CHAPTER 4

ENVIRONMENTAL IMPACTS AND MITIGATION

INTRODUCTION

The CEQA Guidelines require environmental documents to identify significant environmental effects that may result from a proposed project (CEQA Guidelines §151269(a)). Direct and indirect significant effects of a project on the environment should be identified and described, with consideration given to both short- and long-term impacts. The discussion of environmental impacts may include, but is not limited, to the resources involved; physical changes; alterations of ecological systems; health and safety problems caused by physical changes; and other aspects of the resource base, including water, scenic quality, and public services. If significant environmental impacts are identified, the CEQA Guidelines require a discussion of measures that could either avoid or substantially reduce any adverse environmental impacts to the greatest extent feasible (CEQA Guidelines §15126(c)).

The CEQA Guidelines indicate that the degree of specificity required in a CEQA document depends on the type of project being proposed (CEQA Guidelines §15146). The detail of the environmental analysis for certain types of projects cannot be as great as for others. For example, the environmental document for projects, such as the adoption or amendment of a comprehensive zoning ordinance or a local general plan, should focus on the secondary effects that can be expected to follow from the adoption or amendment, but the analysis need not be as detailed as the analysis of the specific construction projects that might follow. Accordingly, this CEQA document analyzes impacts on a regional level and impacts on the level of individual industries or individual facilities where feasible.

As mentioned earlier, the SCAQMD is preparing a Final PEA for the proposed fleet vehicle rules and related amendments. Under the auspice of this Final PEA, the SCAQMD will comprehensively analyze to the degree feasible the direct and indirect environmental impacts associated with the proposed project. Although PRs 1191, 1192, and 1193 are expected to be presented first to the SCAQMD Governing Board at the June 2000 Public Hearing, since the potential impacts associated with these three rules are similar to or less than those of the other the proposed fleet vehicle rules and related amendments, the following environmental impact analyses evaluates the total impacts for the entire series of fleet vehicle rules and related amendments. Therefore, the following analyses will not specifically identify impacts from any particular vehicle category, except where unique issues have been identified for a specific fleet vehicle category (e.g., transit buses, school buses, etc.). However, if specific environmental impacts are identified in the development of the other fleet vehicle rules and related amendments, which have not been fully addressed in this Final PEA, then the SCAQMD will conduct the appropriate CEQA analysis (e.g., focused EA) at that time.

CEQA (Public Resources Code, §21000 et seq.) and the CEQA Guidelines as promulgated by the State of California Secretary of Resources establish the categories of environmental impacts to be studied in a CEQA document. Under the CEQA Guidelines, there are approximately 15 environmental categories in which potential adverse impacts from a project are evaluated. Projects are evaluated against the environmental categories in an environmental checklist and those environmental categories that may be adversely affected by the project are further analyzed in the appropriate CEQA document.

Pursuant to CEQA, an Initial Study, including an environmental checklist, was prepared for this project (see Appendix B). Of the 15 potential environmental impact categories seven (air quality, water resources, transportation/circulation, public services, solid/hazardous waste, energy/mineral resources, and hazards) were identified as being potentially adversely affected by the proposed fleet vehicle rules and related amendments.

The following environmental analysis first proceeds by identifying the fleet vehicle universe that is potentially impacted by the proposed project. Next, the analysis provides an overall comparison of conventional fuels versus alternative clean-fuels. Finally, the potential environmental impacts to all seven areas identified above are comprehensively analyzed. It should be noted that for the seven environmental impact areas that were identified as potentially significant in the NOP/IS and are further evaluated in detail here, the environmental impacts analysis for each environmental topic incorporates a "worst-case" approach. This entails the premise that the vast majority of affected fleet vehicles will convert to alternative clean-fuels. Thus, this approach maximizes the potential environmental impacts associated with infrastructure changes (e.g., number of alternative clean-fuel fueling sites) needed to comply with the demand created by the proposed fleet vehicle rules and related amendments.

In the context of analyzing environmental impacts for construction-related activities the SCAQMD assumed that sufficient infrastructure would be built to meet the demand of alternative clean-fueled vehicles. To maximize construction-related impacts, the SCAQMD did not account for lack of infrastructure funding, model availability, or any other contingency that may delay the building of infrastructure needs[1]. For operational-related impacts the SCAQMD did account for lack of infrastructure funding, model availability, longer vehicle turnover rates, potential loss of public services, etc., which were then compared against the air quality benefits of the proposed project to obtain net air quality benefits under a "worst-case" analysis. Accordingly, the following impacts analyses represents are comprehensive and conservative "worst-case" approach for analyzing the potentially significant adverse environmental impacts associated with the implementation of the proposed fleet vehicle rules and related amendments.

THE PROPOSED FLEET VEHICLE UNIVERSE

Introduction

[1] Unless specifically noted the terms "infrastructure needs" or infrastructure changes" refer collectively to refueling stations for alternative clean-fuels and refinery modifications for low sulfur diesel. Model availability considerations have been take into account for specialty vehicles (e.g., PR 1196).

To understand the nature and extent of the potential environmental impacts associated with the proposed fleet vehicle rules and related amendments, it was necessary for the SCAQMD to estimate the number of fleet vehicles that could potential be affected by the proposed project. There are many hundreds of locally based fleets operating 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, refuse hauling, street sweeping, public works, and other city maintenance departments, urban transit buses, and school buses. There are also many state and federal fleets operating in the SCAQMD's jurisdiction. Also affected by the proposed fleet vehicle rules and associated amendments are commercial and public fleets that provide passenger transportation to and from commercial airports located within the SCAQMD's jurisdiction. These fleets operate passenger/courtesy shuttle and taxi/limousine services..

Table 4-1 describes the various types of on-road fleet vehicles that could be potentially affected by the proposed fleet vehicle rules and related amendments. Table 4-1 categorizes these vehicles by the following weight categories: LDV, MDV, and HDV.

TABLE 4-1

Various On-Road Fleet Vehicles by Gross Vehicle Weight (GVW) Category

LDVs (0 – 6,000 lb GVW)	**MDVs (6,001-14,000 lb GVW)**	**HDVs (> 14,000 lb GVW)**
Passenger car	Passenger Van	Truck
Passenger wagon	Cargo Van	Urban Transit Bus
Passenger Minivan	Service Van	School Bus
Passenger Van	Pickup	Shuttle
Sports Utility Vehicle	Truck	Passenger Van
Pickup	Urban Bus	Trolley
	School Bus	Step Van
	Shuttle	Refuse Hauler
	Trolley	Street Sweeper
	Refuse Hauler	Utility Truck
	Street Sweeper	Vending Truck
	Stake Truck	Box Van
	Step Van	Commercial Bus
	Box Van	Specialty Vehicle[a]
	Wrecker	
	Dump Truck	

TABLE 4-1 (CONTINUED)

Various On-Road Fleet Vehicles by Gross Vehicle Weight (GVW) Category

LDVs (0 – 6,000 lb GVW)	**MDVs (6,001-14,000 lb GVW)**	**HDVs (> 14,000 lb GVW)**

	Service Truck	
	Vending Truck	

[a] Specialty vehicles include, but are not limited to, sign posting trucks, aerial trucks (e.g., signal or street lights), utility trucks, weed spraying trucks, rodder trucks (e.g., sewer cleaning), small/large dump trucks, welding trucks, debris removal trucks (e.g., snow plows), cable trucks, stake bed trucks, patch trucks (e.g., pavement patching/repairing), hydraulic jet cleaners, chipper trucks, specialty cranes, digger derricks, water trucks, paint stripers, etc.

Revised Vehicle Universe

Based on these categories, the SCAQMD in the Draft PEA compiled a fleet vehicle universe potentially subject to the proposed fleet vehicle rules and related amendments. The vehicle universe was compiled using various sources of information including: direct surveying of public and private fleets, reviewing existing reports concerning fleet vehicle population characteristics, information obtained during meetings with associations/organizations that represent public and private fleet operators, and reviewing public agencies' databases (e.g., California Department of Motor Vehicles, CEC, CARB, USEPA Region IX, and the USDOE). Unfortunately, there were some gaps in the vehicle population data gathered. To account for the data gaps and as a "worst-case," the SCAQMD in the Draft PEA scaled up the vehicle population estimate for all categories except transit buses by 20 percent.

Subsequent to the release of the Draft PEA, the SCAQMD revised its vehicle universe estimates for the proposed fleet vehicle rules based upon further investigation and additional surveying of affected fleet operators. The revised estimates reveal that the overall total number of vehicles impacted by the proposed fleet vehicle rules, even with the 1.2 scale-up factor, has decreased overall resulting in the reduction of the number of vehicles that could potentially convert to alternative clean-fuels (see Table 4-5 below). Consequently, since the affected vehicle population is lower, less infrastructure changes (e.g., alternative clean-fuel fueling sites) are required compared to those originally analyzed in the Draft PEA.

Nonetheless, the SCAQMD will continue to base its impact analyses discussed below in this Final PEA on the vehicle universe presented in the Draft PEA. This approach assures a "worst-case" analysis since it provides a reasonable margin of error to account for the possibility that subsequent rule development (e.g., PRs 1194, 1195, and 1196) may reveal slightly larger vehicle counts than what was originally estimated in the Draft PEA.

Table 4-2 presents the SCAQMD's Draft PEA scaled and unscaled vehicle population estimates for the proposed fleet vehicle rules by general vehicle category.

TABLE 4-2

Universe Of Fleet Vehicles At The Release Of The Draft PEA[a]

Vehicle Category	Baseline No. of Vehicles	Adjustment Factor	Adjusted Total	Rounded Up Total
Transit Buses	3,639	1	3,639	3,700

School Buses	4,428	1.2	5,314	5,400
Contracted School Buses	4,428	1.2	5,314	5,400
All Other HDVs	24,980	1.2	29,976	30,000
Total HDVs	37,475	--	44,242	**44,500**
Total MDVs	10,280	1.2	12,336	**12,400**
Total LDVs	64,788	1.2	77,746	**77,800**
Total	**112,543**	--	**134,324**	**134,400**

[a] The universe does not account for AFVs already used by affected fleet operators, which is approximately 3 – 4 percent of the universe. In other words, this 3 – 4 percent of the vehicle population is considered to be vehicles potentially affected by this project. Additionally, the universe does not account for HDVs that are gasoline-fueled.

In the context of the "All Other HDV" category, certain rule-specific waiver provisions, as described in Chapter 2, such as lack of funding, infrastructure, model availability, etc., and specific exemptions or alternative compliance options, will potentially eliminate some of vehicles in the this category. To account for these exempted vehicles, the SCAQMD in the Draft PEA subtracted from the 30,000-vehicle total in Table 4-2, including the 1.2 scale-up factor, 2,400 motorcoaches, 4,920 airport package delivery vehicles, and 6,200 specialty vehicles. Additionally, the SCAQMD removed from the "All Other HDV" vehicle population 1,011 transit buses operating on alternative clean fuels. The remaining vehicle universe population is shown in Table 4-3[2]. This vehicle universe serves as the basis for determining the environmental impacts associated with the implementation of the proposed project in the Draft PEA and this Final PEA.

TABLE 4-3

Universe Of Affected Fleet Vehicles At The Release Of The Draft PEA

Vehicle Category	Baseline No. of Vehicles	Adjustment Factor	Adjusted Total	Rounded Up Total
Total HDVs	25,215	--	29,732	**29,800**
Total MDVs	10,280	1.2	12,336	**12,400**
Total LDVs	64,788	1.2	77,746	**77,800**
Total	**100,283**	--	**119,814**	**119,900** [a]

[a] Difference between Table 4-3 and 4-4 totals due to rounding. For the following impacts analyses, the SCAQMD will use the unrevised vehicle population estimates listed in this table (Table 4-3).

Table 4-4 shows the approximate number of vehicles associated with the proposed fleet rules and related amendments based on the vehicle universe shown in Table 4-3. Table 4-5 represents the SCAQMD's revised vehicle universe estimates on a rule-specific basis.

TABLE 4-4

[2] It should be noted that although there are certain waiver provisions and/or exemptions in 1192 – Clean On-Road Transit Buses and 1195 – On-Road School Buses that could potentially eliminate some of these vehicles from the total universe of affected vehicles, as a "worst-case" none of these vehicles (e.g., diesel transit or school buses) have been removed from the impacts analyses in the following subsections.

Universe Of Affected Fleet Vehicles
Broken Down By Fleet Vehicle Rule At The Release Of The Draft PEA

Fleet Vehicle Rule[a]	**Baseline No. of Vehicles**	**Adjustment Factor**	**Adjusted Total**
LDV/MDV Affected Rules			
PR 1191 – Public LDVs/MDVs	71,770	1.2	86,124
PR 1194 – Airport Operations	3,389	1.2	4,067*
Total	75,159	--	90,191
HDV Affected Rules			
PR 1192 – Transit Buses[b]	3,639	1	3,639
PR 1193 – Waste Haulers	6,000	1.2	7,200
PR 1194 – Airport Operations[c]	318	1.2	382
PR 1195 – School Buses	8,856	1.2	10,627
PR 1196 – Other Public HDVs[d]	6,293	1.2	7,552
PR 1186.1 –Sweepers	450	1.2	540
Total	25,556	--	29,940*
Overall Total	**100,715**	**--**	**120,131**
Rounded Up Total	**--**	**--**	**120,200**[e]

[a] Rule 431.2 would affect all vehicles that burn liquid fuels and are not alternative fuel vehicles.
[b] Does not include transit buses (1,011) currently operating on alternative clean-fuels.
[c] Does not include package delivery (3,400) and post office contractor (700) vehicles.
[d] Assumed that 45 percent of total vehicle population (11,442) qualifies for specialty vehicle waiver.
[e] Difference between Table 4-3 and 4-4 totals due to rounding. For the following impacts analyses, the SCAQMD will use the vehicle totals listed in Table 4-3.
* LDVs, MDVs, and HDVs originally expected in the Draft PEA to convert to alternative clean-fuels. The LDV/MDV/HDV total equated to 4,067 + 29,940 = 34,007.

TABLE 4-5

Revised Universe Of Affected Fleet Vehicles Broken Down By Fleet Vehicle Rule

Fleet Vehicle Rule[a]	**Baseline No. of Vehicles**	**Adjustment Factor**	**Adjusted Total**	**Vehicles Expected to Convert to Alt. Fuels**
LDV/MDV Affected Rules				
PR 1191 – Public LDVs/MDVs[a]	60,800	1.2	73,000	0
PR 1194 – Airport Operations[b]				
LDVs	3,083	1.2	3,700	0
MDV Passenger Shuttles	250	1.2	300	0
MDV Courtesy Shuttles	250	1.2	300	300
Total	64,383	--	77,300	300

TABLE 4-5 (CONTINUED)

Revised Universe Of Affected Fleet Vehicles Broken Down By Fleet Vehicle Rule

Fleet Vehicle Rule[a]	**Baseline No.**	**Adjustment**	**Adjusted**	**Vehicles**

	of Vehicles	Factor	Total	Expected to Convert to Alt. Fuels
HDV Affected Rules				
PR 1192 – Transit Buses[c]	3,400	1	3,400	3,400
PR 1193 – Waste Haulers	6,000	1.2	7,200	7,200
PR 1194 – Airport Operations	270	1.2	325	325
PR 1195 – School Buses	8,800	1.2	10,600	10,600
PR 1196 – Other Public HDVs[d]	6,000	1.2	7,200	7,200
PR 1186.1 –Sweepers	700	1.2	850	850
Total	25,170	--	29,575	29,575
Overall Total		**--**		

[a] Accounts for revised LDV/MDV vehicle estimates provided by the City of Los Angeles and Caltrans.

[b] Does not include package delivery vehicles, post office contractor vehicles, or motorcoaches. Additionally, changes made to PR 1194 after the release of the Draft PEA no longer require fleet operators/owners of taxi/limo and passenger shuttle services to acquire alternative clean-fueled vehicles when purchasing a new or replacing an existing vehicle. Only MDV/HDV courtesy shuttles are required to convert to alternative clean-fuels. Scaled figures taken from Draft Socioeconomic Assessment.

[c] Does not include 800 transit buses currently operating on alternative clean-fuels or approximately 100 (>14,000 <33,000 GVW) diesel-fueled fixed route buses.

[d] Assumed that 45 percent of total vehicle population qualifies for specialty vehicle waiver. Additionally, accounts for revised HDV vehicle estimates provided by the City of Los Angeles and Caltrans.

As mentioned in Chapter 2 of this Final PEA, the proposed fleet vehicle rules now allow different compliance approaches depending on the type of vehicle being purchased or replaced. For LDVs and MDVs, PR 1191 requires fleet operators when acquiring or replacing existing fleet vehicles to obtain LEVs or cleaner in the near-term and when the penetration rate of ULEVs reaches 50 percent then fleet vehicle operators must acquire ULEVs or cleaner. For all HDVs in all other the proposed fleet vehicle rules and some MDVs (e.g., courtesy shuttles) that would be regulated by PR 1194, the proposed fleet vehicle rules and related amendments require fleet operators to acquire methanol equivalent clean-fueled vehicles.

However, it should be noted that in the Draft PEA and in this Final PEA, to estimate the “worst-case” air quality impacts as well as other environmental impacts for both construction- and operational-activities associated with the proposed project, the SCAQMD assumed that 95.5 percent of the total LDV/MDV fleet vehicle population would be replaced by gasoline-fueled LEVs or cleaner in the near-term and in the long-term ULEVs or cleaner. This is the portion of the universe associated with PR 1191. For the remaining 4.5 percent, which is the PR 1194 LDV/MDV portion of the total population, the SCAQMD assumed that fleet operators will comply with PR 1194 by using alternative clean-fueled vehicles such as methanol (0.5 percent), CNG (two percent), LNG (one percent), LPG (0.5 percent), and electric power (0.5 percent).

The assumption, however, that all LDV/MDV vehicles associated with PR 1194 will convert to alternative clean-fuels is an overapproximation. Changes made to PR 1194 after the release of the Draft PEA no longer require fleet operators/owners of taxi/limo and passenger shuttle services to acquire alternative clean-fueled vehicles when purchasing a new or replacing an existing vehicle. Analogous to PR 1191, these commercial airport fleet operators can now acquire compliant CARB-certified ULEVs or cleaner when purchasing and replacing vehicles. Thus, it is expected that the 4.5 percent of the LDV/MDV vehicle population that was expected in the Draft PEA to convert to alternative clean-fuels could continue to use gasoline-fueled vehicles (although there appears to be a trend toward using alternative fuel vehicles for other reasons). As a result, infrastructure changes are not expected to result from these affected vehicles.

For HDVs, the SCAQMD assumed in the Draft PEA and this Final PEA that 100 percent of the HDV fleet vehicle population would comply with the proposed fleet vehicle rules by converting to alternative clean-fueled vehicles such as methanol (one percent), CNG (90 percent), LNG (five percent), LPG (three percent), and electric power (one percent). The SCAQMD chose to evaluate these fuels as potential alternative clean-fuels for HDVs based on the fact that engine models have been previously certified by CARB on these fuels and/or are currently available. It is envisioned that the proposed fleet vehicle rules will encourage OEMs and others to further enhance and develop HDVs fueled with these alternative-clean fuels, which are capable of meeting the methanol equivalency criteria.

Table 4-6 presents the SCAQMD's Draft PEA estimates for the numbers of fleet vehicles that would switch to alternative clean-fuels by fuel type and vehicle category. The numbers in Table 4-6include the scale-up factor where appropriate. These figures are also used in this Final PEA as the basis for estimating environmental impacts.

TABLE 4-6

Estimated Number of Fleet Vehicles At The Release of the Draft PEA That Would Switch To Alternative Clean-Fuels Due To The Proposed Fleet Vehicle Rules

Vehicle Type	Fuel Type				
	Methanol	**CNG**	**LNG**	**LPG**	**EV**
LDV					
0.5% Methanol	389	--	--	--	--
2% CNG	--	1,556	--	--	--
1% LNG	--	--	778	--	--
0.5% LPG	--	--	--	389	--
0.5% EV	--	--	--	--	389
MDV					
0.5% Methanol	62	--	--	--	--
2% CNG	--	248	--	--	--

TABLE 4-6 (CONTINUED)

Estimated Number of Fleet Vehicles At The Release of the Draft PEA That Would Switch To Alternative Clean-Fuels Due To The Proposed Fleet Vehicle Rules

Vehicle Type	Fuel Type				
	Methanol	**CNG**	**LNG**	**LPG**	**EV**
1% LNG	--	--	124	--	--
0.5% LPG	--	--	--	62	--
0.5% EV	--	--	--	--	62
HDV					
1% Methanol	298	--	--	--	--
90% CNG	--	26,820	--	--	--
5% LNG	--	--	1,490	--	--
3% LPG	--	--	--	894	--
1% EV	--	--	--	--	298
Total	**749**	**28,624**	**2,392**	**1,345**	**749**
Rounded Up Total	**750**	**28,630**	**2,400**	**1,350**	**750**

Other Clean Fuel Technologies

For other clean fuels such as ethanol, hydrogen, and fuel cells, the SCAQMD assumed that vehicles fueled with these fuels would not be a viable compliance option for the affected fleet operators in the near future. This conclusion is based on several factors including, cost, availability, and reliability. For example for HDV ethanol-fueled vehicles, the economics of ethanol-fueled vehicles are not attractive at this time[3]. Ethanol generally costs more than diesel fuel on an energy basis. Therefore, the life-cycle costs of ethanol trucks and buses are higher than diesel trucks and buses.

As mentioned in Chapter 3, high production costs and low density have prevented hydrogen's use as a transportation fuel in all but test programs. The CEC estimates that it may be 20 to 30 years or more before hydrogen is a viable transportation fuel and then perhaps only in fuel- cell-powered vehicles (CEC, 1999d).

According to the CEC, fuel cells are currently too bulky and costly to be considered a viable alternative fuel technology (CEC, 1999d). However, the CEC predicts that since the major auto manufacturers are currently evaluating fuel cell technology, alternative clean-fueled vehicles powered by fuel cells should start appearing on the California roadways within the next 10 years.

It should be mentioned that some commentators have argued that developing clean diesel technology (e.g., the combination of ultra low sulfur diesel with emission controls) may be available in the future to meet the HDV methanol equivalency requirements of the proposed fleet vehicle rules. Although clean diesel technology is currently under development, it is not yet commercially available (e.g., no engine with the combination of low sulfur diesel and

[3] It should be noted that if affected fleet operators choose to acquire ethanol FFVs to comply with the LDV/MDV requirements of the proposed fleet vehicle rules, the use of this fuel would have similar or less environmental impacts as methanol. See the appropriate impact analyses below for methanol-fueled vehicles.

emissions control have been certified by CARB to meet its current or future HDV emission standards). Accordingly, based on the uncertainty of the penetration rate of compliant diesel-fueled HDVs with clean diesel technology, the SCAQMD believes that it is speculative to estimate the number of affected HDVs that could be potentially acquired by affected fleet operators. Therefore, the following quantitative impact analyses does not account for any compliant diesel-fueled HDVs in the vehicle universe.

By excluding compliant diesel-fueled HDVs from the vehicle universe the following environmental impact analyses provides a "worst-case" since more infrastructure changes are required with alternative clean-fuels (e.g., methanol, CNG, LNG, LPG, and electric power) than the continued use of diesel. However, the SCAQMD does include in the following analyses a qualitative evaluation of clean diesel technology. See the appropriate section in this chapter for a qualitative discussion of the potential environmental impacts associated with the use of the three most promising clean diesel technologies.

Lastly, regarding bi- and dual-fuel vehicles[4], , the SCAQMD assumes that, to the extent these vehicles meet the requirements of the proposed fleet vehicle rules, the following environmental impact analyses for infrastructure changes to accommodate the use of alternative clean fuels such as methanol, CNG, LNG, LPG, and electricity will also apply to bi- and dual-fuel vehicles. These bi- and dual-fuel vehicles, if used would not have a greater adverse environmental impact than the fuels already analyzed.

COMPARISON OF CONVENTIONAL FUELS TO ALTERNATIVE CLEAN-FUELS

While many studies have explored and documented particular performance advantages or disadvantages of alternative clean-fuels, few have included all major fuel performance characteristics in a comprehensive quantitative comparison between alternative clean- and conventional-fuels. In 1997, the American Institute of Chemical Engineers (AIChE) conducted an objective, comprehensive, and quantitative side-by-side analysis of the leading alternative clean-fuels, including qualitative assessments of the near-term potential for one or more of these fuels to gain a meaningful share of the transportation fuel market. Conventional gasoline was the reference fuel in the analysis as the consumer standard against which potential alternative clean-fuels were compared. Eight key performance characteristics were evaluated for two conventional (regular and reformulated gasoline (RFG)) and five alternative clean-fuels (e.g., ethanol, methanol, electricity, CNG, and LPG). The eight key performance characteristics evaluated include the following.

[4] A bi-fuel vehicle has two separate fuel systems designed to run on either fuel, using only one fuel at a time. A dual-fuel vehicle has two separate fuel systems and operates on two different fuels at the same time.

- *Fuel Cost*: 1995 average United States Gulf Coast wholesale market price per gallon adjusted to an equivalent heating value of a gallon of conventional gasoline.
- *Vehicle Co*st: The lower of the conversion or replacement cost of an existing gasoline vehicle to one, which uses the alternative fuel.
- Energy Dependence: Qualitative effect for each fuel of its reliance on imported energy.
- Net Energy Efficiency: Comparison of energy consumed in the production and distribution of each fuel with the energy available from its use.
- Greenhouse Emissions: Emissions for the life-cycle of each fuel.
- Non-Greenhouse Emissions: Hydrocarbon emissions from production, distribution, fueling, and incomplete combustion of each fuel.
- Infrastructure: Existing infrastructure currently available for production, distribution, and retail sale of each fuel.
- Driveability —Factors such as vehicle range and refill or recharge time.

The study suggested that, while no alternative fuel is a panacea for all problems, CNG, LPG, and RFG present the best overall alternatives to conventional gasoline based on current technology. These three fuels provided environmental benefits at a relatively low fuel cost (AIChE, 1997).

The 1997 AIChE comparative study did not include a comparison for diesel fuel. However, the study's quantitative comparative approach can also be used for comparing diesel fuel to alternative clean-fuels.

To compare diesel fuel to alternative clean-fuels, fuel performance indices were estimated for diesel powered vehicles using engineering approximations. Consistent with the AIChE study, the fuel performance indices of the eight key fuel characteristics discussed above were used in the comparative analysis. The methodology used to set the indices applies a scale of one (1) to five (5), with 5 representing the best fuel and 1 representing the worst fuel in each performance category. The remaining fuels were assigned indices that reflected their relative position by interpolation within the performance range set by the best (5) and worst (1) fuel in each category. It was determined that the span of four numbers was sufficient to differentiate the fuels in each category and that the qualitative portions of the analysis would be no more meaningful had a broader scale been selected.

To estimate the fuel cost index for diesel compared to conventional gasoline, a cursory survey was made of two or three local service stations to compare fuel costs. In the original 1997 AIChE study, the base cost of gasoline is listed as $0.50 per gallon and all fuel costs are relative to that. In order to update that number, the local average cost of regular gasoline in early February 2000 was noted to be about $1.30 per gallon and No. 2 diesel was about $1.60

per gallon. Scaling the ratio of the gasoline and diesel costs and correcting for the higher energy per gallon of diesel an equivalent cost index could be developed. The net result was that the cost index value for diesel, due to its slightly higher cost, was about seven percent below the index value for gasoline.

The vehicle cost index was assumed to be about two percent lower for diesel vehicles since comparable vehicles have slightly higher prices for diesel engines compared with gasoline engines (estimated to be approximately $400 to $500 more for a $20,000 vehicle).

Both diesel and gasoline were considered to be equally dependent on imported oil and were rated the same for energy dependence. The net energy efficiency for diesel was assumed to be slightly higher due to its higher energy content per gallon.

Non-green house gases were assumed to be approximately equivalent for both diesel and gasoline and worse when compared to the alternative clean-fuels. The indices for both gasoline and diesel were assigned a value of one.

Greenhouse gases from the combustion of gasoline and diesel are mostly carbon dioxide (CO_2) (about 74 percent). To scale diesel relative to gasoline, the SCAQMD consulted the USEPA's CO_2 emission factors for uncontrolled diesel and gasoline industrial engines. According to the USEPA, a gasoline engine emits approximately 154 pounds of CO_2 per million British Thermal Unit (MMBTU). Whereas, a diesel engine emits approximately 165 pounds of CO_2 per MMBTU. Consequently, the diesel index was scaled down by approximately seven percent.

For infrastructure, gasoline is more widely available than diesel fuel but for fleet vehicles both should have very good availability. The diesel index was therefore slightly reduced by about two percent compared to gasoline.

The driveability of diesel-fueled vehicles compared to gasoline-fueled vehicles was assumed to be equivalent and rated an index of five.

Table 4-7 presents the SCAQMD's comparative analysis for gasoline and diesel compared to alternative clean-fuels using the AIChE approach.

TABLE 4-7

Comparison of Performance Indices of Conventional Fuels to Alternative Clean-Fuels

Index	Conventional Gasoline	Diesel	RFG	Methanol	Ethanol	CNG	LPG	Electric
Fuel Cost Index	4.6	4.3[a]	4.6	3.6	1.0	5.0	4.8	4.1
Vehicle Cost Index	5.0	4.9[b]	5.0	4.9	4.9	4.6	4.6	1.0
Energy Dependence	1.0	1.0[c]	1.0	4.0	5.0	4.0	4.0	5.0
Net Energy Efficiency	4.8	4.9[d]	4.8	1.0	3.2	5.0	4.8	3.4
Non-Greenhouse Emissions	1.0[e]	1.0[e]	1.7	3.9	2.1	4.5	4.4	5.0
Greenhouse Emissions	3.3	3.1[f]	3.3	2.4	1.0	4.5	4.8	5.0
Existing Infrastructure	5.0[g]	4.9[g]	5.0	1.0	1.0	1.0	1.1	1.0
Driveability	5.0	5.0[h]	5.0	3.8	4.1	4.1	3.8	1.0
Average	**3.7**	**3.6**	**3.8**	**3.1**	**2.8**	**4.1**	**4.0**	**3.2**

[a] Fuel Cost – Gasoline/Gal = $1.30, No. 2 Diesel/Gal - $1.60, (Based on an approximate retail sampling of two sites). Diesel fuel usage (gal/mile) = 0.85 gasoline usage (gal/mile). Equivalent cost index for diesel compared to conventional gasoline is: ($1.30 / (0.85 x $1.60)) x 4.6 = 4.3.

[b] Assumes diesel vehicle cost is 2.5% higher.

[c] Assumes that both gasoline and diesel depend on imported fuel to the same extent.

[d] Energy consumed in production is approximately equivalent for diesel and gasoline. The energy available per pound of fuel is assumed to be slightly higher for diesel.

[e] Assumes that gasoline and diesel are equivalent.

[f] Greenhouse gas (GH) from petroleum fuels is primarily from CO_2. Gasoline CO_2 - 154 lb/MMBTU. Diesel CO_2 - 165 lb/MMBTU. Diesel GH-index = (gasoline GH index) x (154/165) = (3.3) x (154/165) = 3.1.

[g] Assumes that gasoline and diesel are comparable for fleet vehicles.

[h] Assumes that diesel has a slightly greater vehicle range (e.g., > 10%) for same size tank.

When considering a simple average of the indices, CNG (average ranking of 4.1) and LPG (average ranking of 4.0) rank highest. CNG and LPG are the most cost effective and have low relative emissions, but each ranks relatively low in terms of availability and consumer convenience as reflected in the existing infrastructure and driveability indices.

While ethanol, methanol, and electricity all provide environmental benefits relative to conventional gasoline, they are the least preferred fuels in the analysis with average rankings of 2.8, 3.1, and 3.2, respectively. This is due primarily to their relatively high fuel costs and comparatively low net energy efficiency. These factors are related to the extent that fuel production costs are included in the fuel price.

Consistent with the AIChE study, CNG and LPG present the best overall alternatives to conventional gasoline or diesel based on current technology. Although there is a concern with infrastructure, these two fuels provide environmental benefits at a relatively low fuel cost.

AIR QUALITY

Emission Reductions From Implementing the Proposed Fleet Vehicle Rules and Related Amendments

The proposed fleet vehicle rules and related amendments are expected to achieve long-term TAC emission reductions from the reduction of diesel particulates (e.g., PM, benzene, 1-3 butadiene, and PAHs (these TACs are also considered to be VOCs) as well as criteria pollutant (e.g., NOx, CO, VOC, and non-diesel particulates) emission reductions. Table and 4-8 lists the revised estimated emission reductions associated with the implementation of the proposed fleet vehicle rules and related amendments. These total revised estimated emission reductions (e.g., air quality benefits) are compared to the air quality impacts of the proposed fleet vehicle rules and related amendments to determine the overall net emission reductions of the proposed project (see Table 4-19). The reader is referred to Chapter 2 and Appendix E1 of this Final PEA for the estimated air quality benefits presented on a rule-specific basis.

TABLE 4-8

Air Quality Emission Benefits Estimates
For The Proposed Fleet Vehicle Rules (tons/yr)

Year	HC[a]	CO	NOx	PM10
2001	0	0	132	7
2002	0	0	378	22
2003	0	0	488	34
2004	1	50	599	47
2005	3	98	709	59
2006	4	139	819	72
2007	5	177	897	84
2008	5	212	975	97
2009	6	241	1,053	109
2010	7	266	1,122	121

[a] HC = Hydrocarbon

The reader is referred to Appendix E-1 of this Final PEA for the methodologies and assumptions used to estimate the emission reductions associated with the proposed fleet vehicle rules and related amendments.

Estimated Relative Toxicity of Diesel- and Natural Gas-Fueled Transit Buses, School Buses, and All Other HDVs

The relative air toxic risks of diesel and corresponding natural gas-fueled vehicles were estimated for new transit buses, school buses, and all other HDVs. The approach utilized in this analysis is based on determining weighted toxic risk factors for each of these vehicle types, for the two fuels under consideration, diesel and natural gas. The weighted toxic risk 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 PM and non-methane hydrocarbon emissions (NMHC). The purpose of this analysis is to use these weighted toxicity factors by vehicle type to estimate the number of natural gas-fueled vehicles that would be roughly equivalent to one diesel vehicle based on relative toxicity.

For the purposes of this analysis, the toxic component analyzed for diesel-fueled vehicles is limited to total PM emissions. This is because CARB has listed diesel PM as a surrogate for all potential carcinogens in diesel exhaust. For natural gas fueled 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 emissions. CARB speciation profiles were used to develop nickel and hexavalent fraction of the natural gas PM exhaust. With regard to NMHC components, a study from West Virginia University (SAE 1997) was used to develop the benzene and 1,3 butadiene NMHC fractions, and a CARB speciation profile from an industrial natural gas-fueled internal combustion engine was used to develop the formaldehyde and acetaldehyde NMHC fractions[5].

The annual PM emission rates for diesel-fueled vehicles were developed from CARB's motor vehicle emission inventory model MVEI7G (Version 1.0c, updated February 10, 2000). Since MVEI7G does not incorporate emission rates from natural gas-fueled vehicles or any other alternative-fueled vehicle type, the corresponding natural gas PM emission rate was conservatively estimated to be 50 percent of the corresponding diesel PM emission rate. The annual mass emission rate of NMHC emissions for natural gas-fueled vehicles is highly variable based on input received by engine manufacturers, as evidenced by CARB certification data for natural gas engine families approved for sale in California. To estimate the annual NMHC emissions for the purpose of this analysis, the SCAQMD used a range of

[5] The West Virginia University paper provided speciation data generated from a CNG-fueled engine used in on-road vehicle applications, but did not specifically include formaldehyde and acetaldehyde data.

0.03 grams per brake horsepower-hour (g/bhp-hr) to 0.8 g/bhp-hr, which is consistent with CARB's certification data. Additionally, the SCAQMD made the following assumptions:

- Conversion factor of 4.3 g/bhp-hr per mile for diesel-fueled transit buses;
- Conversion factor of 2.6 g/bhp-hr per mile for diesel-fueled school buses and all other HDVs
- Annual miles traveled for transit buses was 50,700 miles per year;
- Annual miles traveled for school buses was 12,000 miles per year; and
- Annual miles traveled for all other HDVs was 10,000 miles per year.

Table 4-9 shows the annual PM and NMHC mass emission rates by vehicle type, relative toxicity factors for PM and NMHC exhaust components, and the overall weighted toxicity factor. Based on these overall weighted toxicity factors, Table 4-10 shows the number of CNG vehicles that may be equivalent to one corresponding diesel-fueled vehicle for each of the vehicle types. The number is equal to the overall weighted toxicity factor for the diesel fueled vehicle divided by the corresponding value for the natural gas-fueled vehicle.

TABLE 4-9

Estimated Relative Toxic Risk

Pollutant (lbs/yr)	Compound Relative Toxicity	New Transit Bus		New School Bus		New HDV	
		Diesel	Natural Gas	Diesel	Natural Gas	Diesel	Natural Gas
PM	--	9.3	4.6	5.6	2.8	4.2	2.1
NMHC	--	--	14.4 - 384	--	2.1 - 55	--	1.7 - 45.8
--	**Diesel PM**[a]	27.9	--	16.8	--	12.6	--
--	**Metals**[b]	--	0.1536	--	0.0935	--	0.07
--	**NMHC**[c]	--	0.15 - 3.91	--	0.021 - 0.56	--	0.017 - 0.466
Overall Weighted Toxicity Factor		27.9	0.3 - 4.06	16.8	0.11 - 0.56	12.6	0.087 - 0.536

a Based on CARB input, the unit risk factor associated with diesel PM includes toxic risk contributions for all other compounds in exhaust including NMHC.

b Toxic risk for PM exhaust in natural gas vehicles based on nickel and hexavalent chromium (Cr^{+6})

c Toxic compounds in NMHC exhaust emissions for natural gas vehicles included in this analysis are formaldehyde, acetaldehyde, benzene, and 1,3 butadiene.

TABLE 4-10

Estimated Vehicle Toxic Risk Ratio

Vehicle Type	Risk Ratio[a]	
	Minimum	Maximum
Transit Bus	7	93
School Bus	30	153
All Other HDVs	24	145

a Number of natural gas vehicles equal to one equivalent diesel vehicle based on toxic risk.

Methodology and Assumptions

Emissions that can adversely affect air quality originate from various activities. A project generates emissions both during the period of its construction and through ongoing daily operations. The current capacity in the SCAQMD's jurisdiction for refueling alternative clean-fueled vehicles is not sufficient for the number of new vehicles expected to be acquired to comply with the proposed fleet vehicle rules. Therefore, new alternative clean fuel refueling capacity will need to be constructed, and emissions will be generated by the construction activities. Additionally, within the SCAQMD's jurisdiction refineries may be required to modify their existing processes to produce Rule 431.2 compliant low sulfur diesel for other types of fleet vehicles not regulated by the proposed fleet vehicle rules. During the operational phase of the proposed project, the operation of the alternative clean-fueled vehicles may lead to increases in fuel delivery trips to the refueling stations because of differences in energy content of the alternative clean fuels compared with diesel fuel and gasoline, which would lead to increased operational emissions from the delivery vehicles.

In the context of refueling station construction, the analysis conservatively assumed that new refueling stations would require excavation and removal of an existing underground diesel or gasoline fuel tank. During construction of a methanol refueling station, this tank would be replaced with a new methanol tank and the gasoline or diesel dispensing equipment would be replaced with methanol dispensing equipment[6]. During construction of the other types of stations, the excavated area would be backfilled completely, graded, and new equipment would be added for the new refueling/recharging option. For electric vehicle recharging stations, it was assumed that 25 recharging stations would be installed for each tank removed. This number was based on the replacement of 20 percent of an average fleet of 125 vehicles each year. For the CNG stations, it was assumed that natural gas compression and dispensing equipment would be added. For the LPG and LNG options, an above-ground storage tank would be added. Construction of all the stations will also require repaving of the area over the excavation.

It was also assumed that refueling stations would be constructed uniformly over a five-year period to accommodate total infrastructure needs for the total universe of vehicles affected by the proposed rule and related amendments. This five-year period takes into account the assumption that affected fleet operators will build infrastructure needs early for their entire fleet, which will most likely be replaced over a longer period of time. The five-year period also accounts for the following:

- staggered compliance dates (e.g., upon adoption for transit buses, January 1, 2001, for fleets of 100 or greater, and January 1, 2002 for fleets of 15 or greater and less than 99);
- the uncertainty of infrastructure funding in the early years of implementing the proposed fleet vehicle rules;
- the use of centralized fueling stations in the near-term; and
- the continued use of existing infrastructure to meet early fueling needs.

Thus, the SCAQMD assumes that all refueling stations will not be built within the first year of rule adoption, but rather to maximize "worst-case" air quality impacts for the reasons identified above, built-out uniformly over the first five years.

For those fleet vehicle rules (e.g., PRs 1992, 1993, 1195,1196, and 1186.1) that do not specifically mandate that affected fleet operators acquire alternative clean-fueled HDVs when purchasing a new or replacing an existing fleet HDV, depending on the development of

[6] It should be noted that this overestimates the extent of methanol fuel related construction (e.g., tank removal). Since 1988, SCAQMD Rule 1170 has required the installation of at least one methanol compatible underground storage tank when installing or replacing two or more tanks.

engine aftertreatment technology, fleet operators may have the option of acquiring low sulfur diesel fueled HDVs. To have sufficient quantities of compliant 431.2 low-sulfur fuel available to meet the future HDV demand, refineries located within the SCAQMD's jurisdiction may have to modify their refinery processes. These refinery modifications could potentially create construction-related air quality impacts. However, since some refineries have already indicated publicly that relative to CARB's Transit Bus Rule they will not have to make any modifications to produce low sulfur diesel, the nature and extent of future refinery modifications is not specifically known at this time. Because refinery processes and operations vary substantially between refineries, it is difficult at this time to determine the actual modifications necessary for each refinery to produce low sulfur fuel pursuant to PAR 431.2. To determine potential "worst-case" refinery modification scenarios for the proposed project, the SCAQMD relied on construction analyses from previous refinery reformulated gasoline (RFG) projects. In particular, the SCAQMD used the Mobil RFG Final EIR as a representative example of RFG construction activities and scaled back potential construction impacts including air quality impacts associated with potential refinery modifications associated with the proposed project (see the "Refinery Modifications" and related discussion in Appendix F for additional information on the rationale for using the RFG project Final EIRs as a surrogate for PAR 431.2 construction activities).

To estimate direct operational-related air quality impacts, the SCAQMD assumed that additional fuel delivery trips to stations dispensing methanol, LNG or LPG, would be required because the energy content of a gallon of these fuels is less than the energy content of a gallon of gasoline or diesel fuel. The numbers of additional fuel delivery trips were estimated from the anticipated reduction in fuel efficiency and the estimated distance traveled by vehicles that would use these fuels. It should be noted that the SCAQMD assumed that additional delivery trips would not be required for CNG. The existing natural gas pipeline system will be used to deliver this alternative clean-fuel.

Additionally, in the context of direct operational-related impacts, for those proposed fleet vehicle rules that could potentially allow the use of clean diesel-fueled engines, the SCAQMD qualitatively analyzed the air quality as well as other environmental impacts associated with the use of clean-diesel technologies. The SCAQMD's investigation and research reveals that clean-diesel technologies would have to be used in conjunction with low sulfur diesel to meet the methanol equivalency criteria of the proposed fleet vehicle rules, in particular for particulates and NOx

For indirect operational-related air quality impacts, the SCAQMD evaluated four scenarios; loss of services, longer vehicle turnover rates, centralized refueling, and increased VMT caused by loss of payload. The methodologies and assumptions used in each of these scenarios are discussed below.

The SCAQMD estimated construction and operational emissions for each year from 2000 through 2010 and incorporated air quality emission reduction benefits anticipated from the proposed fleet vehicle rules. The net benefits, after accounting for the construction and operational emissions, were compared with the CEQA significance thresholds to evaluate the significance of anticipated air quality impacts. To be conservative and provide a "worst-case" conclusion, where construction and operational impacts overlapped (years 2001 – 2004) the lower SCAQMD CEQA operational significance thresholds were used to determine significance.

The complete methodologies and assumptions used to estimate the air quality impacts associated with the adoption and implementation of the proposed fleet vehicle rules are contained in Appendix F and the Attachments to Appendix F.

Significance Criteria

The proposed project will be considered to have significant adverse air quality impacts if any one of the thresholds in Table 4-11 are equaled or exceeded.

TABLE 4-11

SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	**Construction**	**Operation**
NOx	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
SOx	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
TAC, AHM, and Odor Thresholds		
Toxic Air Contaminants (TACs)	MICR[a] ≥ 10 in 1 million HI[b] ≥ 1.0 (project increment) HI ≥ 5.0 (facility-wide)	
Accidental Release of Acutely Hazardous Materials (AHMs)	CAA §112(r) threshold quantities (see Table 5-2)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Change in Concentration Thresholds		
NO_2 1-hour average annual average	20 ug/m^3 (= 1.0 pphm[c]) 1 ug/m^3 (= 0.05 pphm)	
PM10 24-hour annual geometric mean	2.5 ug/m^3[d] 1.0 ug/m^3	
Sulfate 24-hour average	1 ug/m^3	
CO 1-hour average 8-hour average	1.1 mg/m^3[e] (= 1.0 ppm[f]) 0.50 mg/m^3 (= 0.45 ppm)	

a MICR = maximum individual cancer risk.
b HI = Hazard Index.
c pphm = parts per hundred million.
d ug/m^3 = microgram per cubic meter.
e mg/m^3 = milligram per cubic meter.
f ppm = parts per million.

Direct Air Quality Effects

The goal of the proposed fleet vehicle rules is to generate emission benefits beyond or surplus to existing and proposed on-road mobile source rules adopted by CARB and USEPA. As shown in Table 4-8, the emission benefits from the proposed fleet vehicle rules are expected to consist of reducing diesel particulate (e.g., PM) emissions, thus, reducing the public's exposure to this TAC. Emission benefits also include a reduction of criteria pollutants including VOCs (e.g., HCs), CO, and NOx emissions.

The following air quality analysis as well as subsequent impacts analyses estimate the direct/indirect construction- and operational-related impacts associated with the installation and operation of alternative clean fuel refueling stations as well as refinery modification. Also, evaluated are direct/indirect construction- and operational-related impacts associated with the use and operation of low emission and alternative clean-fueled vehicles.

Construction-Related Impacts

Alternative Clean-Fuel Refueling Stations

It is expected that as a result of the implementation of the proposed fleet vehicle rules, alternative clean fuel fueling stations must be constructed to accommodate the clean-fueled vehicles. The use of construction equipment to break up concrete and/or asphalt, remove and/or retrofit tanks and piping, backfill, and pour concrete slabs, as well as the construction worker trips to and from the construction site, will contribute to construction-related air quality impacts. During construction, combustion emissions and fugitive dust will be generated from the operation of heavy-duty equipment, material delivery trips, worker trips, portable equipment operation, concrete slab pouring, etc. Construction activities would also entail the use of portable equipment (e.g., generators) and hand held equipment by small construction crews to weld, cut, and grind metal structures.

Construction emissions can be distinguished as either onsite or offsite. Onsite emissions generated during construction principally consists of exhaust emissions (e.g., NOx, SOx, CO, VOC, and PM10) from mobile diesel and gasoline powered construction equipment and portable auxiliary equipment, fugitive dust (e.g., PM10) from disturbed soil, and evaporative emissions (e.g., VOC) from equipment refueling. Offsite emissions during the construction phase consist of exhaust emissions from worker commute trips and material transport trips to and from the construction site.

Onsite construction activities are typically divided into three distinct phases: (1) demolition and land clearing; (2) site preparation; and (3) general construction. In the context of the proposed fleet vehicle rules, the SCAQMD assumed that large-scale demolition of structures will not occur with the exception of the removal of underground gasoline or diesel fuel storage tanks. Site preparation includes the use of heavy-duty construction equipment (e. g., backhoes) for cut and fill operations, trenching, and grading. General construction activities entail the handling and transport of construction materials in conjunction with the actual physical construction of the alternative clean-fuel fueling stations as well as the slab pouring/paving.

Offsite daily construction emissions entail all emissions generated outside the project's boundaries from worker and material transport trips. Estimates as to the number of construction workers required at each construction site as well as the number of days required to construct a particular fueling site were based on contractor experience as well as construction industry reference guides.

PROJECT SPECIFIC IMPACTS: As a result of the "worst-case" infrastructure requirements (e.g., the conversion of a vast majority of affected fleet vehicles to alternative clean-fuels) associated with the proposed fleet vehicle rules, substantial construction activities are anticipated from the construction of refueling stations. Emissions were estimated for each of the construction activities on a daily basis to determine if the implementation of the proposed fleet vehicle rules generated significant construction-related air quality impacts. The number of stations of each type that would be constructed each year, as well as the number that are likely to be constructed at the same time, are shown in Table 4-12. The reader is referred to Appendix F for the assumptions and methodologies used to estimate the number of fueling stations constructed each as a result of the proposed project.

TABLE 4-12

New Fueling Stations Anticipated for Compliance
With The Proposed Fleet Vehicle Rules

Station Type	No. of Stations Converted per Year	Days per Conversion	Average No. of Conversions per Day[a]	"Worst-Case" Simultaneous Conversions per Day
Methanol	2	5	0.04	0
CNG	59	10	2.27	3
LNG	4	9	0.14	0
LPG	3	6	0.07	0
Electrical	2	6	0.05	0
Total	**70**	**--**	**2.56**	**3**

[a] Average Number = (Total Needed x Days Each)/(260 working days per year)

As seen in Table 4-12, there will be periods when three CNG refueling stations are under construction, because the average number under construction simultaneously is more than two but less than three. Because the average numbers of the other types of stations under construction each day are 0.10 or less, it is unlikely that one or more of the other types of stations will be under construction at the same time as three CNG refueling stations. Therefore, the SCAQMD estimated that the most likely peak daily emissions would occur during simultaneous construction of three CNG refueling stations.

Table 4-13 highlights the maximum short-term alternative clean fuel refueling station construction emission increases associated with the proposed fleet vehicle rules, which would occur during simultaneous construction of three CNG refueling stations. For the methodologies and assumptions used to estimate the construction emissions associated with the implementation of the proposed fleet vehicle rules, the reader is referred to Appendix F.

TABLE 4-13

Summary of The Proposed Fleet Vehicle Rules Refueling Station Construction Air Quality Impacts[a]

Type of Station	Number Under Construction	CO (lbs/day)	VOC (lbs/day)	NO_x (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)
CNG	3	6	11	71	6	34
CEQA Significance Level		*550*	*75*	*100*	*150*	*150*
Significant (Yes/No)		No	No	No	No	No

The PM10 emission estimates do not take into consideration compliance with SCAQMD Rule 403 – Fugitive Dust, which requires best available control measures such as watering the grading site two times per day, reducing fugitive dust by 50 percent.

As shown in Table 4-13, the alternative clean fuel refueling station construction-related activities for the proposed fleet vehicle rules do not result in significant air quality impacts. It should be noted that the analysis of construction air quality impacts is a “worst-case” analysis because it assumes that all peak daily construction emissions for the three simultaneously constructed fueling stations would occur on the same day. There are a number of factors that would preclude concurrent peak construction activities including availability of construction crews, type and size of the fueling stations to be constructed, engineering time necessary to plan and design the fueling stations, permitting constraints, etc. Furthermore, once construction is complete, construction air quality impacts would cease, while the TAC benefits as well as criteria pollutant reductions associated with the implementation of the proposed fleet vehicle rules would be permanent.

Refinery Modifications

PROJECT SPECIFIC IMPACTS: To estimate the potential “worst-case” air quality impacts from refinery modifications associated with the proposed project, the SCAQMD used the air quality impacts analysis contained in the Final EIR for the Mobil Torrance Refinery Reformulated Fuels Project (SCAQMD, 1994) as a representative example of refinery construction activities[7]. The Mobil RFG EIR included a comprehensive analysis of the environmental impacts associated with refinery modifications necessary to enable Mobil to produce gasoline that complied with federal and CARB RFG specifications. However, the

[7] Although the refineries were required to make CARB diesel modifications prior to the RFG II regulation modifications, the CARB diesel modifications were small in nature and extent. Thus, these projects qualified as exempt projects or required a Negative Declaration or Mitigated Negative Declaration. Accordingly, environmental impact estimates from the CARB diesel modifications are not representative of modifications necessary to produce low sulfur diesel.

scope of the modifications analyzed in the Mobil EIR are much more extensive than the modifications expected by affected refineries to produce PAR 431.2 compliant low sulfur diesel fuel. In the Mobil EIR, not only were modifications needed to produce lower sulfur gasoline, but extensive modifications where necessary to enable Mobil to produce gasoline with lower benzene content, lower Reid vapor pressure, lower olefin content, lower T-90, etc. Thus, the Mobil Refinery had to essentially modify major portions of its whole refining process in order to comply with the RFG regulations.

In the context of the proposed project, the SCAQMD does not expect that affected refineries will have to modify their existing refining processes to the extent and nature that Mobil had to for its Reformulated Fuels Project. However, the SCAQMD expects that some of the types of construction activities that occurred for the Mobil Refinery Reformulated Fuels Project would be similar to those required to produce low sulfur fuels that meet the anticipated requirements of PAR 431.2.

In order to estimate the construction impacts associated with refinery modifications, the SCAQMD assumed that peak daily construction emissions during refinery modifications necessary to comply with PAR 431.2 would be about 25 percent of the peak daily construction emissions that were estimated for the Mobile reformulated fuels project. The SCAQMD also assumed that the six largest refineries (e.g., ARCO, Chevron, Mobil, Equilon, Tosco, and Ultramar) within its jurisdiction would undergo modifications that would require similar construction activities, thus, generating similar construction emissions. Finally, as a "worst-case," it was assumed that the peak daily emissions from construction activities at each refinery would all occur on the same day. It was also assumed that refinery modification construction activities would last two years. Under these assumptions, the peak daily emissions for construction activities at all six refineries to comply with PAR 431.2 would be 1.5 times the peak daily emissions estimated for construction activities associated with Mobil's Reformulated Fuels Project (6 refineries x 0.25 x Mobil reformulated fuels project construction emissions). Accordingly, these assumptions lead to an extreme "worst-case" analysis since some refineries may not need to make any modifications and the Mobil modifications from which this analysis is scaled from are much more intensive that what can be expected under the proposed project.

Table 4-14 highlights the maximum short-term refinery modification construction-related emission increases associated with the proposed project, which would occur during simultaneous construction of modifications at six refineries. For the methodologies and assumptions used to estimate the construction emissions associated with the implementation of the proposed fleet vehicle rules, the reader is referred to Appendix F.

TABLE 4-14

Summary of The Proposed Fleet Vehicle Rules Refinery Modifications
Construction Air Quality Impacts

Activity	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	Combustion PM10 (lbs/day)	Fugitive PM10 (lbs/day)	Total PM10 (lbs/day)
Construction Equipment	189	60	389	38	45	0	45
Construction Fugitive Dust	0	0	0	0	0	479	479
On-Road Mobile Sources	498	24	108	6	11	0	11
Total	**687**	**84**	**497**	**44**	**56**	**479**	**534**
CEQA Significance Level	*550*	*75*	*100*	*150*			*150*
Significant (Yes/No)	**Yes**	**Yes**	**Yes**	No			**Yes**

As shown in Table 4-14, the refinery modification construction-related activities for the proposed fleet vehicle rules result in significant CO, VOC, NOx, and PM10 air quality impacts. However, it should be noted that the analysis of construction air quality impacts is a “worst-case” analysis because it assumes that all peak daily construction emissions for all six refineries would occur on the same day. There are a number of factors that would preclude concurrent peak construction activities including availability of construction crews, type and size of the modifications to be constructed, engineering time necessary to plan and design the modifications, permitting constraints, etc. Furthermore, once construction is complete, construction air quality impacts would cease, while the TAC benefits as well as criteria pollutant reductions associated with the implementation of the proposed fleet vehicle rules would be permanent.

Construction-Related Mitigation

PROJECT-SPECIFIC MITIGATION MEASURES: The emissions from refinery construction activities are primarily from three main sources: 1) grading, 2) off-road mobile source equipment, and 3) on-road motor vehicles (construction worker trips). The mitigation measures listed below are intended to minimize the emissions associated with refinery modifications since they are the major source of significant air qualify impacts. As already noted, construction activities to build clean fuel refueling stations would be subject to SCAQMD Rule 403, which requires application of best available control measures to reduce fugitive dust emissions.

Table 4-15 lists mitigation measures for each emission source and identifies the estimated control efficiency of each measure. As shown in the table, no feasible mitigation has been identified for the emissions from worker vehicle trips. Additionally, no other feasible mitigation measures have been identified to further reduce emissions. CEQA Guidelines §15364 defines feasible as “. . . capable of being accomplished in a successful manner within a reasonable period if time, taking into account economic, environmental, legal, social, and technological factors.”

As shown in Table 4-15, the SCAQMD identified no feasible mitigation measures that could be implemented to reduce emissions associated with construction worker trips to and from construction sites. Health and Safety Code §40929 specifically prohibits air districts and other public agencies from requiring an employee trip reduction program making such mitigation infeasible. Furthermore, the fact that most construction workers would be coming from different parts of the district makes carpooling impractical. No other feasible measures have been identified to reduce emissions from this source.

TABLE 4-15

Construction-Related Mitigation Measures and Control Efficiency

Activity	Mitigation	Pollutant	Control Efficiency (%)
Grading	Increase watering of active site by one time per day[a]	PM10	16
Off-Road Mobile Equipment	Proper equipment maintenance	VOC NOx SOx PM10 CO	5 5 5 5 0
On-Road Motor Vehicles	No feasible measures identified	VOC NOx PM10 CO	N/A N/A N/A N/A

[a] It is assumed that affected facilities will comply with SCAQMD Rule 403 – Fugitive Dust, by watering the grading site two times per day, reducing fugitive dust by 50 percent. This mitigation measure assumes an incremental increase in the number of times per day the site is watered (i.e., from two to three times per day)

Table 4-16 presents a summary of mitigated refinery modifications construction emissions for the proposed project. The table includes the emissions associated with each source and an estimate of the reductions associated with mitigation. The implementation of mitigation measures, while reducing emissions, does not reduce the construction-related CO, VOC, NOx, and PM10 impacts below significance

TABLE 4-16

Summary of Refinery Modifications Construction Air Quality Impacts (Mitigated)

Activity	CO lbs/day	VOC lbs/day	NOx lbs/day	SOx lbs/day	Combustion PM10 lbs/day	Fugitive PM10[a] lbs/day	Total PM10 lbs/day
Construction Equipment	189	60	389	38	45	0	45
Mitigation Reduction (%)	0%	5%	5%	5%	5%	0%	--
Mitigation Reduction (lb/day)	0	-3	-19	-2	-2	--	-2
Remaining Emissions	**189**	**57**	**369**	**36**	**43**	**0**	43
Construction Fugitive Dust	0	0	0	0	0	239	239
Mitigation Reduction (%)	0%	0%	0%	0%	0%	16%	**--**
Mitigation Reduction (lb/day)	0	0	0	0	0	-38	-38
Remaining Emissions	**0**	**0**	**0**	**0**	**0**	**201**	**201**
On-Road Mobile	498	24	108	6	11	0	11

TABLE 4-16 (CONTINUED)

Summary of Refinery Modifications Construction Air Quality Impacts (Mitigated)

Activity	**CO** lbs/day	**VOC** lbs/day	**NOx** lbs/day	**SOx** lbs/day	**Combustion PM10** lbs/day	**Fugitive PM10**[a] lbs/day	**Total PM10** lbs/day
Mitigation Reduction (%)	0%	0%	0%	0%	0%	0%	--
Mitigation Reduction (lb/day)	0	0	0	0	0	0	0
Remaining Emissions	**498**	**24**	**108**	**6**	**11**	**0**	**11**
Total Remaining Emissions	**687**	**81**	**477**	**42**	**53**	**201**	**254**
Significance Threshold	*550*	*75*	*100*	*150*	--	--	*150*
Significant (Yes/No)	**Yes**	**Yes**	**Yes**	No	--	--	**Yes**

[a] Includes compliance with SCAQMD Rule 403

REMAINING IMPACTS: The air quality construction impact analysis revealed that the simultaneous construction of alternative clean fuel (e.g., methanol, compressed natural gas, liquefied natural gas, liquefied petroleum gas, and electric power) fueling stations, which are necessary for fleet owners/operators to comply with the proposed fleet vehicle rules and related amendments, and refinery modifications to produce low sulfur diesel, result in significant adverse construction air quality impacts. This would occur despite implementing all feasible mitigation measures. However, the majority of the significant air quality impacts from CO, VOC, NOx, and PM10 emission increases result from refinery modifications, which is considered to be a "worst-case" analysis because it assumes that all refineries would modify their processes at the same time and to the same extent. There are a number of factors that would preclude concurrent refinery modifications including availability of construction crews, type and extent of refinery modifications, engineering time necessary to plan and design the domes/barns, permitting constraints, etc. Furthermore, the as a "worst-case" the SCAQMD's air quality analysis assumes that refinery modifications could take up to two years to complete. Depending on the size and extent of the refinery modifications, actual construction time could be substantially less than two years.

Finally, even assuming that refinery modifications last two full years, once the refinery construction activities cease the remaining construction activities associated with refueling stations would not result in significant air quality impacts (see table 4-13) although these construction activities are projected to last another three years. Accordingly, after completion of construction activities at the six large refineries in the district (i.e., after two years), construction activities to build alternative clean fuel refueling stations would continue for another three years, but these construction activities would not generate significant adverse construction--related air quality impacts.

CUMULATIVE IMPACTS: CEQA requires that the analyses of cumulative impacts include reasonably anticipated past, present, and future projects producing related or cumulative impacts, including those projects that would be outside the control of the lead agency (CEQA Guidelines §15130). In the context of short-term construction-related activities, the SCAQMD is unaware of other construction projects in the vicinity around the affected facilities that could contribute to the project-specific construction impacts of the proposed fleet vehicle rules. However, since the construction-related project-specific impacts are considered significant for proposed project, the cumulative impacts from the simultaneous construction of alternative clean fuel fueling stations and refinery modifications are also considered significant.

CUMULATIVE IMPACT MITIGATION: For construction-related activities, the same mitigation measures listed in Table 4-15 regarding project-specific construction impacts will also mitigate cumulative impacts. However, the employment of these mitigation measures will not reduce construction-related significant adverse cumulative air quality impacts to less than significant. Significant cumulative construction related air quality impacts will cease, however, upon completion of the refinery modifications to produce PAR 431.2 compliant diesel, i.e., after two years.

Operational-Related Impacts

Fuel Delivery

PROJECT SPECIFIC IMPACTS: Potential direct operational-related air quality impacts could arise if off-site daily employee commuter and/or alternative clean fuel delivery trips associated with the implementation of the proposed fleet vehicle rules significantly increase substantially. In the context of additional employee trips, the SCAQMD does not expect long-term direct air quality impacts from the proposed fleet vehicle rules. It is envisioned that existing maintenance personnel will be properly trained in the operation, fueling, and maintenance of clean-fueled vehicles (e.g., methanol, CNG, LNG, LPG, or electricity) as well as fueling stations. Thus, it is not anticipated that there will be a need for additional employees to perform these functions that would significantly increase the overall number of worker commute trips within the district.

Alternative fuel delivery trips will likely change for facilities that convert to methanol, LNG, and LPG due to the lower fuel value per gallon of these clean fuels compared to gasoline or diesel fuel. Compared to one gallon of gasoline the fuel equivalents for methanol (M85), LNG, and LPG are 1.68, 1.55, and 1.36, respectively (see Table 3-26 in Chapter 3). Compared to one gallon of diesel the fuel equivalents for M85, LNG, and LPG are 2.3, 2.1, and 1.86, respectively (see Table 3-26 in Chapter 3). This means it would take that many gallons of these alternative clean fuels to equal one gallon of gasoline or diesel. Thus, a facility using LNG could require 55 percent (for gasoline) up to 130 percent (for diesel) more refilling trips than a facility currently using conventional fuels. Similarly, the vehicles using these fuels may need to return to the fueling station 55 percent (for gasoline) up to 130 percent (for diesel) more often or will potentially need to be equipped with larger fuel tanks.

It should be noted that affected fleet operators converting to CNG or EV on the other hand will experience a reduction in material transport trips. Natural gas for CNG-fueled vehicles is delivered by pipeline and electricity for EVs is delivered via the power grid.

After the release of the Draft PEA the SCAQMD received a comment regarding the fuel efficiencies used in the fuel delivery analysis. As a result of further investigation, the SCAQMD has refined its analysis to take into consideration more conservative fuel efficiencies for alternative clean-fueled vehicles. However, as shown below in Table 4-19, this refinement does not change the Draft PEA's original conclusion that overall air quality operational-related impacts associated with the implementation of the proposed fleet vehicle rules are insignificant.

The increased number of delivery trips that would be required to accommodate the anticipated new methanol, LNG, and LPG-fueled vehicles was estimated for this analysis. As shown in detail in Appendix F, these estimates were based on estimated miles traveled by these vehicles, the reduction in fuel efficiency between the alternative clean fuels and gasoline for LDVs and MDVs and diesel fuel for HDVs, the resulting increase in gallons of conventional fuel used, and the average number of daily trips required to deliver the increased amount of fuel. The resulting increase, which accounted for lower fuel efficiencies (e.g., four miles per gallon), was conservatively estimated to be eight additional delivery trips per day. As shown in Table 4-17, the resulting emissions from the additional trips by the fuel delivery vehicles that are anticipated during 2010, do not cause significant air quality impacts. Additionally, the 33 pounds per day increase in PM10 emissions includes only one pound per day of diesel exhaust PM. The remaining 32 pounds per day are from tire and break wear and entrained paved road dust.

TABLE 4-17

Summary of Emissions from Increased Fuel Delivery
Trips From the Proposed Fleet Vehicle Rules

Increase in Daily Trips	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
8	13	2	16	0	33

Stationary Sources

PROJECT SPECIFIC IMPACTS: It is anticipated that the implementing the proposed fleet vehicle rules and related amendments may result in existing stationary sources, particularly combustion sources, slightly increasing their operation in order to provide power or fuel to or for alternative clean-fueled vehicles and fueling stations. For example, a slight incremental increase in electricity generation from in-district power plants (e.g., utility boilers/gas turbines) may be needed to power pumps, fans, and motors for fueling stations as well as power EVs. Additionally, natural gas compressor stations (e.g., internal combustion engines) within the SCAQMD's jurisdiction may increase the amount of natural gas currently processed to meet the slight incremental fuel demand of CNG and LNG vehicles. Lastly, refineries within the SCAQMD's jurisdiction may increase certain types of processes (e.g., refinery heaters) to meet the demand for petroleum-based alternative-clean fuels (e.g., methanol, LPG, and low sulfur diesel – PAR 431.2). Thus, these increases in power plant, compressor station, and refinery operations could incrementally increase emissions over existing operations.

Additionally, the SCAQMD expects that new CNG compressors will be installed at new CNG fueling stations. According to the CEC's *Evaluation of Compressed Natural Gas (CNG) Fueling Systems,* (October 1999)**,** the most fundamental equipment choice is whether to use an electric motor or an internal combustion engine (ICE) as the prime mover to power gas compression. Both options offer certain advantages and disadvantages, depending on the intended application and other factors. Generally, smaller CNG stations typically choose electric motors, trading off the higher cost of electricity for lower capital and maintenance costs. For larger CNG stations with high gas throughput where a rigorous preventative maintenance program is in place, the higher cost of electricity for gas compression may make gas engine drive more attractive.

Therefore, if electric motors are chosen as the prime movers (e.g., compressors) for new CNG fueling stations, as mentioned above, then new electric-driven CNG compressors could create a slight incremental demand power within the SCAQMD's jurisdiction. This resultant incremental demand for in-district electricity could slightly increase power plant emissions above existing levels.

Analogously, if ICEs are chosen as the compressors for new CNG fueling stations, then new natural gas- or diesel-fueled CNG compressors could increase emissions since they are a new source of emissions

However, these potential combustion emission increases from both existing and new stationary sources over current emission levels are not considered significant air quality impacts. Therefore, for the following reasons, these potential emission increases are not included in this air quality impact analysis.

<u>Existing Permitted Sources</u>

First, as long as incremental emissions increase from existing stationary sources do not exceed maximum permitted capacities, the incremental emissions increase are not considered to be a significant adverse air quality impact. In other words, if the incremental emissions increase associated with a particular project is above current average operating emission levels, but do not exceed the SCAQMD's permitted maximum potential to emit levels (e.g., permitted levels), the project is not considered to create any significant adverse air quality impacts. This conclusion is consistent with current CEQA case law. In particular, the California Second Appellate District Court in *Fairview Neighbors v. County of Ventura,* 70 Cal.App.4th 238 (1999), held that the baseline for analysis of permit expansion is the preexisting permit (e.g., previous permit levels). In this case, a prior use permit had been approved allowing gravel mining that would generate up to 810 truck trips per day. The level of mining activity fluctuated, however, and when an EIR was prepared for the new expansion, the level of truck trips was much lower. The EIR for the expansion found that the proper "baseline" for analyzing impacts of the proposed expansion was the allowed truck trips under the existing permit, rather than the actual level of truck trips when the environmental review was performed. The court upheld the EIR's analysis and rejected claims by project opponents that the EIR in effect had to assume the existing permit was not there.

Second, existing permitting sources such as power plants, compressor stations, and refineries within SCAQMD's jurisdiction that could be affected by implementing the proposed fleet vehicle rules have already had their maximum emission potentials, specifically from combustion sources, accounted for in various ways. For example, most if not all of the existing power plants, compressor stations, and refineries potentially affected by the proposed fleet vehicle rules are in the SCAQMD's RECLAIM program (e.g., Regulation XX). When RECLAIM was adopted by the SCAQMD's Governing Board in October 1993, it was designed to reduce NOx and SOx emissions from RECLAIM facilities to the same extent that would be required through the implementation of existing regulations with future compliance dates and the applicable control measures in the AQMP. It was envisioned that the RECLAIM program would provide the maximum flexibility to RECLAIM facilities in achieving required emissions reductions at a lower cost than under command-and-control rules, while stimulating innovation and technology advancement. To achieve these desired goals, each RECLAIM facility was given an initial facility-wide NOx and or SOx allocation with subsequent declining annual allocations. RECLAIM then establish absolute declining NOx and SOx emission caps for the entire RECLAIM universe. Thus, the incremental NOx and SOx emissions that could be generated by affected existing stationary sources are expected to be within the allocated RECLAIM universe.

Other SCAQMD regulations such as Rule 1135 – Emissions of Oxides of Nitrogen From Electric Power Generating Systems, Rule 1134 – Emissions of Oxides of Nitrogen From Stationary Gas Turbines, and Rule 1109 – Emissions of Oxides of Nitrogen From Boilers and Process Heaters in Petroleum Refineries, have also accounted for NOx emissions from potentially affected stationary sources. Rules 1134 and 1135 establish declining NOx emission caps or low emission concentration limits, which severely restrict the amount of combustion emissions that can be emitted in the SCAQMD's jurisdiction by these sources. Rule 1109 established a stringent NOx concentration limit compared to the previous NOx concentration limit for this source.

Third, all of the aforementioned regulations have had CEQA documents prepared for them. These previously prepared CEQA documents thoroughly analyzed the potential environmental impacts associated with use of add-on emission control equipment to meet the appropriate compliance standards for that rule. Thus, emissions increases and reductions resulting from full compliance with RECLAIM and Rules 1109, 1134, and 1135 have already been evaluated. These same analyses would apply in the context of the proposed fleet vehicle rules since it is expected that existing stationary source capacity will be sufficient to meet the incremental power demands of the proposed fleet vehicle rules.

Lastly, many if not all of the potentially affected stationary sources, when initially permitted or through subsequent permit modifications, have been subjected to the SCAQMD's New Source Review process (e.g. Rule 2005 – New Source Review for RECLAIM or Rule 1303 – New Source Review, which is applicable to non-RECLAIM facilities and pollutants). Rules 2005 and 1303 not only require BACT (Best Available Control Technology) and ambient air modeling for new, modified or relocated sources, but also require all emission increases to be offset. Accordingly, existing emissions levels from these sources allowed through permit conditions have already been accounted for through the SCAQMD's Rules 2005 and 1303 emissions offset process[8].

It should be noted that in the particular case of electric power plants, almost 75 percent of the electricity used in the SCAQMD's jurisdiction is imported from out-of-district and out-of-state power plants. Thus, there is a substantial amount of unused generating capacity within the SCAQMD's jurisdiction. Any additional electricity needed to power new electric motors would most likely be provided by out-of-basin and out-of-state power plants out-of-state power plants. Therefore, any incremental power generation necessary to provide power for the proposed fleet vehicle rules purposes compared to overall in-district generation could be easily met by existing in-district capacity that is tightly regulated by existing SCAQMD rules and regulations.

Additionally, in the context of refinery operations, the SCAQMD expects that once the modifications are completed no further air quality impacts should occur. Direct or indirect operational-related impacts are not expected since refineries can use existing infrastructure (e.g., pipelines, storage tanks, terminals, trucking routes, etc.) to deliver low sulfur fuels.

<u>New Permitted Sources</u>

As mentioned above, new sources in the SCAQMD's jurisdiction are subject to either Rules 2005 and 1303, depending on whether the source is located at a RECLAIM or Non-RECLAIM facility. Both regulations require that new, modified, or relocated stationary sources install BACT and if emissions from the stationary source are greater than one pound conduct ambient air modeling and provide emission offsets. Thus, any emissions associated with new power generating sources or ICE-driven CNG compressors would be offset to zero pursuant to either Rule 2005 or 1303. It should be noted that other emissions sources (e.g., construction, fuel delivery, loss of service, longer vehicle turnover rates, and centralization)

[8] It should be noted that existing stationary sources that potentially have to increase their capacity due to the implementation of the proposed fleet vehicle rules would be subject to the SCAQMD's NSR process and would be required to offset any emission increases.

associated with the alternative clean fuel fueling stations and vehicles are analyzed in the appropriate section of this Final PEA.

CEQA Guidelines §15064(h) states in pertinent part that "[I]f an air emission or water discharge meets the existing standard for a particular pollutant, the Lead Agency may presume that the emission or discharge of the pollutant will not be a significant effect on the environment." Therefore, pursuant to CEQA Guidelines §15064(h), if a new or stationary source complies or will comply with all applicable SCAQMD rules or regulations, the SCAQMD presumes that no significant adverse air quality impacts will result from the project.

Clean Diesel Technology

Typical alternative clean-fuels (e.g., methanol, CNG, LNG, LPG, and electric power) do not need additional mechanical emission controls to achieve low emission levels. Generally, the use of these clean-fuels coupled with the proper engine configuration is sufficient to achieve low emissions levels. However, for diesel-fueled vehicles, additional mechanical emission controls coupled with ultra low sulfur and nitrogen diesel fuel are required to reach low emission levels compared to alternative clean fuels.

The Manufacturers of Emission Controls Association (MECA) reported in *Emission Control Retrofit of Diesel-Fueled Vehicles* (August, 1999) that there are number of promising control strategies available or are being developed that can greatly reduce emissions from diesel-powered motor vehicles. In particular, MECA reports that the retrofitting of diesel oxidation catalysts, diesel particulate filters, selective catalytic reduction, engine component and management devices, and air enhancement technologies on both on-road and non-road vehicles has successfully reduced PM emissions as well as other pollutants. It should be noted that some of the retrofit technologies described here can also be applied, in some cases to alternative fuel vehicles, e.g., CNG vehicles. All references to the clean diesel retrofit technologies hereafter also include applications to alternative clean fuels. Some of the conclusions from MECA's report on clean diesel include:

- Oxidation catalyst technology can substantially reduce particulate, hydrocarbons (HC), smoke, and odor from diesel engines, and improvements in oxidation catalyst technology continue to evolve to further enhance the application of this technology to diesel engines.
- Selective catalytic reduction can simultaneously reduce NOx, PM, and HC emissions substantially.
- Filter technology can substantially reduce harmful PM emissions as well as substantially reduce smoke.
- Air enhancement technologies can be used to reduce emissions of PM, CO, and smoke. They can also be used to enhance the performance of other retrofit controls such as oxidation catalysts.

- Both oxidation catalysts and filters can be used in conjunction with engine management techniques (e.g., injection timing retard or exhaust gas recirculation (EGR)) to reduce diesel PM and NOx emissions.
- For oxidation catalyst retrofit applications, diesel fuel sulfur levels below 0.05 percent by weight are desirable, but not required. *Lower fuel sulfur levels increase the PM reductions provided and makes vehicle integration simpler* (emphasis supplied). However, levels of 0.25 percent by weight and higher have been effectively controlled by catalyst retrofit systems employing new catalyst formulations.
- Both filter and SCR technologies have been used to control diesel emissions at fuel sulfur levels in the 0.50 percent by weight range.
- Properly maintained vehicles will insure that retrofit control technology performs at its designed performance level and that the technology will perform problem-free.

In June of 1999, MECA reported in its *Demonstration of Advanced Emission Control Technologies Enabling Diesel Powered Heavy-Duty Engines to Achieve Low Emission Levels: Final Report*, that it had instituted a test program at Southwest Research Institute to evaluate the performance of a variety of commercially available exhaust emission control technologies on a current design heavy-duty diesel engine with standard Number 2 diesel (368 ppm), lower sulfur (54 ppm) diesel fuel, and, in a limited number of cases, zero ppm sulfur fuel. A 1998 12.7 L Detroit Diesel Corporation, 400 horsepower, Series 60 engine was selected to represent a typical current design on-road heavy-duty diesel engine[9]. The following exhaust emission control technologies were evaluated:

- diesel oxidation catalysts,
- diesel particulate filters,
- selective catalytic reduction (SCR),
- fuel-borne catalysts in combination with filters and oxidation catalysts, and
- combinations of the above technologies.

According to MECA, the test program demonstrated that advanced exhaust emission control technology can be used to meet the emission levels of 0.03 g/bhp-hr PM emission level combined with a 1.5 NOx + HC emission level for standard No. 2 diesel fuel (368 ppm) and a 0.01 g/bhp-hr PM emission level combined with a 1.5 NOx + HC emission level for lower sulfur No. 2 diesel fuel (54 ppm)

Although the testing results from the MECA report appears promising, to date CARB has not certified any heavy-duty diesel-fueled engines at current or future emission standards using clean diesel technology. Consequently, it appears that before the aforementioned diesel

[9] Exhaust gas recirculation (EGR) was incorporated into the engine for some of the testing.

exhaust control technologies using ultra low sulfur diesel fuel can meet both the PM and NOx methanol equivalency criteria of the proposed fleet vehicle rules, further development and refinement of these technologies is required. In fact, the SCAQMD's discussions with OEMs indicate that compliant PM reduction technology (e.g., diesel particulate traps coupled with low sulfur diesel) that can meet low PM standards is six months to two years away and compliant NOx reduction technology is still four to seven years away. Therefore, at this time, the availability of HDVs using these clean diesel technologies to comply with the proposed fleet vehicle rules' and related amendments' methanol equivalency criteria for PM and NOx is somewhat speculative and unquantifiable. Accordingly, the extent of the environmental impacts associated with the use of clean diesel technologies cannot be quantified in detail at this time. However, to the extent feasible the SCAQMD has qualitatively evaluated the environmental impacts from the potential use of clean technologies.

The following discussions are comprised of edited excerpts from reports by MECA entitled *Emission Control Retrofit of Diesel-Fueled Vehicles,* (August 1999) and *Demonstration of Advanced Emission Control Technologies Enabling Diesel Powered Heavy-Duty Engines to Achieve Low Emission Levels: Final Report,* (June 1999).

After the close of the comment period for the Draft PEA, one commentator alleged that its "green diesel" technology be included in the analysis of clean diesel technologies. According to the commentator, the "green diesel" technology consists of (1) optimized engine calibration to minimize NOx and other emissions; (2) exhaust aftertreatment in the form of Continuously Regenerating Trap (CRT); and (3) the use of ultra low sulfur diesel. The commentator reports that this technology installed on a school bus has achieved 0.005 g/bhp-hr PM, 3.0 g/bhp-hr NOx, and 0.0 g/bhp-hr HC. The SCAQMD has not purposely omitted any developing clean diesel technology from its analysis. This analysis and the following discussion are not intended to be an exhaustive analysis of clean diesel technologies. Rather they are intended as a general representation of the type of clean diesel technologies under development and the anticipated impacts associated with the use of these technologies, which have been qualitatively analyzed in the Draft PEA. Accordingly, since the "green diesel" technology incorporates components of clean diesel technologies, the inclusion of the "green diesel" technology in this Final PEA will not change any of the conclusions made in the Draft PEA regarding the environmental impacts associated with the use of clean diesel technologies. For the purposes of the following impacts analyses, it is assumed that "green diesel" technology falls under the auspice of the diesel particulate filter technology category.**PROJECT SPECIFIC IMPACTS**: The use of the aforementioned diesel emission control technologies may generate potentially significant adverse air quality impacts. The potential adverse air quality impacts associated with the use of these technologies are discussed separately below.

Diesel Oxidation Catalysts

The diesel oxidation catalyst has become a leading retrofit control strategy in both the on-road and off-road sectors throughout the world, reducing not only PM emissions but also emissions of CO and HC. Using oxidation catalysts on diesel-powered vehicles is not a new concept. Oxidation converters have been installed on off-highway vehicles around the world for over 20 years and have been installed on urban buses and highway trucks in Europe and the U.S. for over two years with well over 10,000 units having been installed.

The concept behind an oxidation catalyst is that it causes chemical reactions without being changed or consumed. Typically, there are no moving parts with an oxidation catalyst. An oxidation catalytic converter consists of a stainless steel canister that typically contains a honeycomb-like structure called a substrate or catalyst support, which is coated with catalytic precious metals such as platinum or palladium. It is called an oxidizing catalyst because it transforms pollutants into harmless gases by means of oxidation. In the case of diesel exhaust, the catalyst oxidizes CO and gaseous HCs allowing the liquid HCs to be adsorbed on carbon particles. The liquid HCs, also referred to as the soluble organic fraction (SOF), make up part of the total PM in the diesel exhaust.

The level of total PM reduction in diesel exhaust is influenced in part by the percentage of SOF in the particulate. For example, a Society of Automotive Engineers (SAE) Technical Paper (SAE No. 900600) reported that oxidation catalysts could reduce the SOF of the particulate by 90 percent under certain operating conditions, and could reduce total particulate emissions by 40 to 50 percent. Destruction of the SOF is important since this portion of the particulate emissions contains numerous chemical pollutants.

The sulfur content of diesel fuel is critical to the utilization of catalyst technology (emphasis supplied). Catalysts used to oxidize the SOF component of PM can also oxidize SO_2 to form sulfates, which are also counted as part of the total PM. This reaction is not only dependent on the level of sulfur in the fuel, but also the temperature of the exhaust gases. Catalyst formulations have been developed which selectively oxidize the SOF while minimizing oxidation of SO_2. *However, the lower the sulfur content in the fuel, the greater the opportunity to maximize the effectiveness of oxidation catalyst technology* (emphasis supplied). The low sulfur fuel (0.05 percent by weight) which was introduced in 1993 throughout the U.S. has facilitated the application of catalyst technology to diesel-powered vehicles. Furthermore, the very low fuel sulfur content (<0.005 percent by weight) available in several European countries has further enhanced catalyst performance. Additionally, the use of ARCO's ultra low sulfur diesel fuel (<0.0015 percent by weight) should provide even greater PM reductions when used in conjunction with appropriate catalyst. However, the performance of an oxidation catalyst when using a low sulfur diesel is hard to predict since it will vary with catalyst formulation, engine type, and duty cycle.

Potential adverse air quality impacts associated with the use of oxidation catalysts in diesel-fueled vehicles could occur if this technology resulted in the increase of other exhaust pollutants at the expense of reducing PM or a reduction in fuel economy. Additionally, potential air quality impacts could arise if the use of ultra low sulfur diesel fuel in combination with oxidation catalysts could result in infrastructure changes (e.g., fuel supply or delivery).

In the case of exhaust pollutants, MECA reports that the use of oxidization catalysts to reduce PM emissions from diesel-fueled vehicles should not increase other exhaust pollutants. In fact, combining an oxidation catalyst with engine management techniques can be used to reduce NOx emissions from diesel engines. This is achieved by adjusting the engine for low NOx emissions, which is typically accompanied by increased CO, HC, and PM emissions. An oxidation catalyst can be added to offset these increases, thereby lowering the exhaust levels for all of the pollutants. Often, the increases in CO, HC, and PM can be reduced to levels lower than otherwise could be achieved. In fact, a system which uses an oxidation catalyst combined with proprietary ceramic engine coatings and injection timing retard can achieve significant NOx reductions (e.g., greater than 40 percent) while maintaining low PM emissions.

As to a reduction in fuel economy, diesel oxidation catalysts do not adversely affect fuel economy or engine performance. They have little or no impact on exhaust back-pressure when properly sized for a specific application. Careful selection of space velocity not only ensures proper catalyst performance, but also avoids unnecessary restriction of the exhaust system.

Finally, no operational-related infrastructure changes are expected from the use of ultra low sulfur diesel fuel in combination with oxidation catalysts. Existing piping and storage tanks can be used to supply and store the additional demand for ultra low sulfur diesel fuel.

Therefore, no significant adverse air quality impacts were identified from the use of oxidation catalysts in conjunction with ultra low sulfur diesel fuel to potentially comply with the proposed fleet vehicle rules.

Diesel Particulate (PM) Filters

The diesel PM filter system consists of a filter positioned in the exhaust stream designed to collect a significant fraction of the PM emissions while allowing the exhaust gases to pass through the system. Since the volume of PM generated by a diesel engine is sufficient to fill up and plug a reasonably sized filter over time, some means of disposing of this trapped PM must be provided. The most promising means of disposal is to burn or oxidize the PM in the filter, thus regenerating, or cleansing, the filter.

A complete filter system consists of the filter and the means to facilitate the regeneration if not of the disposable type. A number of filter materials have been tested, including ceramic monoliths and fiber wound cartridges, knitted silica fiber coils, ceramic foam, wire mesh, sintered metal substrates, and temperature resistant paper in the case of disposable filters. Collection efficiencies of these filters range from 50 percent to over 90 percent. Currently, the ceramic monoliths, fiber wound cartridges, and paper filters have been used commercially.

All of the technologies function in a similar manner; that is, forcing particulate-laden exhaust gases through a porous media and trapping the PM on the intake side. Excellent filter efficiency has rarely been a problem with the various filter materials listed above, but work has continued with the materials, for example, to: (1) optimize high filter efficiency with accompanying low back pressure, (2) improve the radial flow of oxidation through the filter during regeneration, and (3) improve the mechanical strength of the filter designs.

The exhaust temperature of diesels is not always sufficient to initiate regeneration in the filter. A number of techniques are available to bring about regeneration of filters. It is not uncommon for some of these various techniques to be used in combination. Some of these methods include:

- Using a catalyst coated on the filter element. The application of a base or precious metal coating applied to the surface of the filter reduces the ignition temperature necessary for oxidation of the particulate;
- Using a NOx conversion catalyst upstream of the filter to facilitate oxidation of NO to NO_2 which adsorbs on the collected PM, substantially reducing the temperature required to regenerate the filter;
- Using fuel-borne catalysts to reduce the temperature required for ignition of the accumulated material;
- Throttling the air intake to one or more of the cylinders, thereby increasing the exhaust temperature;
- Using fuel burners, electrical heaters, or combustion of atomized fuel by catalyst to heat the incoming exhaust gas to a temperature sufficient to ignite the PM;
- Using periodically compressed air flowing in the opposite direction of the PM from the filter into a collection bag which is periodically discarded or burned; and
- Throttling the exhaust gas downstream of the filter. This method consists of a butterfly valve with a small orifice in it. The valve restricts the exhaust gas flow, adding back pressure to the engine, thereby causing the temperature of the exhaust gas to rise and initiating combustion.

Potential adverse air quality impacts associated with the use of PM filters in diesel-fueled vehicles could occur if this technology resulted in the increase of other exhaust pollutants at the expense of reducing PM or a reduction in fuel economy. Additionally, potential air quality impacts could arise if the use of ultra low sulfur diesel fuel in combination with oxidation catalysts could result in infrastructure changes (e.g., fuel supply or delivery).

In the case of exhaust pollutants, diesel PM filter systems are being optimized for the particular application to insure that any adverse effects of the system on engine or vehicle performance are minimized or completely eliminated.

As to a reduction in fuel economy, a very slight fuel economy penalty has been experienced with some diesel PM filter technologies, which is attributable to the back-pressure of the system. Some forms of regeneration involve the use of diesel fuel burners, and to the extent those methods are used, there will be an additional consumption of fuel. However, it is expected that the systems can be optimized to minimize, or in some cases possibly eliminate, any noticeable fuel economy penalty.

Finally, no operational-related infrastructure changes are expected from the use of ultra low sulfur diesel fuel in combination with PM filters. Existing piping and storage tanks can be used to supply and store the additional demand for ultra low sulfur diesel fuel.

Therefore, no significant adverse air quality impacts were identified from the use of PM filters in conjunction with ultra low sulfur diesel fuel to potentially comply with the proposed fleet vehicle rules.

Selective Catalytic Reduction (SCR)

SCR has been used to control NOx emissions from stationary sources for many years. More recently, it has been applied to mobile sources including trucks, marine vessels, and locomotives. Applying SCR to diesel-powered vehicles provides simultaneous reductions of NOx, PM, and HC emissions.

Like an oxidation catalyst, SCR promotes chemical reactions in the presence of a catalyst. However, unlike oxidation catalysts, a reductant is added to the exhaust stream in order to convert NOx to elemental nitrogen and oxygen in an oxidizing environment. The reductant can be ammonia but in mobile source applications, urea is normally preferred. The reductant is added at a rate calculated from an algorithm which estimates the amount of NOx present in the exhaust stream as a function of the engine operating conditions (e.g., vehicle speed and load). As exhaust gases along with the reductant pass over a catalyst, which is applied to either a ceramic or metallic substrate, 75 to 90 percent of NOx emissions, 50 to 90 percent of HC emissions, and 30 to 50 percent of PM emissions are reduced. SCR also reduces the characteristic odor produced by a diesel engine and the diesel smoke.

Potential adverse air quality impacts associated with the use of SCRs in diesel-fueled vehicles could occur if this technology resulted in the increase of other exhaust pollutants at the expense of reducing PM or a reduction in fuel economy. Additionally, potential air quality impacts could arise if the use of ultra low sulfur diesel fuel in combination with oxidation catalysts could result in infrastructure changes (e.g., fuel supply or delivery).

In the case of exhaust pollutants, the catalyst composition of SCR and its mode of operation are such that sulfates could form. However, with the use of ultra low sulfur diesel fuel sulfate formation should be negligible. In particular, even at temperatures in excess of 500 degrees Centigrade, only five percent of the sulfur in the fuel would be converted to sulfate, which still allows for significant net PM emission reductions.

As to a reduction in fuel economy, because of the large NOx reductions afforded by SCR, it is possible that low NOx emissions can be achieved with an actual fuel economy benefit. Compared to internal engine NOx abatement strategies like EGR and timing retard, SCR offers a fuel economy benefit in the range of three to 10 percent as a result of being able to optimize engine timing for fuel economy and relying on the SCR system to reduce NOx emissions.

Finally, no operational-related infrastructure changes are expected from the use of ultra low sulfur diesel fuel in combination with SCRs. Existing piping and storage tanks can be used to supply and store the additional demand for ultra low sulfur diesel fuel.

Therefore, no significant adverse air quality impacts were identified from the use of SCRs in conjunction with ultra low sulfur diesel fuel to potentially comply with the proposed fleet vehicle rules.

Indirect Air Quality Effects

Economic and Social Effects

Various commentators have noted that the proposed fleet vehicle rules and related amendments may result in air quality as well as other impacts (e.g., transportation/circulation and energy/mineral resources) due to the costs[10] associated with their implementation. These commentator's in particular assert, that they will have to reduce various types of agency service levels since funding will be diverted from providing current services to acquiring alternative clean-fueled vehicles, which are more expensive in both capital and operational costs than typical gasoline- and diesel-fueled vehicles. However, under CEQA, "[e]conomic or social effects of a project shall not be treated as significant effects on the environment[[11]]" (CEQA Guidelines §15131(a)). "An EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes." Id. "The

[10] Additional incremental costs associated with the purchase of clean-fueled vehicles, the construction and/or retrofitting of fueling/charging facilities, and the purchase of clean fuels.

[11] " 'Significant effect on the environment' means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (CEQA Guidelines §15382).

intermediate economic or social changes need not be analyzed in any detail greater than necessary to trace the chain of cause and effect. *The focus of the analysis shall be on the physical changes*." Id., (emphasis supplied).

However, "[e]conomic or social effects of a project may be used to determine the significance of physical changes caused by the project …" (CEQA Guidelines §15131(b)). The discussion subsection of §15131 to the annotated CEQA Guidelines explains:

> "The interpretation provided in [§]15131 starts with … the question of whether the governmental action involved will culminate in a physical change. There must be a physical change resulting from the project directly or indirectly before CEQA will apply. Direct physical changes are easy to identify. Indirect examples could include the increased traffic, fuel consumption, and air pollution as the potential results of a bus system fare … ."

Thus, any economic effects associated with the implementation of the proposed fleet vehicle rules that result in physical changes to the environment would not be considered direct environmental impacts but rather indirect impacts. Whether or not indirect effects culminate in significant air quality impacts during the operational phase of the proposed fleet vehicle rules is discussed below. To determine significance, the same air quality significance thresholds as discussed above will be used. *Citizens Association for Sensible Development of Bishop Area v. Inyo*, 172 Cal. App. 3d 151 (1985), (holding where a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project). The reader is also referred to the Public Services section below.

Operational-Related Impacts

To determined if the economic effects associated with the implementation of the proposed fleet vehicle rules would create indirect significant adverse operational air quality impacts, the following three scenarios were evaluated:

- Removal of transit bus lines from service;
- Longer fleet turnover rates;
- Centralization of fueling sites; and
- Increased fleet vehicle travel caused by reduced vehicle payload

These scenarios are discussed separately below.

Loss of Service

PROJECT SPECIFIC IMPACTS: Examples of the agencies whose services may be affected by the proposed fleet vehicle rules and related amendments are school districts, transit authorities, the U.S. Postal Service, waste haulers, local Caltrans fleets, and municipalities, with more than 15 vehicles. Actual costs will be highly agency-specific and will depend on various factors such as the current fleet size, vehicle mix, and age of the fleets. However, the assessment of the cost implications to affected fleet operators, which could potentially lead to and increase in emissions , as a "worst-case," focuses on transit bus operators. The potential removal of transit bus lines translates into the most private-sector vehicles being placed back on the road as a result of the implementation of the proposed project. See Appendix F for the methodologies and assumption used in this analysis..

Removal of school buses from service were not included as part of the analysis because PR 1195 will include waiver provisions to alleviate the potential cost burden to school bus operators associated with alternative clean-fueled school buses as well as an alternative compliance option. This waiver provision would exempt a school bus fleet operator from the PR 1195 requirement of acquiring a new alternative clean-fueled school bus when purchasing a new or replacing an existing bus provided the fleet operator can demonstrate to the Executive Officer that there is a lack of funding to support the acquisition or operation of the alternative clean-fueled bus. The alternative compliance option would allow school bus fleet operators to continue to use diesel-fueled provided they installed PM filters and retired older buses. As discussed above, there would not be significant adverse environmental impacts from the use of PM filters.

It is also anticipated that other fleet operators subject to other the proposed fleet vehicle rules, except some transit agencies (PR 1192), would not reduce services, but would instead operate vehicles longer to offset the incremental costs of acquiring alternative clean-fueled vehicles and the supporting infrastructure. Alternatively, as with PR 1195, they may choose to use an alternative compliance option to comply with the rule-specific requirements.

Analysis of this potential indirect impact included removal of transit buses from service for smaller transit districts, rather than from all affected transit agencies. The larger agencies are either currently planning or already replacing their diesel-fueled buses with alternative clean-fueled buses. Furthermore, the largest transit agency in the SCAQMD's jurisdiction, the Los Angeles County Metropolitan Transit Agency, is legally prohibited by a court order from reducing its existing level of bus service.

To estimate the maximum number of transit buses that would be removed from service, it was assumed that the smaller transit districts would not increase capital, operating, and maintenance expenditures above the amounts required to replace, operate, and maintain their existing diesel-fueled transit bus fleet with new diesel-fueled buses. The number of CNG-fueled buses that would be purchased is the number that can be acquired and operated for the same expenditures as required for new diesel-fueled buses. The maximum number of transit buses that would be eliminated is then equal to the current diesel-fueled transit bus fleet minus the number of CNG-fueled buses that are acquired. However, the analysis also assumed that transit districts would eliminate 50 percent of this maximum number and operate the remaining 50 percent portion longer (e.g., longer vehicle turnover rate). This is consistent with the comments that the SCAQMD received at various public meetings where several transit agency representatives alleged that because of the incremental cost associated with the purchase and operation of alternative clean-fueled transit buses, they would be inclined to run their existing diesel buses longer.

Emissions from the transit buses that are removed from service are eliminated. However, as a "worst-case," it was assumed that 57.8 percent of the passengers who traveled on the removed buses would make the same trips by private automobiles. The analysis assumed that 23 percent of the passengers would carpool or would use other modes of mass transit (e.g., rail), which is consistent with SCAG's *1998 State of the Commute Survey* (April 1999). Additionally, the analysis assumed that 25 percent of the remaining 77 percent of the passengers would take an earlier bus or later bus at their existing stop or a stop in the near vicinity. Based on discussions between SCAQMD staff and transit agencies, it is unlikely that a transit agency would completely eliminate a bus service from an existing route. Instead, the number of buses serving the route would be reduced, leading to less frequent stops but still providing service along the route.

Based on these assumptions, the SCAQMD estimated that three transit buses dispersed throughout Los Angeles County would be removed from service each year, leading to a reduction of 329 miles per day traveled by those buses and an increase of 1,824 miles per day, which is the miles traveled by 222 private vehicles during 444 additional private-vehicle one-way trips per day. The resulting incremental reductions in emissions from the removed transit buses and increases in emissions from private vehicles are listed in Table 4-18. The reader is also referred to Appendix F and the Attachment to Appendix F for the methodologies, assumptions, and spreadsheets used to estimate the incremental emissions shown in Table 4-18.

TABLE 4-18

Summary Of The Proposed Fleet Vehicle Rules Emissions Changes
From Removal Of Transit Bus Lines

Vehicle Type	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
Transit Bus[a]	(4)	(3)	(18)	0	0
Private Vehicle	57	15	4	0	0
Incremental Increase[a]	**53**	**12**	**(15)**	**0**	**0**

[b] Negative emission changes () represent emission reductions

Longer Vehicle Turnover Rate

PROJECT SPECIFIC IMPACTS: Some fleet operators may delay replacement of vehicles because of the incremental costs associated with purchasing alternative clean-fueled vehicles and constructing refueling stations. The delay from one year to the next would allow the fleet operators to accumulate the funds that would have otherwise been used for vehicle replacement to apply the next year, or later, to cover the incremental costs for the alternative clean-fueled vehicles. Thus, funding would not be redistributed from other public services to make up the shortfall for alternative clean-fueled vehicles.

It was assumed that longer vehicle turnover rates would only occur for heavy-duty vehicles, because LEV/ULEV or cleaner LDVs/MDVs should be readily available at a relatively small incremental cost. The analysis conservatively assumed that 10 percent of the heavy-duty vehicle population subject to the proposed fleet vehicle rules and related amendments that would be replaced each year would instead be delayed for one year. Therefore, the daily loss of air quality benefits under this scenario would be equal to 10 percent of the daily benefits that would occur if all of the vehicles were replaced each year. It should be noted that the loss of benefits changes yearly due to the increase of air quality benefits over time. Table 4-19 shows the loss of emission benefits for a sample year (2002). The reader is referred to Appendix F and the Attachment to Appendix F for the methodologies, assumptions, and spreadsheets used to estimate the loss of air quality benefits due to longer vehicle turnover rates.

Centralized Refueling

PROJECT SPECIFIC IMPACTS: Some fleet operators may not construct their own alternative clean fuel refueling facilities but would instead depend on centralized stations that serve multiple fleets. The centralized refueling approach would save affected fleet operators money since they would share in the costs associated with the construction, operation, and maintenance of the alternative clean-fuel fueling station.

However, the use of "off-site" refueling facilities could entail additional travel, which may cause additional vehicle emissions. In order to estimate these additional emissions, the analysis assumed that all heavy-duty vehicles subject to the proposed fleet vehicle rules except transit buses would travel five miles round trip to utilize centralized refueling sites. The analysis also estimated the daily average number of refueling trips for these vehicles based on estimated annual vehicle miles traveled (VMT) and range between refuelings. Table 4-19 shows the emission effects from centralized refueling for a sample year (2002). The reader is referred to Appendix F and the Attachment to Appendix F for the methodologies, assumptions, and spreadsheets used to estimate the incremental emissions associated with potential fueling site centralization.

Reduced Fleet Vehicle Payload

PROJECT SPECIFIC IMPACTS: After the release of the Draft PEA, the SCAQMD received a comment regarding the effects of reduced alternative-fueled vehicle payload on fleet vehicle operations. In particular, the commentator asserted that the additional weight added by CNG fuel tanks would reduce the payload for CNG-fueled refuse collection vehicles and street sweepers compared with diesel-fueled vehicles, and that the payload reductions would require the acquisition and use of more CNG-fueled vehicles than would be required for diesel-fueled vehicles to maintain the same level of service. The commentator further asserted that additional personnel would be required to operate the additional vehicles and that, because of increased maintenance requirements for CNG-fueled vehicles, additional maintenance staff would also be required.

The SCAQMD contacted Waste Management (personal communication with Kent Stoddard, Waste Management, May 18, 2000), who is currently operating 30 CNG-fueled refuse collection vehicles in Palm Desert, regarding their experience with operation of those vehicles and any changes in operations that they would anticipate when converting their entire fleet to CNG-fueled refuse collection vehicles. Waste Management indicated that: (1) the CNG tanks on their refuse collection vehicles are sized to provide the same range as diesel-fueled refuse collection trucks; (2) vehicle payload for CNG-fueled refuse collection vehicles is approximately 1,600 pounds less than the 22,000 pound payload of diesel-fueled refuse collection vehicles; (3) the decrease in payload of approximately seven percent could cause an increase in vehicles-miles-traveled (VMT) of approximately seven to eight percent; (4) this increased VMT could be accommodated with the existing fleet, avoiding the need for additional vehicles or drivers; and (5) additional maintenance personnel would not be required to maintain CNG-fueled refuse collection vehicles. Additionally, although Waste Management experienced substantial downtime caused by failure of high-pressure regulators, actuators, spark plugs and the electronic control system, these problems were largely overcome as a result of improved or modified components, training of maintenance personnel and new computer analysis software (letter to David Coel, SCAQMD, from Kent Stoddard, Waste Management, January 21, 2000). The SCAQMD would expect these improved and modified components to be incorporated in new CNG-fueled refuse collection vehicles that would be acquired by the City of Los Angeles for compliance with PR1193.

Based on these discussions with Waste Management, the SCAQMD does not anticipate that additional refuse collection trucks or street sweepers will be needed to comply with the proposed fleet vehicle rules. However, there may be a potential that some alternative clean-fueled refuse collection trucks and street sweepers will travel farther to provide current levels of service. In order to estimate additional emissions from additional VMT due to reduced payload capacity, the SCAQMD assumed that all refuse collection vehicles and street sweepers subject to the proposed fleet vehicle rules would be replaced with CNG-fueled vehicles that would each travel an average of eight percent farther than their diesel-fueled counterparts. Table 4-19 shows the insignificant emission effects from increased vehicle travel caused by reduced payload for a sample year (2002). The reader is referred to Appendix F and the Attachment to Appendix F for the methodologies, assumptions, and spreadsheets used to estimate the incremental emissions associated with potential increased vehicle travel caused by reduced vehicle payload.

PROJECT-SPECIFIC MITIGATION: Based on the foregoing analyses of direct and indirect air quality impacts, the proposed fleet vehicle rules and associated amendments are not anticipated to generate significant direct or indirect operational-related air quality impacts (see Table 4-19). Therefore, mitigation is not required.

CUMULATIVE IMPACTS: The SCAQMD has determined that implementing the proposed fleet vehicle rules, existing rules and regulations, and adopting and implementing control measures from the SCAQMD's Air Toxics Control Plan are anticipated to produce substantial net air quality benefits. Therefore, there will be no cumulative adverse air quality impacts from implementing the proposed fleet vehicle rules.

Although there may be slight, but insignificant increase in operational-related air quality impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since direct and indirect operational-related air quality impacts do not exceed the SCAQMD's significance criteria, cumulative air quality impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: Mitigation of cumulative air quality impacts is not required.

Overall Net Air Quality Benefits

Table 4-19 lists the maximum peak daily construction and direct/indirect operational emissions associated with implementation of the proposed fleet vehicle rules. These emissions are for the year with the highest peak construction and operational impacts (2002). Table 4-19 also lists the net air quality benefits for the proposed fleet vehicle rules and related amendments after accounting for the maximum peak daily construction and direct/indirect operational emissions. The reader is referred to Table F-17 of Appendix F for the estimated yearly net air quality benefits for the proposed fleet vehicle rules and related amendments.

In order to estimate emissions for each year (e.g., 2001 through 2010), the following assumptions were used:

- Construction of refueling sites would occur uniformly from 2000 through 2004 (e.g., five years);
- Direct and indirect operational impacts from increased fuel delivery trips, longer vehicle turnover rates, and trips associated with centralized refueling stations would begin one year after the first compliance date of July 1, 2001 was in affect (e.g., during 2002);
- Construction of refinery modifications would occur during 2001 and 2002;
- As a "worst-case," emissions from additional fuel delivery trips would reach the 2010 emission level for each year beginning in 2002;

- Reductions in transit bus service would begin in 2003 accounting for a 1-1/2- to two-year procurement period, with three additional buses removed from service each year, thereafter. After five years (e.g., 2007), however, the SCAQMD assumes that the loss of service indirect impacts associated with transit buses will end. Due to implementation of the fleet vehicle rules and related amendments as well as CARB's Urban Bus Rule, after five years infrastructure changes, funding sources, and vehicle availability are expected to be on par or close to the existing diesel infrastructure. Therefore, the SCAQMD considers it speculative from this point forward (e.g., 2008 and on) to estimate what the impacts would be from loss of transit bus services.
- Indirect operational impacts from reduced vehicle payload would begin on the rule compliance dates.

Table 4-19 also lists the revised anticipated emissions benefits (reductions), the revised net emissions after accounting for the construction and operational emissions due to overlap, the CEQA significance criteria for the emissions levels, and the significance of the impacts.

TABLE 4-19

Summary of The Proposed Fleet Vehicle Rules Emissions (Mitigated)[a]

Activity	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	Combustion PM10 (lbs/day)	Fugitive PM10 (lbs/day)	Total PM10 (lbs/day)
Refueling Construction	61	11	71	6	0	34	34
Refinery Mod. Construction	687	81	477	42	53	201	254
Fuel Deliveries	13	2	16	0	1	32	33
Longer Turnover Rate	0	0	210	0	11	0	11
Centralized Refueling	0	0	37	0	1	0	1
Transit Bus Removal[b]	0	0	0	0	0	0	0
Reduced Payload	0	0	183	0	4	0	4
Total Emissions Increase	**761**	**94**	**1,092**	**48**	**66**	**267**	**343**
Total Emission Benefits[b]	**0**	**0**	**(3,028)**	**0**	**(173)**	**0**	**(173)**
Net Emission Benefits[b]			**(1,936)**	**48**	**(97)**	**267**	**170**
Threshold	*550*	*55*	*55*	*150*	--	--	*150*
Significant	**Yes**	**Yes**	No	No	--	--	**Yes**

[a] Net emission benefits summary for year 2002 (see Appendix F).
[b] Numbers in parentheses represent air quality benefits (e.g., emission reductions).

WATER RESOURCES

Water is an essential commodity in Southern California. Due to the low average rainfall in the region, over half of the water supply in the SCAQMD's jurisdiction is imported, making water supply and water quality important issues when implementing a new rule. During preparation of the NOP/IS, water demand impacts were eliminated from further consideration as potential impacts did not appear significant. However, during further evaluation conducted as part of this Final PEA, potential adverse water resources impacts were identified and are discussed in the following subsections.

Significance Criteria

The project will be considered to have significant adverse water demand impacts if any one of the following criteria are met by the project:

- The project increases demand for water by more than 5,000,000 gallons per day.
- The project requires construction of new water conveyance infrastructure.

The project will be considered to have significant adverse water quality impacts if any one of the following criteria are met by the project:

- The project creates substantial increase in mass inflow of effluents to public wastewater treatment facilities.
- The project results in a substantial degradation of surface water or groundwater quality.
- The project results in substantial increases in the area of impervious surfaces, such that interference with groundwater recharge efforts occurs.
- The project results in alterations to the course or flow of floodwaters.

Water Demand Effects

Construction-Related Impacts

Alternative Clean fuel Refueling Station

PROJECT SPECIFIC IMPACTS: Conversion to methanol, CNG, LNG, LPG, or electricity would require installation and/or modification of fueling facilities. This would entail the demolition and removal of existing underground gasoline and diesel tanks. Increased water use associated with dust suppression during the demolition and removal of underground gasoline and diesel fuel storage tanks or grading activities could result from the implementation of the proposed fleet vehicle rules. Watering for dust suppression purposes would be required pursuant to SCAQMD Rule 403 and/or local government permitting requirements (Brenk, 1993).

It is estimated that approximately 139 square yards per refueling station will require excavation and grading over a time period of 10 hours. Using the assumption that it takes 0.2 gallons per square yard per hour for adequate dust suppression, the "worst-case" water demand can be estimated by the following equation, (USEPA, 1992).

$$\text{Daily Water Usage} = 0.2\frac{\text{gal}}{\text{yd}^2\text{ - hr}} \times 139\frac{\text{yd}^2}{\text{site}} \times 8\frac{\text{hrs}}{\text{day}} \times = 222\frac{\text{gal}}{\text{site - day}}$$

Thus, on a "worst-case" basis, dust suppression activities would require 222 gallons of water per day per site. As discussed under the Air Quality section above, the maximum number of fueling stations that may be constructed simultaneously in any one day is three. The maximum estimated daily the proposed fleet vehicle rules construction-related water demand would be approximately 666 gallons per day (222 gallons/site-day x 3 sites). Accordingly, water demand impacts from the proposed fleet vehicle rules are not significant since the total daily estimated construction-related water demand does not exceed the SCAQMD's significance criteria of 5,000,000 gallons per day. In fact, it would take the installation of nearly 23,000 alternative clean fuel fueling sites on the same day to exceed the SCAQMD's significance criteria.

It should be noted that the water needed for dust suppression associated with the installation of methanol, CNG, LNG, LPG, or EV fueling stations does not have to be of potable quality, but can be reclaimed water. Reclaimed water is currently available in many areas of the SCAQMD's jurisdiction. A number of projects are currently in various stages of planning and development that are expected to supply an amount of reclaimed water equal to almost 22 percent of current total district consumption by 2010 (Water Reuse Association of California, 1993). Thus, the insignificant water demand estimated for the proposed fleet vehicle rules are most likely an overestimation of the actual potable water demand impacts associated with their implementation.

Refinery Modifications

The Mobil Clean Fuels Project Final EIR concluded that construction-related activities would not result in significant water demand impacts. Therefore, since the construction-related activities associated with refinery modifications for the proposed project are expected to be less intensive than the Mobil Clean Fuels Project, significant construction-related water demand impacts are not anticipated. This conclusion is not only consistent with the conclusion in the Final EIR for the Mobil Reformulated Fuels Project, but is consistent with the conclusions in the Final EIRs for the five other large refinery (and one small refinery) RFG projects. These other projects entailed substantially greater refinery modifications resulting in addition, but insignificant, water demand impacts than is anticipated to occur relative to producing low sulfur diesel pursuant to PAR 431.2.

Operational-Related Impacts

Methanol, CNG, LNG, and LPG

PROJECT SPECIFIC IMPACTS: No project-specific impacts associated with the operation and use of clean fuel fueling facilities are expected, as the use of methanol, CNG, LNG, LPG, or electricity in fleet vehicles will not affect existing water demand or water supplies.

Since CNG and LNG would replace some quantity of gasoline and diesel use, which requires water in the production and refining of these petroleum fuels, the proposed fleet vehicle rules may result in a slight water savings.

Electricity

PROJECT-SPECIFIC IMPACTS: Project-specific impacts associated with the operation of EV-recharging facilities are not expected. However, water is required for the manufacture of batteries; therefore, increased water demand could occur as a result of increased battery production. According to Exide Corporation, 17.9 gallons of water are needed to manufacture one battery, and an average size battery plant manufacturers 1,000,000 batteries per year, or approximately 2,740 batteries per day. To exceed the significance criteria of an additional demand for 5,000,000 gallons of water per day, approximately 280,000 additional batteries per day would have to be manufactured within the SCAQMD's jurisdiction solely to comply with the proposed fleet vehicle rules. Based upon the small number of EVs expected to be used as replacement vehicles to comply with the proposed fleet vehicles, a substantially smaller number of additional batteries than 280,000 will be needed.

Since electricity use in EVs would replace some quantity of gasoline and diesel use, which requires water in the production and refining of these petroleum fuels, the proposed fleet vehicle rules may result in a slight water savings.

Refinery Modifications

PROJECT-SPECIFIC IMPACTS: The Final EIR for the Mobil Clean Fuels Project estimated that an additional 892,800 gallons of water per day would be required as part of the modified process to produce reformulated gasoline. To estimate potential water demand from refinery modifications to comply with PAR 431.2, the Mobil RFG project Final EIR was used as a surrogate project (see Air Quality Section). The same scaling factor that was used to estimate construction air quality impacts was used to estimate water demand impacts. Multiplying 892,000 gallons of water per day by 1.5 to account for the smaller scope and the six refineries that might modify their facilities gives an estimated increase of 1,339,200 gallons per day for compliance with proposed project, which is below the 5,000,000 gallons per day significance level.

PROJECT-SPECIFIC MITIGATION MEASURES: No mitigation measures are required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in water demand impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific water demand impacts do not exceed the SCAQMD's significance criteria, cumulative water demand impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

Water Quality Effects

Methanol

PROJECT SPECIFIC IMPACTS: Methanol is currently transported into the SCAQMD's jurisdiction primarily by rail cars and distributed by tanker truck. In the event of a large accidental release, methanol has the potential to affect surface and /or groundwater.

Groundwater contamination resulting from a large methanol spill may reach 10 milligrams per liter before being detected because methanol diluted by water is not expected to have a strong odor or taste. It is a clear, colorless, volatile liquid with a faint alcohol-like odor.

However, groundwater contamination due to a methanol spill is unlikely. An analysis of the lateral and vertical movement of a methanol spill showed that penetration was limited to the immediate spill area (D'Eliscu, 1987). According to D'Eliscu, contamination of an underground water supply is unlikely unless the aquifer is small, near the surface, and the spill very large.

Table 4-20 provides a summary of the estimates of the range of probable methanol half lives (the time required for 50 percent reduction in the mass released) in various environmental media as documented from various reports, in comparison with the probable half-lives of benzene, a common gasoline constituent. Based on these data, methanol appears unlikely to accumulate in the groundwater, surface water, air, or soil.

TABLE 4-20

Methanol Half-Lives in Various Environmental Media

Environmental Medium	Methanol Half-Life (Days)	Benzene Half-Life (Days)
Soil (based upon grab sample of aerobic/water suspension from groundwater aquifers)	1-7	5-16
Air (based on photooxidation half-life)	3-30	2-20
Surface Water (based upon aqueous aerobic biodegradation)	1-7	5-16
Groundwater (based upon grab sample of aerobic/water suspension from groundwater aquifers)	1-7	10-730

Source: Adapted from Howard et al. (1991)

A gasoline underground storage tank (UST) can release fuel into the subsurface at a leak rate as high as 0.05 gallons per hour before the leak detection devices are activated (NFPA Standard) and methanol USTs are expected to have similar detection sensitivity. Consequently, it is conceivable that methanol releases will occur at methanol fueling facilities at a rate similar to gasoline UST releases. However, since methanol USTs are expected to replace gasoline and diesel USTs, no new impacts to groundwater quality will occur from the implementation of the proposed fleet vehicle rules.

As with petroleum fuels, accidental releases of methanol that contaminate groundwater can be remediated by established technologies. In addition, as shown in table 4-19 above, methanol will quickly biodegrade under aerobic conditions and, therefore, natural attenuation is a likely remediation strategy for both soil and water.

A large methanol spill into a surface water body would have some immediate impacts to the biota in the direct vicinity of the spill. However, because of its properties (methanol is infinitely soluble in water and evaporates rapidly), methanol would dissipate rather quickly into the environment, and within a fairly short distance from the spill would reach levels where biodegradation could occur.

The USEPA's Office of Pollution Prevention and Toxics has indicated that methanol is essentially non-toxic to the four aquatic fish species that were tested. Applying the hazard assessment guidelines from the Office of Pollution Prevention and Toxics, a recent study supports the conclusion that methanol is not persistent in the environment because it readily degrades in air, soil and water, and has no persistent degradation intermediates (ENVIRON, 1996).

Federal, state and local regulations, as well standard design techniques, are in place that reduce the potential for a release of methanol, including:

- Underground storage tank regulations require spill and leak containment, cathodic protection, leak detection, and in some instances, groundwater monitoring. Reporting requirements also apply.
- Tank design specifications required by the California Code of Regulations, Title 8, must be followed.
- Distribution facilities and equipment, including tank trucks, must comply with DOT regulations for transportation of hazardous materials.
- In California, contingency planing is required for facilities storing hazardous materials including methanol in quantities greater than 55 gallons.

As methanol would be used in place of, rather than in addition to petroleum fuels, the net effect of implementing the proposed fleet vehicle rules could be a reduction in water quality impacts from transporting conventional motor vehicle fuels compared to the existing baseline.

CNG, LNG, and LPG

Because CNG is a gas that is stored in aboveground high-pressure cylinders, the potential for impacts to water quality is minimal.

LNG and LPG are gases under ambient conditions. LNG is created by cooling natural gas until it liquefies and subsequently storing it under cryogenic conditions. LPG is created by pressurizing petroleum gas, mainly consisting of propane. Thus, the potential for impacts to water quality are minimal.

PROJECT-SPECIFIC IMPACTS: The construction-related water quality impacts associated with the construction of CNG, LNG, and LPG fueling facilities are mainly related to the demolition and removal of existing gasoline and diesel fuel dispensing facilities and are similar to those discussed previously under methanol. The impacts from the simultaneous construction of CNG, LNG, and LPG fueling facilities are included in the methanol discussion above, which found water demand construction impacts to be insignificant.

Additionally, no operational-related water quality impacts associated with the operation of CNG, LNG, and LPG fueling facilities are expected. No additional wastewater is generated from the operation of CNG, LNG, and LPG fueling facilities.

Lastly, even though LNG and LPG are transported and stored as liquids, they will volatilize upon release forming a gas. Thus, since these fuels, will pool on the ground only for a short period of time upon release and consequently will not migrate to freshwater or groundwater bodies, operational-related water quality impacts associated with the transporting, storing, and handling of CNG, LNG, and LPG are not expected.

Electricity

PROJECT-SPECIFIC IMPACTS: Battery manufacturing has the potential to affect surface water quality. The reactive materials in most batteries include one or more of the following toxic metals: lead, cadmium, nickel and zinc. These metals are often found in wastewater discharges and solid wastes from battery plants. Water is used throughout the manufacturing process, specifically in: preparation of electrolytes and electrode active masses; deposition of active materials on electrode supporting structures; charging electrodes and removing impurities; and washing finished batteries, production equipment, and manufacturing areas. The USEPA‘s Pollution Prevention Project (EP3) provides technical assistance to industry with respect to pollution prevention to improve environmental quality. An EP3 assessment of a battery manufacturer determined that substantial wastewater can be generated in the grid pasting and washing processes (USEPA, 1994).

It is estimated that there are 255 battery-manufacturing plants in the United States. A substantial majority of these facilities are located in California, Pennsylvania, North Carolina, and Texas. Of the 255 identified battery manufacturing plants, 22 discharge wastewater directly to surface waters, 150 discharge wastewater to publicly owned treatment works (POTWs) and 83 plants do not discharge wastewater. The battery manufacturing plants that do not discharge wastewater most likely process wastewater onsite and reuse the treated water in their processes. The off-site discharges are regulated either by the National Pollutant Discharge Elimination System (NPDES) regulations or the federal pretreatment standards.

Direct discharge of wastewater requires an NPDES permit that specifies the effluent limitations for the discharge. The federal effluent limitations were established on an industry-by-industry basis and reflect technology-based standards for the amount of both toxic and conventional pollutants (oil and grease, bacteria, dissolved oxygen, etc.) that are allowed to be discharged from a particular industrial activity. In addition, water quality standards have been established for each body of water, and each state is required to establish effluent limitations in the NPDES permit issued so that each water body attains or maintains a level of cleanliness that will support its native animal and plant life. Any discharge must meet the requirements of the permit.

Federal pretreatment standards became effective in 1987 for existing sources and upon startup of discharge for new sources. The pretreatment program establishes an overall strategy for controlling the introduction of non-domestic wastes to POTWs in accordance with the overall objectives of the Clean Water Act. The general standards establish administrative mechanisms requiring POTWs to develop local pretreatment programs to enforce the general discharge prohibitions and specific categorical pretreatment standards. These categorical standards are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of the POTW. Any discharge to a POTW must meet the permit requirements, as well as the pretreatment requirements for battery manufacturing. Therefore, no project-specific water quality impacts associated with wastewater discharge from battery manufacturing operations are expected.

Because some batteries contain toxic materials, water quality impacts are possible if the batteries are disposed in an unsafe manner, such as by illegal dumping or by disposal into an unlined landfill. However, most battery and fuel cell technologies employ materials that are recyclable. Furthermore, both regulatory requirements and market forces encourage recycling. Federal and State laws and regulations have created the following incentives and requirements for disposal and recycling of batteries:

- The federal Battery Act promulgated in 1996 requires that each regulated battery be labeled with a recycling symbol. NiCad batteries must be labeled with the words "NiCad" and the phrase "Battery must be recycled or disposed of properly." Lead-acid batteries must be labeled with the words "Lead," "Return," and "Recycle."
- Current regulations require ZEV manufacturers to take into account the complete life-cycle of car batteries and to plan for safe disposal and/or recycling of battery materials.
- The California Health and Safety Code does not allow the disposal of lead-acid batteries at a solid waste facility or on or in any land, surface waters, water courses, or marine waters. Legal disposal methods for used lead-acid batteries are to recycle/reuse the battery or to dispose of it at a hazardous waste disposal facility. A lead-acid battery dealer is required to accept spent batteries when a new one is purchased.
- California businesses may take a 40 percent tax credit for the cost of equipment used to manufacture recycled products (Kimball, 1992).
- The Public Resources Code requires state agencies to purchase car batteries made from recycled material.

Recycling lead-acid and nickel-cadmium batteries is a well-established activity. Eighty percent of lead consumed in the United States is used to produce lead-acid batteries and, because of the economic value associated with lead, the lead recovery rate from batteries is approximately 80 to 90 percent. According to the Lead-Acid Battery Consortium, 95 to 98 percent of all battery lead used in the United States is recycled. Of the remaining 2 to 5 percent, some if not all would typically be handled and disposed of appropriately as a hazardous waste.

Nickel-cadmium batteries are 100 percent recyclable, and recycling operations currently exist in North America, Europe and Japan. These batteries have long lives, at least as long as the average life of vehicles, so the battery waste from nickel-cadmium batteries will be relatively low (Dunning, 1992). Accordingly, the NiCd waste stream is not expected to contribute a significant volume of waste to landfills located within the SCAQMD's jurisdiction.

However, the toxicity of cadmium is a concern, and the nickel-cadmium battery may be replaced in the near future by the nickel-metal hydride (Ni-MH) battery.

While recycling is already well established for the two battery technologies that are in wide use, most new battery technologies also show great potential for recyclability. The United States Advanced Battery Consortium calls the Ni-MH battery “environment-friendly.” All components of the battery are completely recyclable, so disposal is not necessary. If disposal were necessary, testing has demonstrated that the metal alloy powders used in the Ni-MH batteries are at least an order of magnitude below hazardous waste limits. Thus, these batteries could be legally disposed of in municipal landfills, rather than requiring handling as hazardous waste.

A zinc-air battery has been developed in which recharging is accomplished by removing spent zinc oxide and replacing it with new zinc. The zinc oxide is then sent to a facility where it is converted back to zinc metal and packaged for re-use (ETIC, 1993). The zinc-bromine battery is 100 percent recyclable and constructed almost totally of plastic (Clean Fuel Vehicle Week, 1993).

The lithium-ion (Li-ion) battery holds great promise. Government agencies in Europe, the United States and Japan are actively supporting research and development on the Li-ion system. However, the high price of cobalt in the batteries’ cathodes is prohibitive and much of the current research and development is focused on substituting manganese and nickel for cobalt.

While the switch to electric batteries has the potential to create water quality impacts, the increasing use of EVs will result in a decline in the use of ICEs, and therefore, a reduction in the impacts of these engines. For instance, reducing the use of ICEs will result in generating less used engine oil, because electric motors do not use oil as a lubricant. Used engine oil contains several contaminants, including metals and the organic combustion products of gasoline. Table 4-21 gives typical concentrations of these contaminants in used motor oil.

TABLE 4-21

Motor Oil Toxic Contaminant Concentrations

Contaminant	Concentration (Parts Per Million)
Arsenic	5
Cadmium	3
Lead	240
1,1,1-Trichloroethane	200
Perchloroethylene	105
Benzene	20
Toluene	380
Xylene	550

Source: *Final EIR for the 1994 AQMP*, Table 4.3-2 (SCAQMD, August 1994).

In 1988, 847 million gallons of used motor oil were generated in the United States. Of this total, an estimated 260 million gallons were dumped in sewers, waterways, and on land. Another 64 million gallons were disposed of into unlined landfills (TBS, 1989 cited in Hegberg, et al., 1991). Given the total gallons of used motor oil released to the environment, and the typical concentrations of these contaminants, one can estimate the total mass of contaminants released to the environment (e.g., soil, water, and air). To make such an estimate, it is further assumed that used motor oil dumping in the SCAQMD's jurisdiction follows the national trend, pro-rated for the number of cars in the region. By converting the volume concentrations of typical contaminants to mass, the pounds per year of contaminants released in the region were estimated and are presented in Table 4-22. Since electric motors do not require motor oil as a lubricant, replacing ICEs with electric engines will eliminate the impacts associated with motor oil use and disposal.

TABLE 4-22

Estimated Annual Mass Release of Toxics from Illegal Disposal of Used Motor Oil in the SCAQMD's Jurisdiction

Contaminant	Mass Released (lbs/yr)[a]	Mass Released (lbs/yr)[a]
Arsenic	4,300	1
Cadmium	3,800	1
Lead	410,000	62
1,1,1-Trichloroethane	40,000	6
Perchloroethylene	25,000	4
Benzene	28,000	4
Toluene	48,000	7
Xylene	71,000	11

Source: *Final EIR for the 1994 AQMP*, Table 4.3-3 (SCAQMD, August 1994).

a Estimates based on a total district vehicle population of 5,000,000.

b Figures have been adjusted for the 750 EV population estimated for the proposed fleet vehicle rules and related amendments.

Therefore, based on available information, illegal disposal of electric batteries that could result in significant water quality impacts by allowing contaminants to leach into surface or ground waters is not expected for the following reasons. First, electric batteries generally hold significant residual economic value, and for the most part are completely recyclable. Second, the electric batteries that power EVs are packaged in battery packs and cannot be disposed of as easily as a single 12-volt conventional vehicle battery. Third, the total number of EVs that are expected to be used due to the implementation of the proposed fleet vehicle rules are estimated to be only 750 with a yearly maximum of 100. Fourth, even if it is assumed as a "worst-case" that five percent of the recycable portion of a 100 EV battery packs were disposed of improperly per year, this small volume would not create significant water quality impacts because illegal disposal of batteries would likely be dispersed throughout the district. Finally, when offsetting the incremental yearly improper EV battery pack disposal with the corresponding anticipated reduction in motor oil disposal, implementing the proposed fleet vehicle rules may result in a slight water quality benefit.

Refinery Operations

PROJECT-SPECIFIC IMPACTS: The existing refineries in the district typically have wastewater treatment capacity onsite to handle effluent and storm water runoff. As a result, it is expected that each existing refinery's wastewater treatment system can handle any increases in wastewater generation associated with production of low-sulfur diesel fuel pursuant to PAR 431.2. Therefore, significant adverse water quality impacts are not anticipated. This conclusion is not only consistent with the conclusion in the Final EIR for the Mobil Reformulated Fuels Project, but is consistent with the conclusions in the Final EIRs for the five other large refinery (and one small refinery) RFG projects. These other projects entailed substantially greater refinery modifications resulting in addition, but insignificant, wastewater impacts than is anticipated to occur relative to producing low sulfur diesel pursuant to PAR 431.2.

PROJECT-SPECIFIC MITIGATION MEASURES: No mitigation measures are required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in water quality impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific water quality impacts are not significant, cumulative water impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

TRANSPORTATION / CIRCULATION

In the NOP/IS, staff identified potentially significant transportation/circulation impacts that could occur as a result of implementing the proposed fleet vehicle rules. Specifically, potential impacts were identified from additional vehicle trips related to construction activities to support infrastructure changes that will be required to accommodate the increase in the use of clean fuel vehicles. Another potential impact may be an increase in the VMT if the distance between alternative clean fuel refueling stations increases, in which case vehicles must travel farther to refuel.

Methodology and Assumptions

Approximately 120,000 vehicles will be affected by the proposed fleet vehicle rules, which will include 90,000 LDVs/MDVs fleet vehicles, 3,700 urban buses, 10,800 school buses, and 15,500 other HDVs[12]. As discussed previously in the Air Quality section, approximately 70 alternative clean fuel refueling stations will be constructed each year between 2001 and 2005. In addition, to determine the construction transportation/circulation impacts associated with the implementation of the proposed fleet vehicle rules, the SCAQMD estimated the number of construction workers who would be travelling to and from each alternative clean fuel refueling station construction site each day and the daily travel distance (see Appendix F for the assumptions used to determine the number of construction workers per site). The SCAQMD also assumed that each construction worker's vehicle has a fuel efficiency of 20 miles per gallon of gasoline. Additionally, the Mobil Clean Fuels Project Final EIR was used to estimate the number of construction worker trips during construction of refinery modifications to comply with PAR 431.2

Direct and indirect operational transportation/circulation impacts were calculated by estimating the number of additional trips that might be required for methanol, LNG, and LPG fuel deliveries, additional private vehicle trips that may be caused by removal of transit buses from service, and additional trips by affected school buses and other heavy duty vehicles to centralized refueling sites. The reader is referred to Appendix F for the assumptions used in the transportation/circulation impacts analysis below.

Significance Criteria

The project will be considered to have significant adverse transportation/circulation impacts if any one of the following criteria are met by the project:

- The project will increase traffic to and/or from any one facility or site by more than 350 truck trips per day.
- The project will increase customer traffic to a facility by more than 700 trips per day.

[12] It should be noted that these are unrevised vehicle population estimates from the Draft PEA figures. The reader is referred to The Proposed Fleet Vehicle Universe section above.

Direct Transportation / Circulation Effects

Construction-Related Impacts

Alternative Clean fuel Refueling Station

PROJECT-SPECIFIC IMPACTS: To estimate the transportation/circulation construction-related impacts from the proposed fleet vehicle rules, it is necessary to determine the number of construction worker commute trips that will be generated at each refueling station construction site. In the air quality impact analysis, emissions were calculated for the construction phase, including the emissions from worker commute trips. Construction impacts on transportation can result from two sources, daily trips from construction equipment and from cars of construction workers commuting to each job site.

Table 4-23 summarizes construction schedules derived for this analysis, and truck and worker trips per station for each of the alternative clean fuels. The reader is referred to Appendix F, Table F-7 for more detailed information on construction activities. Based on Table 4-23, retrofitting a facility is estimated to require about five to 10 workdays (1 to 2 weeks) dependent upon the clean fuel option selected. The maximum number of trips per day are estimated to occur during backfill and grading of the sites where an existing gasoline tank has been removed and a new tank and refueling equipment is installed for alternative clean-fuels (e.g., CNG, LNG, LPG, and electric power).

TABLE 4-23

Truck and Workers Trips Required to Construct a Typical Refueling Station[a]

Construction Activity	Assumed Construction Duration (Days)	Number of Cement and Haul Truck Trips (per Day)	Number of Trips by Construction Workers (per Day)	Total Number of Vehicle Trips (per Day)
Surface Cover Removal/UST Excavation (all options)	1	1	6	7
UST Degassing (all options)	1	0	6	6
Tank Removal (all options)	1	2	6	8
Backfill/Grading (all options except methanol)	1	20	6	**26**
Slab Pouring/Paving (all options)	1	2	6	8
Clean Fuel System Installation incl. Backfill and Grading – Methanol	1	2	6	8
Clean Fuel System Installation – CNG	4	10	6	16
Clean Fuel System Installation – LNG	1	4	6	10
Clean Fuel System Installation – LPG	1	4	6	10
Clean Fuel System Installation – EV	5	10	8	18

[a] It was assumed that major categories of construction activity at a single fueling station would occur sequentially, i.e., separately and that no overlap would occur between construction categories. For example, UST degassing would not commence until the UST surface cover removal and excavation were completed. Therefore, whether there are significant transportation/circulation construction-related impacts will be based on the construction activity that generates the most peak worker commute trips for that fueling station construction.

As discussed in the Air Quality section, the SCAQMD estimates that the maximum construction activities will occur during the simultaneous construction of three CNG refueling stations. As seen in Table F-1 of Appendix F, the SCAQMD estimates that three workers will travel to each construction site each day, so the total number of worker commute trips to an individual site will be six (3 workers/site x 2 trips/worker-day). Additionally, as shown in Table 4-23, the maximum number of non-worker trips will occur during backfill and grading when haul trucks make 10 round trips to each site to deliver fill material, for a total of 20 trips (10 round trips/site x 2 trips/round trip). Thus, the maximum number of daily trips is 26 per construction site, which is below the significance criterion of 350 trips per day per site.

Refinery Modifications

The Mobil Clean Fuels Project Final EIR estimated that 382 construction workers and 25 trucks would travel to and from the Mobil refinery during the peak construction activities. Using the assumption that the activities required for construction of modifications to comply with the proposed project would be approximately 25 percent of the activities for the Mobil Clean Fuels Project, the SCAQMD estimated that approximately 102 peak daily round trips would be added during construction at each refinery (0.25 x (382 + 25)). The resulting number of one-way trips (204) from each affected refinery is below the significance level of 350 trips per day per site.

PROJECT-SPECIFIC MITIGATION: None required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in construction-related transportation/circulation impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific operational-related transportation/circulation impacts do not exceed the SCAQMD's significance criteria and are spread throughout the basin such that there is not a concentration of vehicles at any one location, cumulative operational-related transportation/circulation impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: None required.

Operational-Related Impacts

PROJECT-SPECIFIC IMPACTS: Potential operational-related transportation/circulation impacts could arise if off-site daily employee commuter and/or alternative clean fuel delivery trips associated with the implementing the proposed fleet vehicle rules significantly increase. In the context of additional employee trips, long-term transportation/circulation impacts from the proposed fleet vehicle rules are not expected. It is envisioned that existing maintenance personnel will be properly trained in the operation, fueling, and maintenance of clean-fueled vehicles (e.g., methanol, CNG, LNG, LPG, or electricity) as well as fueling stations. Thus, it is not anticipated that additional employees will be needed to perform these functions. Additionally, it is not anticipated that the number of employees at affected refineries will increase as a result of the modifications to produce low-sulfur diesel fuel to comply with the proposed project. Therefore, no significant increase in the overall number of trips within the SCAQMD's jurisdiction is expected.

As discussed previously in the Air Quality section, alternative fuel delivery trips will likely change for facilities that convert to methanol, LNG, and LPG due to the lower fuel value per gallon of these clean fuels compared to gasoline or diesel. As shown in Table 4-16 eight additional fuel delivery trips would be required, for a total of 16 daily one-way trips. These eight additional delivery trips will most likely be to eight different refueling sites, so the resulting two trips per site do not exceed the SCAQMD's significance threshold of 350 trips per site for transportation/circulation. Therefore, there are no direct adverse significant transportation/circulation operational-related impacts associated with the proposed fleet vehicle rules and related amendments.

Additionally, since the proposed fleet vehicle rules are not expected to induce population growth in the vicinity of the fueling facilities, there will not be any significant impacts on parking capacity, pedestrian hazards, local traffic congestion, traffic or traffic patterns. Therefore, the proposed fleet vehicle rules are not expected to generate significant direct adverse transportation/circulation impacts during the operational phase.

Indirect Transportation / Circulation Effects

Operational-Related Impacts

The proposed fleet vehicle rules might lead to changes in fleet operations, which in turn, might create indirect transportation/circulation impacts. The effects of the following three such changes, discussed below, were evaluated:

- Removal of transit buses from service;
- Longer fleet vehicle turnover rates;
- Increased fleet vehicle travel to centralized refueling stations; and
- Increased vehicle travel caused by reduced fleet vehicle payload.

Removal of Transit Buses from Service

PROJECT SPECIFIC IMPACTS: As discussed in the Air Quality section, it was assumed for this analysis that three transit buses might potentially be removed from service each year over a five year period (15 buses total removed from service) because of the additional incremental costs associated with the proposed fleet vehicle rules. The SCAQMD also estimated that the average daily passenger trips for these buses prior to their removal from service would be 255 trips per bus. However, approximately 57 (e.g., 23 percent) of those trips would be made by carpools or other modes of mass transit (e.g., rail) and 64 (e.g., 25 percent) of those trips would be by passengers taking later or earlier buses servicing the same stop. This leaves approximately 147 additional daily trips that might be made by private vehicles, which is below the SCAQMD's significance threshold of 350 trips per site.

The reader is referred to Appendix F and the Attachment to Appendix F for the methodologies, assumptions, and spreadsheets used to estimate the potential incremental increase in private sector vehicles trips.

Longer Fleet Vehicle Turnover Rates

PROJECT SPECIFIC IMPACTS: Some fleet operators may delay replacement of vehicles because of the incremental costs associated with purchasing alternative clean-fueled vehicles and constructing refueling stations. The delay from one year to the next would allow the fleet operators to accumulate the funds that would have otherwise been used for vehicle replacement to apply the next year, or later, to cover the incremental costs for the alternative clean-fueled vehicles.

The SCAQMD does not anticipate that longer fleet vehicle turnover rates would change the number or locations of vehicle trips, since these vehicles would be used for the same functions as replacement vehicles. Therefore, there are no indirect adverse significant transportation/circulation operational-related impacts associated with longer fleet vehicle turnover rates.

Centralized Refueling

PROJECT SPECIFIC IMPACTS: Some fleet operators may not construct their own alternative clean fuel refueling facilities but would instead depend on centralized stations that serve multiple fleets. The centralized refueling approach would save affected fleet operators money since they would share in the costs associated with the construction, operation, and maintenance of the alternative clean-fuel fueling station.

However, the use of these "off-site" refueling facilities could entail additional travel. In order to estimate the additional trips, the SCAQMD assumed that all HDVs subject to the proposed fleet vehicle rules except transit buses would travel an additional five miles during each refueling trip. Based on annual VMT by these vehicles and the estimated range between refueling trips, the SCAQMD estimated that an average of 6,588 refueling round trips would be made to centralized sites. The SCAQMD also estimated that a total of 352 refueling sites would be constructed, with 333 sites to serve school buses (e.g., PR 1195), other HDVs (e.g., PRs 1193 and 1196 and 1186.1), and airport LDVs/MDVs/HDVs (e.g., PR 1194), and 19 serving transit bus (e.g., PR 1192) fueling sites. Therefore, the cumulative average number of refueling trips over 10 years to each site would be 40 (6,588 round trips x

2 trips per round trip / 333 refueling sites), which is below the significance criterion of 350 trips per site.

Increased Travel from Decreased Fleet Vehicle Payload

PROJECT SPECIFIC IMPACTS: As discussed in the indirect air quality impacts section, reduced payload for refuse collection vehicles and for street sweepers may result in an increase of about eight percent in miles traveled by these vehicles. The SCAQMD estimates that a total of about 7,200 refuse collection vehicles may be affected by PR 1193 and that about 840 street sweepers may be affected by PAR 1186.1. However, the SCAQMD does not anticipate that the additional vehicle miles traveled would cause significant transportation/circulation impacts, because the refuse collection and street sweeping routes followed by these vehicles are spread throughout the district. Therefore, the additional trips, if any, associated with the additional miles traveled are anticipated to be substantially less than the significance criterion of 350 trips per site.

PROJECT-SPECIFIC MITIGATION MEASURES: The above analysis demonstrates that the direct and indirect operational-related transportation/circulation impacts associated with the proposed fleet vehicle rules and related amendments will not exceed the SCAQMD's significance thresholds for transportation/circulation. Accordingly, mitigation measures are therefore not required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in operational-related transportation/circulation impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since the transportation/circulation impacts are not project-specifically significant, and the potential increased trips associated with the proposed vehicle rules and related amendments are dispersed throughout the SCAQMD's jurisdiction such that accumulation of traffic near are at any one facility is unlikely, cumulative impacts are expected to be insignificant.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

PUBLIC SERVICES

In the NOP/IS, the SCAQMD identified potential significant impacts to public services that could occur as a result of implementing the proposed fleet vehicle rules. In particular, the SCAQMD noted that potential public services impacts could result to fire departments relating to transporting, handling, and storing alternative clean fuels. These potential impacts are discussed below.

Significance Criteria

The project will be considered to have significant adverse public service impacts if it meets the following criterion on a district-wide basis:

- The proposed project will result in the need for new or altered public services (e.g., fire and police protection, schools, parks, or other public facilities)

Public Services Effects

Fire Protection Services Impacts

PROJECT-SPECIFIC IMPACTS: Fire protection services are generally provided by city and county fire departments. Fire protection services include emergency response actions, which may be adversely affected by potential hazard risks associated with the transport, storage, and use of methanol, natural gas, and electric power. An analysis of the hazard risks associated with the proposed fleet vehicle rules is provided under the Hazards section, which includes a comparison of the hazard impacts posed by conventional fuels, such as gasoline, and alternative clean fuels.

Based on the findings of the hazards analysis, potential adverse fire hazards resulting from increasing use of alternative clean fuels will be equal or less than those posed by gasoline. Fire protection services are also not expected to be significantly adversely affected by the operation of alternative clean-fueled vehicles and refueling facilities, as many of the potential hazards associated with the use and storage of these alternative clean fuels are already found in association with the existing diesel and gasoline refueling facilities. In fact, hazards posed by an accidental release of diesel are generally greater than those posed by alternative clean fuels because of diesel's inherent toxicity and the unsafe driving conditions created by spilled diesel. In addition, emergency respond personnel are exposed to the hazards associated with natural gas, methanol, and electric power in their routine operations and have the capabilities and equipment to handle emergencies associated with these fuel and energy sources. It is therefore unlikely that the proposed fleet vehicle rules will cause a significant increase in the need for fire protection services.

Fire protection services may experience a minimal increase in the demand for agency permitting and underground storage tank removal oversight during the retrofitting and/or construction of the refueling facilities from diesel and gasoline to clean fuels. Assuming a maximum district-wide station conversion (and tank removal) rate of 65 per year, and eight staff hours per tank, the total staff time involved with the permitting and closure is expected to be less than 600 hours per year, which is insignificant on a district-wide basis.

In the context of refinery modifications necessary to comply with all of the fuel specifications of both state and federal reformulated gasoline, the Final EIRs for all six large refineries in the district included analyses of potential public service impacts to fire departments anticipated from the RFG projects. In all cases potential adverse impacts to local fire departments were concluded to be insignificant. For one RFG project at a small refinery (the former Powerine refinery) an analysis of public service impacts to the local fire department was not even warranted. Since public service impacts were determined to be insignificant for the RFG projects at all of the refineries in the district, it is reasonable to assume that public service impacts to local fire departments as a result of producing low sulfur fuel to comply with PAR 431.2 will also be insignificant because the magnitude and scope of the PAR 431.2 modifications are substantially less than modifications necessary to comply with state and federal RFG fuel specifications. Therefore, potential public service impacts to local fire departments associated with refinery modifications at each refinery to comply with PAR 431.2 are expected to be insignificant.

PROJECT-SPECIFIC MITIGATION: None required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in public services impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "[w]here a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable." Therefore, since the public services impacts are not project-specifically significant, cumulative public services impacts are expected to be insignificant.

CUMULATIVE IMPACT MITIGATION: None required.

Economic and Social Effects

During the Public Workshops for the proposed fleet vehicle rules held on December 21, 1999, January 12, 2000, and February 16, 2000, and as part of comments submitted on the NOP/IS, various commentators noted that public service providers subject to the proposed fleet vehicle rules may incur additional incremental costs associated with the purchase of alternative clean-fueled vehicles, the construction and/or retrofitting of fueling/charging facilities, and the purchase of clean fuels. As a result, the shifting of funds to pay for alternative clean-fueled vehicles may cause a discontinuation or reduction in public services. Commentators asserted that a reduction in public services could constitute a significant adverse public service impact.

Pursuant to CEQA and CEQA case law, a reduction in public services is not considered a public service impact. Appendix G of the CEQA guidelines indicates that a project has significant public service impacts if "the project result[s] in substantial adverse physical impacts associated with the provision of *new or physically altered governmental facilities,* *need for new or physically altered governmental facilities* (emphasis supplied), the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for … public services." Thus, there must be an expansion of existing or the addition of new public services in order to trigger significant public service impacts.

This conclusion is consistent with the California Appellate Court's view on what triggers significant public service impacts. In *Goleta Union School District v. The Regents of the University of California*, 36 Cal. App. 4^{th} 1121 (1995), the Goleta school district sued the University of California, claiming that the EIR failed to find that potential classroom overcrowding associated with the proposed project would result in significant public service impacts, thus, obligating the University to mitigate the significant public service impacts by funding the construction of new classrooms. However, the Appellate Court disagreed holding that increased student enrollment is an economic or a social impact, not a public service impact, and that mitigation could not be required under CEQA. The court noted that in prior court decisions it was the need for construction of new schools, not increased enrollment or potential overcrowding that triggered an EIR under CEQA. The mere fact that student overcrowding may result from the project, standing alone, is not a change in physical conditions that would trigger significance.

Consistent with Appendix G of the CEQA Guidelines as well as the *Goleta* case, the SCAQMD has based its public services significance criteria on whether proposed projects will result in the need for new or altered public services. Therefore, the conversion to alternative clean fuels associated with the implementation of the proposed fleet vehicle rules will not require new public services or the expansion of existing services and, therefore, is not considered a significant adverse public services impact.

Although CEQA only applies to activities that will cause a physical change in the environment, a project's social and economic effects can be relevant to an EIR's analysis if they will lead to physical impacts (CEQA Guidelines §15131(a)). Social and economic effects can also be relevant when used to gauge the significance of an environmental change. Id. In the case of the proposed fleet vehicle rules, the potential reduction of public services (e.g., removal of transit lines) could indirectly affect air quality, transportation/circulation, and energy/mineral resources (e.g., increase in private sector vehicle trips and associated VMT). These indirect environmental impacts are discussed elsewhere in this chapter under Air Quality, Transportation/Circulation, and Energy/Mineral Resources Impacts sections. The reader is specifically referred to the Air Quality Section above for a more detailed discussion of indirect impacts analysis under CEQA.

SOLID / HAZARDOUS WASTE

The daily solid and/or hazardous waste generated during construction of alternative clean fuel refueling stations will be estimated based on the highest expected daily conversion rate of three refueling stations and will be compared to the total annual disposal capacity of the landfills within the SCAQMD's jurisdiction. The significance of solid and/or hazardous waste generation during potential refinery modifications was determined using the Mobil Clean Fuels Project Final EIR as a basis for evaluation.

Methodology and Key Assumptions

The daily solid and/or hazardous waste generated during construction will be estimated based on the highest expected daily conversion rate of three refueling stations and will be compared to the total annual disposal capacity of the landfills within the SCAQMD's jurisdiction.

The operational impacts will be based on assumption that the vehicles affected by the proposed fleet vehicle rules will be replaced with the alternative clean-fueled vehicles as shown in Table 4-3A above. Additionally, the significance of solid and/or hazardous waste generation during production of low-sulfur diesel fuel to comply with the proposed project was based on the Mobil Clean Fuels Project Final EIR.

Significance Criteria

The project will be considered to have significant adverse solid/hazardous waste impacts if the following criterion is exceeded by the project:

- The generation and disposal of nonhazardous or hazardous waste exceeds the capacity of designated landfills in the SCAQMD's jurisdiction (see Chapter 3 of this Final PEA).

Solid / Hazardous Waste Effects

Construction-Related Impacts

Alternative Clean fuel Refueling Stations

Substitution of current gasoline and diesel operations by any of the alternative clean-fuels would correspondingly reduce the need for gasoline and diesel fuel capacity at the fleet fueling stations. As gasoline and diesel-fuel capacity is reduced, gasoline and diesel fuel production and distribution would be reduced and the substituted alternative clean fuel technology production and distribution would increase. This would require the modification of some existing gasoline and diesel-fuel dispensing facilities and the substitution of gasoline and diesel-fuel production to methanol, CNG, LNG, LPG, and electric power. Solid or hazardous wastes generated from construction-related activities would consist primarily of materials from the demolition of existing gasoline and diesel-fuel storage and dispensing facilities and construction associated with new methanol loading facilities.

PROJECT-SPECIFIC IMPACTS: The demolition/construction debris and backfilling, which is estimated to consist of approximately 22 20-ton haul truck loads per station, would be disposed of at a Class II (industrial) or Class III (municipal) landfill[13]. This assumes that the removed USTs would most likely be recycled. Although some soil contamination may be present the analysis assumed this impact to be negligible, since most of the leaking UST sites have been or are in the process of being remediated as a result of the California and Federal UST regulations.

The estimated maximum number of fueling stations that would be under construction at a given time is three stations per day (see Appendix F). If it is assumed that all three stations are simultaneously under construction and haul their demolition debris on the same day, the "worst-case" daily amount of construction debris transported to the landfills within the SCAQMD jurisdiction is 1,200 tons per day (3 stations/day x 22 loads/station x 20 tons/load). There are 48 Class II/Class III landfills within the SCAQMD's jurisdiction. The estimated total capacity of these landfills is approximately 111,198 tons per day. Therefore, as shown in Table 4-24, the amount of waste disposed of during construction activities associated with construction for the proposed fleet vehicle rules are about one percent of the total disposal capacity.

TABLE 4-24

Amount of Nonhazardous Waste Landfilled
During Construction-Related Activities

	Demolition Material (tons/day)
Total Disposal from The Proposed Fleet Vehicle Rules	1,320
Threshold (Capacity of Landfills)	111,198
% of Capacity	1.18%
Significant (Yes/No)	No

Increases in solid waste disposal related to construction/demolition activities would be small and temporary. Therefore, the solid/hazardous waste impacts from construction activities associated with the implementation of the proposed fleet vehicle rules would not be significant.

[13] The 20 haul truck load number was mistakenly used in the Draft PEA to estimate solid waste impacts. The correct number should have been 22 (two UST demolition and 20 backfilling loads, assuming as a "worst-case" that all backfilling/grading trips are backfilling loads). The reader is referred to Table 4-23.

Refinery Modifications

PROJECT-SPECIFIC IMPACTS: According to the Mobil Reformulated Fuels Project Final EIR, solid/hazardous waste generated from the project was attributable to the demolition of existing refinery structures and non-contaminated and contaminated soil. However, although the demolition waste and contaminated soils would contribute to the diminishing availability of landfill capacity, the Mobil Final EIR concluded that solid/hazardous waste impacts were insignificant since they would occur only during the construction phase of the project. This conclusion was premised on the following:

- demolition material could be recycled or salvaged;
- non-contaminated soil could be used as either backfill and/or grading material;
- contaminated soil could be preferentially treated on-site;
- off-site disposal, if required, will be at an approved disposal facility; and
- landfill capacity currently exists to handle these materials.

Therefore, since the construction-related activities associated with refinery modifications for the proposed project are expected to be less intensive than the Mobil Clean Fuels Project, significant construction-related solid/hazardous waste impacts are not anticipated. This conclusion is not only consistent with the conclusion in the Final EIR for the Mobil Reformulated Fuels Project, but is consistent with the conclusions in the Final EIRs for the five other large refinery (and one small refinery) RFG projects. These other projects entailed substantially greater refinery modifications resulting in addition, but insignificant, solid/hazardous waste impacts than is anticipated to occur relative to producing low sulfur diesel pursuant to PAR 431.2.

PROJECT-SPECIFIC MITIGATION: None required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in solid/hazardous waste impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since the solid/hazardous waste impacts are not project-specifically significant, cumulative public services impacts are expected to be insignificant.

CUMULATIVE IMPACT MITIGATION: None required.

Operational-Related Impacts

Methanol

PROJECT-SPECIFIC IMPACTS: In the event of a methanol spill or a UST release, methanol-contaminated soil/materials may require remediation and/or disposal. Since methanol tanks would be replacing diesel fuel and gasoline tanks, soil contamination from leaking methanol tanks would be less hazardous similar leaks from gasoline or diesel tanks. These conventional fuels contain components that are considerably more toxic than methanol. For example, diesel fuel contains highly toxic PAHs, and gasoline contains an array of toxic compounds, including benzene, a known carcinogen.

Substituting diesel fuel or gasoline with a less toxic fuel, such as methanol, would likely reduce the severity of operation-related solid/hazardous waste impacts from disposing of contaminated soil. As indicated in Table 4-19 the half-life of methanol in soil, surface water, and groundwater can be substantially less than for benzene, a common gasoline constituent. Further, methanol does not persist in the environment because it readily degrades in air, soil, and water, and has no persistent degradation intermediates (ENVIRON, 1996). As a result, switching to methanol to comply with the proposed fleet vehicle rules could have a small beneficial effect with regard to disposal of contaminated soil or other materials.

CNG

PROJECT-SPECIFIC IMPACTS: CNG would be released as a gas and does not have the potential to become a solid or hazardous waste nor can it cause other waste streams to become hazardous.

LNG/LPG

PROJECT-SPECIFIC IMPACTS: LNG and LPG are gases under ambient conditions. LNG is created by cooling natural gas until it liquefies and subsequently storing it under cryogenic conditions. Pressurizing petroleum gas creates LPG, mainly consisting of propane. Since these fuels are gases under ambient conditions they do not have the potential to become a solid or hazardous waste nor can they cause other waste streams to become hazardous.

EVs

PROJECT-SPECIFIC IMPACTS: To comply with the proposed fleet vehicle rules, some fleet vehicle operators may replace existing fleet vehicles with EVs. When the battery packs in the EVs reach the end of their useful lives, they will need to be replaced. The spent battery packs will be either recycled or disposed of as either solid or hazardous waste, depending on their constituents. Therefore, implementation of the proposed fleet vehicle rules has the potential to affect solid and hazardous waste landfills and disposal facilities.

EV batteries typically have useful lives similar to or less than the life of a vehicle. Since some batteries contain toxic materials, solid waste impacts are possible if they are disposed of in an unsafe or improper manner, such as by illegally dumping or disposing into an unlined landfill.

Most battery and fuel cell technologies employ materials that are recyclable. Additionally, both regulatory requirements and market forces encourage recycling. The following is a brief listing of some of the more important Federal and California regulations that have created incentives for the proper disposal and recycling of EV battery packs:

- The federal Battery Act promulgated in 1996 requires that each regulated battery be labeled with a recycling symbol. NiCad batteries must be labeled with the words "NiCad" and the phrase "Battery must be recycled or disposed of properly." Lead-acid batteries must be labeled with the words "Lead," "Return," and "Recycle."
- Current California and federal regulations require ZEV manufacturers to take into account the complete life-cycle of car batteries and to plan for safe disposal and/or recycling of battery materials.
- The California Health and Safety Code does not allow the disposal of lead-acid batteries at a solid waste facility or on or in any land, surface waters, water courses, or marine waters. Legal disposal methods for used lead-acid batteries are to recycle/reuse the battery or to dispose of it at a hazardous waste disposal facility. A lead-acid battery dealer is required to accept spent batteries when a new one is purchased.
- California businesses may take a 40 percent tax credit for the cost of equipment used to manufacture recycled products (Kimball, 1992).
- California Public Resources Code requires state agencies to purchase car batteries made from recycled material.

Recycling of lead-acid and nickel-cadmium batteries is a well-established activity. Eighty percent of lead consumed in the United States is used to produce lead-acid batteries, and the lead recovery rate from batteries is approximately 80 to 90 percent. According to the Lead-Acid Battery Consortium, 95 to 98 percent of all battery lead is recycled.

The Universal Waste Rule requires that spent batteries exhibiting hazardous waste characteristics and that are not recycled need to be managed as hazardous waste. This includes lead-acid and NiCad batteries. There are currently three Class I (hazardous waste) landfills located in California. Chemical Waste Management Corporation in Kettleman City is a treatment, storage and disposal facility that has a capacity of 13 million cubic yards. At current disposal rates, this capacity would last for approximately 26 years (Turek, 1996). Safety Kleen operates a Class I facility in Buttonwillow with a permitted capacity of 13 million cubic yards, of which 2.5 million cubic yards has been filled. In addition, landfill disposal is available at the Safety Kleen facility located in Westmoreland. Hazardous wastes can also be transported to permitted facilities outside of California.

Because most EV batteries and are recycled, it is unlikely that the increase in battery use would significantly adversely affect landfill capacity in California. As mentioned earlier, electric batteries generally hold significant residual value, and 95 to 98 percent of all lead-acid batteries are recycled. In addition, the electric batteries that would power EVs are packaged in battery packs and cannot be as easily disposed of as a single 12-volt conventional vehicle battery. Furthermore, the total number of EVs that are expected to be used due to the implementation of the proposed fleet vehicle rules is estimated to be only 750 with a yearly maximum of 100. Accordingly, even if it is assumed as a “worst-case” that five percent of the recycable portion of a 100 EV battery packs were disposed of as solid or hazardous waste, there is sufficient landfill capacity available to handle this relatively small volume of waste.

It should be noted that the increased operation of EVs associated with the implementation of the proposed fleet vehicle rules may actually result in a reduction of the amount of solid/hazardous waste generated in the SCAQMD’s jurisdiction. EVs do not require the various oil and gasoline filters that are required by vehicles using internal combustion engines. Furthermore, EVs do not require the same type or amount of engine fluids (oil, antifreeze, etc.) that are required by vehicles using internal combustion engines (see Water Quality discussion and Tables 4-20 and 4-21.

Refinery Operations

Using the Mobil Clean Fuels Project Final EIR as a representative sample, operation of the reformulated fuels project would increase refinery solid waste generation by an estimated 2,713 tons per year of which 2,441 is expected to be recycled and 272 tons per year (e.g., 0.74 tons per day at 365 days per year) will be landfilled. Using the assumption that the operational-related refinery activities necessary for each affected refinery to comply with the proposed project would be approximately 25 percent of the activities for the Mobil Clean Fuels Project, the SCAQMD estimates that the proposed project could incrementally generate approximately 1.12 tons per day of solid waste [(0.25 x 0.74 tons per day)x 6 refineries].

There are 48 Class II/Class III landfills within the SCAQMD’s jurisdiction. The estimated total capacity of these landfills is approximately 111,198 tons per day. Therefore, as shown in Table 4-25, the amount of waste disposed of during refinery operations associated the proposed project is less than one percent of the total disposal capacity within the SCAQMD’s jurisdiction.

TABLE 4-25

Amount of Nonhazardous Waste Landfilled
During Operational-Related Activities

	Demolition Material (tons/day)
Total Disposal from The Proposed Fleet Vehicle Rules	1.2
Threshold (Capacity of Landfills)	111,198
% of Capacity	0.001%
Significant (Yes/No)	No

As shown in Table 4-25, increases in solid waste disposal related to refinery operations would be small. Therefore, the solid/hazardous waste impacts from refinery operations associated with the implementation of the proposed project would not be significant.

Clean Diesel Technology

PROJECT-SPECIFIC IMPACTS: The use of the following clean diesel technologies also has the potential to generate significant adverse solid/hazardous waste impacts. The potential adverse solid/hazardous waste impacts associated with the use of these technologies are discussed separately below.

Diesel Oxidation Catalysts and Diesel PM Filters

Field experience with diesel oxidization catalysts and PM filters indicated that they have durability that meets heavy-duty diesel engine manufacturers' requirements. This is also the case when used in conjunction with a fuel-borne catalyst. Field trials and emerging commercial experience in Europe with particulate filter technology do not disclose any major durability concerns. Thus, it is expected that a diesel oxidization catalyst and/or PM filter will have the same life expectancy as the diesel-fueled vehicle on which it is used. Accordingly, these technologies are not expected to create any significant adverse solid/hazardous waste impacts.

SCR With Urea Solution

SCR systems have been tested extensively in vehicles under real world operating conditions. Several trucks have accumulated over 200,000 miles with SCR systems fully functioning. The total mileage accumulated on the fleet of trucks equipped with SCR systems is more than 5,000,000 kilometers. No serious failure has been reported thus far. Catalyst deterioration is following the path predicted by its manufacturer. Therefore, it is expected that an SCR will have the same life expectancy as the diesel-fueled vehicle on which it is used. Accordingly, this technology is not expected to create any significant adverse solid/hazardous waste impacts.

PROJECT-SPECIFIC MITIGATION: Since project-specific operational solid/hazardous waste impacts were found to be insignificant, no mitigation is required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in solid/hazardous waste impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific solid/hazardous waste do not exceed the SCAQMD's significance criteria, cumulative solid/hazardous waste impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: None required.

ENERGY / MINERAL RESOURCES

In the NOP/IS, staff identified potentially significant adverse energy/mineral resources impacts that could occur as a result of implementing the proposed fleet vehicle rules. Specifically, potential impacts were identified from the use of fuels as a result of construction and operational activities associated with installing alternative fuel refueling stations.

Methodology and Key Assumptions

To estimate the "worst-case" energy impacts associated with the construction of alternative clean fuel refueling stations, the SCAQMD estimated hours of equipment operation based on previous contractor reference materials for similar projects (see Appendix G2). In addition, to estimate construction workers' and haul truck fuel usage per round trip, the SCAQMD assumed that workers' vehicles would get 20 miles to the gallon and would travel 40 miles per round trip, while haul trucks would get 20 miles to the gallon and would travel 50 miles per round trip (see Appendix G2). The estimated energy usage associated with potential refinery modifications was based on the Mobil Clean Fuels Project Final EIR.

To estimate the "worst-case" energy impacts associated with the operational phase of the proposed fleet vehicle rules, the analysis is based on the fleet vehicle universe identified for the proposed project to project VMT, fuel efficiency, and alternative clean-clean fuel usage (see Appendix G2). For refinery operations, it is expected that once refinery modifications are completed no further energy/mineral resources impacts would be expected. Direct or indirect operational-related impacts are not expected since refineries can use existing infrastructure (e.g., pipelines, storage tanks, terminals, trucking routes, etc.) to deliver low sulfur fuels.

The reader is referred to Appendix G2 for the methodologies, variables, and assumptions used in the following energy/mineral resources impacts analysis.

Significance Criteria

The project will be considered to have significant adverse energy/mineral resources impacts on if any one of the following criteria is met or exceeded by the project:

- The project will be considered significant if it will result in the use of fuel or energy in a wasteful manner.
- The project will be considered significant if it result in substantial depletion of existing energy resource supplies.
- The project will be considered significant if it encourages activities that will result in the use of large amounts of fuel or energy resources.

Direct Energy / Mineral Resources Effects

Construction-Related Impacts

Alternative Clean Fuel Refueling Stations

PROJECT-SPECIFIC IMPACT: During the construction phase of both alternative clean fuel fueling stations as well as refinery modifications, diesel and gasoline fuel will be consumed in construction equipment used: to demolish and remove existing underground gasoline and diesel tanks, to erect various structures, and by construction workers' vehicles traveling to and from construction sites. Table 4-26 lists the projected energy impacts associated with the construction phase of the proposed fleet vehicle rules.

As shown in Table 4-26, the direct energy impacts associated with the proposed fleet vehicle rules' construction-related activities would not be considered significant. The SCAQMD has determined that the equipment and vehicles needed for construction-related the proposed fleet vehicle rules' activities are necessary and will not use energy in a wasteful manner. There will be no substantial depletion of energy resources nor will significant amounts of fuel be needed when compared to existing supplies.

TABLE 4-26

Total Projected Fuel Usage For The
Proposed Fleet Vehicle Rules' Construction Activities

Construction Activity	**On-site Construction Equipment Fuel Usage[a] (gallons/yr)**		**Off- site Construction-Related Fuel Usage[b] (gallons/yr)**		**Total Fuel Usage per Activity (gallons/yr)**	
	Diesel	Gasoline	Diesel	Gasoline	Diesel	Gasoline
Refueling Station Type						
Methanol	291	104	53	29	344	133
CNG	26,153	11,779	2,130	5,326	28,283	17,105
LNG	1,079	364	142	296	1,221	660
LPG	740	249	97	203	837	452
Electricity	862	646	120	284	1,146	930
Refinery Modifications	3,054	0	345	808	3,399	808
Total Fuel Usage	32,180	13,141	6,483	3,350	**38,662**	**16,492**
Threshold (Fuel Supply)[c]					1,086 x 10^6	6,469 x 10^6
% Of Fuel Supply					0.004%	0.0003%
Significant (Yes/No)					No	No

[a] For on-site construction equipment operation, the SCAQMD assumed that diesel would be used in all heavy-duty construction equipment and gasoline would be used in all small portable equipment.

[b] For off-site mobile sources, the SCAQMD assumed that diesel would be used in all haul trucks and gasoline would be used in all construction worker vehicles. TCF = trillion cubic feet.

[c] Year 2000 CEC projection. See Table 3-19 in Chapter 3. Construction activities in future years would yield similar results.

PROJECT-SPECIFIC MITIGATION: Since project-specific construction-related energy/mineral resources impacts were found to be insignificant, no mitigation is required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in energy demand during construction-related activities associated with the implementation of the proposed fleet vehicle rules and related amendments, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific construction-related energy/mineral resources impacts do not exceed the SCAQMD's significance criteria, cumulative construction-related energy/mineral resources impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: None required.

Operational-Related Impacts

Alternative Clean Fuel Demand

PROJECT-SPECIFIC IMPACT: Direct operational energy impacts associated with the implementation of the proposed fleet vehicle rules are attributable to the consumption of alternative clean fuel in alternative clean-fueled vehicles. For the purposes of this impact analysis, it will be assumed that the proposed fleet vehicle rules will result in the increase usage of methanol, CNG, LNG, LPG, and electricity. Other clean-fuels that could be used (e.g., fuel cells, hydrogen, hybrids, etc.) would be negligible and would not result in potential significant energy impacts. Table 4-27 lists the projected direct energy impacts associated with the operational phase of the proposed fleet vehicle rules.

After the release of the Draft PEA the SCAQMD received a comment regarding the fuel efficiencies used in the fuel delivery analysis. As a result of further investigation, the SCAQMD has refined its analysis to take into consideration more conservative fuel efficiencies (e.g., four miles per gallon) for alternative clean-fueled vehicles, which is reflected in Table 4-27 below.

Additionally, the SCAQMD received a comment asserting that the fuel usage associated with compressors used at alternative clean-fuel fueling stations should be included in this analysis. In response to this comment, the SCAQMD has included in Table 4-27 the estimated fuel usage associated with compressors operating at alternative clean-fuel fueling stations.

The reader is referred to Appendix G for the methodologies and assumptions used to estimate the values in Table 4-27.

TABLE 4-27

Total Projected Fuel Usage for the Proposed
Fleet Vehicle Rules' Operational Activities (Direct)

Fuel Type	**Year**		
	2000	**2005**	**2010**
Methanol Total Usage (gallons/yr)	208,372	221,552	225,210
Threshold (Fuel Supply – gallons/yr)[a]	12,000,000	12,000,000	12,000,000
Percent of Fuel Supply	1.74%	1.85%	1.88%
Significant (Yes/No)	No	No	No
CNG/LNG Total Usage (TCF/yr) [b]	0.0054	0.0203	0.0204
Threshold (Fuel Supply – TCF/yr) [c]	0.7200	0.7400	0.7800
Percent of Fuel Supply	0.75%	2.75%	2.61%
Significant (Yes/No)	No	No	No
LPG Total (gallons/yr)	612,808	651,460	669,441
Threshold (Fuel Supply – gallons/yr) [a]	39,000,000	39,000,000	39,000,000

TABLE 4-27 (CONTINUED)

Total Projected Fuel Usage for the Proposed
Fleet Vehicle Rules' Operational Activities (Direct)

Fuel Type	Year		
	2000	**2005**	**2010**
Percent of Fuel Supply	1.57%	1.67%	1.72%
Significant (Yes/No)	No	No	No
Electricity Total (MW)[d]	0.41	1.96	1.96
Threshold (Fuel Supply – MW)[e]	8,115	6,694	4,664
Percent of Fuel Supply	0.0051%	0.0293%	0.0421%
Significant (Yes/No)	No	No	No

[a] Assumed that 60 percent of state total consumed in the SCAQMD's Jurisdiction

[b] Assumed that CNG and LNG have Net/Lower Heating Values of 92,800 BTU/gal and 72,900 BTU/gal, respectively.

[c] See Table 3-16 in Chapter 3. Year 2005 and 2010 figures based on linear interpolation.

[d] See Table 3-13 in Chapter 3.

[e] Assumed that natural gas has a Heating Value of 1,050 BTU/scf. See CEC's *1998 Baseline Energy Outlook* Tables A-7 and B-7

Based on the foregoing analysis, the SCAQMD has determined that the fuel needed for alternative cleanfuel vehicle operation (e.g., vehicle demand, lower fuel efficiencies, and compressor operation) is sufficient to meet the incremental energy demand associated with the operational phase of the proposed fleet vehicle rules. As shown in Table 4-27, there will be no substantial depletion of energy resources nor will significant amounts of fuel be needed when compared to existing supplies. Additionally, since the operation of clean-fueled vehicles is necessary to comply with the proposed fleet vehicle rules, the use/consumption of these fuels would not be considered wasteful. Thus, there are no significant direct adverse energy/mineral resources impacts associated with the operational phase of the proposed fleet vehicle rules.

In the event that additional fuel (e.g., natural gas or fuel oil) is needed by affected facilities to meet fleet vehicle electricity demands (e.g., pumps, fans, motors, etc.), the consumption of fuel would be for the purpose of aiding facilities in complying with the proposed fleet vehicle rules. As mentioned earlier, the consumption of fuel to comply with air quality regulations is not considered a wasteful use of energy. Therefore, fuel consumed by in-district power plants to generate additional electricity for electric motors, pumps, fans, etc., used at clean fuel refueling stations and refineries to produce low sulfur diesel is not considered a significant adverse energy impact. Furthermore, the small amount of additional fuel that may be used to generate electricity would be negligible compared to existing supplies, and, thus, would not substantially deplete existing energy resources.

Supply of Low Sulfur Diesel Fuel

PROJECT-SPECIFIC IMPACTS: Once the appropriate modifications are made to affected refineries, sufficient quantities of low sulfur diesel are expected to be available to meet the demand created by the proposed project[14]. Essentially, a percentage of the existing in-district supply as shown in Table 4-26 above would be converted to low sulfur diesel. There is currently sufficient diesel available to meet current energy demands.

Clean Diesel Technology

PROJECT-SPECIFIC IMPACTS: The use of the following clean diesel technologies also has the potential to generate significant adverse energy/mineral resources impacts. The potential adverse energy/mineral resources impacts associated with the use of these technologies are discussed separately below.

Diesel Oxidation Catalysts

Diesel oxidation catalysts do not adversely affect fuel economy or engine performance. They have little or no impact on exhaust back pressure when properly sized for a specific application. Careful selection of space velocity not only ensures proper catalyst performance, but also avoids unnecessary restriction of the exhaust system.

Diesel Oxidation Combined With Fuel-Borne Catalyst

The discussion above for diesel oxidation catalysts is applicable here. However, there has been an indication in MECA's test program that the use of a fuel borne catalyst may have some benefits regarding fuel economy.

Diesel PM Filters

A slight fuel economy penalty has been experienced with some diesel PM filter technology, which is attributable to the back pressure of the system. Some forms of regeneration involve the use of diesel fuel burners, and to the extent those methods are used, there will be an additional consumption of fuel. However, it is expected that the systems can be optimized to minimize, or in some cases possibly eliminate, any noticeable fuel economy penalty. If a fuel-borne catalyst is also used, it may generate some benefits with regard to fuel economy.

SCR With Urea Solution

Because of the large NOx reductions afforded by SCR, it is possible that low NOx emissions can be achieved with an actual fuel economy benefit. Compared to internal engine NOx

[14] Recently, in various public forums, a BP Amoco (formerly ARCO) representative has stated that BP Amoco's Carson Refinery has the current capacity to produce approximately a 1,000,000 gallons of low sulfur diesel per day. According to this representative, this is twice the supply needed to comply with the proposed fleet vehicle rules if clean diesel technology is allowed. PAR 431.2 would require all diesel in the district to be low sulfur and the environmental impacts of this rule have been analyzed

abatement strategies like EGR and timing retard, SCR offers a fuel economy benefit in the range of 3 to 10 percent as a result of being able to optimize engine timing for fuel economy and relying on the SCR system to reduce NOx emissions.

Thus, it is expected that these emissions technologies will not significantly reduce the fuel efficiency of potentially compliant the proposed fleet vehicle rules diesel-fueled HDVs in comparison to existing diesel-fueled HDVs. In some instances, these technologies may promote fuel efficiency.

Indirect Energy / Mineral Resources Effects

Operational-Related Impacts

Centralization and Loss of Transit Bus Service

PROJECT-SPECIFIC IMPACT: Indirect operational energy impacts associated with the implementation of the proposed fleet vehicle rules are attributable to the consumption of alternative clean and conventional-fuels (e.g., gasoline) resulting from additional miles traveled to refuel at centralized fueling sties and the increase in private sector vehicles due to potential loss of transit bus service. For the purposes of this indirect impact analysis, it will be assumed that the potential additional miles traveled to refuel at centralized fueling sites involves a slight increase in the usage of alternative clean-fuels such as methanol, CNG, LNG, LPG, and electricity. Whereas, the increase in private sector vehicles due to potential loss of transit bus service involves a slight increase in the usage of gasoline. Table 4-28 lists the projected indirect energy impacts associated with the operational phase of the proposed fleet vehicle rules. The reader is referred to Appendix G for the methodologies and assumptions used to estimate the values in Table 4-28.

TABLE 4-28

Total Projected Fuel Usage for the
Proposed Fleet Vehicle Rules' Operational Activities (Indirect)

Fuel Type	Year 2000
Methanol Total Usage (gallons/yr)	2,325
Threshold (Fuel Supply – gallons/yr)[a]	12,000,000
% Of Fuel Supply	0.02%
Significant (Yes/No)	No
CNG Total Usage (gallons/yr)	71,465
LNG Total Usage (gallons/yr)	7,009
CNG/LNG Total Usage (TCF/yr)[b]	0.00001
Threshold (Fuel Supply – TCF/yr)[c]	0.7200
% Of Fuel Supply	0.001%
Significant (Yes/No)	No
LPG Total Usage (gallons/yr)	3,473

TABLE 4-28 (CONTINUED)

Total Projected Fuel Usage for the
Proposed Fleet Vehicle Rules' Operational Activities (Indirect)

Fuel Type	Year 2000
Threshold (Fuel Supply – gallons/yr)[a]	39,000,000
% Of Fuel Supply	0.009%
Significant (Yes/No)	No
Electricity Total Usage (kWh/yr)	7,290
Electricity Total Usage (MW)[d]	0.00056
Threshold (Fuel Supply - MW)[e]	4,664
% Of Fuel Supply	0.00001%
Significant (Yes/No)	No
Gasoline Total Usage (gallons/yr)	33,024
Threshold (Fuel Supply – gallons/yr)[f]	6,469,000,000
% Of Fuel Supply	0.001%
Significant (Yes/No)	No

[a] Assumed that 60 percent of state total consumed in the SCAQMD's Jurisdiction
[b] Assumed that CNG and LNG have Net/Lower Heating Values of 92,800 BTU/gal and 72,900 BTU/gal, respectively. TCG = trillion cubic feet.
[c] See Table 3-16 in Chapter 3. Year 2005 and 2010 figures based on linear interpolation.
[d] See Table 3-13 in Chapter 3.
[e] Assumed that natural gas has a Heating Value of 1,050 BTU/scf. See CEC's *1998 Baseline Energy Outlook* Tables A-7 and B-7
[f] See Table 3-19 in Chapter 3.

As illustrated in Table 4-28, the incremental indirect energy demand associated with the implementation of the proposed fleet vehicle rules and related amendments would be negligible. Even when combining the direct energy impacts from Table 4-27 with the indirect energy impacts, the proposed fleet vehicle rules and related amendments would not result in any significant energy impacts. Additionally, since the incremental alternative clean fuel demand is associated with complying with a regulation to reduce TACs and criteria pollutants from mobile sources, it would not be considered a wasteful use of energy resources.

PROJECT SPECIFIC MITIGATION MEASURES: No mitigation measures are required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in energy demand during operational-related activities associated with the implementation of the proposed fleet vehicle rules and related amendments, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific operational-related direct/indirect energy/mineral resources impacts do not exceed the SCAQMD's significance criteria, cumulative operational-related energy/mineral resources impacts are not expected from the implementation of the proposed fleet vehicle rules.

Furthermore, even when combining the proposed project's negligible operational-related direct/indirect energy/mineral resources impacts with related regulatory projects (e.g., CARB's Transit Rule), the small cumulative incremental increase in energy demand would not result in any significant energy impacts. There is sufficient energy supply to meet the cumulative incremental increase in energy demand. Additionally, since this cumulative incremental alternative clean fuel demand is associated with complying with regulations to reduce TACs and criteria pollutants from mobile sources, it would not be considered a wasteful use of energy resources.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

HAZARDS

In the NOP/IS, staff identified potentially significant hazard impacts that could occur as a result of implementing the proposed fleet vehicle rules. This hazard analysis examines potential hazards that may arise from conversions to alternative clean fuels. Specifically, the proposed fleet vehicle rules require the phased conversion of fleet vehicles from their current utilization of gasoline and diesel fuel to alternative clean fuels, such as methanol, CNG, LNG, LPG, and electric power. Conversion to these alternative clean fuels or electric power reduces air pollution but introduces operational changes with different hazards than those associated with gasoline or diesel fuel.

Significance Criteria

The proposed fleet vehicle rules will be considered to have significant adverse hazards impacts if any one of the following criteria is met or exceeded:

- The project results in a substantial number of people being exposed to a substance causing irritation.
- The project results in one or more people being exposed to a substance causing serious injury or death.
- The project creates substantial human exposure to a hazardous chemical.

Hazards Effects

The following analysis examines the construction and operational hazards of the conversion from gasoline and diesel fuel to the various alternative clean fuel technologies and compares operational-related hazards with those of gasoline and diesel fuel. The discussion below includes hazard impacts associated with methanol, CNG, LNG, LPG, and electricity.

Construction-Related Impacts

Clean Alternative-Fuel Refueling Stations

PROJECT-SPECIFIC IMPACTS: Substitution of current gasoline and diesel fuel operations by any of the clean fuel alternatives would reduce the need for gasoline and diesel fuel capacity at existing fleet fueling stations. As gasoline and diesel fuel capacity is reduced, gasoline and diesel fuel production and distribution would be reduced and the substituted alternative clean-fuel technology production and distribution would be increased. This would require the modification of some existing gasoline and diesel fuel dispensing facilities and the substitution of gasoline and diesel fuel production with methanol, CNG, LNG, LPG and electric power. Construction hazards associated with this type of change would involve tank removal and disposal leading potentially to workplace injuries and accidental releases; new fuel storage construction with associated construction emissions, and modification of production facilities with excess capacity of some byproduct streams. In the case of conversion to methanol, LNG, or LPG, additional shipping facilities and vehicles may be required to absorb the increased delivery frequencies to accommodate the lower fuel value of these fuels. The hazards associated with the construction of methanol, CNG, LNG, LPG, and electric power fueling stations needed to comply with the proposed fleet vehicle rules are similar to the hazards associated with the installation of gasoline or diesel fuel facilities. Both involve approximately equivalent risks of upsets and worker and public exposure to physical hazards and hazardous substances. These construction-related hazards, however, are relatively well defined and commonplace and considered insignificant when compared to the overall construction activities within the SCAQMD jurisdiction.

Refinery Modifications

PROJECT-SPECIFIC IMPACTS: The Mobil Clean Fuels Project Final EIR concluded that significant hazards might be associated with modifications to its fluid catalytic cracking unit and the addition of a 1,000 gallon anhydrous ammonia tank. However, the SCAQMD does not anticipate that affected refineries will make these types of modifications to produce PAR 431.2 compliant low-sulfur diesel fuel. Therefore, since the hazards impacts associated with refinery modifications to each refinery for the proposed project are expected to be less intensive than those of the Mobil Clean Fuels Project, significant hazards impacts are not anticipated.

CUMULATIVE IMPACTS: The overall construction-related impacts of implementing the proposed fleet vehicle rules are expected to be similar or the same as for construction activities associated with gasoline and diesel fuels. Therefore, potential cumulative significant adverse hazards impacts are not anticipated from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

Operational-Related Impacts

Methanol

Methanol or methyl alcohol can be produced from natural gas, coal or biomass. Methanol is mainly produced from natural gas. The methanol fuel that is most widely used currently is M85, a mixture of 85 percent methanol and 15 percent unleaded gasoline. M100, consisting of 100 percent methanol, may increasingly be used for low emission methanol powered vehicles as a result of the implementation of the proposed fleet vehicle rules.

PROJECT-SPECIFIC IMPACTS: The energy content of methanol is lower than gasoline or diesel fuel. As discussed in the Air Quality section and in Appendix F, based on energy, about 1.68 gallons of M85 methanol are equal to one gallon of gasoline. Compared to one gallon of diesel the fuel equivalent for M85 is 2.3. This requires larger fuel tanks in a methanol vehicle to achieve the same range as a gasoline- or diesel-powered vehicle. It would also require about 68 (gasoline) to 130 (diesel) percent more tanker deliveries to supply refueling stations with the same available energy as conventional fuels. Since the probability of accidents is related to the miles traveled, about 68 to 130 percent more delivery accidents can be expected with methanol than conventional fuels (assuming that they are delivered from similar source locations in similar sized tankers). However, the truck accident rate is small, on the order of one accident per ten million miles traveled (Risk of Upset Evaluation, UNOCAL San Francisco Refinery, ENSR 1994) and the accident rate with chemical releases is even less, so this would not be a significant risk factor.

Methanol is more corrosive to rubber and plastic parts than gasoline and diesel fuel, which requires that parts more tolerant to such corrosion be incorporated into vehicles and refueling stations. Methanol-fueled vehicles also require a special (more expensive) lubricant with additives that enhance acid neutralization.

TABLE 4-29

Hazard Summary of Methanol Compared to Gasoline[a]

Toxicity	M100	Gasoline
Inhalation – Low Concentration		
Toxicity	3	10
Ease of Occurrence	10	10

TABLE 4-29 (CONTINUED)

Hazard Summary of Methanol Compared to Gasoline[a]

Toxicity	M100	Gasoline
Inhalation – High Concentration		
Toxicity	10	10
Ease of Occurrence	3	4
Skin Contact		
Toxicity	9	8
Ease of Occurrence	3	3
Ingestion		
Toxicity	10	10
Ease of Occurrence	8(2)[b]	3

Source: Table adapted from Machiel, 1998

[a] 1- No concern. 2 to 3 – Low Level concern. 4 to 6 – moderate concern. 7 to 8 – high-level concern. 9 to 10 – extreme hazard.

[b] Number in parenthesis incorporates the lowered likelihood of ingestion due to the presence of additives.

Compared with diesel fuel and gasoline the following can be stated:

- Diesel fuel and gasoline contain components that are considerably more hazardous than methanol. For example, diesel fuel contains highly toxic PAHs and gasoline contains an array of toxic compounds, including benzene, a known carcinogen. Table 4-29 presents a summary of the flammable and toxic hazards of methanol (M100) versus gasoline. The reader is also referred to Table 3-26 in Chapter 3 of this Final PEA.
- Diesel fuel and gasoline vapors are heavier than air (for a specific gravity of air =1, gasoline is 3.4 and diesel is greater than 4). Methanol is heavier than air but lighter (specific gravity is 1.11) than gasoline and diesel fuel and disperses more readily in air than gasoline or diesel fuel;
- Methanol has a higher auto ignition temperature (793 degrees Fahrenheit [^{o}F]) than diesel fuel (500 ^{o}F) or gasoline (500 ^{o}F);
- Methanol is more difficult to ignite since it has a "lower flammability limit" that is higher (5.5 percent) than gasoline (approximately 1 percent) or diesel fuel (0.5 percent);
- Unlike gasoline, methanol can ignite in enclosed spaces such as fuel tanks since its upper flammability limit is 15 percent and it is slightly heavier than air. For gasoline in a confined space, the vapor concentration exceeds the higher flammability limit (7.6 percent) and is therefore too high to ignite in the tank. Modifications such as materials inside the fuel tank that can arrest and quench flame propagation and modifications to isolate the tank from sparks and ignition sources are required to avoid ignition in the fuel tanks; and,
- In case of fire, methanol can be extinguished with water while water on gasoline or diesel fuel spreads the fire.

Methanol is generally stored in underground storage tanks. Because the fuel is corrosive to rubber, some metals and certain plastics, special methanol-compatible storage facilities, tanks, hoses pumps and parts are needed.

Based upon the preceding information, hazards associated with methanol are approximately equivalent or less compared to gasoline and diesel. Therefore, increased usage of methanol with a concurrent decline in usage of gasoline and diesel will not significantly alter existing hazards associated with mobile source fuels. Consequently, increased usage of methanol is not expected to generate significant adverse hazard impacts.

Compressed Natural Gas

Natural gas is a mixture of hydrocarbons, mainly methane, that are in gaseous form at ambient temperature and pressure. Natural gas can be compressed to increase its density, and in compressed form it contains a high enough fuel value that it can be used as a fuel for motor vehicles. Typical on-board pressures for CNG range from 3,000 to 3,600 pounds per square inch gauge (psig).

A CNG refueling station requires a compressor station. Compressor stations can be designed with or without fuel storage. Stations without storage (slow fill) are equipped with a compressor and fill posts. Gas at line pressure (typically 50 psig) is compressed to 3,000 to 3,600 psig and is used to charge one to multiple vehicles over a four to five hour period.

Compressor stations equipped with fuel storage (fast fill) can refuel vehicles in times similar to a regular gasoline station (five minutes). The compressor stores gas in cylinders at typical pressures of 4,000 to 4,500 psig. The storage cylinders (called bottles) are generally 2 feet wide and can typically range from 8 feet to 30 feet in length. A 30-foot long by 2-foot diameter bottle at 4,000 psig contains about 30,000 cubic feet of standard temperature and pressure natural gas. Multiple bottles can be stored on site depending on the refueling requirements. Vehicle tanks are fueled from the higher-pressure bottles in a matter of minutes. NFPA Codes specify requirements for fueling stations.

PROJECT-SPECIFIC IMPACTS: Compared with diesel fuel and gasoline the following can be stated:

- Diesel fuel and gasoline are toxic to the skin and lungs and CNG is not;
- Diesel fuel and gasoline vapors are heavier than air (for specific gravity of air =1, gasoline is 3.4 and diesel fuel is >4). CNG is lighter than air (specific gravity is 0.55) and disperses more readily in air;
- CNG has a higher auto ignition temperature (1,200 ^{o}F) than diesel fuel (500 ^{o}F) or gasoline (500 ^{o}F);
- CNG is more difficult to ignite since it has a “lower flammability limit” that is higher (5.3 percent) than gasoline (1 percent) or diesel fuel (0.5 percent); and,

- Natural gas can be directly shipped via pipelines to the compressor station, rather than by on-road delivery trucks, and has less delivery accident risk than vehicle shipments.

The reader is also referred to Table 3-26 in Chapter 3 of this Final PEA.

The compressed natural gas cylinders in vehicles are built to rigorous quality standards (Standards for CNG Vehicular Fuel Systems are specified in NFPA 52). CNG fuel tanks are made of ½" to ¾" aluminum or steel and have been shown to be safer than conventional gasoline tanks in accidents. For the 85,000 vehicles operating in the US over the approximate two year (1998 to 1999) time period, there had not been a fuel tank rupture in over two years (GRI, 1999b).

In August and December of 1999, two shuttle busses powered by CNG were destroyed by fire at the Baltimore-Washington International (BWI) Airport. The buses were manufactured by El Dorado National in California and were a dedicated design, not a bus conversion. Eighteen of these buses had been operating for seven years at BWI without a fire incident. Hudson Bus Lines owns. and operates the buses under a contract with BWI.

The Maryland Aviation Administration operates BWI and was contacted by telephone on February 4, 2000 to find out information about the fires and whom to contact to gain insight into the cause of the fires. The Director of Ground Transportation at BWI, Mr. Richard King, stated that the National Highway Traffic Safety Board (NHTSB) was investigating the cause of the fires and was expected to publish a detailed report shortly. The NHTSB Inspector, Mr. Scott York, recently provided BWI with a preliminary letter report summarizing the suspected cause of both accidents. Information from both fires helped to identify the probable cause of the fires, which is considered to be a design flaw with the El Dorado engine system and not generic to all CNG-fueled vehicles.

The initial cause of the fires was due to a leak in the power steering hose that runs close to the hot turbocharger in the engine compartment. When the hose deteriorated and failed, the power steering fluid ignited on contact with the hot turbocharger. Sensors in the engine compartment detected the fire and activated the safety system that vents the CNG at the top of the bus. Three CNG cylinders are mounted under the bus about mid-way and two are mounted in the engine compartment above the engine. All were vented through a single copper pipe. Before all the CNG could be vented, the copper line failed in the fire and fed CNG to the fire that escalated the problem.

The system has been redesigned and retrofitted to repair the problem. The BWI Administration is confident that the system is now safe. The power steering was rerouted to avoid the turbocharger. The single copper vent was replaced with two stainless steel vents of thicker construction. One vent is positioned to relieve the two cylinders in the engine compartment and the other vents the three cylinders at the mid-point of the bus. Heat sensors are used to detect a fire and activate the vents. A fire detected anywhere vents all cylinders.

A dry chemical fire suppression system (which is not required by regulation) was installed in the engine compartment and is also activated by a heat sensor.

In collisions, gasoline-fueled vehicles have a much higher rate of fuel leakage and fires than CNG-fueled vehicles (Automotive Fuels Reference Book, Owen K. and T. Coley, SAE 1995). If a sudden release of CNG were to occur, the gas disperses rather than pooling or forming a vapor cloud like gasoline. Due to the high ignition temperature of CNG, the risk of fire is lower than gasoline and comparable to diesel fuel.

There are conflicting data about the safety of compressor stations. CNG suppliers generally state that CNG compressor stations are as safe as diesel fuel and gasoline stations. Recently, however, there have been two explosions (October 8, 1999 and November 23, 1999) at the New York City Metropolitan Transit Authority Jackie Gleason Depot operated by Brooklyn Gas. This facility is used to refuel CNG-fueled buses. Mr. Robert Mahoney, Manager of Media Relations and Mr. Chris Kavanaugh, Section Manager of Production Planning for Brooklyn Gas were interviewed by telephone to discuss the circumstances of the accidents. The purpose of these conversations was to determine if the accidents at Brooklyn Gas were unique to the specific system at Brooklyn Gas or applicable to CNG systems, in general.

For over two years, Brooklyn Gas had been operating a temporary, skid mounted compressor system to service CNG-fueled buses during a trial CNG evaluation. They decided to construct a permanent compressor facility that was undergoing shakedown trials at the time of the accidents. The first accident occurred when both systems were operating and they were alternating between the two. An operator accidentally closed the gas supply to the skid mounted system and allowed it to continue operating. This overheated the lubricant of the compressor, and the lubricant exploded in the heat exchanger of the compressor, damaging the heat exchanger and a sheet metal roof over the compressor. There was no gas release and there were no injuries in this accident. The second accident occurred during test trials of the new system. A leaky valve was replaced with an improper replacement valve and gasket. When the system was pressure tested at 600 psig above the normal operating pressure (3,000 psig), the replacement gasket blew out and released high pressure natural gas until the system was shut down. There was no fire or "gas explosion." Some workers received medical attention for excessive exposure to the noise (pressure wave) generated by the gasket blow out. Neither one of these accidents is representative of normal operations since they occurred during system testing. These accidents therefore do not reflect on the general system safety of CNG.

CNG bottles are typically stored above ground as opposed to below ground for gasoline or diesel fuel tanks. As such, there is a risk of vehicles colliding with the bottles causing a gas release. This can generally be mitigated by installation of curbing and bollards to protect the tanks from vehicle operations.

Maintenance of CNG-fueled vehicles creates operational issues that are not associated with gasoline- or diesel-fueled vehicles. When maintaining CNG-fueled vehicles, there is a danger of releasing gas in the maintenance shop potentially creating explosive hazards (A flammable concentration within an enclosed space in the presence of an ignition source can explode). This can be mitigated by installing methane detection systems in the shop, ensuring that all electrical systems in the shop are explosion proof and providing adequate ventilation. As an alternative approach, procedures can be established to ensure that all vehicles requiring maintenance are depressurized before admission to the maintenance depot.

Repair facilities for compressed natural gas engines and fuel systems are regulated under California Fire Code Article 29, Section 2903. Such facilities require mechanical ventilation systems that exhaust at a rate of one cfm per square foot of floor space. Exhaust inlet openings shall be located within six inches of the highest point in the garage in the exterior walls or roof. Make-up air inlet openings must be located within six inches of the floor. Exhaust duct openings must be located to effectively remove flammable vapor accumulations from all parts of the repair area. Exhaust discharge must be directed to a safe location outside of the building. The mechanical ventilation system must be independent of the heating and air conditioning system. The ventilation system must either operate continuously or be interlocked with the lighting system. Accordingly, facilities (e.g., maintenance yards) that are modified in conformance with local fire department regulations, the California Fire Code requirements, and NFPA standards would provide a safe work environment for affected fleet operator's employees.

Liquefied Natural Gas

Natural gas can be liquefied by refrigerating it to below -161.5 degrees Celsius or -259 ^{o}F at atmospheric pressure. Once liquefied, LNG is much more compact, occupying only 1/600th of its gaseous volume (Dept. of Energy, Energy Information Administration, "Liquefied Natural Gas (LNG) Fact Sheet", October 1998). This makes it more economical to ship over long distances and to use in heavy-duty vehicles. LNG is usually shipped in refrigerated trucks to user locations. LNG fueling stations consist of an above-ground storage tank and insulation systems. Typical storage tanks are 30,000 to 70,000 gallons in capacity. Suppliers usually refill them in 10,000-gallon increments. The inner tank is stainless steel and is surrounded by an outer carbon steel tank that forms about a four-inch annulus around the tank. The annulus is evacuated and filled with pearlite insulation. Two pressure safety valves (PSVs) set at 80 psig and 100 psig to protect the inner tank. The outer jacket is also protected in case of an inner jacket leak.

Mr. Fred Golisano of Mid Coast Gas (one of the largest suppliers of LNG on the West Coast) was interviewed by telephone to obtain details concerning the LNG systems. The vacuum jacketed storage tanks can maintain the LNG for approximately two weeks before venting vapor. The specific time depends on the size of the tank and usage (vapors can be drawn down and used rather than vented). Fueling stations can be constructed to provide combined CNG and LNG service. For CNG, LNG is run through a vaporizer (ambient temperature heat exchanger) and stored in high pressure (4,000 psig and above) gas bottles (see discussion above for CNG). These are then used to fast-fill CNG-fueled vehicles.

Heavy-duty vehicles typically have one or two 40- to 50-gallon insulated tanks that store LNG at 150 psig. The "shelf life" of LNG in vehicles is approximately 14 days. The LNG is run through a small on-board vaporizer to produce CNG that powers the vehicle.

PROJECT-SPECIFIC IMPACTS: The energy content of a gallon of LNG is lower than a gallon of diesel fuel (2.1 gallons of LNG has the same fuel value as a gallon of diesel fuel). This requires larger fuel tanks in an LNG-fueled vehicle to achieve the same driving range as a diesel powered vehicle. It would also require about 110 percent more tanker deliveries to supply refueling stations with the same available energy as diesel fuel. Since the probability of accidents is related to the miles traveled, about 110 percent more delivery accidents can be expected with LNG than with diesel fuel (assuming that they are delivered from similar source locations in similar sized tankers). Most LNG deliveries on the West Coast come by truck from Arizona (Mid Coast Gas LP, Mr. Fred Golisano), so the miles traveled are probably much greater than for diesel fuel deliveries. However, the national truck accident rate is small (on the order of one accident per ten million miles traveled) and the accident rate with chemical releases is even less, so this would not be a controlling risk factor.

Other safety issues associated with LNG are similar to those discussed previously for CNG, with the added hazards associated with handling a cryogenic liquid. The hazards posed by the use of LNG versus gasoline and diesel fuel are:

- Diesel fuel and gasoline are toxic to the skin and lungs and natural gas is not;
- Diesel fuel and gasoline vapors are heavier than air (for specific gravity of air =1, gasoline is 3.4, diesel is greater than 4). Natural gas is lighter than air (specific gravity is 0.55) and disperses more readily in air;
- Natural gas has a higher auto ignition temperature (1,200 ^{o}F) than diesel (500 ^{o}F) or gasoline (500 ^{o}F). Natural gas is more difficult to ignite since it has a "lower flammability limit" that is higher (5.3 percent) than gasoline (1 percent) or diesel fuel (0.5 percent);
- Cryogenic liquids have the potential risk to workers of burns (frost-bite) that can be suffered if workers come in contact with the liquid or with surfaces that are not insulated. Proper safety equipment and training can minimize these hazards; and,
- Since LNG is a cryogenic liquid, in the event of a release from an aboveground storage tank or tanker truck, a fraction of the liquid immediately flashes off to gas while the remainder will pool and boil violently emitting dense vapor. The liquid transitions to dense vapor and the dense vapor transitions to gas as the liquid and vapor draw heat from the surroundings. If a source of ignition is present, the boiling liquid, vapor cloud and gas could explode and burn, threatening surrounding facilities and other storage vessels.

The reader is also referred to Table 3-26 in Chapter 3 of this Final PEA.

The safety record of LNG-fueled vehicles is not as well established as that of CNG-fueled vehicles, due to the much smaller number of LNG-fueled vehicles in use. If spilled, however, the vapor cloud above the LNG pool is very difficult to ignite, due to the narrow range of flammability of natural gas vapor.

One of the major concerns with the use of LNG-fueled vehicles is the possibility that excess vapor pressure might be vented in an enclosed area, such as a parking garage, possibly causing an explosion. Fuel tanks of inactive vehicles can store LNG up to eight to ten days without pressure relief valves being activated. Inactive vehicles left enclosed for long periods of time could pose problems.

Maintenance of LNG-fueled vehicles creates operational problems that are not associated with gasoline- or diesel-fueled vehicles. When maintaining LNG-fueled vehicles, there is a danger of releasing gas in the maintenance shop with its related explosive hazards. (A flammable concentration within an enclosed space in the presence of an ignition source can explode). This can be minimized by the installation of methane detection systems in the shop, ensuring that all electrical systems in the shop are explosion proof and providing adequate ventilation. As an alternative approach, procedures can be established to ensure that all vehicles that require maintenance are de-fueled and depressurized before admission to the maintenance depot.

Repair facilities for liquid natural gas-fueled engines and fuel systems are regulated under California Fire Code Article 29, Section 2903. Such facilities require mechanical ventilation systems that exhaust at a rate of one cfm per square foot of floor space. Exhaust inlet openings must be located within six inches of the highest point in the garage in the exterior walls or roof and must also be located within six inches of the floor. Make-up air inlet openings must be located within six inches of the floor. Exhaust duct openings must be located to effectively remove flammable vapor accumulations from all parts of the repair area. Exhaust discharge must be directed to a safe location outside of the building.

If the building has a basement or pit where flammable vapors (heavier than air) could accumulate, the basement or pit shall be provided with ventilation to prevent such accumulation. The ventilation system will either operate continuously or be interlocked with a gas detection system that activates when the gas concentration exceeds 25 percent of the lower explosive limit (gas detection systems are not required for LPG and CNG, which are odorized). Accordingly, facilities (e.g., maintenance yards) that are modified in conformance with local fire department regulations, the California Fire Code requirements, and NFPA Standards would provide a safe work environment for affected fleet operator’s employees.

Liquefied Petroleum Gas

Liquefied petroleum gas (LPG) consists mainly of propane, propylene, butane, and butylene in various mixtures. For LPG fuels in the US, the mixture is mainly propane. It is produced as a by-product of natural gas processing and petroleum refining. Propane is a liquid at -42.1

^{o}F and atmospheric pressure. At about 80 ^{o}F and a pressure of about 150 psig, propane can be stored as a liquid.

LPG is stored in tanks that typically range from 12,000 gallons to 120,000 gallons. Transports carry 8,000 to 11,000 gallons and rail cars range from 11,000 to 34,500 gallons. Over 350,000 vehicles currently operate in the US on LPG fuel (USDOE, 1999).

PROJECT-SPECIFIC IMPACTS: The energy content of a gallon of LPG is lower than a gallon of gasoline (based on energy content, about 1.36 gallons of LPG are equal to a gallon of gasoline). Compared to one gallon of diesel the fuel equivalent for LPG is 1.86. This requires larger fuel tanks in a methanol vehicle to achieve the same range as a gasoline- or diesel-powered vehicle. It would also require about 36 (gasoline) to 86 (diesel) percent more tanker deliveries to supply refueling stations with the same available energy as conventional fuels. Since the probability of accidents is related to the miles traveled, about 36 to 86 percent more delivery accidents can be expected with methanol than conventional fuels (assuming that they are delivered from similar source locations in similar sized tankers). However, the national truck accident rate is small (on the order of one accident per ten million miles traveled) and the accident rate with chemical releases is even less, so this would not be a significant risk factor.

Compared with diesel fuel and gasoline the following can be stated:

- Diesel fuel and gasoline are toxic to the skin and lungs and propane is not;
- Diesel fuel gasoline vapors are heavier than air (for specific gravity of air =1, gasoline is 3.4, diesel fuel is 4.0). PG is lighter than gasoline and diesel fuel but heavier than air (specific gravity is 1.52). It disperses more readily in air than gasoline or diesel fuel;
- LPG has a higher auto ignition temperature (920 ^{o}F) than diesel fuel (500 ^{o}F) or gasoline (500 ^{o}F);
- LPG is more difficult to ignite since it has a "lower flammability limit" that is higher (2.0 percent) than gasoline (1 percent) or diesel fuel (0.5 percent).

The reader is also referred to Table 3-26 in Chapter 3 of this Final PEA.

LPG is generally stored in above ground tanks. In case of a rupture, there is the potential for the gas to pool and boil off. This presents the possibility of a boiling liquid, vapor cloud explosion and fire with potential consequences to nearby structures and other storage tanks. NFPA 58 Code specifies the separation distances required between various sized LPG tanks.

LPG poses a somewhat greater safety risk than CNG, but lower than gasoline. Unlike natural gas, LPG vapors are heavier than air, so that leaks from the fuel system tend to pool at ground level rather than disperse. The flammability limits of LPG vapor in air are also broader than those for natural gas.

Maintenance of LPG-fueled vehicles creates operational problems that are not associated with gasoline- or diesel-fueled vehicles. When maintaining LPG vehicles, there is a potential danger associated with the releasing of gas in the maintenance shop . Under the right conditions, a flammable concentration within an enclosed space in the presence of an ignition source could explode. However, this situation can be minimized and/or avoided altogether by the installation of detection systems in the shop and insuring that all electrical systems in the shop are explosion proof. As an alternative approach, procedures can be established to insure that all vehicles that require maintenance are de-fueled and depressurized before admission to the maintenance depot.

Repair facilities for LPG engines and fuel systems are regulated under California Fire Code Article 29, §2902. If the building has a basement or pit where flammable vapors could accumulate, the basement or pit must be provided with ventilation to prevent such accumulation. If CNG and LNG are also present, the ventilation system must also comply with 2903.2 as discussed in the sections for CNG and LNG. LPG requirements for facilities also apply to gasoline powered vehicle repair facilities. Accordingly, facilities (e.g., maintenance yards) that are modified in conformance with local fire department regulations, the California Fire Code requirements, and NFPA Standards would provide a safe work environment for affected fleet operator's employees.

Electric Powered Vehicles

Electricity used to power vehicles is commonly provided by batteries, but fuel cells are also an emerging competitor. Batteries are energy storage devices and fuel cells convert chemical energy to electricity. Commercially available EVs are mostly battery-powered at the current time. The following discussion concentrates therefore on battery powered EVs.

PROJECT-SPECIFIC IMPACTS: In 1996, the International Center for Technology Assessment (ICTA) conducted a comprehensive review of the safety concerns associated with the use of EVs. ICTA evaluated what it considered to be the four most pressing safety considerations associated with the use of EVs, which include hydrogen offgassing, electrolyte spillage, electric shock, and exposure to toxic fumes. First, the ICTA found that hydrogen offgassing risks are not present in the three types of batteries likely to be used in EVs. In fact, in these three battery technologies hydrogen gas is not released as part of the chemical processes, which take place during normal operation. Additionally, the risk of hydrogen emissions during stressful conditions has been virtually eliminated by the use of seals and proper valve regulation. Finally, the NEC's and the SAE's recommended safety practices and guidelines for the operation and maintenance of EVs, which is expected under the proposed project, eliminates any hydrogen gas risk during EV battery recharging (ICTA, 1996).

Second, the ICTA found that EV batteries do not present a serious risk of burns from electrolyte spillage. While electrolyte leakage presents a risk in today's ICE vehicles because of their use of flooded lead acid batteries, most EVs use batteries that are sealed, maintenance-free, and use either starved or gelled electrolyte. Moreover, the SAE, in conjunction with existing federal safety standards, has established standards that regulate the amount of electrolyte allowed to escape during an EV accident. As a result of these battery technologies and the SAE efforts, the amount of electrolyte that can escape during a battery broken by accident has been minimized to the point of providing EV users extreme safety (ICTA, 1996).

Third, the ICTA found that the risk of electric shock from EV use and charging has been thoroughly addressed and poses minimal safety risk. In fact, the entire design of EVs has been premised around minimizing electrical hazards. The high voltage circuits in current EV designs are self-contained and entirely isolated from the passenger compartment, other electric conductors on board the vehicle, and from the vehicle chassis itself (unlike the battery in a conventional ICE vehicle, which uses the frame as grounding). EVs further isolate sources of electricity by using automatic disconnection devices in the event of a malfunction to disconnect the main propulsion battery from all electrical components in the vehicle. Finally, the SAE and manufacturers have worked closely to ensure that the NEC provides for the safe use of both conductive and inductive EV charging systems (ICTA, 1996).

Fourth, the ICTA found that the configuration of modern EV batteries virtually eliminates the risk of exposure to toxic and hazardous materials during normal operating conditions. By isolating batteries and battery packs from the rest of a vehicle operating system, designers have limited the chance of fire causing batteries to release toxic fumes. Moreover, crash tests and direct combustion attempts have indicated that batteries themselves are virtually non-flammable. In addition, Fed/OSHA has set strict standards to ensure that battery manufacturers do not expose workers to harmful doses of toxic or carcinogenic materials during manufacture (ICTA, 1996).

Overall, the ICTA's findings support the view that the widespread adoption of EVs will result in a significantly safer fleet of vehicles than the gasoline- or diesel-fueled ICEs currently in use (ICTA, 1996). Given the ICTA’s findings on EV safety and the total number of EVs that are expected to be used due to the implementation of the proposed fleet vehicle rules are only 750 with a yearly maximum of 100, significant hazards risks are not expected from using this technology.

Refinery Operations

PROJECT-SPECIFIC IMPACTS: The Mobil Clean Fuels Project Final EIR concluded that significant hazards might be associated with operation of its fluid catalytic cracking unit and the use of anhydrous ammonia (e.g., transporting, storing, and handling). However, the SCAQMD does not anticipate that refinery operations involving these units or chemicals will change as a result of the proposed project. Accordingly, since the hazards impacts associated with refinery modifications to each refinery for the proposed project are expected to be less intensive than those of the Mobil Clean Fuels Project, significant hazards impacts are not anticipated.

Clean Diesel Technology

PROJECT-SPECIFIC IMPACTS: The use of following the clean diesel technologies may generate potentially significant adverse hazards impacts if they significantly increase the public's risk of exposure to various hazards. The following discussion is comprised of edited excerpts from a report by MECA entitled *Demonstration of Advanced Emission Control Technologies Enabling Diesel Powered Heavy-Duty Engines to Achieve Low Emission Levels: Final Report*, (June 1999).

<u>Diesel Oxidation Catalysts and PM Filters</u>

Maintenance: Experience gathered from the application of diesel oxidation catalysts in diesel engine-powered vehicles indicates that these devices are mostly passive and require very little maintenance. A key to their durability and compatibility with diesel applications is their proper canning and installation. Many applications have a combined diesel oxidation catalysts and muffler in one package.

It is anticipated that PM filters will be virtually maintenance free as is the case with diesel oxidation catalysts. Periodic inspections at major maintenance intervals may be advised to ensure trouble-free operation of these systems, even though they may be mostly passive (do not require the addition of outside sources of supplemental heat). Lubrication oil, fuel-borne catalyst (where used), ash, as well as trace metals will accumulate in the filter after long service accumulation hours. Filter cleaning may be required if exhaust back pressure increases above a predetermined level.

Ease of Vehicle Integration: Diesel oxidation catalysts and PM filters are easily integrated into the exhaust system. In fact, most installations have benefited from either completely eliminating the exhaust muffler, replacing it with the catalytic converter, or have combined both the catalyst and a reduced muffler in a new package referred to as a catalytic muffler.

Safety: According to MECA, diesel oxidation catalysts and PM filters installed in exhaust systems pose no safety problems.

Tampering: If diesel oxidation catalysts and PM filters are stand-alone devices, the operator could remove them. If diesel oxidation catalysts and PM filters are part of a muffler package, they may be more tamper-resistant. Electronic interlocking devices could be used to prevent any potential tampering.

<u>Diesel Oxidation Catalyst Combined With Fuel-Borne Catalyst</u>

Maintenance: Care must be exercised to ensure metering of the right amount of fuel-borne catalyst material into the fuel supply system. Onboard dosing systems have been developed and are undergoing field tests to acquire experience with their performance. Any required maintenance should evolve during these field trials. Early indications are that these systems do not have major technical issues.

Ease of Vehicle Integration: For systems, which require the use of a fuel-borne catalyst, on-board injection technology has been developed and demonstrated. These systems are readily incorporated onto vehicles.

Safety: As far as safety is concerned, there is no special risk involved in storing fuel-borne catalyst onboard a vehicle. Suppliers of such catalysts point to carrying fuel onboard the vehicle and the risk it represents. Relative to fuel, fuel-borne catalysts are reported to be much less of a risk to vehicle occupants, catalyst handlers, and the environment.

Tampering: It is anticipated that sensors will be developed and installed to sense the fuel-borne catalyst level and ensure that its dispensing system is functioning correctly. These same sensors could be involved in an anti-tampering scheme to prevent gaming of the system.

SCR With Urea Solution[15]

Maintenance: When SCR systems become commercially viable for heavy-duty applications, it is expected that training provided by OEMs as well as guidance provided in operating and maintenance manuals will be available to assist fleet operators in the proper maintenance associated with the operation of SCRs.

Ease of Vehicle Integration: SCR systems can be integrated into the exhaust of existing trucks. The muffler may be replaced, or can be simplified due to additional inherent noise reduction provided by the SCR system. Onboard aqueous urea storage tanks are sized to provide range equivalent to that of diesel fuel tanks. The volume of the urea tank is generally about five percent of the fuel tank capacity. The urea tank is small compared to the fuel tank and can be installed in a relatively small space. The electronic SCR system control can be provided in a designated control panel communicated via standard industry protocol with the engine control, or integrated with the engine.

Safety: The aqueous urea solution used in SCRs is a non-hazardous, odorless, and non-flammable liquid. According to MECA, urea is safe to handle and there should be no risk involved in making it available at refueling stations or truck stops. The catalyst material of the SCRs has proven to be safe in numerous applications around the world, including coal-, oil-, and gas-fired power plants, boilers and incinerators as well as stationary and mobile diesel engine applications.

[15] According to MECA, the low cost of a urea solution should discourage using other more hazardous chemicals (e.g., anhydrous ammonia).

Tampering: SCR systems can be provided with the same tamper-resistant systems as other engine controls and/or emission control equipment. Sensors will monitor the use and injection of the reducing agent (e.g., aqueous urea). Tank sensors will be designed to monitor the urea solution level as well as distinguish between the aqueous urea solution and water. The urea supply and injection system will be equipped with sensors to detect system malfunction. A NOx sensor could be added to assist as part of the tampering prevention scheme. All these measures can be used to ensure proper maintenance, inspection, and function of the system.

Conclusions

Conventional fuels, such as gasoline and diesel fuel, have been used since the introduction of the internal combustion engine, and their associated hazards are well known. The alternative clean-fuels discussed in this section pose different hazards during storage, handling, transport, and use than conventional fuels. In general, the hazards posed by the conversion to alternative clean fuels appear no greater than those posed by conventional fuels, particularly when compared to gasoline. Hazards due to fuel leakage are lower due to the lower vapor densities, higher auto ignition temperatures, and the higher "Lower Flammability Limits" of the clean fuels compared to gasoline. The hazards posed by the use of alternative clean fuels that may be slightly higher than those posed by the conventional fuels are in the following areas:

Methanol - Unlike gasoline or diesel, methanol can ignite in confined spaces due to its high upper flammability limit, which exceeds its saturated vapor concentration.

CNG - The main additional hazard associated with the use of CNG versus conventional fuels is the exposure to high pressures employed during storage, dispensing and operations. Due to these high pressures a large amount of gas could escape in a short amount of time and, if present under flammable conditions, could explode in the presence of an ignition source. Another potentially significant hazard is a release of natural gas during vehicle maintenance.

LNG - The main additional hazard associated with the use of LNG versus conventional fuels are personal injuries from contact with a cryogenic liquid and the potential for a large fire stemming from release in the case of an accident (e.g. a tanker truck accident or storage tank failure). Another potentially significant hazard is a release of natural gas during vehicle maintenance.

LPG - The main additional hazard associated with the use of LPG versus conventional fuels is the potentiality of a large fire stemming from a release in the case of an accident (e.g. a tanker truck accident). Another significant hazard is a release of propane gas during vehicle maintenance.

EV - Specific safety issues involving EV technology revealed no significant risks in utilizing this technology. Overall, the widespread adoption of EVs will result in a significantly safer fleet of vehicles than the gasoline- and diesel fueled powered ICEs currently in use.

Clean Diesel - The potential use of clean diesel technologies should not introduce any significant hazards impacts when compared to the hazards associated with conventionally-fueled gasoline and diesel vehicles.

There are various existing regulations and recommended safety procedures that, when employed by fleet operators, will reduce any slightly higher insignificant hazards associated with use of alternative clean fuels to the same or lower level as conventional fuels. Table 4-30 summarizes some of the regulations and safety procedures associated with use of alternative clean fuels. Also, the reader is referred to the safety regulations and procedures discussed in the Hazards section of Chapter 3 - Existing Setting.

Therefore, when affected fleet operators comply with existing regulations and recommended safety procedures, hazards impacts associated with the use of alternative clean-fuels will be the same or less than those of conventional fuels. Accordingly, significant hazards impacts are not expected from the implementation of the proposed fleet vehicle rules and related amendments.

TABLE 4-30

Summary of Hazards and Existing Safety Regulations/Procedures
Associated with Alternative Clean-Fuels

Fuel Type	Hazard	Regulation/Procedure
Methanol	Methanol can ignite in enclosed spaces such as fuel tanks since its upper flammability limit is 15 percent and it is slightly heavier than air.	Modifications such as materials inside the fuel tank that can arrest and quench flame propagation and modifications to isolate the tank from sparks and ignition sources are required to avoid ignition in the fuel tanks.

TABLE 4-30 (CONTINUED)

Summary of Hazards and Existing Safety Regulations/Procedures
Associated with Alternative Clean-Fuels

Fuel Type	Hazard	Regulation/Procedure
CNG	CNG bottles are typically stored outside and are required to be above ground (NFPA 52) as opposed to below ground for gasoline or diesel tanks. There is a risk of vehicles colliding with the bottles causing a gas release.	Collisions can be mitigated by installation of curbing and bollards to protect the tanks from vehicle operations (LAFC57.42.16).
	There is a danger of releasing gas in the maintenance shop potentially creating explosive hazards.	Installation of methane detection systems in the shop can provide early detection of leaks and alert the maintenance personnel. (If integrated with vent systems, vents are not required to operate continuously - CFC 2903.2.5). Ignition sources can be reduced/eliminated by ensuring that all electrical systems in the shop are explosion proof (smoking and open flames are prohibited under CFC 2901.7). Providing adequate ventilation can prevent the occurrence of explosive conditions (required under CFC2903.1). Procedures can be established to ensure that all vehicles requiring maintenance are defueled and depressurized before admission to the maintenance depot.
LNG	LNG is a cryogenic liquid and has the potential risk to workers of burns (frostbite) that can be suffered if workers come in contact with the liquid or with surfaces that are not insulated.	Proper safety equipment and training can mitigate these hazards.
	LNG is generally stored above ground. Since it is a cryogenic liquid, in the event of a release, a fraction of the liquid immediately flashes off to gas while the majority of the remainder will pool and boil violently emitting dense vapor. If a source of ignition is present, the boiling liquid, dense vapor and gas could explode and burn threatening surrounding facilities and other storage vessels.	Tanks can be protected by containment dikes (required if neighboring tanks can be affected LAFC57.42.11) and physically separated LAFC57.42.10) so that they do not interact in case of a fire or explosion. Deluge systems can be installed to cool neighboring tanks in case of a fire.

TABLE 4-30 (CONTINUED)

Summary of Hazards and Existing Safety Regulations/Procedures
Associated with Alternative Clean-Fuels

Fuel Type	Hazard	Regulation/Procedure
LNG (Continued)	There is a danger of releasing gas in the maintenance shop with its related explosive hazards (A flammable concentration within an enclosed space in the presence of an ignition source can explode).	Installation of flammable gas detection systems in the shop can provide early detection of leaks and alert the maintenance personnel. (Required for LNG under CFC2903.3). Ignition sources can be reduced/eliminated by ensuring that all electrical systems in the shop are explosion proof (smoking and open flames are prohibited under CFC 2901.7). Providing adequate ventilation can prevent the occurrence of explosive conditions (required under CFC2903.1). Vehicle fuel shut-off valves shall be closed prior to repairing any portion of the vehicle fuel system (CFC2903.4.1). Vehicles fueled by LNG, which may have sustained damage to the fuel system, shall be inspected for integrity with a gas detector before being brought into the garage (CFC2903.4.2). Procedures can be established to ensure that all vehicles requiring maintenance are defueled and depressurized before admission to the maintenance depot.
LPG	There is a danger of releasing gas in the maintenance shop with its related explosive hazards (A flammable concentration within an enclosed space in the presence of an ignition source can explode).	Installation of combustible gas detection systems in the shop can provide early detection of leaks and alert the maintenance personnel. Ignition sources can be reduced/eliminated by ensuring that all electrical systems in the shop are explosion proof. Providing adequate ventilation can prevent the occurrence of explosive conditions. Procedures can be established to ensure that all vehicles requiring maintenance are defueled and depressurized before admission to the maintenance depot. NFPA 58, 8-6 requires that the cylinder shut-off valve be closed when vehicles or engines are under repair except when the engine is operated. Also, the vehicle cannot be parked near sources of heat, open flames, or similar sources of ignition or near inadequately ventilated pits.

TABLE 4-30 (CONCLUDED)

Summary of Hazards and Existing Safety Regulations/Procedures
Associated with Alternative Clean-Fuels

Fuel Type	Hazard	Regulation/Procedure
EV	Certain types of batteries that are used in commercially available electric vehicles emit hydrogen during the charging process. Emission of hydrogen gas in an enclosed setting such as a garage presents the potential for the accumulation of flammable concentrations.	Forced ventilation can prevent build-up but if ventilation fails, a hazardous condition can occur. NEC and SAE recommended practices provide strict guidance for eliminating hydrogen gas risk.

CWC = California Fire Code
LAFC = City of Los Angeles Fire Code. It is expected that cities in Orange, Riverside, and San Bernardino Counties have in place similar regulations.
NFPA = National Fire Protection Association
NEC = National Electric Code
SAE = Society of Automotive Engineers

Implementing the proposed fleet vehicle rules will require additional knowledge and training of owners/operators of fueling stations regarding maintaining and operating alternative fuel refueling stations and emergency responders. The Natural Gas Vehicle Institute (NGVI) in Las Vegas offers a series of forums and classes designed to educate the end users of natural gas vehicle refueling stations. For example, twice annually the NGVI offers a three-day Natural Gas Fueling Station Technology Exchange as an official forum for natural transportation fuel retailers to share common strategies, problem-solving techniques, design elements, and experiences. Also twice annually, the NGVI offers its Natural Gas Fueling Station Operation & Maintenance Forum, which is specifically designed for people with hands-on responsibility for solving day-to-day operation and maintenance problems at natural gas refueling stations. A third forum that NGVI offers is the Natural Gas Fueling Station Certification Course, which is a four-day program for public and private sector professional involved with the design and operation of natural gas vehicle refueling stations. Not only does greater knowledge of natural gas refueling infrastructure improve safety, it contributes to reducing high natural gas refueling station life-cycle costs (CEC, 1999). As indicated in the preceding, sources of information on natural gas vehicle fueling stations are currently available.

Finally, there are local community colleges in the district that that offer programs in proper operation and maintenance of alternative fuel vehicles. LA Trade Tech, Cypress College, and College of the Desert currently offer such programs.

Therefore, when affected fleet operators comply with existing regulations and recommended safety procedures, hazards impacts associated with the use of alternative clean-fuels will be the same or less than those of conventional fuels. Accordingly, significant hazards impacts are not expected from the implementation of the proposed fleet vehicle rules and related amendments.

PROJECT SPECIFIC MITIGATION MEASURES: No mitigation measures are required.

CUMULATIVE IMPACTS: Although there may be slight, but insignificant increase in hazards impacts, these incremental effects are not considered to be cumulatively considerable. This conclusion is consistent with CEQA Guidelines §15130(a), which states in part, "Where a lead agency is examining a project with an incremental effect that is not 'cumulatively considerable,' a lead agency need not consider that effect significant, but shall briefly describe its basis for concluding that the incremental effect is not cumulatively considerable. Therefore, since project-specific hazards impacts do not exceed the SCAQMD's significance criteria, cumulative hazards impacts are not expected from the implementation of the proposed fleet vehicle rules.

CUMULATIVE IMPACT MITIGATION: No cumulative impact mitigation measures are required.

ENVIRONMENTAL IMPACTS FOUND NOT TO BE SIGNIFICANT

As previously mentioned, a NOP/IS (see Appendix B) was prepared for the proposed fleet vehicle rules, which described the anticipated environmental impacts that may result from its implementation. However, it was concluded in the NOP/IS that the proposed fleet vehicle rules would not result in significant adverse impacts to the environmental areas identified in the following subsections. Accordingly, these environmental areas were not further analyzed in this Final PEA. A brief discussion of why the proposed fleet vehicle rules will not result in significant adverse impacts in these environmental areas is provided below

Land Use and Planning

Present or planned land uses in the SCAQMD's jurisdiction will not be affected as a result of implementing the proposed fleet vehicle rules. There are no provisions in the proposed fleet vehicle rules that would affect land use plans, policies, regulations, or require changes to zoning ordinances, or general plans. Land use and other planning considerations are determined by local governments and no land use or planning requirements will be altered by the proposed fleet vehicle rules. In addition, potential land use planning impacts from implementing the proposed fleet vehicle rules are also not anticipated for the reasons given in the following paragraphs.

Light- and medium-duty fleet vehicles, subject to PR 1191 (e.g., public fleets) and PR 1194 (e.g., taxis/limos and passenger shuttles), will not require land use or infrastructure changes because replacement vehicles would consist of CARB-certified LEV or cleaner vehicles such as LEVs, ULEVs, and SULEVs as required by the proposed rules. These vehicles can operate on conventional reformulated gasoline.

Currently, public agency fleet vehicles typically have centralized refueling and maintenance yards where fleet vehicles are maintained, refueled, and often garaged. It is assumed that infrastructure changes for heavy-duty vehicles, such as construction of EV charging stations or natural gas compressors, will largely occur at existing maintenance and refueling sites. If AFV refueling stations must be constructed at sites other than existing maintenance and refueling sites, it is anticipated that they will be sited in appropriately zoned areas, which are not expected to require changes to existing zoning ordinances. At the December 21, 1999 workshop for the proposed fleet vehicle rules (formerly PR 1190), a representative from Pickens Fuel Corporation testified that Pickens had built five natural gas refueling stations in 1999 and is expecting to build 10 more this year (2000). Further, it was indicated that no siting problems had been encountered as part of the refueling station siting process. Therefore, no significant adverse impacts affecting existing or future land uses are expected.

Population and Housing

Human population in the SCAQMD's jurisdiction is anticipated to grow regardless of implementing the proposed fleet vehicle rules. Further, the proposed fleet vehicle rules are not expected to result in the creation of any industry that would induce or inhibit population growth or distribution since the proposed fleet vehicle rules primarily regulates air toxics and criteria pollutants emitted from fleet vehicles. Because the proposed amendments have no effect on population growth or distribution, the proposed fleet vehicle rules are not expected to directly or indirectly induce the construction of single- or multiple-family housing units. Accordingly, no significant adverse impacts human population or housing are expected.

Geophysical

Significant adverse geophysical impacts are not anticipated to occur for many of the same reasons significant adverse land use impacts are not expected. Public agencies that replace light- and medium-duty fleet vehicles with LEVs, ULEVs, and/or SULEVs, as specified in PR 1191, will be able to continue using existing reformulated gasoline refueling stations. Also, under PR 1194, certain fleet operators will be allowed to use ULEV or cleaner vehicles, which are expected to be gasoline-fueled.

The installation of alternative clean fuel fueling stations will require construction activities (e.g., excavation, grading or filling) that have a potential to impact the existing geophysical conditions. In general, however, soil disruption impacts are expected to be negligible because construction will be limited to areas where previous soil disruption has occurred and there is some form of overcovering (e.g., pavement of concrete) already in place. Therefore, since the proposed project would result in only minor construction activities in industrial, institutional, and/or commercial settings, little site preparation is anticipated that could adversely affect geophysical conditions in the jurisdiction of the SCAQMD.

Furthermore, the proposed fleet vehicle rules have no potential to result in changes in topography or surface relief features, the erosion of beach sand, or a change in existing siltration rates. The proposed fleet vehicle rules merely involves the reduction of TACs and to a certain extent criteria pollutants from fleet vehicles operated in the SCAQMD's jurisdiction.

The proposed fleet vehicle rules will not expose people or property to geological hazards such as earthquakes, landslides, mudslides, ground failure, or other natural hazards. As stated earlier, the proposed fleet vehicle rules provides air quality benefits to the citizens that reside in the SCAQMD's jurisdiction by reducing TACs and to a certain extent criteria pollutants from fleet vehicles.

Further, for heavy-duty vehicles affected by the remaining proposed fleet vehicle rules, it is expected that, to the extent possible, alternative fuel refueling stations will be sited at existing fleet refueling station locations. It is, however, not known and cannot be known at this time where alternative fuel refueling stations would be located. Therefore, potential geophysical impacts are considered speculative at this time. This conclusion is consistent with CEQA Guidelines §15145.

Therefore, the geophysical environment would not be adversely affected as a result of the implementation of the proposed fleet vehicle rules.

Biological Resources

No direct or indirect impacts from the proposed fleet vehicle rules were identified that could adversely affect plant or animal species or the habitats on which they rely in the SCAQMD's jurisdiction. The net effect of implementing the proposed fleet vehicle rules will be improved air quality resulting from reducing TACs and to a certain extent criteria pollutant emissions, which is expected to be beneficial for both plant and animal life. A conclusion of the 1997 AQMP EIR was that population growth in the region would have greater adverse effects on plant species and wildlife dispersal or migration corridors in the basin than SCAQMD regulatory activities, (e.g., air quality control measures or regulations). The current and expected future land use development to accommodate population growth is primarily due to economic considerations or local government planning decisions. The proposed rule will not affect population growth or land use development. The objective of the proposed fleet vehicle rules are to improve air quality by requiring affected fleet vehicle operators to purchase low emission fleet vehicles. As a result, the proposed fleet vehicle rules are not expected to directly or indirectly adversely affect biological resources.

Noise

The potential noise impacts from construction activities are not considered significant because: 1) construction equipment operation would be required to comply with local city or county noise ordinances; and 2) the duration of the noise would only be for a short period of time (e.g., 10 days) and would not exceed local city or county ordinance requirements. In addition, it is anticipated that approximately 80 percent of the affected replacement fleet vehicles (both light- and medium-duty vehicles regulated by PRs 1191 and 1194) will be either LEV, ULEV or a SULEV vehicles, , that will be able to use existing conventional gasoline refueling stations. As a result, potential noise impacts from the proposed fleet vehicle rules, PR 1191 in particular, are expected to be unchanged from the existing setting.

It is expected that heavy-duty vehicles will likely comply with the proposed heavy-duty fleet vehicle rules by replacing vehicles with compressed natural gas-fueled vehicles. The prime mover to power gas compression at refueling stations is either an electric motor or an internal combustion engine (ICE). Electric motors are relatively inexpensive, don't require extensive maintenance, are very reliable, and do not have noise impacts associated with them. Electric motor compressors tend to be used at small- to medium-sized refueling stations.

Larger refueling stations, such as those used by transit districts, tend to operate compressors using ICEs to avoid the high compressor costs. The main advantages of ICE-driven compressors are that fuel costs are relatively inexpensive and they are independent of the electricity grid in the event of a power outage. The main disadvantage of ICE-driven compressors is that they are labor intensive, have higher maintenance costs, are not as reliable as electric motors, and are relatively noisy. It is anticipated that bus fleet operators, e.g., transit bus fleet operators will install ICE-driven compressors at existing fleet refueling/maintenance locations because they have trained onsite maintenance personnel. Existing refueling/maintenance bus fleet locations tend be in industrial or commercial areas where noise levels are already relatively high, due to industrial processes and vehicular traffic. Noise from refueling/maintenance locations would typically be attenuated substantially by distance, air absorption, and other attenuation factors before reaching a community area. Finally, ICE-driven compressor will normally be installed and fitted with mufflers, silencers or other appropriate noise reduction equipment and located as far from the facility's perimeter as possible to reduce noise levels to comply with local noise ordinances and applicable OSHA or Cal/OSHA workplace noise reduction requirements. For all of the above reasons the proposed fleet vehicle rules are not expected to generate significant adverse noise impacts.

Additionally, under the proposed fleet vehicle rules it is envisioned that low emission vehicles with the same relative performance characteristics (e.g., horsepower, size, make, model, etc.) will replace conventional-fueled fleet vehicles. As a result, no noticeable change in noise levels from the operation of low emission vehicles is expected in industrial, commercial, institutional, or residential settings. In fact, noise levels associated with some alternative clean-fueled vehicles such as electric powered and CNG-fueled have lower operation noise levels as compared to conventional-fueled fleet vehicles. Therefore, no significant adverse noise impacts are expected from the operation of low emission or alternative clean-fueled vehicles.

Therefore, no significant adverse noise impacts are expected from the operation of alternative clean fuel fueling stations due to the implementation of the proposed fleet vehicle rules.

Aesthetics / Recreation

Construction activities associated with the installation or modification of alternative clean fuel fueling stations could include the use of construction barriers, the presence of heavy-duty construction equipment and material, and the stockpiling of construction materials. However, views of these activities would be comparable to views from other industrial, institutional, or commercial construction activities. Furthermore, construction activities associated with the proposed fleet vehicle rules (e.g., building an alternative clean fuel fueling station) will last only a few days (e.g., 10 days for an EV charging station). Therefore, the construction phase of the proposed fleet vehicle rules are not expected to create significant aesthetic impacts.

Additionally, the proposed fleet vehicle rules and related amendments are not expected to adversely affect or change existing land use designations in the SCAQMD's jurisdiction. Any structures erected (e.g. methanol storage tanks, CNG compressor stations, LNG/LPG fueling stations, and EV charging stations) to comply with the proposed fleet vehicle rules would be visually compatible with the surrounding structures that are currently allowed in industrial, institutional, or commercial areas. Therefore, no significant impacts adversely affecting existing visual resources such as scenic views or vistas, etc., are anticipated to occur.

Furthermore, the proposed fleet vehicle rules would not require any new construction of buildings or other structures that would obstruct scenic resources or degrade the existing visual character of a site. Methanol storage tanks would be located underground and other alternative clean fuel fueling stations' components would not be sufficiently tall to block any scenic views.

Likewise, additional light or glare from the installation of alternative clean fuel fueling stations is not expected that would adversely affect day or nighttime views in the area since no light generating equipment would be required for the project's implementation.

Cultural Resources

It is expected that the implementation of the proposed fleet vehicle rules in the context of making infrastructure changes (e.g., installation of alternative clean fuel fueling stations) will occur at existing fleet vehicle facilities or existing fuel dispensing facilities, which are currently located in industrial, institutional, or commercial areas. Even if new alternative clean fuel fueling stations are built as a result of the proposed fleet vehicle rules, it is expected that these fueling stations will be located in industrial, institutional, or commercial areas. As a result, significant impacts to cultural resources are not expected because the proposed fleet vehicle rules will not require the destruction of existing buildings or sites with prehistoric, historic, archaeological, religious, or ethnic significance. The proposed fleet vehicle rules and related amendments are, therefore, not anticipated to result in any activities or promote any programs that could have a significant adverse impact on cultural resources within the SCAQMD's jurisdiction.

Economic and Social Impacts

Various commentators have noted that the proposed fleet vehicle rules may result in environmental impacts as a result of the costs associated with its implementation. As explained above, the SCAQMD considers any economic effects associated with the implementation of the proposed fleet vehicle rules would be considered indirect environmental impacts than rather direct impacts. The reader is referred to the appropriate sections above for a detailed discussion of the resulting environmental impacts associated with the economic effects of the proposed fleet vehicle rules.

Once released, the reader should refer to the Socioeconomic Impact Report and the Staff Report for a complete discussion relative to the economic impacts and cost effectiveness, respectively, of the proposed fleet vehicle rules.

OTHER CEQA TOPICS

Pursuant to CEQA requirements, the following sections consider the project's potential for irreversible environmental changes, growth inducement, and inconsistency with any regional plans.

Irreversible Environmental Changes

CEQA Guidelines §15126.6(c) requires an environmental analysis to consider "significant irreversible environmental changes which would be involved in the proposed project should it be implemented." The NOP/IS identified air quality, water resources, transportation/circulation, public services, solid/hazardous waste, energy/mineral resources, and hazards as potential impact areas. The unavoidable, but insignificant air quality impacts associated with construction-related activities would be temporary. Subsequent to the insignificant construction-related air quality impacts, the proposed fleet vehicle rules would result in overall net air quality benefits (e.g., reduction of TACs and criteria pollutants).

The temporary transportation/circulation, solid/hazardous waste, energy/mineral resources impacts associated with construction were determined to be insignificant. Furthermore, no transportation/circulation, solid/hazardous waste, and energy/mineral resources impacts are expected during the operational-related phase of the proposed fleet vehicle rules.

While small insignificant quantities of water would be used to reduce fugitive dust during construction-related activities (as is standard operating practice), the project would not result in the long-term significant water-use. Additionally, significant water quality impacts are not expected to occur from potential methanol leaks or the disposal of EV battery packs.

With regard to HDVs, the proposed fleet vehicle rules (e.g., PRs 1192 through 1196 and 1186.1) would accelerate an existing trend of moving away from diesel-fueled HDVs to alternative clean fuel HDVs. Further, even without the proposed fleet vehicle rules, greater penetration of alternative clean fuel HDVs will occur because of CARB's existing and future anticipated HDV standards. As a result, existing trends and current and future CARB HDV standards are the main drivers irreversibly moving HDVs to alternative-clean fuels. The proposed fleet vehicle rules and related amendments simply act as a catalyst to accelerate their irreversible changes. Based upon the expected air quality benefits (e.g., reduction of TACs and criteria pollutants) anticipated from the proposed fleet vehicle rules and related amendments, the irreversible commitment is justified.

Finally, potential public services (e.g., fire department) and hazard impacts associated with the storage, transport, and handling of alternative clean-fuels were determined to be insignificant.

Accordingly, as can be seen by the information presented in this Final PEA, the proposed project would not result in irreversible environmental changes or the irretrievable commitment of resources.

Growth-Inducing Impacts

CEQA Guidelines §15126.6(d) requires an environmental analysis to consider the "growth-inducing impact of the proposed action." The proposal, which reduces TACs and other criteria pollutant emissions from government and certain private fleets, does not include any provisions which foster economic or population growth, or the construction of additional housing, either directly or indirectly.

CONSISTENCY

The Southern California Association of Governments (SCAG) and the SCAQMD have developed, with input from representatives of local government, the industry community, public health agencies, the USEPA - Region IX and CARB, guidance on how to assess consistency within the existing general development planning process in the SCAQMD's jurisdiction. Pursuant to the development and adoption of its Regional Comprehensive Plan and Guide (RCPG), SCAG has developed an Intergovernmental Review Procedures

Handbook (June 1, 1995). The SCAQMD also adopted criteria for assessing consistency with regional plans and the AQMP in its CEQA Air Quality Handbook. The following sections address consistency between the proposed fleet vehicle rules and relevant regional plans pursuant to the SCAG Handbook and SCAQMD Handbook.

Consistency with the Air Quality Management Plan (AQMP)

1994 AQMP

The 1994 AQMP is part of the 1994 State Implementation Plan (SIP), which is the most current SIP approved by USEPA. The 1994 AQMP contains 11 long-term on-road mobile source control measures (including three Federal Implementation Plan control measures). The long-term control measures are measures that are expected to be implemented in a five to 10 year time frame and rely on advanced air pollution control technologies. The long-term control measures are also referred to as Section 182(e)(5) control measures. The name of these long-term measures is in reference to Section 182(e)(5) of the federal CAA, which allows extreme ozone nonattainment areas to develop control measures that rely on anticipated development of new control techniques or improvement of existing control technologies.

With regard to on-road mobile sources, the long-term control measures in the 1994 AQMP identify greater or accelerated use of alternative clean fuels, including methanol, ethanol, propane, CNG, electricity etc., as advanced technologies that could provide the additional future emission reductions necessary to attain all state and federal ambient air quality standards. The 1994 AQMP not only identified specific categories of vehicles and the applicable advanced control technologies, but also identified penetration rates (Table 4-31).

Although not specifically included in the 1994 AQMP, the proposed fleet vehicle rules are consistent with the 1994 AQMP for the following reasons. First, they implement portions of the on-road mobile source provisions from the 1997 AQMP's Section 182(e)(5) control measures to accelerate the penetration rate of low emitting and alternative clean fuel vehicles. Second, they will assist with attaining the in-use penetration percents for each vehicle category. Finally, accelerated criteria pollutant emission reductions from mobile sources will contribute to the SCAQMD's other regulatory efforts to improve air quality and attain and maintain relevant state and federal ambient air quality standards.

The 1994 AQMP also contains TAC emission control programs. To the extent that the proposed fleet vehicle rules contribute to reducing TAC emissions, they are considered to be consistent with both this part of the 1994 AQMP's control strategies.

TABLE 4-31

In-use Penetration Rates for Mobile Source Advanced Technologies

Technology	In-use Penetration (Percent
Medium- and Heavy-duty Sources	
Fuel Cells/Electric Hybrid or Equivalent	35
Alternative Fuels/Advanced Emission Controls	50
Light-duty Trucks	
Alternative Fuels/Advanced Emission Controls	85
Fuel Cells/Electric Hybrid	15
Passenger Cars	
Alternative Fuels/Advanced Emission Controls	78
Fuel Cells/Electric Hybrid	22
Urban Buses	
Zero Emission Vehicles	100

1997 AQMP

The proposed fleet vehicle rules are not specifically identified as short- or intermediate-term control measure in the 1997 AQMP as amended in 1999 (1997 AQMP). The 1997 AQMP has not yet received full approval by USEPA. The 1997 AQMP contains many of same on-road mobile source control measures contained in the 1994 AQMP, including the long-term Section 182(e)(5) control measures.

Section 182(e)(5) control measures in the 1997 AQMP continue to include provisions for alternative clean fuels (e.g., methanol, ethanol, propane, CNG, electricity, etc.) and advanced emission controls. Advanced emission controls for gasoline and/or diesel include electrically heated catalysts; NOx reduction catalysts; oxidation catalysts; catalyst placement strategies, charge air after cooling, etc. The main difference between the long-term mobile control measures contained in the 1994 and 1997 AQMPs is that the 1997 AQMP has dropped the in-use penetration percentage targets and many of the specifically identified long-term mobile source measures from the 1994 have either been adopted or dropped from further consideration in the 1997 AQMP.

The proposed fleet vehicle rules are consistent with the AQMP for two reasons. First, they implement portions of the on-road mobile source provisions from the 1997 AQMP's Section 182(e)(5) control measures to accelerate the penetration rate of low emitting and alternative clean fuel vehicles. Second, early criteria pollutant emission reductions from mobile sources will contribute to the SCAQMD's other regulatory efforts to improve air quality and attain and maintain relevant state and federal ambient air quality standards.

The 1997 AQMP also contains TAC emission control programs, which have been more fully developed in the SCAQMD's Air Toxic Control Plan. To the extent that the proposed fleet vehicle rules contribute to reducing TAC emissions, they are considered to be consistent with both the AQMP and the Air Toxics Control Plan.

Consistency with Regional Comprehensive Plan and Guide (RCPG) Policies

The RCPG provides the primary reference for SCAG's project review activity. The RCPG serves as a regional framework for decision making for the growth and change that is anticipated during the next 20 years and beyond. The Growth Management Chapter (GMC) of the RCPG contains population, housing, and jobs forecasts, which are adopted by SCAG's Regional Council and that reflect local plans and policies, are used by SCAG in all phases of implementation and review. The following subsections summarize the main policies and goals contained in the GMC and whether or not the proposed fleet vehicle rules are consistent with these polices and goals

Growth Management - Improve the Regional Standard of Living

Growth Management in the context of the RCPG does not mean curtailing growth through population, economic, or land use policies. Instead, Growth Management means encouraging local land use actions that could ultimately lead to the development of an urban form that will help minimize development costs, save natural resources, and enhance quality of life in the region.

Patterns of development and resulting land uses and urban form, influence to a large extent the way people choose to travel, the distances they must cover, and the time they spend to reach their destination. This, in turn, determines the amount of congestion on the roadways, the amount of fuel consumed, and consequent air pollution. Therefore, the Growth Management goals are to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, which would strengthen the regional strategic goal to stimulate the regional economy.

The proposed fleet vehicle rules and related amendments in relation to Growth Management would not interfere with achieving these goals, nor would it interfere with any powers exercised by local land use agencies to achieve these goals. The proposed fleet vehicle rules will not interfere with efforts to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness. The proposed fleet vehicle rules indirectly promote Growth Management goals of enhancing quality of life in the region through improving air quality.

Provide Social, Political and Cultural Equity

The Growth Management goals to develop urban forms that avoid economic and social polarization promotes the regional strategic goals of minimizing social and geographic disparities and of reaching equity among all segments of society. The proposed fleet vehicle rules and related amendments in relation to the GMC would promote, to a certain extent, accomplishing these goals because the proposed project will reduce TACs and criteria pollutants from mobile sources. Since mobile sources are not geographically confined, the benefits of the proposed fleet vehicle rules and related amendments would occur region-wide, thus, benefiting all segments of the population as well as in areas with high diesel risks.

Local jurisdictions, employers and service agencies should provide adequate training and retraining of workers, and prepare the labor force to meet the challenges of the regional economy. The RCPG encourages employment development in job-poor localities through support of labor force retraining programs and other economic development measures. In fact, job-training courses related to operation and maintenance of AFVs are available to local community colleges. To the extent that local community colleges incorporate AFV job training, additional job training and opportunities would be available. Additional job opportunities would be expected as new AFV refueling stations are built.

Local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection. Implementing the proposed fleet vehicle rules is not expected to interfere with the goals of providing social, political and cultural equity.

Improve the Regional Quality of Life

The Growth Management goals also include attaining mobility and clean air goals and developing urban forms that enhance quality of life, accommodate a diversity of life styles, preserve open space and natural resources, are aesthetically pleasing, preserve the character of communities, and enhance the regional strategic goal of maintaining the regional quality of life. The RCPG encourages planned development in locations least likely to cause environmental impacts and supports the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals. While encouraging the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites, the plan discourages development in areas with steep slopes, high fire, flood and seismic hazards, unless complying with special design requirements. Finally, the plan encourages mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and develop emergency response and recovery plans. The proposed fleet vehicle rules and related amendments in relation to the

GMC are not expected to interfere with attaining these goals and, in fact, promote improving air quality in the region through the reduction of TACs and criteria pollutants from mobile sources region-wide.

Consistency with the Regional Transportation Plan / Regional Mobility Element (RME)

Federal and state legislation has vested SCAG with the responsibility of preparing the regional transportation plan and program. The RME, which is part of SCAG's RCPG, meets state and federal requirements for a regional transportation plan. Specifically, the RTP/RME is the principal transportation policy, strategy, and objective statement of SCAG, which is a proposal for a comprehensive strategy for achieving mobility and air quality mandates. The RTP/RME links the goals of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, etc.

The primary goal of the RTP/RME is to sustain mobility through: sustaining or bettering the 1990 levels of service for the movement of people and goods; ensuring that transportation investment provides for the greatest possible mobility benefits; serving the transportation needs of everyone including the elderly, handicapped, disadvantaged, and transit dependent; and developing regional transportation solutions that complement subregional transportation systems and serve the needs of cities and communities.

In addition to the primary goals identified in the preceding paragraph, the RTP/RME also contains several subgoals (SCAG, 1996), which are described in the following sentences. The first subgoal is to foster economic vitality by promoting transportation strategies that support and encourage economic vitality within the region, while reducing transportation costs. The second subgoal is to enhance the environment through transportation strategies that minimize impacts on the environment and to support new technologies that improve air quality, mobility, etc. The third subgoal consists of reducing energy consumption through transportation strategies and investments that reduce the region's dependence on traditional fossil fuels, while actively supporting the development and deployment of clean/alternative fuel technologies and the associated transition to clean alternative fuel vehicles. The fourth subgoal is to promote transportation friendly development through land us development patterns that complement transportation investments such as telecommuting, smart shuttles, etc. The last subgoal is to promote fair and equitable access to regional transit systems.

The core of the RTP/RME is the planned improvements to highways, rail and bus transit, ports, truck facilities and aviation facilities that a variety of public agencies have committed to fund over the next 20 years. To this core, an advanced transportation and air quality technologies strategy has been added to help meet the strict air quality and mobility requirements the region must confront over the 20-year planning period. This development and implementation of advanced transportation technology strategies includes the use of ZEVs, alternative clean fuels, etc.

The RTP/RME is also comprised of other strategies that include: transportation demand management, which attempts to modify peoples' travel behavior (e.g., promoting ridesharing, telecommuting, use of mass transit, etc.); transportation system management, e.g., traffic signal synchronization, etc.; transportation control measures, which are strategies designed to reduce the amount of motor-vehicle based emissions by changing the way people make trips through alleviating traffic congestion, and by facilitating infrastructure changes to promote alternatives to single occupancy vehicles; etc. The proposed fleet vehicle rules do not hinder these other RME strategies and, therefore, are considered to be consistent with them.

Currently in the district (which comprises only a portion of the SCAG region) commuters rely primarily on single occupancy vehicles (SOV) for the majority of all trips. The average vehicle ridership (AVR) is 1.38 persons per passenger vehicle (SCAG, 1996).

Since 1984/85, the region has lost 100,000,000 annual transit riders (SCAG, 1997). Further, only 5.62 percent of the population use some form of transit to commute to work. Analysis by SCAG indicates that 20 percent of existing transit routes carry 60 percent of the current transit trips. Alternatively, 20 percent of the existing transit routes carry only 10 percent of the current transit trips (SCAG, 1997).

Based upon the components of the RTP/RME summarized above, not only are the proposed fleet vehicle rules considered to be consistent with the RTP/RME, but they promote the specific core transportation and air quality components of the RTP/RME. The proposed fleet vehicle rules promote the RTP/RME's subgoal of reducing energy consumption through transportation strategies and investments that reduce the region's dependence on traditional fossil fuels, while actively supporting the development and deployment of clean/alternative fuel technologies and the associated transition to clean alternative fuel vehicles The net effect of the proposed project is an improvement in air quality.

The analysis of potential indirect impacts from the proposed fleet vehicle rules indicated that they could result in the loss of buses from service if transit agencies are unable to fund the additional costs associated with purchasing alternative fuel buses. The analysis assumed that only small transit agencies in Los Angeles County might have difficulty covering the total costs of replacing diesel buses with alternative fuel buses. The analysis assumed that funding shortfalls would only occur for the first five years after adopting and implementing PR 1192 because it is assumed that it would take five years to install the refueling infrastructure necessary to support AFV fleets. The analysis concluded that three buses would be removed from service each year for five years. Removing three buses from service over five years for a total of 15 buses is not considered to be inconsistent with the RTP/RME for the following reason. As indicated above, transit services are substantially underutilized. Because transit services are underutilized, the 1998 RTP includes a recommendation for transit operators and transportation commissions to restructure existing services away from least performing lines toward feeder services, smart shuttles, busways and back into top performing lines by the year 2010 (SCAG, 1997). Since it is likely that any buses removed from service would be from low performing lines, this would be consistent with SCAG's transit restructuring proposal.

A second indirect impact from the proposed fleet vehicle rules identified as part of the environmental impact analysis was also associated with the loss of bus service. The analysis assume that as a result of the loss of bus service there would be an increase in daily passenger commute trips. The SCAQMD estimated that the average daily passenger trips for buses prior to their removal from service would be 255 passenger trips per bus. However, approximately 57 (e.g., 23 percent) of those trips would be made by carpools or other modes of mass transit (e.g., rail) and 64 (e.g., 25 percent) of those trips would be by passengers taking later or earlier buses servicing the same stop. This leaves approximately 147 additional daily trips that might be made by private vehicles per bus dropped from service. An increase of 147 additional vehicle trips per bus dropped from service will have no effect on the regional AVR and, because the additional vehicle trips would not be clustered together but would be spread out over Los Angeles County, would not significantly affect the level of service on roadways in Los Angeles County. Therefore, is spite of these indirect affects generated by the proposed fleet vehicle rules, which were determined to be insignificant environmental impacts, they are not considered to be inconsistent with the RTP/RME.