APPENDIX F

CONSTRUCTION AND OPERATIONAL EMISSION CALCULATION METHODOLOGIES

INTRODUCTION

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 that would be acquired to comply with the proposed fleet vehicle rules[1]. Therefore, new alternative clean-fuel refueling capacity will need to be constructed, and emissions will be generated by the construction activities. Additionally, the SCAQMD anticipates that refineries in the SCAQMD's jurisdiction will require modifications to produce low-sulfur diesel fuel for compliance with proposed amended rule (PAR) 431.2, which will necessitate construction activities and lead to emissions. 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. Finally, fleet operators may operate some vehicles longer because of lack of refueling infrastructure or drive vehicles further to centralized refueling stations, which could lead to indirect air quality impacts.

The following discussion provides the methodologies used by the SCAQMD to estimate the construction and operational air quality impacts from the implementation of the proposed fleet vehicle rules. The discussion first presents the methodologies for estimating unmitigated construction emissions and unmitigated operational emissions. Next, summary tables including analysis of the alternatives are presented. Emissions were estimated for each year from 2000 through 2010 and compared with the emissions benefits (e.g., emissions reductions) from the proposed fleet vehicle rules and project alternatives. The remaining benefits were compared with CEQA significance levels to determine if significant air quality impacts would result.

[1] The proposed fleet vehicle rules include Proposed Rules 1191, 1992, 1193, 1194, 1195, 1196, 1186.1 and proposed amended Rule 431.2.

CONSTRUCTION EMISSIONS (UNMITIGATED)

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

Construction-Related Emissions

Alternative Clean-Fuel Refueling Station

To help quantify the environmental impacts associated with the construction of refueling stations needed to comply with the proposed fleet vehicle rules, the SCAQMD calculated emissions generated during construction of each of five proposed refueling/recharging station alternatives: methanol, compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG), and electric,. Construction of each of the stations requires activities including removal of existing underground fuel tanks and installation of new equipment.

The SCAQMD then estimated the number of stations of each type that would be constructed each year to comply with the proposed fleet vehicle rules and the most likely number of each type that would be under construction at the same time. Finally, the maximum daily emissions from the construction of each type of station were multiplied by the number to be constructed at the same time, and the results were added together to estimate total maximum daily emissions from station construction.

The SCAQMD assumed that construction of all of the 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[2]. During construction of the other types of stations, the excavated area would be backfilled completely and 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

[2] 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 UST when installing or replacing two or more tanks

equipment would be added. For the LPG and LNG options, an aboveground storage tank would be added. Construction of all the stations will also require repaving of the area over the excavation.

The use of construction equipment to breakup 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.

Based upon the current requirements in the proposed fleet vehicle rules, substantial construction activities are anticipated at each of the refueling stations. The SCAQMD estimated emissions for each of the construction activities on a daily basis to determine if the implementation of the proposed fleet vehicle rules would generate significant construction-related air quality impacts.

Number of Stations to be Constructed

The SCAQMD estimated the number of stations that would be constructed each year as follows. First, the SCAQMD estimated the total number of refueling stations that would be needed for all heavy-duty vehicles subject to the proposed fleet vehicle rules. Next, the average number of heavy-duty vehicles (HDVs) refueled per station per day was calculated and used to calculate the number of stations required for light- and medium-duty vehicles (LDVs/MDVs) estimated to switch to alternative clean fuels to comply with the proposed fleet vehicle rules. The total number of new stations of each type was calculated by multiplying the total number of stations for each vehicle type by the percentage of the vehicles estimated to switch to each alternative clean fuel. Finally, the SCAQMD assumed that the refueling stations would be constructed uniformly over a five-year period to accommodate total infrastructure needs for total universe of vehicles affected by the proposed rule and related amendments. This five-year period takes into account the fact that affected fleet operators will build early on the infrastructure needs of their entire fleet, which will most likely be replaced over a longer period of time. The five-year period also accounts for the staggered compliance dates (e.g., upon adoption for transit buses, January 1, 2001, for fleets 100 or greater, and January 1, 2002 for fleets 15 or greater and less than 99) for of the proposed fleet vehicle rules, centralization that may occur in the near-term, and the availability of existing infrastructure to meet some the early fueling needs of affected fleet operators.

The number of new refueling stations required for HDVs and the PR 1194 LDVs/MDVs was estimated as follows:

- For transit buses, it was assumed that one station would be required for every 200 vehicles. This translates into a total of 19 fueling sties (3,700 transit buses / 200 buses per fueling station).

- Through direct contact, the SCAQMD determined that the Los Angeles Unified School District (LAUSD) would require 10 new refueling stations for non-contracted school buses and 20 new stations for contractor-operated school buses.

- The SCAQMD apportioned non-LAUSD school buses into small and medium sized school districts categories. The apportionment to school district size was based on 30 percent of non-contract school buses in medium sized school districts, 70 percent of non-contracted school buses in small sized school districts, and all contractor-operated school buses in medium sized school districts. The SCAQMD then assumed that one refueling station would serve 20 vehicles for the small school districts and that a larger refueling station would serve 50 school buses for the medium sized school districts.

- For the remaining HDVs, the SCAQMD apportioned these vehicles into three fleet sizes (15 to 50 vehicles, 51 to 100 vehicles, and greater than 100 vehicles). The SCAQMD then estimated an average fleet size for each range. For the 15 to 50 fleet vehicle range, the average was 20 vehicles. For the 51 to 100 fleet vehicle range, the average was 60 vehicles. For the greater that 100 fleet vehicle range, the average was 125 vehicles. The apportionment to fleet size was based on 40 percent from 15 to 50 fleet vehicle range, 20 percent from the 51 to 100 fleet vehicle range, and 40 percent for the greater than 100 fleet vehicle range. The number of vehicles in each fleet size range was then divided by the average fleet size to estimate the number of refueling stations required.

- To estimate the PR 1194 LDVs/MDVs number of fueling sites, the SCAQMD applied that same ratio of total HDV fueling sites to total HDV vehicle population to the total LDV/MDV PR 1194 vehicle population.

The reader is referred to the attached spreadsheets for the projected number of fueling sites necessary to meet the proposed project's alternative fuel demands.

Onsite Refueling Station Construction Emissions

Number and Type of Construction Equipment

To estimate the peak daily emissions associated with the construction of the stations, the phases of construction (e.g., construction activities), the types of construction equipment, and the number of construction equipment must be determined. The SCAQMD relied on construction industry reference materials. Table F-1 lists the construction schedule and construction activities analyzed by the SCAQMD for constructing a single station of each type to determine the peak daily construction emissions. The size and number of natural gas compressors may vary from one station to another, depending on the number of vehicles that need to be refueled each day. The equipment use in Table F-1 for CNG refueling stations is the SCAQMD's estimate of the average use. Note that the activities and equipment for the LPG and LNG stations are identical.

TABLE F-1

Construction Equipment Types and Numbers

Methanol Refueling Station			
Construction Activity	**Type of Equipment**	**No. of Equip.**	**Work Crew**
Tank Excavation (Day 1)			2 Laborers
Driveway Demolition	Backhoe	1	1 Backhoe Op.
Excavation	Backhoe	1	
Concrete Removal	Backhoe	1	
Tank Degassing (Day 2)	IC Engine	1	3 Laborers
Tank Removal (Day 3)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Tank and Dispenser Installation (Day 4)			2 Laborers
All*	Backhoe	1	1 Backhoe Op.
All	Generator	1	
Backfill and Grading (Day 4)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Paving (Day 5)			2 Laborers
	Cement Truck	1	1 Truck Driver
CNG Refueling Station			
Construction Activity	**Type of Equipment**	**No. of Equip.**	**Work Crew**
Tank Excavation (Day 1)			2 Laborers
Driveway Demolition	Backhoe	1	1 Backhoe Op.
Excavation	Backhoe	1	
Concrete Removal	Backhoe	1	
Tank Degassing (Day 2)	IC Engine	1	3 Laborers
Tank Removal (Day 3)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Backfill and Grading (Day 4)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Paving (Day 5)			2 Laborers
	Cement Truck	1	1 Truck Driver
CNG System Installation (Days 6-9)			2 Laborers
Excavation for Gas Delivery Line	Backhoe	1	1 Backhoe Op./
Backfill Delivery Line	Backhoe	1	Truck Driver
Repave Delivery Line Run	Cement Truck	1	
Pour Pad for CNG System	Cement Truck	1	
CNG System Installation	Welder	1	
All	Generator	1	

TABLE F-1 (CONTINUED)

Construction Equipment Types and Numbers

LNG or LPG Refueling Station			
Construction Activity	**Type of Equipment**	**No. of Equip.**	**Work Crew**
Tank Excavation (Day 1)			2 Laborers
Driveway Demolition	Backhoe	1	1 Backhoe Op.
Excavation	Backhoe	1	
Concrete Removal	Backhoe	1	
Tank Degassing (Day 2)	IC Engine	1	3 Laborers
Tank Removal (Day 3)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Backfill and Grading (Day 4)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Paving (Day 5)			2 Laborers
	Cement Truck	1	1 Truck Driver
LPG System Installation (Day 6)			2 Laborers
Pour Pad for LPG System	Cement Truck	1	1 Truck Driver
All	Generator	1	
Electrical Recharging Station			
Construction Activity	**Type of Equipment**	**No. of Equip.**	**Work Crew**
Tank Excavation (Day 1)			2 Laborers
Driveway Demolition	Backhoe	1	1 Backhoe Op.
Excavation	Backhoe	1	
Concrete Removal	Backhoe	1	
Tank Degassing (Day 2)	IC Engine	1	3 Laborers
Tank Removal (Day 3)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Backfill and Grading (Day 4)			2 Laborers
	Backhoe	1	1 Backhoe Op.
Charger Installation (Days 5-9)			2 Laborers
Excavation for Electrical Lines	Backhoe	1	1 Backhoe Op.
Pour Islands and Mount Chargers	Cement Truck	1	1 Truck Driver
All	Generator	1	
Paving (Day 10)			2 Laborers
	Cement Truck	1	1 Truck Driver

All = Miscellaneous activities performed by the designated type of equipment.
Op = Operators

For this air quality analysis, the SCAQMD assumed that each phase of construction would occur separately and sequentially. For example, slab pouring/paving would not commence until the backfill and grading was completed. The reason for this approach was to provide a worst case analysis of peak daily emissions.

Hours of Equipment Operation

The number of hours any piece of construction equipment operates in any one day is a component in estimating the daily mass emissions from construction activities. Hours of operation for various pieces of construction equipment during the various phases of construction were estimated from previous contractor experience with similar types of construction activities. If the total hours for a single piece of equipment exceeds eight hours, a default value of eight hours per day is used.

See the appropriate attached spreadsheet for the equipment hour of operation values estimated for each construction activity for each station.

Once the SCAQMD used the aforementioned methodologies to estimate the number of pieces of construction equipment and the hours of operation of each piece of construction equipment, these values were used to determine the exhaust emissions and fugitive dust emissions generated from construction equipment associated with the proposed fleet vehicle rules. The following discussion provides the methodologies employed by the SCAQMD to determine the exhaust emissions and fugitive dust emissions generated from construction equipment.

Exhaust Emissions from Construction Equipment

The combustion of fuel, either gasoline or diesel, to provide power for the operation of various construction activities and equipment results in the generation of NOx, SOx, CO, VOC, and PM10 emissions. Heavy-duty off-road construction equipment required for tank excavation, backfill and grading, and slab pouring/paving generates exhaust emissions. The following predictive emission equations, emission factors, and default values were used by the SCAQMD to estimate exhaust emissions from each construction activity.

$$\text{Exhaust Emissions}, \frac{\text{lbs}}{\text{day}} = \text{EF} \times \text{BHP} \times \text{LF} \times \text{T}_\text{h} \times \text{Equip}$$

Where:

$\text{EF} = \text{Emission Factor for specific air contaminant}, \frac{\text{lb}}{\text{BHP-hr}}$ (See Table F – 2)

$\text{BHP} = \text{Construction Equipment Brake Horsepower}$ (See Table F - 2) **EQ. F-1**

$\text{LF} = \text{Load Factor}$ (See Table F - 3)

$\text{T}_\text{h} = \text{Hours of construction equipment operation}, \frac{\text{hrs}}{\text{day}}$ (See Table F - 1)

$\text{Equip} = \text{Number of pieces of equipment}$ (See Table F - 1)

Equation F-1 was used to estimate combustion emissions from onsite heavy-duty mobile construction equipment (e.g., backhoes, cement trucks, etc.) and onsite small portable equipment (generators, welders, etc.).

Tables F-2 and F-3 provide the emission factors and default values used by the SCAQMD in the above equations to estimate exhaust emissions generated during construction activities.

TABLE F-2

Default Exhaust Emission Factors for Specific Engines at 100% Load [a]

Equipment Type	Diesel, EF (lb/BHP-hr)					Gasoline[b], EF (lb/BHP-hr)				
	CO	VOC [c]	NO_x	SO_x	PM_{10}	CO	VOC [c]	NO_x	SO_x	PM_{10}
Backhoe	0.015	0.003	0.022	0.002	0.001					
IC Engine						0.0436	0.00165	0.0012	0.00005	0.00005
Cement Truck	0.02	0.003	0.024	0.002	0.0015					
Generator Set < 50 HP	0.011	0.002	0.018	0.002	0.001					
Welder < 50 HP	0.011	0.002	0.018	0.002	0.001					

[a] Factors are only shown for fuels used during the proposed project construction activities. All construction equipment, except ICE, is diesel fueled.
[b] Gasoline emission factors adjusted for in-use effects.
[c] VOC emission factor comprised of exhaust and refueling emission factors.
Source: Nonroad Engine and Vehicle Study Report, Table 2-07, EPA 460/3-91-02, November 1991; ICE used for tank degassing assumed to be 50% controlled by catalytic converter.

TABLE F-3

Default Ratings and Load Factors for Specific Construction Equipment [a]

Equipment Type	Diesel		Gasoline	
	Rating BHP	Load Factor (%)	Rating BHP	Load Factor (%)
Backhoe	79	46.5		
IC Engine			200	100
Cement Truck	161	62		
Welder < 50 HP	35	45		
Generator < 50 hp	22	74		

[a] Factors are only shown for fuels used during the proposed project construction activities. All construction equipment, except ICE, is diesel fueled.
Source: Nonroad Engine and Vehicle Study Report, EPA 460/3-91-02, November 1991.

Fugitive Dust (PM10) Emissions

Fugitive dust emissions generated during the construction phase can generally be classified into three major categories: demolition; site preparation (e.g., backfill and grading); and general construction. Demolition and site preparation include the use of heavy-duty construction equipment (e.g. backhoe) for excavation, concrete removal, backfill and grading, and slab pouring/paving. General construction activities entail the handling and transport of construction materials in conjunction with the actual physical installation of the equipment.

Although fugitive dust emissions from construction activities are temporary, they may have a significant impact on local air quality. Fugitive dust emissions often vary substantially from day to day, depending on the level of activity at the construction site, the specific operations, and the prevailing meteorological conditions. The following methodologies provide the predictive emission equations, emission factors, and default values used by the SCAQMD to calculate fugitive dust emissions for construction activities associated with the proposed fleet vehicle rules.

Emissions from Material Handling Activities

$$\text{Em} = \left(0.00112 \times (G/5)^{1.3} / (H/2)^{1.4}\right) \times (I/J)$$

Where:

$$\text{Em} = \text{Fugitive Dust Emissions}, \frac{\text{lbs}}{\text{day}}$$

$$\text{G} = \text{Mean Wind Speed, mph (See Table F-4)}$$

$$\text{H} = \text{Soil Moisture Content, \% (See Table F-4)}$$

$$\text{I} = \text{Dirt Handled or Stocked in Storage Pile, lbs (See Table F-4)}$$

$$\text{J} = \text{Conversion from pounds of dirt to tons of dirt, 2000}$$

EQ. F-2

Source: CEQA Handbook, Table A9-9-G, SCAQMD, 1993.

Emissions from Vehicles on Paved Roads

$$\text{Em} = 0.016 \times \left(\frac{\text{SL}}{2}\right)^{0.65} \times \left(\frac{\text{W}}{3}\right)^{1.5} \times \text{VMT}$$

Where:

$$\text{Em} = \text{Fugitive Dust Emissions}, \frac{\text{lbs}}{\text{day}}$$

$$\text{SL} = \text{Silt Loading, g/m}^2 \text{ (See Table F-4)}$$

$$\text{W} = \text{Mean Vehicle Weight, tons (See Table F-4)}$$

$$\text{VMT} = \text{Vehicle Miles Traveled}, \frac{\text{miles}}{\text{day}} \text{ (See Table F-4)}$$

EQ. F-3

Source: AP-42, Section 13.2.1, EPA, October 1997.

Emissions from Stock Pile Wind Erosion

$$\mathrm{Em} = \left(0.85 \times \left(\frac{s}{1.5}\right) \times \left(\frac{365 - \mathrm{p}}{235}\right) \times \left(\frac{\mathrm{UW}}{15}\right)\right) \times \mathrm{A}$$

Where :

Em = Fugitive Dust Emission, $\frac{\text{lbs}}{\text{day}}$

EQ. F-4

s = Material Silt Content, % (See Table F - 4)

p = Number of Days with Rain $\geq$ 0.01 inches per year (See Table F - 4)

UW = Percentage of Time That Unobstructed Wind Exceeds 12 mph (See Table F - 4)

A = Area covered by Storage Pile, acre (See Table F - 4)

Source: Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures, EPA, September 1992.

Table F-4 provides the default values used by the SCAQMD in the above equations to estimate fugitive dust emissions generated during construction activities.

TABLE F-4

Default Values Used To Estimate Fugitive Dust Construction Emissions from the Proposed Fleet Vehicle Rules

Variable	Value	Unit	Reference
Soil Silt Content, s	6.9	%	ASTM Test Method Default
Soil Moisture Content, M or H	15	%	SCAQMD 1993 CEQA Air Quality Hand Book
Soil Density, SD	2430	lbs/CY	Handbook of Solid Waste Management, Table 2.46
Mean Wind Speed, U or G	3.5	mph	A Climatological Air Quality Profile, Table XIII, SCAQMD, December 1981.
Mean Vehicle Speed, S	5	mph	SCAQMD Assumption
Mean Vehicle Weight (loaded), W			
Haul Truck	20	tons	CARB Vehicle Classifications
Cement Truck	15	tons	CARB Vehicle Classifications
Employee (light-duty trucks)	2.4	tons	CARB Vehicle Classifications
Mean Vehicle Wheels, w	4	per vehicle	SCAQMD Assumption
Silt Loading, SL	0.037	g/m^2	Final Report – Phase 1 PM10 Fugitive Dust Integration Project, Countess Environmental, July 1996.
Precipitation, p	34	inches/yr	SCAQMD Meteorological Records
Unobstructed Wind, UW	95	%	SCAQMD Assumption
Area Covered by Stockpile, A	0.018	acre	SCAQMD Assumption

Offsite Refueling Station Construction Emissions

Offsite daily construction emissions entail all emissions generated outside the project's boundaries from worker and material transport trips. The primary sources of offsite daily construction emissions and the methods of estimating emissions from these sources are discussed in the following sections.

Emissions associated with material transport trips were estimated based on the quantity of material. Work crew sizes were estimated from construction contractor experience and used to estimate emissions associated with construction workers traveling to and from the work site. The SCAQMD used the following methodology (EQ. F-5) to estimate off-site vehicle emissions.

Mobile Sources

$$\text{NOx \& CO, Em} = \left(\frac{(EF_{Run} \times TL \times Trip) + (EF_{Start} \times Start)}{453.6 \frac{g}{lb}} \right) \times \text{Vehicles}$$

$$\text{VOC, Em} = \left(\frac{(EF_{Run} \times TL \times Trip) + (EF_{Start} \times Start) + (EF_{Soak} \times Trip) + EF_{Diurnal}}{453.6 \frac{g}{lb}} \right) \times \text{Vehicles}$$

$$\text{PM10, Em} = \left(\frac{(EF_{Run} \times TL \times Trip)}{453.6 \frac{g}{lb}} \right) \times \text{Vehicles} \quad [\text{Equation used for Combustion, Brake, \& Tire Wear}]$$

Where :

$\text{Em} = \text{Exhaust Emissions}, \frac{lbs}{day}$

$EF_{Run} = \text{Running Emission Factor for specific air contaminant}, \frac{g}{mile}$ (See Table F-5)

$EF_{Start} = \text{Start-up Emission Factor for specific air contaminant}, \frac{g}{start}$ (See Table F-6)

$EF_{Soak} = \text{VOC Hot Soak Emission Factor}, \frac{g}{soak}$ (See Table F-6)

$EF_{Diurnal} = \text{VOC Diurnal Emission Factor}, \frac{g}{day}$ (See Table F-6)

$TL = \text{One-Way Trip Length}, \frac{mi}{trip}$ (See Table F-8)

Start = Number of Daily Start-ups per Vehicle (See Table F-7)

Trip = Number of Daily One-way Trips per Vehicle (See Table F-7)

Vehicles = Number of Vehicles Operated per Day (See Table F-7)

The following tables provide the emission factors and default values used by the SCAQMD in the above equations to estimate exhaust emissions generated by offsite vehicles during construction activities.

TABLE F-5

On-Road Motor Vehicle Running Emission Factors, EF_{Run}

Vehicle Type	CO g/mile	VOC g/mile	NOx g/mile	SOx g/mile	Combustion PM10 g/mile	Tire Wear PM10 g/mile	Brake Wear PM10 g/mile
Haul Truck[a]	7.20	1.22	9.20	0.00	0.67	0.04	0.01
Cement Truck[b]	6.00	0.96	6.56	0.00	0.45	0.01	0.01
Employee[c]	4.02	0.39[d]	0.78	0.00	0.00	0.01	0.01

Source: CARB's MVEIG Program, 2000 (Summertime), non-enhanced I/M
[a] Heavy-Heavy Diesel Truck, traveling at 35 mph
[b] Medium Heavy Diesel, traveling at 35 mph
[c] Light-Duty Trucks - Cat, traveling at 35 mph
[d] Includes exhaust and evaporative running losses

TABLE F-6

On-Road Motor Vehicle Start-Up Emission Factors, (EF_{Start}, EF_{Soak}, $EF_{Diurnal}$)

Vehicle	Start-Up CO[a] g/start	Start-Up VOC[a] g/start	Hot Soak VOC g/soak	Diurnal VOC[b] g/day	Start-Up NOx[b] g/start
Haul Truck (Heavy-Heavy Truck)	N/A	N/A	N/A	N/A	N/A
Cement Truck (Medium Heavy Truck)	N/A	N/A	N/A	N/A	N/A
Employee (Light-Duty Trucks - Cat)	45.70	4.08	0.62	18.96	2.42

[a] Start-up after 720 minutes
[b] Includes diurnal and resting losses

TABLE F-7

Construction Activity, Vehicle Type, Trip Length, Start-Ups and Hot Soaks

Methanol Refueling Station			
Construction Activity	**Vehicle Type**	**One-Way Trip Length, TL (miles)**	**Daily Trips/ Start-Ups/Hot Soaks**
Tank Excavation	Employee	20	6
Tank Excavation	Haul Truck	25	2
Tank Degassing	Employee	20	6
Tank Removal	Employee	20	6
Tank Removal	Haul Truck	25	2
Tank and Dispenser Installation	Employee	20	6
Tank and Dispenser Installation	Haul Truck	25	2
Backfill and Grading	Employee	20	6
Paving	Employee	20	6
Paving	Cement Truck	25	2

TABLE F-7 (CONTINUED)

Construction Activity, Vehicle Type, Trip Length, Start-Ups and Hot Soaks

CNG Refueling Station			
Construction Activity	**Vehicle Type**	**One-Way Trip Length, TL (miles)**	**Daily Trips/Start-Ups/Hot Soaks**
Tank Excavation	Employee	20	6
Tank Excavation	Haul Truck	25	2
Tank Degassing	Employee	20	6
Tank Removal	Employee	20	6
Tank Removal	Haul Truck	25	2
Backfill and Grading	Employee	20	6
Backfill and Grading	Haul Truck	25	20
Paving	Employee	20	6
Paving	Cement Truck	25	2
CNG System Installation	Employee	20	6
CNG System Installation	Cement Truck	25	2
CNG System Installation	Cement Truck	25	2
CNG System Installation	Haul Truck	25	2
CNG System Installation	Haul Truck	25	4
LPG and LNG Refueling Station			
Construction Activity	**Vehicle Type**	**One-Way Trip Length, TL (miles)**	**Daily Trips/Start-Ups/Hot Soaks**
Tank Excavation	Employee	20	6
Tank Excavation	Haul Truck	25	2
Tank Degassing	Employee	20	6
Tank Removal	Employee	20	6
Tank Removal	Haul Truck	25	2
Backfill and Grading	Employee	20	6
Backfill and Grading	Haul Truck	20	20
Paving	Employee	20	6
Paving	Cement Truck	25	2
LPG System Installation	Employee	20	6
LPG System Installation	Cement Truck	25	2
LPG System Installation	Haul Truck	25	2
Electrical Recharging Station			
Construction Activity	**Vehicle Type**	**One-Way Trip Length, TL (miles)**	**Daily Trips/Start-Ups/Hot Soaks**
Tank Excavation	Employee	20	6
Tank Excavation	Haul Truck	25	2
Tank Degassing	Employee	20	6
Tank Removal	Employee	20	6
Tank Removal	Haul Truck	25	2
Backfill and Grading	Employee	20	6
Backfill and Grading	Haul Truck	25	20
Charger Installation	Employee	20	8
Charger Installation	Haul Truck	25	8
Charger Installation	Cement Truck	25	2
Paving	Employee	20	6
Paving	Cement Truck	25	2

This approach assumes that each work crewmember drives his/her own vehicle to the construction site in the morning and back to his/her residence at the end of the day. No carpooling is assumed nor are other types of vehicle trips included (e.g., errands, lunch, etc.). Therefore, the number of vehicles driven each day is given by dividing the number of daily trips by two.

Refinery Modification Construction

At this point in time, sufficient information is unavailable that would allow the SCAQMD to ascertain in detail the type and extent of refinery process changes that may be required to produce PAR 431.2 compliant liquid fuels. To date the SCAQMD, has received conflicting information whether all refineries will need to make process changes. In fact, some refineries have publicly indicated in the context of CARB's Transit Bus Rule that they will not need to make refinery changes to produce compliant PAR 431.2 liquid fuels in sufficient quantities.

However, in order to estimate the potential "worst-case" air quality impacts with refinery modifications associated with the proposed project, the SCAQMD utilized the air quality impacts analysis contained in the Final EIR for the Mobil Torrance Refinery Reformulated Fuels Project (SCAQMD, 1994). The Mobil EIR comprehensively analyzed the environmental impacts associated with refinery modifications necessary to enable Mobil to produce gasoline that complied with federal and CARB reformulated gasoline (RFG) regulations. However, the scope of the modifications analyzed in the Mobil EIR appear to be much more extensive than the modifications expected by affected refineries that would be required 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 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 low sulfur fuels that meet the requirements of PAR 431.2.

In order to estimated the construction impacts associated with refinery modifications, the SCAQMD assumed that peak daily construction emissions during modification of a refinery 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 construct modifications that would have similar emissions. Finally, as a "worst-case," the SCAQMD assumed that the peak daily emissions from construction of modifications 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 of refinery modifications to comply with PAR 431.2 would be 1.5 times the peak daily emissions estimated for construction of modifications for 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.

OPERATIONAL EMISSIONS (UNMITIGATED)

After construction is completed, the project becomes operational. Operational emissions are produced by the operation or occupancy of a facility or structure and by both stationary and mobile sources associated with its use. Stationary emissions may result from the use of equipment associated with manufacturing processes for example. Mobile source emissions result from motor vehicles.

Direct Operational Impacts

Potential 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 increase substantially. In the context of additional employee trips, long-term direct air quality 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 alternative clean-fueled vehicles (e.g., methanol, CNG, LNG, LPG, or electricity) as well as fueling stations. Thus, the need for additional employees to perform these functions that would significantly increase the overall trips within the district is not expected to occur.

However, alternative clean 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 (California Energy Commission, 1999). This means it would take that many gallons of each of these fuels to equal one gallon of gasoline. Thus, a facility using LNG could require up to 55 percent more refilling trips than a facility currently using gasoline. Similarly, the vehicles using these fuels may need to return to the fueling station up to 55 percent more often or will need to be equipped with larger fuel tanks. Facilities converting to CNG or EV, on the other hand, will experience a decrease in material transport trips. Natural gas for CNG-fueled vehicles is delivered by pipeline, and electricity for EVs is delivered via the power grid.

Table F-8 lists the number of vehicles that the SCAQMD estimates will be replaced by methanol-, LNG-, and LPG-fueled vehicles, the estimated conventional fuel use for these vehicles, the increased fuel use for the alternative clean fuels, and the average daily increase in fuel deliveries, based on 5,000 gallons per delivery. The total estimated increase is four fuel deliveries per day. The SCAQMD assumed a vehicle weight of 30 tons, a roadway silt loading of 0.037 g/m^2 and an average round trip of 100 miles in Equations F-5 and F-6 to estimate emissions from the fuel trucks making these increased deliveries.

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 explained in Air Quality Section of Chapter 4, 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.

TABLE F-8

Increase In Fuel Delivery Trips during 2010 from the Proposed Fleet Vehicle Rules

	Fuel Type		
	Methanol	**LNG**	**LPG**
LDVs/MDVs (assumed to be currently gasoline-fueled with exception of PR 1194 vehicles)			
Number of Vehicles	450	900	450
Annual VMT per Vehicle	10,000	10,000	10,000
Gasoline Fuel Efficiency (mi/gal)	21.00	21.00	21.00
Current Annual Gasoline Use (gal)	214,286	404,762	214,286
Alternative Fuel Efficiency (mi/gal)	12.50	13.55	15.44
Annual Alternative Fuel Use (gal)	360,000	664,207	291,451
Annual Increased Fuel Use (gal)	145,714	235,635	77,165
HDVs (all assumed to be currently diesel-fueled)			
Number of Vehicles	300	1,260	765
Annual VMT per Vehicle	13,000	13,000	13,000
Diesel Fuel Efficiency (mi/gal)	4.00	4.00	4.00
Current Annual Diesel Fuel Use (gal)	975,000	4,095,000	2,486,250
Alternative Fuel Efficiency (mi/gal)	1.74	1.88	2.15
Annual Alternative Fuel Use (gal)	2,241,379	8,712,766	4,625,581
Annual Increased Fuel Use (gal)	1,266,379	4,617,766	2,139,331
Totals			
Increased Annual Fuel Use (gal)	1,412,094	4,853,401	2,216,496

Increased Daily Fuel Use (gal) (250 operating days/year)	5,648	19,414	8,866
Average Daily Increase in Fuel Deliveries at 5,000 gal each	1.1	3.9	1.8
Rounded-Up Average Daily Increase in Fuel Deliveries	2	4	2

In the context of refinery changes, 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.

Indirect Operational Impacts

The proposed fleet vehicle rules might lead to changes in fleet operations which, in turn, could lead to increased mobile source emissions. Effects of the following four changes were evaluated for:

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

These scenarios are discussed in the following subsections.

Removal of Vehicles from Service

Examples of the agencies whose services may be affected by the proposed fleet vehicle rules 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, specific cost information for all these affected entities was not readily available. Therefore, the assessment of the cost implications to affected entities for this scenario will, as a "worst-case" focus on transit buses, since their removal would translate into the most vehicles being placed back on the road as a result of the implementation of the proposed fleet vehicle rules.

Removal of school buses from service was not considered because PR 1195 will provide a financial hardship provision to alleviate the potential cost burden to school bus operators associated with alternative clean-fueled buses. This 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. It is also anticipated that other fleet operators, except some transit agencies, 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.

The analysis considered removal of transit buses from service by smaller transit districts, rather than from all affected transit agencies. The larger agencies are either currently planning on replacing their diesel-fueled buses with alternative clean-fueled buses or are prohibited from reducing service.

To estimate the maximum number of transit buses that would be removed from service, it was assumed that the transit districts would not increase capital, operating and maintenance expenditures above the amounts required to replace, operate and maintain the existing transit bus fleet with diesel-fueled buses (see the attached spreadsheets to this Appendix). The number of CNG-fueled buses that would be purchased is then estimated by:

$$N_{CNG} = N_{Fleet} (P_{Dies} + O_{Dies}) / (P_{Dies} + O_{Dies} + I_{CNG}) \qquad \textbf{EQ. F-6}$$

Where:

N_{CNG} = Number of CNG-fueled transit buses to be acquired
N_{Fleet} = Number of diesel-fueled transit buses in current fleet
P_{Dies} = Purchase price of a replacement diesel-fueled transit bus after 83 percent FTA cofunding
O_{Dies} = Lifetime operating and maintenance costs for a diesel-fueled bus
I_{CNG} = Incremental purchase and lifetime operating and maintenance costs for a CNG-fueled bus relative to a diesel-fueled bus

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 SCAQMD also assumed that transit districts would only eliminate 50 percent of this maximum number and operate the other 50 percent longer. 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 SCAQMD also assumed that transit districts would only eliminate 50 percent of this maximum number and operate the remaining portion 50 percent longer (e.g., longer vehicle turnover rate). This is consistent with the comments that the analysis 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," the analysis assumed that 77 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 SCAQMD assumed that 25 percent of the remaining passengers (e.g., 33.5 percent) would use take an earlier bus or later bus at their existing stop or a stop in the near vicinity. Based on conversations 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.

The increased private automobile travel using 1998 passenger-miles and passenger-trip data for small transit agencies within the SCAQMD's jurisdiction was estimated. Data were not available for all of the transit districts, so overall daily averages per transit bus were calculated from the available data and assumed to apply to the buses that would be removed from service. The data and calculated values used by the SCAQMD to estimate the number of transit buses that would be eliminated and the number of automobile trips added and the associated mileage are listed in Table F-9. The values in Table F-9 were used in Equation F-5 to calculate the resulting emissions. The emission factors that were used are listed in Tables F-10 and F-11.

TABLE F-9

Assumptions Used to Estimate Emissions from Elimination of Transit Buses

Item	Value
Number of diesel-fueled buses for smaller transit agencies and Prop A cities	1,150
Urban bus lifetime (years)	12
Purchase price of new diesel bus ($ per bus)	$300,000
Percent cofunded by FTA	83
Purchase price of new diesel bus after cofunding ($/bus)	$51,000
Purchase price to replace buses with new diesel-fueled buses ($ million)	$58.7
CRF for 12 year bus lifetime at 5% annual interest rate	0.113
Annualized capital cost to replace fleet with diesel-fueled buses ($ million)	$6.6
Total capital cost to replace fleet with diesel-fueled buses ($ million)	$79.5
Operating and maintenance costs for diesel-fueled bus ($/mile)	$0.56
Annual VMT per bus	40,000
Annual O&M cost per diesel-fueled bus ($/bus)	$22,400
Annual diesel-fueled bus O&M cost for fleet ($ million)	$25.8
Diesel-fueled O&M cost for diesel-fueled bus fleet over fleet lifetime ($ million)	$309.1
Total cost for diesel-fueled fleet over fleet lifetime ($ million)	$388.6
Incremental CNG-fueled bus capital and O&M costs over bus lifetime ($/bus)	$20,300
CNG-fueled bus capital and O&M costs over bus lifetime ($/bus)	$358,256
Number of CNG-fueled buses for diesel-fueled bus costs	1,084
Number of buses operated longer to accommodate shortfall (50%)	33
Number of buses removed from service to accommodate shortfall (50%)	33
Average number of buses removed from service each year	3
Annual average passenger miles per bus	384,217
Annual average passenger trips per bus	93,228
Operating days per year	365
Daily average passenger miles per bus	1,053
Daily average passenger trips per bus	255
Daily average passenger miles from buses removed from service	3,158
Daily average passenger trips from buses removed from service	766
Percent of passengers carpooling or using alternate mode of mass transit	23
Percent of remaining passengers using different bus	25
Percent of passengers making new private vehicle trips	57.75
Daily average increase in private vehicle VMT	1,824

Daily average increase in private vehicle trips	443
Daily average increase in private vehicles	222
Bus miles eliminated each day	329

TABLE F-10

Transit Bus and Automobile Running Emission Factors

Vehicle Type	**CO** g/mile	**VOC**[a] g/mile	**NOx** g/mile	**Exhaust PM10** g/mile	**Tire Wear PM10** g/mile	**Brake Wear PM10** g/mile
Transit Bus[b]	4.96	4.08	25.05	0.31	0.03	0.01
Light Duty Auto (cat)[c]	4.70	0.37	0.51	0.00	0.01	0.01

Source: CARB's MVEIG Program, 2000 (summer), non-enhanced I/M
[a] Includes exhaust and evaporative running losses
[b] Urban bus factors used for transit buses, transit bus at 10 mph
[c] Light duty auto at 25 mph

TABLE F-11

Transit Bus and Automobile Start-Up, Hot Soak and Diurnal Emission Factors

Vehicle	**Start-Up CO**[a] g/start	**Start-Up VOC**[a] g/start	**Hot Soak VOC** g/trip	**Diurnal VOC**[b] g/day	**Start-Up NOx**[a] g/start
Transit Bus	0.00	0.00	0.00	0.00	0.00
Light Duty Auto (cat)	38.82	3.44	0.59	18.96	1.57

Source: CARB's MVEIG Program, 2000 (summer), non-enhanced I/M
[a] After 720 minutes
[b] Includes diurnal and resting losses

Longer Vehicle Turnover Rate

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 assumed that longer vehicle turnover rates would only occur for HDVs, because LEV/ULEV or cleaner LDVs/MDVs should be readily available at a relatively small incremental cost. The SCAQMD conservatively assumed that 10 percent of the heavy-duty vehicle population subject to the proposed fleet vehicle rules that would be replaced each year would 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 the entire 10 percent of the vehicles were replaced each year.

Centralized Refueling

Some fleet operators may not construct their own alternative clean-fuel refueling facilities but would instead depend on centralized stations that serve multiple fleets. Use of these "off-site" refueling facilities would entail additional travel, which would cause additional emissions. In order to estimate these additional emissions, the analysis assumed that all HDVs subject to the proposed fleet vehicle rules except transit buses would travel an additional five miles for each refueling trip. The analysis estimated the daily average number of refueling trips based on estimated daily VMT and vehicle operating range. The additional emissions are then calculated by multiplying the total daily mileage listed in Table F-12 by CNG-fueled heavy-duty vehicle emission factors, which are 2.0 g/bhp-hr for NOx and 0.031 g/bhp-hr for PM10. Based on 2.6 bhp-hr/mi, these factors correspond to 5.20 and 0.08 g/mi for NOx and PM10, respectively.

TABLE F-12

Assumptions Used to Estimate Additional Emissions from Centralized Refueling (Year 2010)

Vehicle Type	Annual VMT per Vehicle	Range per Refueling (mi)	Annual Refuelings per Vehicle	Daily Avg. Refuelings per Vehicle*	VMT per Refueling	Number Vehicles Added per Year	Average Daily Refueling VMT	Daily Average Refuelings
Non-Contract School Bus	12,000	160	75	0.30	5	2,430	3,645	729
Contract School Bus	10,000	160	63	0.25	5	4,860	6,124	1,225
Other Heavy Duty	10,000	120	84	0.34	5	13,770	23,134	4,627
Total						**21,060**	**32,902**	**6,580**

Based on 250 operating days per year

Reduced Fleet Vehicle Payload

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 PR 1193.

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 this additional travel, 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.

The analysis first estimated the annual bhp-hr per vehicle by multiplying estimated annual diesel fuel use, in gallons, by the bhp-hr per gallon of diesel fuel. The increased energy use, in bhp-hr per vehicle, was then estimated by multiplying the result by eight percent. The daily average increase was estimated by dividing the estimated annual increase by 250 operating days per year. The additional emissions were then calculated by multiplying the total daily in bhp-hr in Table F-13 by CNG-fueled heavy-duty vehicle emission factors, which are 1.4 g/bhp-hr for NOx and 0.031 g/bhp-hr for PM10.

TABLE F-13

Assumptions Used to Estimate Additional Emissions from
Reduced Payload Caused by Reduced Vehicle Payload (Year 2010)

Vehicle Type	Annual Diesel Fuel Use per Vehicle (gal)	Annual bhp-hr per Vehicle with Diesel Fuel	Annual Increase in bhp-hr per Vehicle from Reduced Payload*	Daily Increase in bhp-hr per Vehicle from Reduced Payload**	Number of Vehicles	Daily Increase in bhp-hr from Reduced Payload
Refuse Collection	10,000	185,000	14,800	59.2	5,0005	296,000
Street Sweeper	7,500	138,750	11,100	44.4	700	31,080
Total						**21,060**

* Based on eight percent increase

** Based on 250 operating days per year

EMISSIONS SUMMARY (UNMITIGATED)

Proposed Fleet Vehicle Rules

Table F-14 lists the maximum daily emissions associated with the construction of each type of refueling/recharging station.

In order to estimate the peak daily emissions that would occur during construction of the stations, the analysis estimated the average number of each type of refueling/recharging station that would need to be constructed at the same time. Table F-15 lists estimated number of new stations of each type that would need to be constructed each year, the number of days to construct each station, and the number of each type that would need to be constructed simultaneously. The number is calculated by multiplying the total number needed by the number of days needed to construct each one and then dividing by 260 working days in a year.

As seen in Table F-15, there will be times 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 F-14

Summary of Daily Proposed Fleet Vehicle Rules Construction Air Quality Impacts for Individual Stations (Unmitigated)

Type of Station	CO (lbs/day)	VOC (lbs/day)	NO_x (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)

Methanol	19	3	11	1	2
Electrical	20	4	23	2	11
CNG	20	4	24	2	11
LPG or LNG	21	4	23	2	11

TABLE F-15

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*	"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**

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

Table F-16 lists the total estimated maximum daily emissions for this scenario, assuming that the days with the highest emissions from the construction of all three CNG refueling stations all occur at the same time. Table F-16 also lists the CEQA significance levels for the pollutants.

TABLE F-16

Summary of Proposed Fleet Vehicle Rules Refueling Station Construction Air Quality Impacts (Pre-mitigation)

Type of Station	Number Under Construction	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
CNG	3	61	11	71	6	34
CEQA Significance Level	-	*550*	*75*	*100*	*150*	*150*
Significant (Yes/No)	--	No	No	No	No	No

Table F-17 lists the SCAQMD's worst-case estimate of peak daily emissions during construction of refinery modifications to comply with PAR 431.2. Table F-17 also lists the CEQA significance level for the pollutants.

TABLE F-17

Summary of Proposed Fleet Vehicle Rules Refinery Modification Construction Air Quality Impacts (Pre-mitigation)

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**

Table F-18 lists the maximum daily construction and direct and indirect operational emissions associated with implementation of the proposed fleet vehicle rules for each year from 2000 through 2010. The SCAQMD assumed that:

- Alternative clean-fuel refueling station construction would occur uniformly from 2000 through 2004
- Construction of refinery modifications would occur during 2001 and 2002
- Direct and indirect operational impacts from increased fuel delivery trips, longer vehicle turnover rates and trips to centralized refueling stations would begin one year after compliance dates (e.g., during 2002)
- As a worst case, emissions from additional fuel delivery trips would be at the 2010 level for each year beginning in 2002

- Reductions in transit bus service would begin during 2003 because of a 1-1/2 to 2-year procurement period, with an additional three buses removed from service each year. The SCAQMD also anticipates that increased demand for alternative clean-fueled transit buses created by the proposed fleet vehicle rules along with increased fuel efficiencies and experience would reduce the shortfall in available funding after five years so that additional buses would not be removed after 2007.

- Indirect operational impacts from reduced vehicle payload would begin on the compliance dates

Table F-18 also lists the anticipated emissions benefits (reductions) from the proposed fleet vehicle rules during each year, the net emissions after accounting for the construction and operational emissions, the CEQA significance criteria for the emissions levels and the significance of the impacts.

TABLE F-18

Summary of Proposed Fleet Vehicle Rules Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2000	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emission Increase	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No
2001	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**95**	**659**	**50**	**58**	**513**	**570**
	Emission Benefits	**0**	**0**	**() (1,058)**	**0**	**(56)**	**0**	**(56)**

Year	Activity	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
	Net Emission Benefits	**748**	**95**	**((400)**	**50**	**2**	**513**	**515**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

TABLE F-18 (CONTINUED)

Summary of Proposed Fleet Vehicle Rules Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	306	0	17	0	17
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**97**	**1,111**	**50**	**78**	**545**	**623**
	Emission Benefits	**0**	**0**	**() (3,028)**	**0**	**() (173)**	**0**	**() (173)**
	Net Emission Benefits	**761**	**97**	**() (1,917)**	**50**	**(95)**	**545**	**450**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2003	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	391	0	27	0	27
	Centralized Refueling	0	0	845	0	1	0	1
	Transit Bus Removal	53	12	(15)	0	(0)	0	(0)
	Reduced Payload	0	0	288	0	6	0	6
	Emission Increase	**127**	**25**	**835**	**6**	**35**	**66**	**101**
	Emission Benefits	**0**	**0**	**() (3,907)**	**0**	**() (273)**	**0**	**() (273)**
	Net Emission Benefits	**127**	**25**	**() (3,073)**	**6**	**() (238)**	**66**	**() (172)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2004	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	479	0	37	0	37
	Centralized Refueling	0	0	126	0	2	0	2
	Transit Bus Removal	106	24	(30)	0	(0)	0	(0)
	Reduced Payload	0	0	393	0	9	0	9
	Emission Increase	**180**	**37**	**1,055**	**6**	**49**	**66**	**115**
	Emission Benefits	**() (401)**	**(11)**	**() (4,790)**	**0**	**() (373)**	**0**	**() (373)**

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
	Net Emission Benefits	**() (221)**	**26**	**() (3,735)**	**6**	**() (324)**	**66**	**() (258)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-18 (CONTINUED)

Summary of Proposed Fleet Vehicle Rules Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2005	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	567	0	47	0	47
	Centralized Refueling	0	0	168	0	3	0	3
	Transit Bus Removal	159	36	(45)	0	(1)	0	(1)
	Reduced Payload	0	0	498	0	11	0	11
	Emission Increase	**172**	**38**	**1,204**	**0**	**61**	**32**	**93**
	Emission Benefits	**() (782)**	**(21)**	**() (5,673)**	**0**	**() (473)**	**0**	**() (473)**
	Net Emission Benefits	**() (610)**	**17**	**() (4,469)**	**0**	**() (412)**	**32**	**() (380)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	656	0	57	0	57
	Centralized Refueling	0	0	186	0	3	0	3
	Transit Bus Removal	212	48	(60)	0	(1)	0	(1)
	Reduced Payload	0	0	603	0	13	0	13
	Emission Increase	**225**	**50**	**1,424**	**0**	**74**	**32**	**106**
	Emission Benefits	**() (1,108)**	**() (29)**	**() (6,555)**	**0**	**() (573)**	**0**	**() (573)**
	Net Emission Benefits	**() (883)**	**21**	**() (5,131)**	**0**	**() (499)**	**32**	**() (467)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	718	0	67	0	67
	Centralized Refueling	0	0	251	0	4	0	4
	Transit Bus Removal	265	60	(75)	0	(1)	0	(1)
	Reduced Payload	0	0	708	0	16	0	16
	Emission Increase	**278**	**62**	**1,618**	**0**	**87**	**32**	**119**
	Emission Benefits	**((1,414)**	**(36)**	**() (7,178)**	**0**	**() (673)**	**0**	**() (673)**

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
	Net Emission Benefits	**() (1,136)**	**26**	**() (5,560)**	**0**	**() (586)**	**32**	**() (554)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-18 (CONTINUED)

Summary of Proposed Fleet Vehicle Rules Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	780	0	77	0	77
	Centralized Refueling	0	0	293	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	813	0	18	0	18
	Emission Increase	**13**	**2**	**1,902**	**0**	**101**	**32**	**133**
	Emission Benefits	**() (1,693)**	**() (42)**	**() (7,801)**	**0**	**() (773)**	**0**	**() (773)**
	Net Emission Benefits	**() (1,680)**	**() (40)**	**() (8,899)**	**0**	**() (672)**	**32**	**() (640)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	842	0	87	0	87
	Centralized Refueling	0	0	335	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	918	0	20	0	20
	Emission Increase	**13**	**2**	**2,112**	**0**	**113**	**32**	**145**
	Emission Benefits	**() (1,927)**	**() (48)**	**() (8,424)**	**0**	**() (873)**	**0**	**() (873)**
	Net Emission Benefits	**() (1,914)**	**() (46)**	**() (6,312)**	**0**	**() (759)**	**32**	**() (727)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	897	0	96	0	96
	Centralized Refueling	0	0	377	0	6	0	6
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	1,010	0	22	0	22
	Emission Increase	**13**	**2**	**2,300**	**0**	**125**	**32**	**157**
	Emission Benefits	**() (2,132)**	**() (52)**	**() (8,973)**	**0**	**() (964)**	**0**	**() (964)**

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
	Net Emission Benefits	**() (2,119)**	**() (50)**	**() (6,672)**	**0**	**() (839)**	**32**	**() (807)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Project Alternatives

The following emission summary tables for the feasible alternatives to the proposed fleet vehicle rules are based on the same methodologies discussed above that were used to estimate the construction and operational emissions associated with the implementation of the proposed fleet vehicle rules.

Alternative A - No Project

Alternative A (No Project) would not generate any of the secondary adverse air quality impacts from construction activity needed to implement the proposed fleet vehicle rules.

Alternative B – CARB HDV Standards

Alternative B takes into account the potential affects of CARB adopting lower emissions standards for HDVs. Under this Alternative, the SCAQMD assumes that CARB will adopt its proposed Urban Bus Rule, which would go into effect in 2004. Furthermore, the SCAQMD assumes that CARB would subsequently adopt the same emission standards for all other HDVs, which would go into effect beginning 2007. All other components of Alternative B would be the same as the proposed fleet vehicle rules, including compliance dates/fleet sizes, acquisition rate, fuel scope, exemptions, etc.

In order to estimate the peak daily emissions that would occur during construction of the stations under Alternative B, the SCAQMD estimated the average number of each type of refueling/recharging station that would need to be constructed at the same time. Table F-19 lists these estimates. As seen in Table F-19, there will be times when two CNG refueling stations will be under construction at the same time. It is very unlikely however, that one of the other types of stations would be under construction at the same time. Therefore, SCAQMD estimated that the most likely peak daily emissions would occur during simultaneous construction of two CNG refueling stations.

Table F-20 lists the total estimated maximum daily emissions for this scenario, assuming that the days with the highest emissions from the construction of the two CNG refueling stations occur at the same time. Table F-20 also lists the CEQA significance levels for the pollutants.

TABLE F-19

New Fueling Stations Anticipated from Implementation of Alternative B

Station Type	No. of Stations Converted per Year	Days per Conversion	Average No. of Conversions per Day*	"Worst-Case" Simultaneous Conversions per Day
Methanol	1	5	0.02	0
CNG	33	10	1.27	2
LNG	3	9	0.10	0
LPG	2	6	0.05	0
Electrical	3	6	0.07	0
Total	**42**	**--**	**1.51**	**2**

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

TABLE F-20

Summary of Alternative B Refueling Station Construction
Air Quality Impacts (Pre-mitigation)

Type of Station	Number Under Construction	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
CNG	2	41	8	47	4	23
CEQA Significance Level		*550*	*75*	*100*	*150*	*150*
Significant (Yes/No)		No	No	No	No	No

Alternative B does not alter the provisions of PAR 431.2, so emissions from construction of refinery modifications would be the same as for the proposed fleet vehicle rules. See Table F-17.

The SCAQMD estimated that Alternative B would affect a total of 200 transit buses. This is 5.4 percent of the transit buses subject to the proposed fleet vehicle rules. Multiplying the 1,200 small transit district city transit buses subject to the proposed fleet vehicle rules by 5.4 percent gives a total of 65 transit buses operated by these transit agencies that would be subject to Alternative B. Using the same analysis as for the proposed fleet vehicle rules, the SCAQMD estimated that a total of two buses might be removed from service to accommodate the incremental costs associated with Alternative B, or an average of less than one transit bus per year. The SCAQMD therefore concluded that the indirect air quality impacts from loss of transit bus service would be negligible for Alternative B.

The total numbers of vehicles that would be replaced with methanol, LNG and LPG-fueled vehicles that were used to calculate additional fuel delivery trips are presented in Chapter 5.

The indirect impacts from increased refuse collection vehicle and street sweeper VMT caused by loss of payload would be the same under Alternative B as for the proposed fleet vehicle rules (see Table F-13).

Table F-21 lists the maximum daily emissions and air quality benefits (emissions reductions) for Alternative B by year from 2000 through 2010.

TABLE F-21

Summary of Alternative B Operational Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2000	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emissions Increase	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**728**	**92**	**635**	**48**	**58**	**502**	**559**
	Emission Benefits	**0**	**0**	**(1,058)**	**0**	**(56)**	**0**	**(56)**
	Net Emission Benefits	**728**	**92**	**(424)**	**48**	**2**	**502**	**504**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	303	0	17	0	17
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**736**	**93**	**1,081**	**48**	**78**	**521**	**599**
	Emission Benefits	**0**	**0**	**(3,028)**	**0**	**(173)**	**0**	**(173)**

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
	Net Emission Benefits	**736**	**93**	**(1,947)**	**48**	**(95)**	**521**	**426**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

TABLE F-21 (CONTINUED)

Summary of Alternative B Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2003	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	391	0	27	0	27
	Centralized Refueling	0	0	84	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	288	0	6	0	6
	Emission Increase	**49**	**9**	**820**	**4**	**36**	**42**	**78**
	Emission Benefits	**0**	**0**	**(3,907)**	**0**	**(273)**	**0**	**(273)**
	Net Emission Benefits	**49**	**9**	**(3,088)**	**4**	**(238)**	**42**	**(196)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2004	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	479	0	37	0	37
	Centralized Refueling	0	0	126	0	2	0	2
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	393	0	9	0	9
	Emission Increase	**46**	**9**	**1,055**	**4**	**49**	**42**	**91**
	Emission Benefits	**(401)**	**(11)**	**(4,790)**	**0**	**(373)**	**0**	**(373)**
	Net Emission Benefits	**(352)**	**(2)**	**(3,735)**	**4**	**(324)**	**42**	**(282)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2005	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	567	0	47	0	47
	Centralized Refueling	0	0	168	0	3	0	3
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	498	0	11	0	11
	Emission Increase	**8**	**1**	**1,243**	**0**	**62**	**19**	**81**
	Emission Benefits	**(782)**	**(21)**	**(5,673)**	**0**	**(473)**	**0**	**(473)**
	Net Emission Benefits	**(774)**	**(20)**	**(4,430)**	**0**	**(411)**	**19**	**(392)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-21 (CONTINUED)

Summary of Alternative B Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	656	0	57	0	57
	Centralized Refueling	0	0	210	0	3	0	3
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	603	0	13	0	13
	Emission Increase	**8**	**1**	**1,478**	**0**	**75**	**19**	**94**
	Emission Benefits	**(1,108)**	**(29)**	**(6,555)**	**0**	**(573)**	**0**	**(573)**
	Net Emission Benefits	**(1,100)**	**(28)**	**(5,077)**	**0**	**(498)**	**19**	**(479)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	670	0	58	0	58
	Centralized Refueling	0	0	251	0	4	0	4
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	708	0	16	0	16
	Emission Increase	**8**	**1**	**1,639**	**0**	**79**	**19**	**98**
	Emission Benefits	**(1,414)**	**(36)**	**(6,697)**	**0**	**(580)**	**0**	**(580)**
	Net Emission Benefits	**(1,406)**	**(35)**	**(5,058)**	**0**	**(501)**	**19**	**(482)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	670	0	59	0	59
	Centralized Refueling	0	0	293	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	813	0	18	0	18
	Emission Increase	**8**	**1**	**1,786**	**0**	**82**	**19**	**101**
	Emission Benefits	**(1,693)**	**(42)**	**(6,698)**	**0**	**(587)**	**0**	**(587)**
	Net Emission Benefits	**(1,685)**	**(41)**	**(4,912)**	**0**	**(505)**	**19**	**(486)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-21 (CONTINUED)

Summary of Alternative B Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	670	0	59	0	59
	Centralized Refueling	0	0	335	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	918	0	20	0	20
	Emission Increase	**8**	**1**	**1,933**	**0**	**86**	**19**	**105**
	Emission Benefits	**(1,927)**	**(48)**	**(6,698)**	**0**	**(594)**	**0**	**(594)**
	Net Emission Benefits	**(1,919)**	**(47)**	**(4,765)**	**0**	**(508)**	**19**	**(489)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	663	0	59	0	59
	Centralized Refueling	0	0	377	0	6	0	6
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	1,010	0	22	0	22
	Emission Increase	**8**	**1**	**2,060**	**0**	**88**	**19**	**107**
	Emission Benefits	**(2,132)**	**(52)**	**(6,626)**	**0**	**(592)**	**0**	**(592)**
	Net Emission Benefits	**(2,124)**	**(51)**	**(,566)**	**0**	**(504)**	**19**	**(485)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative C – Delay Rule Implementation Dates by One Year

Alternative C is identical to the proposed fleet vehicle rules, except that the implementation dates of the rule would be one year later for all affected vehicle categories. This has the effect of shifting the construction- and operational related air quality impacts forward one year. However, starting in 2003 when the 15 or greater but less than 99 vehicle category is in effect, assuming a constant turnover rate for all subsequent years, the number of clean-fuel fueling stations that need to be built will be approximately the same as the proposed fleet vehicle rules, but construction will begin one year later with peak daily emissions the same as for the proposed fleet vehicle rules (Table F-16).

Operational emissions for Alternative C will be the same as for the proposed fleet vehicle rules, with the exception of emissions from longer vehicle turnover rates, because the emissions benefits from Alternative C are lower than for the proposed fleet vehicle rules. Table F-22 summarizes peak daily emissions and emissions benefits (emissions reductions) for Alternative C by year from 2001 through 2010.

TABLE F-22

Summary of Alternative C Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2001	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emission Increase	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**95**	**659**	**50**	**58**	**513**	**570**
	Emission Benefits	**0**	**0**	**(811)**	**0**	**(56)**	**0**	**(56)**
	Net Emission Benefits	**748**	**95**	**(152)**	**50**	**2**	**513**	**515**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2003	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	162	0	15	0	15
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**97**	**970**	**50**	**76**	**545**	**621**
	Emission Benefits	**0**	**0**	**(1,167)**	**0**	**(147)**	**0**	**(147)**

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
	Net Emission Benefits	**761**	**97**	**(647)**	**50**	**(71)**	**545**	**474**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

TABLE F-22 (CONTINUED)

Summary of Alternative C Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2004	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	250	0	25	0	25
	Centralized Refueling	0	0	84	0	1	0	1
	Transit Bus Removal	53	12	(15)	0	(0)	0	(0)
	Reduced Payload	0	0	288	0	6	0	6
	Emission Increase	**127**	**25**	**694**	**6**	**33**	**66**	**99**
	Emission Benefits	**(401)**	**(11)**	**(2,500)**	**0**	**(247)**	**0**	**(247)**
	Net Emission Benefits	**(274)**	**14**	**(1,806)**	**6**	**(214)**	**66**	**(148)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2005	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	338	0	35	0	35
	Centralized Refueling	0	0	126	0	2	0	2
	Transit Bus Removal	106	24	(30)	0	(0)	0	(0)
	Reduced Payload	0	0	393	0	9	0	9
	Emission Increase	**180**	**37**	**914**	**6**	**46**	**66**	**112**
	Emission Benefits	**(782)**	**(21)**	**(2,492)**	**0**	**(347)**	**0**	**(347)**
	Net Emission Benefits	**(602)**	**16**	**(2,468)**	**6**	**(301)**	**66**	**(235)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	426	0	45	0	45
	Centralized Refueling	0	0	168	0	3	0	3
	Transit Bus Removal	159	36	(45)	0	(1)	0	(1)
	Reduced Payload	0	0	498	0	11	0	11
	Emission Increase	**172**	**38**	**1,063**	**0**	**59**	**32**	**91**
	Emission Benefits	**(1,108)**	**(29)**	**(4,265)**	**0**	**(447)**	**0**	**(447)**
	Net Emission Benefits	**(936)**	**9**	**(3,202)**	**0**	**(388)**	**32**	**(356)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-22 (CONTINUED)

Summary of Alternative C Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	489	0	55	0	55
	Centralized Refueling	0	0	210	0	3	0	3
	Transit Bus Removal	212	48	(60)	0	(1)	0	(1)
	Reduced Payload	0	0	603	0	13	0	13
	Emission Increase	**225**	**50**	**1,257**	**0**	**71**	**32**	**103**
	Emission Benefits	**(1,414)**	**(36)**	**(4,888)**	**0**	**(547)**	**0**	**(547)**
	Net Emission Benefits	**(1,189)**	**14**	**(3,630)**	**0**	**(476)**	**32**	**(444)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	551	0	65	0	65
	Centralized Refueling	0	0	251	0	4	0	4
	Transit Bus Removal	265	60	(75)	0	(1)	0	(1)
	Reduced Payload	0	0	708	0	16	0	16
	Emission Increase	**278**	**62**	**1,452**	**0**	**84**	**32**	**117**
	Emission Benefits	**(1,693)**	**(42)**	**(5,511)**	**0**	**(647)**	**0**	**(647)**
	Net Emission Benefits	**(1,415)**	**20**	**(4,059)**	**0**	**(562)**	**32**	**(530)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	613	0	75	0	75
	Centralized Refueling	0	0	293	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	813	0	18	0	18
	Emission Increase	**13**	**2**	**1,736**	**0**	**98**	**32**	**130**
	Emission Benefits	**(1,927)**	**(48)**	**(6,133)**	**0**	**(747)**	**0**	**(747)**
	Net Emission Benefits	**(1,914)**	**(46)**	**(4,398)**	**0**	**(648)**	**32**	**(616)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-22 (CONTINUED)

Summary of Alternative C Operational Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	676	0	85	0	85
	Centralized Refueling	0	0	335	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	918	0	20	0	20
	Emission Increase	**13**	**2**	**1,945**	**0**	**111**	**32**	**143**
	Emission Benefits	**(2,132)**	**(52)**	**(6,756)**	**0**	**(846)**	**0**	**(8 46)**
	Net Emission Benefits	**(2,119)**	**(50)**	**(4,811)**	**0**	**(736)**	**32**	**(704)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative D – Minimum Fleet Size is ≥ 50 Vehicles

Alternative D is identical to the proposed fleet vehicle rules, except the fleet size cut-off for government and certain affected private sector fleets is 50 vehicles or greater. Table F-23 lists the SCAQMD's estimates of the number of refueling stations that will be constructed each year, and Table F-24 lists the resulting worst-case peak daily emissions.

TABLE F-23

New Fueling Stations Anticipated from Implementation of Alternative D

Station Type	No. of Stations Converted per Year	Days per Conversion	Average No. of Conversions per Day*	"Worst-Case" Simultaneous Conversions per Day
Methanol	1	5	0.02	
CNG	48	10	1.85	2
LNG	3	9	0.10	0
LPG	3	6	0.07	
Electrical	2	6	0.05	
Total	**57**	**--**	**2.08**	

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

TABLE F-24

Summary of Alternative D Refueling Station Construction
Air Quality Impacts (Pre-mitigation)

Type of Station	Number Under Construction	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
CNG	2	41	8	47	4	23
CEQA Significance Level		*550*	*75*	*100*	*150*	*150*
Significant (Yes/No)		No	No	No	No	No

Alternative D does not alter the provisions of PAR 431.2, so emissions from construction of refinery modifications would be the same as for the proposed fleet vehicle rules. See Table F-17.

The SCAQMD estimated that a total of 3,600 transit buses would be subject to Alternative D, which is only slightly lower than the number that would be subject to the proposed fleet vehicle rules. Therefore, as a worst case, the SCAQMD assumed the indirect impacts from removal of transit buses from service would be that same as for the proposed fleet vehicle rules.

Table F-25 lists the maximum daily emissions and emissions benefits (emissions reductions) for Alternative D by year from 2000 through 2010.

TABLE F-25

Summary of Alternative D Operational Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2000	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emission Increase	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-25 (CONTINUED)

Summary of Alternative D Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	73	0	2	0	2
	Emission Increase	**728**	**92**	**617**	**48**	**58**	**502**	**55 9**
	Emission Benefits	**0**	**0**	**(892)**	**0**	**(47)**	**0**	**(47)**
	Net Emission Benefits	**728**	**92**	**(276)**	**48**	**10**	**502**	**512**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	262	0	15	0	15
	Centralized Refueling	0	0	39	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	146	0	3	0	3
	Emission Increase	**741**	**94**	**1,006**	**48**	**75**	**534**	**6 09**
	Emission Benefits	**0**	**0**	**(2,616)**	**0**	**(151)**	**0**	**(151)**
	Net Emission Benefits	**741**	**94**	**(1,610)**	**48**	**(76)**	**534**	**458**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2003	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	13	0	1	32	33
	Longer Turnover Rate	0	0	339	0	24	0	24
	Centralized Refueling	0	0	77	0	1	0	1
	Transit Bus Removal	53	12	(15)	0	(0)	0	(0)
	Reduced Payload	0	0	233	0	5	0	5
	Emission Increase	**107**	**22**	**697**	**4**	**31**	**55**	**86**
	Emission Benefits	**0**	**0**	**(3,392)**	**0**	**(236)**	**0**	**(236)**
	Net Emission Benefits	**107**	**22**	**(2,694)**	**4**	**(206)**	**55**	**(151)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-25 (CONTINUED)

Summary of Alternative D Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2004	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	417	0	32	0	32
	Centralized Refueling	0	0	116	0	2	0	2
	Transit Bus Removal	106	24	(30)	0	(0)	0	(0)
	Reduced Payload	0	0	320	0	7	0	7
	Emission Increase	**160**	**34**	**886**	**4**	**42**	**55**	**97**
	Emission Benefits	**(364)**	**(10)**	**(4,171)**	**0**	**(322)**	**0**	**(322)**
	Net Emission Benefits	**(204)**	**24**	**(3,285)**	**4**	**(281)**	**55**	**(226)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2005	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	495	0	41	0	41
	Centralized Refueling	0	0	154	0	2	0	2
	Transit Bus Removal	159	36	(45)	0	(1)	0	(1)
	Reduced Payload	0	0	407	0	9	0	9
	Emission Increase	**172**	**38**	**1,027**	**0**	**53**	**32**	**85**
	Emission Benefits	**(710)**	**(19)**	**(4,949)**	**0**	**(408)**	**0**	**(408)**
	Net Emission Benefits	**(538)**	**19**	**(3,922)**	**0**	**(355)**	**32**	**(323)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	573	0	49	0	49
	Centralized Refueling	0	0	193	0	3	0	3
	Transit Bus Removal	212	48	(60)	0	(1)	0	(1)
	Reduced Payload	0	0	493	0	11	0	11
	Emission Increase	**225**	**50**	**1,215**	**0**	**63**	**32**	**96**
	Emission Benefits	**(1,006)**	**(27)**	**(5,728)**	**0**	**(494)**	**0**	**(494)**
	Net Emission Benefits	**(781)**	**23**	**(4,513)**	**0**	**(430)**	**32**	**(398)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-25 (CONTINUED)

Summary of Alternative D Operational Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	625	0	58	0	58
	Centralized Refueling	0	0	232	0	4	0	4
	Transit Bus Removal	265	60	(75)	0	(1)	0	(1)
	Reduced Payload	0	0	580	0	13	0	13
	Emission Increase	**278**	**62**	**1,377**	**0**	**74**	**32**	**107**
	Emission Benefits	**(1,284)**	**(33)**	**(6,247)**	**0**	**(579)**	**0**	**(579)**
	Net Emission Benefits	**(1,006)**	**29**	**(4,870)**	**0**	**(505)**	**32**	**(473)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	677	0	67	0	67
	Centralized Refueling	0	0	270	0	4	0	4
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	667	0	15	0	15
	Emission Increase	**13**	**2**	**1,630**	**0**	**87**	**32**	**119**
	Emission Benefits	**(1,537)**	**(38)**	**(6,766)**	**0**	**(665)**	**0**	**(665)**
	Net Emission Benefits	**(1,524)**	**(36)**	**(5,137)**	**0**	**(578)**	**32**	**(546)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	729	0	75	0	75
	Centralized Refueling	0	0	309	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	754	0	17	0	17
	Emission Increase	**13**	**2**	**1,807**	**0**	**98**	**32**	**130**
	Emission Benefits	**(1,749)**	**(43)**	**(7,285)**	**0**	**(751)**	**0**	**(751)**
	Net Emission Benefits	**(1,736)**	**(41)**	**(5,478)**	**0**	**(653)**	**32**	**(621)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-25 (CONTINUED)

Summary of Alternative D Operational Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	773	0	83	0	83
	Centralized Refueling	0	0	347	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	827	0	18	0	18
	Emission Increase	**13**	**2**	**1,693**	**0**	**107**	**32**	**139**
	Emission Benefits	**(1,935)**	**(47)**	**(7,731)**	**0**	**(828)**	**0**	**(828)**
	Net Emission Benefits	**(1,922)**	**(45)**	**(5,767)**	**0**	**(721)**	**32**	**(689)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative E – Acquisition Rate

Under Alternative E, starting on the same implementation dates as the proposed fleet vehicle rules, the fleet vehicle acquisition rate for affected fleet operators is 50 percent. Two years later the acquisition rate becomes 100 percent.

Alternative E has the effect of delaying when some alternative clean-fuel fueling stations are built since the acquisition rate of vehicles is less than under the proposed fleet vehicle rules in the near-term. However, two years after rule adoption, when the acquisition rate becomes 100 percent, assuming a constant turnover rate for all subsequent years, the number of clean-fuel fueling stations that need to be built and the resulting construction emissions will be the same as for the proposed fleet vehicle rules (see Table F-16).

Peak daily operational emissions will be the same as the proposed fleet vehicle rules with the exception of indirect impacts from longer vehicle turnover rates because the air quality benefits for Alternative E are not the same as for the proposed fleet vehicle rules. Table F-26 summarizes peak daily emissions and emissions benefits (e.g., emissions reductions) for Alternative E for each year from 2000 through 2010.

TABLE F-26

Summary of Alternative E Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2000	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emission Increase	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**61**	**11**	**71**	**6**	**0**	**34**	**34**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No
2001	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**95**	**659**	**50**	**58**	**513**	**570**
	Emission Benefits	**0**	**0**	**(529)**	**0**	**(28)**	**0**	**(28)**
	Net Emission Benefits	**748**	**95**	**129**	**50**	**30**	**513**	**543**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	**Yes**	No			**Yes**
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	151	0	9	0	9
	Centralized Refueling	0	0	21	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**97**	**939**	**50**	**69**	**545**	**614**
	Emission Benefits	**0**	**0**	**(1,514)**	**0**	**(87)**	**0**	**(87)**
	Net Emission Benefits	**761**	**97**	**(575)**	**50**	**(17)**	**545**	**528**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

TABLE F-26 (CONTINUED)

Summary of Alternative E Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2003	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	211	0	16	0	16
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	53	12	(15)	0	(0)	0	(0)
	Reduced Payload	0	0	288	0	6	0	6
	Emission Increase	**127**	**25**	**612**	**6**	**24**	**66**	**90**
	Emission Benefits	**0**	**0**	**(2,106)**	**0**	**(165)**	**0**	**(165)**
	Net Emission Benefits	**127**	**25**	**(1,493)**	**6**	**(141)**	**66**	**(75)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2004	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	295	0	26	0	26
	Centralized Refueling	0	0	84	0	1	0	1
	Transit Bus Removal	106	24	(30)	0	(0)	0	(0)
	Reduced Payload	0	0	393	0	9	0	9
	Emission Increase	**180**	**37**	**, ,29**	**6**	**37**	**66**	**103**
	Emission Benefits	**(401)**	**(11)**	**(2,952)**	**0**	**(260)**	**0**	**(260)**
	Net Emission Benefits	**(221)**	**26**	**(2,123)**	**6**	**(223)**	**66**	**(157)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2005	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	383	0	36	0	36
	Centralized Refueling	0	0	126	0	2	0	2
	Transit Bus Removal	159	36	(45)	0	(1)	0	(1)
	Reduced Payload	0	0	498	0	11	0	11
	Emission Increase	**172**	**38**	**978**	**0**	**49**	**32**	**81**
	Emission Benefits	**(782)**	**(21)**	**(3,834)**	**0**	**(360)**	**0**	**(360)**
	Net Emission Benefits	**(610)**	**17**	**(2,856)**	**0**	**(311)**	**32**	**(279)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-26 (CONTINUED)

Summary of Alternative E Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	472	0	46	0	46
	Centralized Refueling	0	0	168	0	3	0	3
	Transit Bus Removal	212	48	(60)	0	(1)	0	(1)
	Reduced Payload	0	0	603	0	13	0	13
	Emission Increase	**225**	**50**	**1,198**	**0**	**62**	**32**	**94**
	Emission Benefits	**(1,108)**	**(29)**	**(4,717)**	**0**	**(460)**	**0**	**(460)**
	Net Emission Benefits	**(883)**	**21**	**(3,519)**	**0**	**(398)**	**32**	**(366)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	534	0	56	0	56
	Centralized Refueling	0	0	210	0	3	0	3
	Transit Bus Removal	265	60	(75)	0	(1)	0	(1)
	Reduced Payload	0	0	708	0	16	0	16
	Emission Increase	**278**	**62**	**1,393**	**0**	**75**	**32**	**107**
	Emission Benefits	**(1,414)**	**(36)**	**(5,340)**	**0**	**(560)**	**0**	**(560)**
	Net Emission Benefits	**(1,136)**	**26**	**(3,948)**	**0**	**(485)**	**32**	**(452)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-26 (CONTINUED)

Summary of Alternative E Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	596	0	66	0	66
	Centralized Refueling	0	0	251	0	4	0	4
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	813	0	18	0	18
	Emission Increase	**13**	**2**	**1,677**	**0**	**89**	**32**	**121**
	Emission Benefits	**(1,693)**	**(42)**	**(5,963)**	**0**	**(660)**	**0**	**(660)**
	Net Emission Benefits	**(1,680)**	**(40)**	**(4,286)**	**0**	**(571)**	**32**	**(539)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	659	0	76	0	76
	Centralized Refueling	0	0	293	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	918	0	20	0	20
	Emission Increase	**13**	**2**	**1,886**	**0**	**102**	**32**	**134**
	Emission Benefits	**(1,927)**	**(48)**	**(6,586)**	**0**	**(760)**	**0**	**(760)**
	Net Emission Benefits	**(1,914)**	**(46)**	**(4,700)**	**0**	**(658)**	**32**	**(626)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	717	0	86	0	86
	Centralized Refueling	0	0	335	0	5	0	5
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	1,010	0	22	0	22
	Emission Increase	**13**	**2**	**2,078**	**0**	**114**	**32**	**146**
	Emission Benefits	**(2,132)**	**(52)**	**(7,171)**	**0**	**(855)**	**0**	**(855)**
	Net Emission Benefits	**(2,119)**	**(50)**	**(5,093)**	**0**	**(742)**	**32**	**(710)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative F – School Buses

Alternative F, with the exception of exclusion of school buses, would target the same vehicle population as the proposed fleet vehicle rules. Specifically, PR 1195 would not be adopted. Table F-27 lists the SCAQMD's estimates of the number of refueling stations that will be constructed each year, and Table F-28 lists the resulting worst-case peak daily emissions.

TABLE F-27

New Fueling Stations Anticipated from Implementation of Alternative F

Station Type	No. of Stations Converted per Year	Days per Conversion	Average No. of Conversions per Day*	"Worst-Case" Simultaneous Conversions per Day
Methanol	1	5	0.02	0
CNG	37	10	1.42	2
LNG	3	9	0.10	0
LPG	3	6	0.07	0
Electrical	2	6	0.05	0
Total	**46**	**--**	**1.66**	**2**

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

TABLE F-28

Summary of Alternative F Refueling Station Construction
Air Quality Impacts (Pre-mitigation)

Type of Station	Number Under Construction	CO (lbs/day)	VOC (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)
CNG	2	41	8	47	4	23
CEQA Significance Level		*550*	*75*	*100*	*150*	*150*
Significant (Yes/No)		No	No	No	No	No

Alternative F does not alter the provisions of PAR 431.2, so emissions from construction of refinery modifications would be the same as for the proposed fleet vehicle rules. See Table F-16.

Because Alternative F has the same effect on transit buses as the proposed fleet vehicle rules, the impacts from removal of transit buses from service will be the same as for the proposed project. Table F-29 lists the maximum daily emissions and emissions benefits (emissions reductions) for Alternative F by year from 2000 through 2010.

TABLE F-29

Summary of Alternative F Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2000	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	0	0	0	0	0
	Emission Increase	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Emission Benefits	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Net Emission Benefits	**41**	**8**	**47**	**4**	**0**	**23**	**23**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	No	No	No	No			No
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**728**	**92**	**635**	**48**	**58**	**502**	**559**
	Emission Benefits	**0**	**0**	**(838)**	**0**	**(42)**	**0**	**(42)**
	Net Emission Benefits	**728**	**92**	**(204)**	**48**	**15**	**502**	**517**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	151	0	9	0	9
	Centralized Refueling	0	0	29	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**738**	**94**	**1,030**	**48**	**76**	**525**	**601**
	Emission Benefits	**0**	**0**	**(2,619)**	**0**	**(146)**	**0**	**(146)**
	Net Emission Benefits	**738**	**94**	**(1,589)**	**48**	**(71)**	**525**	**454**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

TABLE F-29 (CONTINUED)

Summary of Alternative F Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2003	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	211	0	16	0	14
	Centralized Refueling	0	0	59	0	1	0	1
	Transit Bus Removal	53	12	(15)	0	(0)	0	(0)
	Reduced Payload	0	0	288	0	6	0	6
	Emission Increase	**104**	**22**	**738**	**4**	**31**	**46**	**77**
	Emission Benefits	**0**	**0**	**(3,470)**	**0**	**(233)**	**0**	**(233)**
	Net Emission Benefits	**104**	**22**	**(2,732)**	**4**	**(202)**	**46**	**(156)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2004	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	295	0	26	0	26
	Centralized Refueling	0	0	88	0	1	0	1
	Transit Bus Removal	106	24	(30)	0	(0)	0	(0)
	Reduced Payload	0	0	393	0	9	0	9
	Emission Increase	**157**	**34**	**943**	**4**	**43**	**46**	**89**
	Emission Benefits	**(401)**	**(11)**	**(4,323)**	**0**	**(319)**	**0**	**(319)**
	Net Emission Benefits	**(244)**	**23**	**(3,380)**	**4**	**(276)**	**46**	**(230)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2005	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	383	0	36	0	36
	Centralized Refueling	0	0	118	0	2	0	2
	Transit Bus Removal	159	36	(45)	0	(1)	0	(1)
	Reduced Payload	0	0	498	0	11	0	11
	Emission Increase	**169**	**38**	**1,100**	**0**	**54**	**23**	**77**
	Emission Benefits	**(782)**	**(21)**	**(5,176)**	**0**	**(405)**	**0**	**(405)**
	Net Emission Benefits	**(613)**	**17**	**(4,076)**	**0**	**(352)**	**23**	**(329)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-29 (CONTINUED)

Summary of Alternative F Air Quality Impacts (Pre-mitigation)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2006	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	472	0	46	0	46
	Centralized Refueling	0	0	147	0	2	0	2
	Transit Bus Removal	212	48	(60)	0	(1)	0	(1)
	Reduced Payload	0	0	603	0	13	0	13
	Emission Increase	**222**	**50**	**1,305**	**0**	**65**	**23**	**88**
	Emission Benefits	**(1,108)**	**(29)**	**(6,030)**	**0**	**(492)**	**0**	**(492)**
	Net Emission Benefits	**(886)**	**21**	**(4,724)**	**0**	**(427)**	**23**	**(404)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2007	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	534	0	56	0	56
	Centralized Refueling	0	0	177	0	3	0	3
	Transit Bus Removal	265	60	(75)	0	(1)	0	(1)
	Reduced Payload	0	0	708	0	16	0	16
	Emission Increase	**275**	**62**	**1,484**	**0**	**76**	**23**	**100**
	Emission Benefits	**(1,414)**	**(36)**	**(6,623)**	**0**	**(578)**	**0**	**(578)**
	Net Emission Benefits	**(1,139)**	**26**	**(5,139)**	**0**	**(502)**	**23**	**(478)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2008	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	596	0	66	0	66
	Centralized Refueling	0	0	206	0	3	0	3
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	813	0	18	0	18
	Emission Increase	**10**	**2**	**1,753**	**0**	**89**	**23**	**112**
	Emission Benefits	**(1,693)**	**(42)**	**(7,217)**	**0**	**(664)**	**0**	**(664)**
	Net Emission Benefits	**(1,683)**	**(40)**	**(5,464)**	**0**	**(576)**	**23**	**(553)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

TABLE F-29 (CONTINUED)

Summary of Alternative F Air Quality Impacts (Pre-mitigation)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2009	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	659	0	76	0	76
	Centralized Refueling	0	0	236	0	4	0	4
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	918	0	20	0	20
	Emission Increase	**10**	**2**	**1,947**	**0**	**100**	**23**	**123**
	Emission Benefits	**(1,927)**	**(48)**	**(7,810)**	**0**	**(751)**	**0**	**(751)**
	Net Emission Benefits	**(1,917)**	**(46)**	**(5,863)**	**0**	**(651)**	**23**	**(628)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No
2010	Refueling Construction	0	0	0	0	0	0	0
	Refinery Construction	0	0	0	0	0	0	0
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	717	0	86	0	86
	Centralized Refueling	0	0	265	0	4	0	4
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	1,010	0	22	0	22
	Emission Increase	**10**	**2**	**2120**	**0**	**110**	**23**	**133**
	Emission Benefits	**(2,132)**	**(52)**	**(8,330)**	**0**	**(829)**	**0**	**(829)**
	Net Emission Benefits	**(2,122)**	**(50)**	**(6,210)**	**0**	**(719)**	**11**	**(696)**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	No	No	No	No			No

Values in parentheses () represent air quality benefits (e.g., emission reductions).

EMISSIONS SUMMARY (MITIGATED)

Proposed Fleet Vehicle Rules

As indicated in the previous summary tables, construction of refinery modifications to comply with PAR 431.2 may have significant unmitigated air quality impacts. However, emissions from construction of alternative clean-fuel refueling stations and operational emissions for the proposed fleet vehicle rules and for the alternatives are not anticipated to exceed CEQA significance levels, so mitigation of these emissions is not required.

The emissions from construction 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 these sources.

Table F-30 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."

TABLE F-30

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[b]	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)

[b] Health and Safety Code §40929 prohibits the air districts and other public agencies from requiring an employee trip reduction program making such mitigation infeasible. No feasible measures have been identified to reduce emissions from this source.

Table F-31 presents a summary of mitigated refinery modifications construction emissions for PAR 431.2. 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 F-31

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*** 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
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**

* Includes compliance with SCAQMD Rule 403

Table F-32 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions during the two years when construction of refinery operations is assumed to occur (2001 and 2002). The net NOx emissions benefits from the proposed fleet vehicle rules are below the significance criterion, but CO, VOC and PM_{10} emissions are significant.

TABLE F-32

Summary of Proposed Fleet Vehicle Rules Air Quality Impacts
During Periods of Refinery Modifications Construction (Mitigated)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2001	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**92**	**639**	**48**	**55**	**235**	**290**
	Emission Benefits	**0**	**0**	**(1,058)**	**0**	**(56)**	**0**	**(56)**
	Net Emission Benefits	**748**	**92**	**(419)**	**48**	**(1)**	**235**	**235**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	303	0	17	0	17
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**94**	**1,092**	**48**	**76**	**267**	**343**
	Emission Benefits	**0**	**0**	**(3,028)**	**0**	**(173)**	**0**	**(173)**
	Net Emission Benefits	**761**	**94**	**(1,936)**	**48**	**(97)**	**267**	**170**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Project Alternatives

Alternative B – CARB HDV Standards

Table F-33 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions for Alternative B during the two years when construction of refinery modifications is assumed to occur (2001 and 2002).

TABLE F-33

Summary of Alternative B Air Quality Impacts
During Periods of Refinery Modifications Construction (Mitigated)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**728**	**89**	**615**	**46**	**55**	**224**	**279**
	Emission Benefits	**0**	**0**	**(1,058)**	**0**	**(56)**	**0**	**(56)**
	Net Emission Benefits	**728**	**89**	**(443)**	**46**	**(1)**	**224**	**224**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	8	1	10	0	1	19	20
	Longer Turnover Rate	0	0	303	0	17	0	17
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**736**	**90**	**1,062**	**46**	**76**	**243**	**319**
	Emission Benefits	**0**	**0**	**(3,028)**	**0**	**(173)**	**0**	**(173)**
	Net Emission Benefits	**736**	**90**	**(1,966)**	**46**	**(97)**	**243**	**146**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative C – Delay Rule Implementation Dates by One Year

Table F-34 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions for Alternative C during the two years when construction of refinery modifications is assumed to occur (2001 and 2002).

TABLE F-34

Summary of Alternative C Air Quality Impacts
During Periods of Refinery Modifications Construction (Mitigated)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**92**	**639**	**48**	**55**	**235**	**290**
	Emission Benefits	**0**	**0**	**(811)**	**0**	**(56)**	**0**	**(56)**
	Net Emission Benefits	**748**	**92**	**(171)**	**48**	**(1)**	**235**	**235**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2003	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	162	0	15	0	15
	Centralized Refueling	0	0	42	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**94**	**745**	**48**	**74**	**267**	**341**
	Emission Benefits	**0**	**0**	**(1,617)**	**0**	**(147)**	**0**	**(147)**
	Net Emission Benefits	**761**	**94**	**(666)**	**48**	**(74)**	**267**	**194**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative D – Minimum Fleet Size is $\geq$ 50 Vehicles

Table F-35 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions for Alternative D during the two years when construction of refinery modifications is assumed to occur (2001 and 2002).

TABLE F-35

Summary of Alternative D Air Quality Impacts
During Periods of Refinery Modifications Construction (Mitigated)

Year	Activity	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	73	0	2	0	2
	Emission Increase	**728**	**89**	**597**	**46**	**55**	**224**	**279**
	Emission Benefits	**0**	**0**	**(892)**	**0**	**(47)**	**0**	**(47)**
	Net Emission Benefits	**728**	**89**	**(295)**	**46**	**8**	**224**	**232**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	262	0	15	0	15
	Centralized Refueling	0	0	39	0	1	0	1
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	146	0	3	0	3
	Emission Increase	**741**	**91**	**986**	**46**	**73**	**256**	**329**
	Emission Benefits	**0**	**0**	**(2,616)**	**0**	**(151)**	**0**	**(151)**
	Net Emission Benefits	**741**	**91**	**(1,630)**	**46**	**(78)**	**256**	**178**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative E – Acquisition Rate

Table F-36 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions for Alternative E during the two years when construction of refinery modifications is assumed to occur (2001 and 2002).

TABLE F-36

Summary of Alternative E Air Quality Impacts
During Periods of Refinery Modifications Construction (Mitigated)

Year	Activity	CO lb/day	VOC lb/day	NOx lb/day	SOx lb/day	Combustion PM10 lb/day	Fugitive PM10 lb/day	Total PM10 lb/day
2001	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**748**	**92**	**639**	**48**	**55**	**235**	**290**
	Emission Benefits	**0**	**0**	**(529)**	**0**	**(28)**	**0**	**(28)**
	Net Emission Benefits	**748**	**92**	**110**	**48**	**27**	**235**	**263**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	**Yes**	No			**Yes**
2002	Refueling Construction	61	11	71	6	0	34	34
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	13	2	16	0	1	32	33
	Longer Turnover Rate	0	0	151	0	9	0	9
	Centralized Refueling	0	0	21	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**761**	**94**	**919**	**48**	**67**	**267**	**334**
	Emission Benefits	**0**	**0**	**(1,514)**	**0**	**(87)**	**0**	**(87)**
	Net Emission Benefits	**761**	**94**	**(594)**	**48**	**(19)**	**267**	**248**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Values in parentheses () represent air quality benefits (e.g., emission reductions).

Alternative F – School Buses

Table F-37 presents mitigated construction and operational emissions, emissions benefits, and remaining emissions for Alternative F during the two years when construction of refinery modifications is assumed to occur (2001 and 2002).

TABLE F-37

Summary of Alternative F Air Quality Impacts During Periods of Refinery Modifications Construction (Mitigated)

Year	**Activity**	**CO** lb/day	**VOC** lb/day	**NOx** lb/day	**SOx** lb/day	**Combustion PM10** lb/day	**Fugitive PM10** lb/day	**Total PM10** lb/day
2001	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	81	477	42	53	201	254
	Fuel Deliveries	0	0	0	0	0	0	0
	Longer Turnover Rate	0	0	0	0	0	0	0
	Centralized Refueling	0	0	0	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	91	0	2	0	2
	Emission Increase	**728**	**89**	**615**	**46**	**55**	**224**	**279**
	Emission Benefits	**0**	**0**	**(838)**	**0**	**(42)**	**0**	**(42)**
	Net Emission Benefits	**728**	**89**	**(223)**	**46**	**13**	**224**	**237**
	Threshold	*550*	*75*	*100*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**
2002	Refueling Construction	41	8	47	4	0	23	23
	Refinery Construction	687	84	497	44	56	479	534
	Fuel Deliveries	10	2	12	0	1	23	24
	Longer Turnover Rate	0	0	262	0	15	0	15
	Centralized Refueling	0	0	29	0	0	0	0
	Transit Bus Removal	0	0	0	0	0	0	0
	Reduced Payload	0	0	183	0	4	0	4
	Emission Increase	**738**	**91**	**1,010**	**46**	**73**	**247**	**321**
	Emission Benefits	**0**	**0**	**(2,619)**	**0**	**(146)**	**0**	**(146)**
	Net Emission Benefits	**738**	**91**	**(1,609)**	**46**	**(73)**	**247**	**174**
	Threshold	*550*	*55*	*55*	*150*			*150*
	Significant	**Yes**	**Yes**	No	No			**Yes**

Values in parentheses () represent air quality benefits (e.g., emission reductions).