	0									
Temple City Unified SD	0									
Torrance Unified SD	9			9						
Tustin Unified SD	0			0						
Upland Unified SD	0									
Val Verde Unified SD	0									
Valle Lindo Elementary SD	0									
Walnut Valley Unified SD	3			2		1				
West Covina Unified SD	0									
Westminster Elementary SD	3				3					
Whittier City Elementary SD	0									
Whittier Union High SD	2				2					
William S. Hart Union SD	1			1						
Wiseburn Elementary SD	0									
Yucaipa-Calimesa Unified SD	0									
<b>School District Totals</b>	292	222	0	296	211	3	2	2	0	0

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>University/College</b>										
CA State Univ. Fullerton	2			2						
CA State Univ. Long Beach	4			2	2					
CA State Univ. Northridge	0									
Cerritos College	1			1						
Chaffey College	4				4					
Citrus Community College	0				0					
Coast Community College	3				3					
College of the Canyons	1				1					
College of the Desert	0									
Crafton Hills College	0									
Irvine Valley College	0									
LA Trade Technical College	1			1						
LA Valley College	0									
Los Angeles Pierce College	1			1						
Mt. San Antonio College	10			6	4					
Riverside Community College	0									
Saddleback College	3			2	1					
San Bernardino Valley College	0									
Santa Monica College	0									
UC Riverside	0							0		
UCLA <sup>2</sup>		28	28							
<b>Universities/College Totals</b>	30	28	28	15	15	0	0	0	0	0



GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>Special District</b>										
Beaumont-Cherry Valley Water	0									
Big Bear Airport District	1				1					
Big Bear Area Regional Wastewater Agency	2			2						
Big Bear Municipal Water District	2				2					
Castaic Lake Water District	0									
Chino Basin Water District	0									
Chino Valley Independent Fire District	0									
Coachella Valley MVCD	1				1					
Coachella Valley RCD	0									
Compton Creek Mosquito AD	0									
Costa Mesa Sanitary District	14				14					
Crescenta Valley Water District	7			3	4					
Crest Forest Fire Protection District	0									
Crestline-Lake Arrowhead Water Agency	0									
East Orange County Water District	0									
East Valley Water District	8			3	5					
Eastern Municipal Water District		57		6	48		3			
El Toro Water District		33		28	5					
Elsinore Water District	0									
Fern Valley Water District	1			1						
Foothill Municipal Water District	2			2						
Home Gardens County Water District	0									
Home Gardens Sanitary District	0									
Inland Empire Utilities Agency		18		10	8					
Irvine Ranch Water District		28		1	27					
Jurupa Area Recreational & Park District	0			0						
Jurupa Community Services District	5				5					
Kinneloa Irrigation District	0									
La Canada Irrigation District	0									
LA Department Of Water & Power	0									
La Habra Heights County Water District	0									
Laguna Beach County Water District	3				3					
Lake Hemet Municipal Water		15		3	12					
Los Alisos Water District	8			2	6					
Mesa Consolidated Water District	4			1	3					

Metropolitan Water District		118		41	77					
GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>Special District</b>										
Midway City Sanitary District		19			19					
Miraleste Recreation & Park District	1			1						
Mission Springs Water District	4			3	1					
Monte Vista Water District	0									
Morongo Valley Community Services District	0									
Moulton Niguel Water District	10			3	7					
Northeast Mosquito Vector Control District	0									
Orange County Vector Control District	0									
Orchard Dale County Water District	0									
Pinyon Pines County Water District	0									
Rancho CA Water District	12				12					
Riverside-Corona RCD	0									
Rowland Water District	3			3						
Rubidoux Comm. Services District	2				2					
Running Springs Water District	1			1						
San Bernardino Valley Water Conservation District	1			1						
San Bernardino Valley Water District	0									
Santa Rosa Community Services District	0									
Santiago County Water District	1				1					
Serrano Water District	0									
SGV Municipal Water District	1			1						
South Coast AQMD	1			1						
Sunset Beach Sanitary District	0									
Three Valleys Munic. Water District	0									
Trabuco Canyon Water District	3				3					
Tri- Cities Munic. Water District	0									
Valley Sanitary District	3			2	1					
Valley Wide Recreation & Park District	0									
Walnut Valley Water District	0									
Water Replenishment District of Southern CA	0									
West San Bernardino County Water District	3			2	1					
Western Municipal Water		17		7	10					
Wilmington Cemetery District	0									
<b>Special District Totals</b>	104	305	0	128	278	0	3	0	0	0

GOVERNMENT AGENCY	Total		HEAVY-DUTY VEHICLES							
	with < 15	with ≥ 15	Unspecified	Gasoline	Diesel	Meth	LPG	CNG	LNG	EV
<b>Federal Agency</b>										
USPS		657			657					
USMC	0									
Air Force	0									
Army	0									
Navy	0									
VA	0									
NASA	0									
DOT	0									
DLA	0									
DOI	0									
Corps of Civil Engineers	0									
DOD	0									
USDA	0									
HHS	0									
DOL	0									
DOE	0									
SSA	0									
DOJ	0									
GSA	0									
Treasury	0									
FEMA	0									
State	0									
Congress	0									
FDIC	0									
NLRB	0									
CPSC	0									
EEOC	0									
EPA	0									
Fed Mar. Comm	0									
HUD	0									
SBA	0									
SEC	0									
USIA	0									
<b>Federal Agency Totals</b>	<b>0</b>	<b>657</b>	<b>0</b>	<b>0</b>	<b>657</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>1</sup> Based on information received from counties.

Unspecified vehicles: Los Angeles - 7,000, Orange - 1,500, & San Bernardino - 1,400, of which 17% distributed for heavy-duty diesel vehicles.

<sup>2</sup> Based on *Municipal EV Fleets 1996-1998*, SCE.

<sup>3</sup> No information was received from this government agency.



**APPENDIX C**

**PARTIAL LIST OF PR1196-COMPLIANT  
HEAVY-DUTY ENGINES AVAILABLE IN 2000  
(PROVIDED FOR ILLUSTRATION PURPOSES ONLY)**

## PR1196-COMPLIANT HEAVY-DUTY ENGINES

– Available in 2000 –

Engine Manufacturer	Engine Family	Engine Model	Fuel	Horse-power	Torque lb-ft
<b>Aftermarket:</b> Alternative Fuel Technology (AFT)	(to be certified June 2000)	AFT Navistar DT466	NG	240	680
	(to be certified Aug. 2000)	AFT Cummins L10	NG	250	680
Baytech	YBYTH05.7050	L31	NG, Gaso	211 / 245	
	YBYTH05.71LV	L31	NG	211	
	YBYTH05.7LEV	L31	NG, Gaso	211 / 245	
	YBYTH05.7ULV	L31	NG, Gaso	211 / 245	
GFI	YG9XH06.88CP	V-10 GFP	LPG, Gaso	310	
IMPCO	YTJXH07.4502	L21	LPG	224	343
	YTJXH07.4505	L21	LPG	229	347
Cummins Engine Co	YCEXH0359BBL	B5.9-195 LPG	LPG	195	420
	YCEXH0359BBK	B5.9G	NG	150, 195, 230	375, 420,
	YCEXH0505CBG	C8.3G	NG	250, 275	500
	YCEXH0505CBI	(2.5 NOx) C8.3G	NG	250, 275	660, 750
	YCEXH0505CBJ (under Cert. Testing)	(2.5 NOx) C8.3G C8.3G	NG NG	250, 275 280	660, 750 660, 750 850
Deere Power Systems Group	YJDXH06.8004	6068 HFN 6.8 L	NG	250	660
	YJDXH08.1001	6081 HFN 8.1 L	NG	250	800
	YJDXH08.1003	6081 HFN 8.1 L	NG	250	800
	(certification due 6/00)	6081 HFN 8.1 L	NG	280	900
Detroit Diesel Corp	YDDXH08.5FJF	Series 50	NG	275	890
	YDDXH08.5FJG	(2.0 NOx) Series 50	NG	275	890
	YDDXH12.7FGF	Series 60	NG	330, 400	1400, 1450
	YDDXH12.7FGG	(2.5 NOx) Series 60	NG	330, 400	1400, 1450
Ford	YFMXH05.4CF5	OE414Y0505	Gasoline	255	350
		OE414N0A05	Gasoline	255	350
	YFMXH06.8BHF	0F717N0500	Gasoline	310	425
		0F717E0500	Gasoline	310	425
		0F718Q0500	Gasoline	310	425
0F728U0500		Gasoline	310	425	
YFMXH06.8CF5	0E418N0500	Gasoline	305	420	
General Motors	YGMXH05.7582YGMXH0	L31L21	GasolineG	255270	330
	7.4502	L29	asoline	290	390
	YGMXH07.4503		Gasoline		410
Mack Trucks	YMKXH11.9G55	E7G	NG	325, 350	1180, 1250
Power Systems Associates/ Caterpillar	YPSXH0442EGJ	3126B Dual-Fuel (7.2L)	Diesel-NG	190, 250	550, 660
	YPSXH0629E6J	C10 Dual-Fuel (10.3L)	Diesel-NG	305	1050
	YPSXH0729E6J	C12 Dual-Fuel (11.9L)	Diesel-NG	410	975, 1050

