CHAPTER 4

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 INTRODUCTION

The CEQA Guidelines require EIRs to identify significant environmental effects that may result from a proposed project [CEQA Guidelines §15126.2(a)]. Direct and indirect significant effects of a project on the environment should be identified and described, with consideration given to both short- and long-term impacts. The discussion of environmental impacts may include, but is not limited to, the resources involved; physical changes, alterations of ecological systems; health and safety problems caused by physical changes; and other aspects of the resource base, including water, quality, and public services. If significant adverse environmental impacts are identified, the CEQA Guidelines require a discussion of measures that could either avoid or substantially reduce any adverse environmental impacts to the greatest extent feasible (CEQA Guidelines §15126.4).

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

This chapter analyzes the potential environmental impacts of the 2003 AQMP. This chapter is subdivided into the following sections based on the area of potential impacts: air quality, energy, hazards, hydrology/water quality, and solid/hazardous waste.

Included for each impact category is a discussion of project-specific impacts, project-specific mitigation (if necessary and available), impacts remaining after mitigation (if any), cumulative impacts and cumulative impact mitigation (if necessary and available).

In order to address the full range of potential environmental impacts several assumptions were made for purposes of evaluation. First, to provide a "worst-case" analysis, the environmental analysis contained herein assumes that the control measures contained in the AQMP apply to the entire district (i.e., the Basin and those portions of the MDAB and SSAB under the SCAQMD's jurisdiction).

If control equipment which has secondary adverse environmental impacts could be used to comply with a particular control measure, it was assumed that such equipment would be used even if it may not be the most appropriate technology or method of compliance. This approach was taken for each environmental topic. In practice, there are typically a number of ways to comply with requirements of SCAQMD rules, but only one type of compliance option will actually be implemented. This approach has the potential to substantially overestimate impacts because only a single type of control equipment will be used.

Every control measure in the 2003 AQMP was evaluated to determine whether or not it has the potential to generate adverse environmental impacts. Each environmental topic subchapter in Chapter 4 contains a table identifying those control measures that have the potential to generate significant adverse impacts to that environmental topic. Table 4.0-1 lists the various control measures, which were evaluated and determined not to have significant adverse impacts on the environment.

TABLE 4.0-1

Control Measures with no Significant Adverse Environmental Impacts

Control Measure	Control Measure Description	Reason Not Significant
MEASURES TO BE IMPLEMENTED BY THE SCAQMD		
CMB-07	Emission Reductions from Petroleum Refinery Flares	1,2
PRC-07	Industrial Process Operations	1,2
MSC-03	Promotion of Catalyst-Surface Coating Technology Programs	1,2
MEASURES TO BE CONSIDERED BY OTHER AGENCIES		
LT/MED-DUTY-2	Smog Check Improvements	2,3
ON-RD HVY DUTY-1	Augment Truck and Bus Highway Inspections with Community-Based Inspections	2,3
ON-RD HVY DUTY-2	Capture and Control Vapors from Gasoline Cargo Tankers	2,3
SMALL OFF-RD-1	Set Lower Emission Standards for New Handheld Lawn and Garden Equipment (Spark Ignited Engines Under 25 hp such as Weed Trimmers, Leaf Blowers, and Chainsaws)	1,2
FVR-3	Reduce Fuel Permeation Through Gasoline Dispenser Hoses	2
LONG-TERM	Smog Check – Explore program expansion to increase benefits, including: Statewide enhanced smog check; Opt-in to test-only program; Halting rolling 30-year exemption at pre-1974 vehicles	2,3
	Incentives – Establish clean air labeling program; Continue Statewide energy conservation program; Consider Statewide public education campaign for air quality	1,2
CONTINGENCY MEASURES		
CTY-01	Accelerated Implementation of Control Measures	2

TABLE 4.0-1 (Concluded)

Control Measures with no Significant Adverse Environmental Impacts

Control Measure	Control Measure Description	Reason Not Significant
CONCEPTUAL IDEAS FOR POSSIBLE CONSIDERATION AS LONG-TERM MESURES		
Conceptual Long-Term Measures	Accelerate Penetration and Use of Existing Technologies	2
	Accelerate Retirement of Older High Emitting Vehicles	2
	Clean Communities Concept	3
	Smog Check Improvements	2,3
	Modify Stationary Source Monitoring Requirements	3
	Add Flexibility to Current Programs	2,3
	Educational Programs	3
	Emission Bubbles at Ports	2,3

1 Control technologies do not generate adverse impacts.
2 Changes in operating practices with no impact identified.
3 Changes in testing, inspection, or enforcement procedures with no impact identified.

There are several reasons why the control measures in Table 4.0-1 are not expected to generate significant adverse impacts. First, the primary control methods of compliance do not involve control equipment that would generate any adverse secondary or cross media impacts. For example, PRC-07 would largely control VOC emissions through enhanced inspection and maintenance and other housekeeping work practices to reduce fugitive emissions from material transfer, storage, and processing from sources not currently permitted or regulated. Inspection and maintenance and housekeeping practices are not expected to generate secondary impacts because these are procedures to ensure proper operation of equipment, for example.

Another reason control measures in Table 4.0-1 were determined to have no significant adverse impacts is because they consist primarily of changes in operating practices, are primarily administrative in nature, and upon evaluation, no adverse impacts were identified. For example, controlling emissions from refinery flares is primarily expected to be accomplished by reducing the number of flaring events. Reducing the number of flaring events would not generate secondary impacts.

A third reason control measures in Table 4.0-1 were determined to be insignificant was that some measures would require changes to testing, inspection, or enforcement procedures. Since testing, inspection and enforcement entail procedures that ensure proper operation of equipment, as opposed to installing control equipment, no secondary impacts were identified. Implementing LT/MED-DUTY-2 would require improving smog check requirements and implementing ON-RD HVY DUTY-1 would augment truck and bus highway inspections with community-based inspections, potentially increasing the inspections that would occur.

In addition, there are several control measures proposed in the 2003 AQMP for which there is insufficient information regarding compliance options or how they would be implemented to determine the potential impacts (see Table 4.0-2). For example, the control measures that would impose fees (e.g., FLX-01, FSS-04, FSS-05 and FSS-07) do not indicate how the fees would be used. They could be used for educational purposes or purchasing control equipment. Because the control measures are general in nature, its difficult to determine what, if any, impacts could be expected from these control measures. Therefore, the impacts of the control measures identified in Table 4.0-2 would be considered speculative and no further environmental analysis is required (CEQA Guidelines §15145).

TABLE 4.0-2

Control Measure Whose Impacts are Speculative

Control Measure	**Control Measure Description**
MEASURES TO BE IMPLEMENTED BY THE SCAQMD	
FLX-01	Economic Incentive Programs
FSS-04	Emission Charges of $5,000 per Ton of VOC for Stationary Sources Emitting Over 10 Tons
FSS-05	Mitigation Fee Program for Federal Sources
FSS-07	Emission Fee Program for Port-Related Sources
CONCEPTUAL IDEAS FOR POSSIBLE CONSIDERATION AS LONG-TERM MEASURES	
	Demand-Side Strategies

SUBCHAPTER 4.1

SECONDARY AIR QUALITY IMPACTS

4.1 SECONDARY AIR QUALITY IMPACTS

4.1.1 INTRODUCTION

The purpose of the 2003 AQMP is to establish a comprehensive program to attain all state and federal ambient air quality standards through implementation of different categories of control measures. To achieve emission reductions necessary to meet state and federal ambient air quality standards, the 2003 AQMP also relies on advances in technology that are reasonably expected to be available by the year 2010.

The California Clean Air Act requires a non-attainment area to update its SIP triennially to incorporate the most recent available technical information. In addition, U.S. EPA requires that transportation conformity budgets be established based on the most recent planning assumptions (i.e., within the last five years). Both the 1997 SIP and 1999 amendments were based on demographic forecasts of the mid-1990's using 1993 as the base year. Since then, updated demographic data have become available, new air quality episodes have been identified, and the science for estimating motor vehicle emissions and modeling techniques for ozone and PM10 have improved. Therefore, a plan update is necessary to ensure continued progress toward attainment and to avoid a transportation conformity lapse and associated federal sanctions.

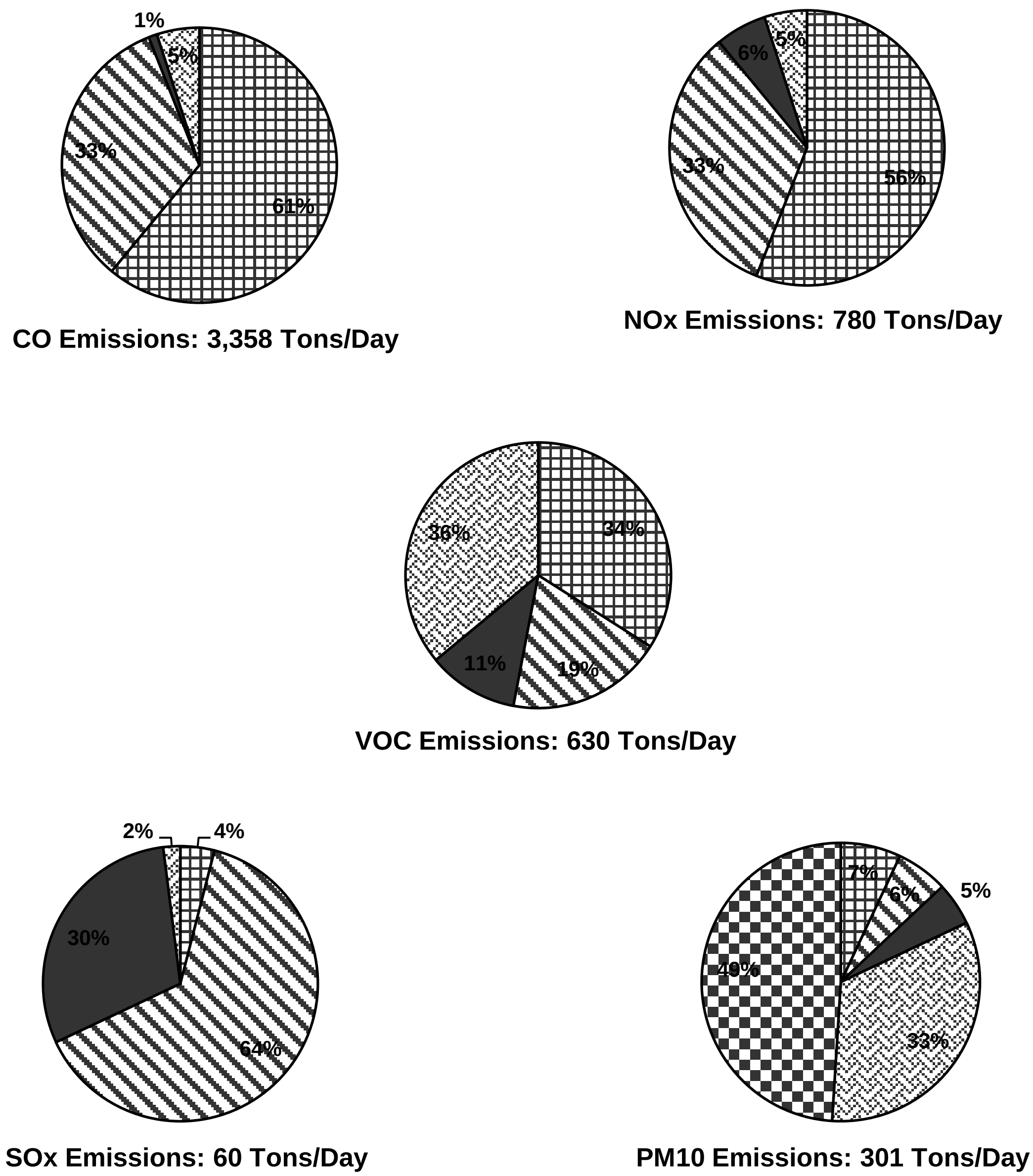
This subchapter evaluates secondary air pollutant emissions that could occur as a consequence of efforts to improve air quality (e.g., emissions from control equipment such as afterburners). The analysis is divided into the following sections: Future Air Quality Baseline, Significance Criteria, Potential Impacts and Mitigation, Ambient Air Quality, Cumulative Air Quality Impacts, and Summary of Secondary Air Quality Impacts.

4.1.2 FUTURE AIR QUALITY BASELINE

Figures 4.1-1 and 4.1-2 show baseline and future projected emissions, respectively, by major source categories. These figures are included here to show projected air quality trends through 2010. Baseline emissions for major source categories (i.e., point, area, on-road, and off-road) in 1997 are provided in Figure 4.1-1. Figure 4.1-2 shows the projected future baseline that would be expected if no new AQMP control measures are promulgated as rules. It does, however, reflect emission reductions for existing rules with future compliance dates. As seen in the figures, in 1997 (average annual day) on-road and off-road mobile sources are major contributors of CO (97 percent), NOx (89 percent), SOx (57 percent) and VOC (65 percent) emissions. PM10 is produced mostly from entrained road dust (52 percent). For 2010 (average annual day), mobile sources continue to be major contributors to total CO, NOx, and SOx emissions by approximately 94 percent, 89 percent, and 68 percent, respectively. However, the contribution of VOC emissions by mobile sources is reduced due to the CARB programs. On the contrary, area sources become major contributors to VOC emissions (from 28 percent in 1997 to 36 percent in 2010).

FIGURE 4.1-1

Relative Contribution by Source Category to
1997 Emissions Inventory – Average Annual Day



[Figure updated to reflect changes to the AQMP]

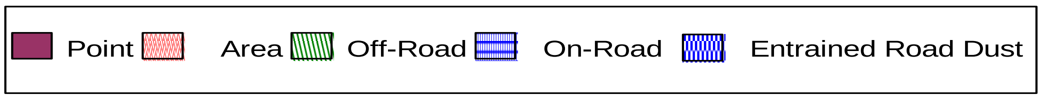


FIGURE 4.1-2
Relative Contribution by Source Category to
2010 Emissions Inventory – Average Annual Day

4.1.3 SIGNIFICANCE CRITERIA

To determine whether or not air quality impacts from the proposed project are significant, impacts will be evaluated and compared to the significance criteria in Table 4.1-1. If impacts equal or exceed any of the following criteria, they will be considered significant.

TABLE 4.1-1
Air Quality Significance Thresholds

Mass Daily Thresholds		
Pollutant	**Construction**	**Operation**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
SOx	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
TAC, AHM, and Odor Thresholds		
Toxic Air Contaminants (TACs)	Maximum Incremental Cancer Risk $\geq$ 10 in 1 million Hazard Index $\geq$ 1.0 (project increment) Hazard Index $\geq$ 3.0 (facility-wide)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality for Criteria Pollutants		
NO_2 1-hour average annual average	20 ug/m^3 (= 1.0 pphm) 1 ug/m^3 (= 0.05 pphm)	
PM10 24-hour annual geometric mean	2.5 ug/m^3 1.0 ug/m^3	
Sulfate 24-hour average	1 ug/m^3	
Ambient Air Quality for Criteria Pollutants (Concluded)		
CO 1-hour average 8-hour average	1.1 mg/m^3 (= 1.0 ppm) 0.50 mg/m^3 (= 0.45 ppm)	

ug/m^3 = microgram per cubic meter; pphm = parts per hundred million; mg/m^3 = milligram per cubic meter; ppm = parts per million; TAC = toxic air contaminant; AHM = Acutely Hazardous Material

Other indicators of significance include emissions that cause a CO hotspot or cause or contribute to an exceedance of any ambient air quality standard.

4.1.4 POTENTIAL IMPACTS AND MITIGATION

The objective of the 2003 AQMP is to attain and maintain ambient air quality standards. Based upon the modeling analyses described in Subsection 4.1.5 of this document, implementation of all control measures contained in the 2003 AQMP is anticipated to bring the district into compliance for all pollutants, except for the state ozone and PM10 air quality standards, by the year 2010 (see Table 4.1-2).

TABLE 4.1-2

Expected Year of Compliance with State and Federal Standards

Pollutant	Standard	Threshold Concentration Level	Expected Compliance Year
Ozone	NAAQS 1-hour	12 pphm	2010
	CAAQS 1-hour	9 pphm	Beyond 2010
PM10	NAAQS Annual	50 ug/m^3	2006
	NAAQS 24-hour	150 ug/m^3	2010
	CAAQS Annual	30 ug/m^3	Beyond 2010
	CAAQS 24-hour	50 ug/m^3	Beyond 2010
CO(1)	NAAQS 8-hour	9 ppm	Achieved
	NAAQS 1-hour	35 ppm	Achieved
	CAAQS 8-hour	9 ppm	Achieved
	CAAQS 1-hour	20 ppm	Achieved
NO_2	NAAQS Annual	5.34 pphm	Achieved
	CAAQS 1-hour	25 pphm	Achieved

(1) Although the district has attained the federal CO ambient air quality standards, it has not yet been designated as being in attainment by the federal government.

Secondary air quality impacts are potential increases in air pollutants that occur indirectly from implementation of control measures in the 2003 AQMP. Table 4.1-3 lists 2003 AQMP control measures with potential secondary air quality impacts.

4.1.4.1 Criteria Pollutants

Secondary Impacts from Increased Electricity Demand

PROJECT-SPECIFIC IMPACTS: Electricity is often used as the power source to operate various components of add-on control equipment, such as electrostatic precipitators, ventilation systems, fan motors, vapor recovery systems, etc. Increased demand for electrical energy may require generation of additional electricity, which in turn could result in increased indirect emissions of criteria pollutants in the district and in other portions of California. The stationary source measures that may result in increased demand for electrical energy due to operation of add-on control equipment are included in Table 4.1-3.

TABLE 4.1-3

Control Measures with Potential Secondary Air Quality Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Air Quality Impact
MEASURES TO BE IMPLEMENTED BY THE SCAQMD			
CMB-09	Emission Reductions from Petroleum Refinery FCCUs	Add on control equipment (dry electrostatic precipitator)	Electricity generation to operate equipment
CMB-10	Additional Reductions for NOx RECLAIM	Add on control equipment (Selective catalytic reduction, non-selective catalytic reduction), process changes, purchase RTCs	Electricity generation to operate equipment, combustion emissions from heaters
FUG-05	Emission Reductions from Fugitive Sources	Enhanced inspection & maintenance, process mods., add on control equipment	Electricity generation to operate equipment; afterburner combustion emissions
CTS-07	Further Emission Reductions from Architectural Coating and Cleanup Solvents	Reformulated low-VOC coatings/solvents	Potential change in use of VOC and toxic contaminants
CTS-10	Miscellaneous Industrial Coatings and Solvent Operations	Reformulation/ Alternative Applications, Innovative implementation mechanism	Potential change in use of VOC and toxic contaminants
PRC-03	Emission Reductions from Restaurant Operations	Add on control equipment, equipment modification (e.g., Smokeless broiler, grease extraction hoods, electrostatic precipitator or water scrubber, adsorption filter system or afterburner, catalyst filters, equipment replacement)	Electricity generation to operate equipment; afterburner combustion emissions
WST-01	Emission Reductions from Livestock Waste	Removal and disposal of manure	Increase in haul truck emissions
WST-02	Emission Reductions from Composting	Best management practices. Add on control equipment	Electricity generation to operate equipment
BCM-07	Further PM10 Reductions from Fugitive Dust Sources	Improved testing, soil stabilization requirements., work practices, track-out devices	Increase in water truck emissions
BCM-08	Further Emission Reductions from Aggregate and Cement Plant Manufacturing Operations	Dust suppression, covering of conveyors, wheel washing system	Increase in water truck emissions
MSC-04	Emission Reductions from Miscellaneous Ammonia Sources	Add on control equipment.	Increase in haul truck emissions
MSC-05	Truck Stop Electrification	Provide electricity to eliminate use of diesel engines at truck stops	Electricity generation for truck cooling refrigeration, etc., systems
MSC-08	Further Emission Reductions from Large VOC Sources	Emission Reduction Plan; Controls based on specific source categories	Electricity generation to operate equipment; afterburner combustion emissions

TABLE 4.1-3 (continued)

Control Measures with Potential Secondary Air Quality Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Air Quality Impact
FSS-06	Further Emission Reductions From In-Use Off-Road Vehicles and Equipment	Add on control equipment and use of alternative fuels	Electricity generation to operate equipment; potential decrease in engine efficiency. Expanded use of alternative fuels could increase emissions at refineries.
TCB-01	Transportation Conformity Budget Backstop Control Measures	Fugitive dust reduction, add on control equipment, VMT reduction strategies	Electricity generation to operate equipment; potential decrease in engine efficiency. Increase in water truck emissions
LTM-ALL	Long-Term Control Measures	Near-zero or zero VOC coating and solvent formulations, add-on controls, inspection & maintenance, process changes	Electricity generation to operate equipment; afterburner combustion emissions
MEASURES TO BE CONSIDERED BY OTHER AGENCIES			
ON-RD HVY DUTY-3	Pursue Approaches to Clean Up the Existing Truck/Bus Fleet – PM In-Use Emission Control, Engine Software Upgrade, On-Board Diagnostics, Manufacturers' In-Use Compliance, Reduced Idling	Reduce emissions from existing heavy-duty diesel vehicles through a mix of strategies (add on control devices, engine software upgrades, on-board diagnostics, in-use vehicle testing, reduced idling)	Potential decrease in engine efficiency could reduce fuel economy and increase emissions
OFF-RD CI-1	Pursue Approaches to Clean Up the Existing Heavy-Duty Off-Road Equipment Fleet (Compression Ignition Engines) – Retrofit Controls	Engine modifications, add on control technology, alternative clean fuels, add on control devices	Potential decrease in engine efficiency could reduce fuel economy and increase emissions
OFF-RD LSI-2	Clean Up Existing Off-Road Gas Equipment Fleet Through Retrofit Controls and New Emission Standards (Spark Ignited Engines 25 hp and Greater)	Add on control equipment, 3-way catalyst and modified injector, use of electricity	Potential decrease in engine efficiency could reduce fuel economy and increase emissions, electricity generation to operate equipment
MARINE-1	Pursue Approaches to Clean Up the Existing Harbor Craft Fleet – Cleaner Engines and Fuels	Retrofit control technology, add on control devices, alternative clean fuels	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Potential for passive particulate filters to emit higher levels of NO_2, affecting ozone, NO_2, nitric acid, and secondary particulate. Expanded use of alternative fuels could increase emissions at refineries.

TABLE 4.1-3 (Continued)

Control Measures with Potential Secondary Air Quality Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Air Quality Impact
MARINE-2	Pursue Approaches to Reduce Land-Based Emissions at Ports – Alternative Fuels, Cleaner Engines, Retrofit Controls, Electrification, Education Programs, Operational Controls	Retrofit crtl. Tech., Alternative Clean Fuels, electrification of diesel equip., operational changes	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Expanded use of alternative fuels could increase emissions at refineries. Potential increase in emissions from the generation of electricity. Potential for passive particulate filters to emit higher levels of NO_2, affecting ozone, NO_2, nitric acid, and secondary particulate.
FUEL-2	Set Lower-Sulfur Standards for Diesel Fuel Trucks/Buses, Off-Road Equipment, and Stationary Engines	Alternative Clean Diesel Fuels.	Production of cleaner fuels, could increase emissions at refineries
CONS-1	Set New Consumer Product Limits for 2006	Reformulation/alternative applications	Potential change in use of VOC and toxic contaminants
CONS-2	Set New Consumer Product Limits for 2008 – 2010	Reformulation/alternative applications	Potential exposure to toxic air contaminants
LONG-TERM	On-Road Heavy Duty Vehicles - Provide incentives for cleaner trucks and buses, including school buses	Reduce emissions through a mix of strategies	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels could increase emissions at refineries. Potential for passive particulate filters to emit higher levels of NO_2, affecting ozone, NO_2, nitric acid, and secondary particulate.
	Off-Road Class 1 Vehicles - Provide incentives for cleaner off-road equipment, lower emission standards for new off-road compression ignition engines	Engine modifications, add on control technology, alternative clean fuels, lower emission standards	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels could increase emissions at refineries
	Ports/Marine – Pursue advanced technologies and innovative strategies – alternatives for dockside power and propulsion in/out of port, operational controls, clean up existing ocean-going ship fleet	Operational controls, cleaner fuels, electrification, retrofit controls, new engines stds., engine mods, and retire older ships	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels could increase emissions at refineries

TABLE 4.1-3 (Continued)

Control Measures with Potential Secondary Air Quality Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Air Quality Impact
LONG-TERM	Airports – Pursue approaches to reduce emissions from vehicles traveling to and from airports, reduce emissions from jet aircraft	Lower emission stds., alternative fuels, engine mods., retrofit controls, particulate filters, infrastructure for alternative fuel/ electric vehicles, entry fees, increased transport options	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels could increase emissions at refineries
	Railroad Locomotives	Accelerate intro. of new, lower emitting locomotive engines, add on controls, alternative fuels, standards for new engines	Potential decrease in engine efficiency could reduce fuel economy and increase emissions
	Diesel Engines – Set toxics standard for stationary and portable diesel engines; Set toxics standard for diesel fueled refrigeration units on trucks	Retrofit technology, electrification, use of alternate fuels, particulate filters	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels could increase emissions at refineries
	Fuels - sulfur/ash content limits for diesel engine lubrication oils; infrastructure for zero-emission vehicles – electric, hydrogen; low sulfur diesel; clean up existing engines	Sulfur/ash limits, construction of new infrastructure, low sulfur standards	Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels and low sulfur fuels could increase emissions at refineries.
	Consumer Products - Future consumer products regulations	Reformulation/alternative applications	Potential change in use of VOC and toxic contaminants
TCM	Transportation Control Measures	Installation of HOV improvement projects, transit & systems management, and information systems	Potential increase in mobile source and construction emissions
CONTINGENCY MEASURES			
CTY-04	Increase Oxygen Content of Gas in Winter Months	Higher oxygen content of gas (ethanol) sold in winter months	Use of reformulated fuels could increase emissions at refineries and transport emissions associated with ethanol import

TABLE 4.1-3 (Concluded)

Control Measures with Potential Secondary Air Quality Impacts

Control Measures	Control Measure Description (Pollutant)	Control Methodology	Air Quality Impact
CONCEPTUAL IDEAS FOR POSSIBLE CONSIDERATION AS LONG-TERM MEASURES			
Conceptual Control Measures	Remove Disincentives on Voluntary Measures	Control would vary depending on the emission source, e.g., add on control equipment	Impacts would vary depending on the type of emission source and the control equipment used, e.g., increase in construction emissions.
	Expand Fleet Rules to Private Fleets	Require the use of alternative fuels	Construction of alternative clean fuel fueling stations.
	Control Emissions from Port Operations	Cold-ironing, electrification, diesel truck retrofit, low sulfur diesel	Potential increase in emissions from the generation of electricity. Potential decrease in engine efficiency could reduce fuel economy and increase emissions. Production of reformulated fuels and low sulfur fuels could increase emissions at refineries
	Consumer Products	Reformulation/alternative applications	Potential change in use of VOC and toxic contaminants

Control measures PRC-03 and CMB-09 call for emission reductions from restaurant operations and refinery FCCUs, respectively. Other control measures that could result in an increase in electricity use include measures that would require add-on controls, including CMB-10, WST-02, and MSC-04. The required emissions reduction may be achieved through various types of add-on control equipment such as electrostatic precipitators. Each of the possible control types may have potential adverse energy impacts. The analysis of the effects of energy resources and electricity demand from implementing the 2003 AQMP can be found in Subchapter 4.3 of this EIR.

Several of the control measures would require support facilities and potentially increased use of electric vehicles, e.g., MARINE-4, some of the LONG-TERM control measures and some of the conceptual ideas for consideration as long-term control measures. An increase in the use of electric vehicles would require the generation of additional electricity in the district and other areas of California. In addition, electricity may be required associated with cold ironing. The potential increase and amount of electricity is unknown. Because the control measure is general in nature, it's difficult to determine what, if any, impacts could be expected. Therefore, the electrical impacts of cold-ironing are considered speculative and no further environmental analysis is required (CEQA Guidelines §15145). Additional environmental analyses will be completed prior to adoption when a rule is drafted, workshopped and reviewed. A number of control measures target emission reductions from transportation measures (including FSS-06) that would encourage the development of vehicle control technology to meet or exceed ultra-low emission vehicle standards. Such technology would include electric and advance hybrid electric vehicles as a result of advanced battery technology and development of property support infrastructure. The emissions from traditional vehicles would be reduced substantially. The increased demand for electrical energy may require generation of additional electricity, which in turn may result in increased indirect emissions of all criteria pollutants (due to the increase in natural gas combustion used to generate more electricity). The amount of electricity generated is described in the energy impacts Subchapter 4.3 of this EIR.

Electrification of motor vehicles and other commercial and industrial equipment will greatly reduce fossil fuel usage in the district. At that time, there may be an increase in emissions due to increased electric power generation due to increased demand. The number of electric vehicles is unknown at this time and will need to be calculated during the rule development of these control measures. The SCAQMD will need to compensate for the potential increase in secondary NOx emissions. While the control measures may cause an increase in NOx emissions, overall the 2003 AQMP should achieve enough NOx reductions to attain ambient air quality standards.

An incremental increase in electricity demand would not create significant adverse air quality impacts. However, if electricity demand exceeds available power, additional sources of electricity would be required. Electricity generation within the district is subject to applicable SCAQMD rules such as Rule 1135 – Emissions of Oxides of Nitrogen from Stationary Gas Turbines and Regulation XX – RECLAIM. Both regulate NOx emissions (the primary pollutant of concern from combustion to generate electricity) from existing power generating equipment. Both Rule 1135 and Regulation XX establish mass caps on the allowable NOx emissions from electric generating facilities. As a result, NOx emissions from existing electric generating facilities will not increase significantly, regardless of increased power generation for add-on control equipment or electrification activities.

New power generation equipment would be subject to either Rule 2005 or Regulation XIII. New power generating equipment would not result in air quality impacts because they would be subject to BACT requirements; air quality modeling would be required to demonstrate that new emissions would not result in significant ambient air quality impacts (so there would be no localized impacts), and all emission increases would have to be offset (through either emission reduction credits or RECLAIM trading credits) before permits could be issued. Further, emissions from the combustion of gasoline or diesel fuels are generally the emissions that would be reduced when electrification is proposed and replaced with emissions from the combustion of natural gas (as would generally occur from electricity generating facilities). Emissions from diesel combustion (e.g., marine vessel engines) are orders of magnitude higher than emissions from the combustion of natural gas. So overall emissions are expected to decrease. No significant adverse impacts to air quality are expected from control measures requiring electricity use.

There could be an increase in emissions from generators that may be used to charge batteries in remote locations where no grounded power source is available. Generators are regulated sources in the district. Existing SCAQMD regulations that apply to generators and emergency generators would apply to generators used to charge batteries. Existing generators are subject to SCAQMD Rule 1110.2 – Emissions from Gaseous and Liquid Fueled Engines. Rule 1110.2 does not establish a facility emission cap, but establishes a stringent NOx emission rate. Portable equipment may also be regulated under the state registration program (Rule 2100 – Registration of Portable Equipment), which establishes emission limitations on NOx, VOCs, and CO.

The emissions from electrical generation have been included in the emissions inventory prepared for the 2003 AQMP. Table 4.1-4 summarizes the emissions associated with electric generation in 2002 and 2010.

TABLE 4.1-4
Annual Average Emissions by for Electric Generation in the District from Non-RECLAIM Facilities
(tons/day)

Source Category	**VOC**	**CO**	**NOx**	**SOx**	**PM10**
2002 Emissions Inventory					
Electric Utilities	1.25	5.44	1.02	0.27	0.85
Cogeneration	0.83	1.71	0.62	0.01	0.68
Total 2002	**2.08**	**7.15**	**1.64**	**0.28**	**1.53**
2010 Emissions Inventory					
Electric Utilities	1.47	6.41	0.73	0.29	0.99
Cogeneration	0.83	1.73	0.34	0.01	0.69
Total 2010	**2.30**	**8.14**	**1.07**	**0.30**	**1.68**
Emissions Reductions (emissions in 2002-emissions in 2010) (tons/day)	(0.22)[1]	(0.99)	0.57	(0.02)	(0.15)
Pounds per Day	(440)	(1,980)	1,140	(40)	(300)
Projected Increase Associated with the 2003 AQMP[2] (lbs/day)	(4.4)	(19.8)	11.4	(0.04)	(3)
SCAQMD Significance Threshold (lbs/day)	75	550	100	150	150
Significant?	NO	NO	NO	NO	NO

Source: SCAQMD, 2003 AQMP, Appendix III
(1) Numbers in parentheses are emissions increases
(2) Assumes that overall increase in electricity associated with the AQMP control measures is one percent (see Table 4.2-3).

Based on a recent analysis of RECLAIM facilities (June 6, 2003 Board agenda item number 39), annual NOx emissions for the 14 RECLAIM electric power generating facilities (representing approximately a maximum of 9,000 MWh generating capacity) is anticipated to be 1,395 tons per year. Further, an analysis of California Energy Commission data prepared for the SCAQMD in July 2001 in conjunction with 2003 AQMP projects, indicates that electricity generating capacity in the year 2010 is expected to be 10,600 GWh. NOx emissions corresponding to this generation capacity are 930 tons per year. NOx emissions data do not include RECLAIM Trading Credits held by affected facilities.

The inventory prepared for the 2003 AQMP includes estimates for electric utilities and cogeneration facilities in 2002 and 2010. It is assumed that the emissions associated with electrical generation that are part of the AQMP control measures would partially contribute to the emission changes identified in the emission inventories. The inventory also accounts for growth in population. It has been estimated that implementation of all the control measures is expected to result in an overall increase in electricity in 2010 of less than one percent (see Table 4.2-3), relative to the projected peak electricity demand in 2010. The estimated NOx and SOx emissions due to increased electrical demand associated with implementation of the 2003 AQMP are expected to be reduced between the 2002 and 2010 inventories. The estimated VOC, CO, and PM10 emissions due to increased electrical demand associated with implementation of the 2003 AQMP are expected to increase, but the increases are less than the SCAQMD significance thresholds (see Table 4.1-4). Based on Table 4.1-4 and due to the existing regulations that would apply to the generation of electricity in the district, emissions from power generating equipment in the district are not expected to be significant.

The SCAQMD does not regulate electricity generating facilities outside of the district so the rules and regulations discussed above do not apply to electricity generating facilities outside of the district. About 82 percent of the electricity used in California is generated in-state and about 18 percent is imported (see Section 3.2.2). While these electricity generating facilities would not be subject to SCAQMD rules and regulations, they would be subject to the rules and regulations of the local air pollution control district and the U.S. EPA. These agencies also have established New Source Review regulations for new and modified facilities that generally require compliance with BACT or lowest achievable emission reduction technology. Most electricity generating plants use natural gas, which provides a relatively clean source of fuel (as compared to coal- or diesel-fueled plants). The emissions from these power plants would also be controlled by local, state, and federal rules and regulations, minimizing overall air emissions. These rules and regulations may differ from the SCAQMD rules and regulations because the ambient air quality and emission inventories in other air districts are different than those in the district. Compliance with the applicable air quality rules and regulations are expected to minimize air emissions in the other air districts to less than significant.

Electricity in California is also generated by alternative sources that include hydroelectric plants (about 23 percent), geothermal energy (about five percent), wind power (one percent), and solar energy (less than one percent) which are clean sources of energy. These sources of electricity generate little, if any, air emissions. Increased use of these and other clean technologies will continue to minimize emissions from the generation of electricity.

PROJECT-SPECIFIC MITIGATION: No significant secondary air quality impacts from increased electricity demand have been identified so no mitigation measures are required.

Secondary Impacts from Control of Stationary Sources

PROJECT SPECIFIC IMPACTS: Emission reductions from the control of emissions at several stationary sources could result in secondary emissions. CMB-09 would reduce PM10 and ammonia slip (a PM10 precursor) emissions from petroleum refinery FCCUs. CMP-09 is estimated to reduce emissions by approximately 0.5 ton per day of solid filterable PM10 and about 1.5 tons per day of condensable PM10 by the end of 2006 from affected facilities. The implementation of CMB-09 (e.g., the replacement of existing add-on controls or the addition of new add-on controls) could create both direct and indirect air quality impacts.

CMB-10 includes options for further NOx emissions reduction such as reducing the NOx allocation for some NOx RECLAIM facilities. Under the RECLAIM regulations, operators of affected facilities are currently able to choose how to reduce NOx emissions. Options for further NOx emission reductions could include addition of control equipment (selective and non-selective catalytic reduction), process changes to reduce emissions (reduction in throughput or operating hours), or NOx RECLAIM Trading Credits (RTCs) could be purchased. Installation of new SCR or non-selective catalytic reduction equipment or increasing the control efficiency of existing equipment would be expected to increase the amount of ammonia used for NOx control. As a result ammonia slip emissions could increase, thus, contributing to PM10 concentrations. Injecting ammonia at the proper molar ratio, increasing the amount of catalyst used, or installing scrubbers can minimize potential increases in ammonia slip emissions.

CMB-10 could reduce NOx by using SCR, which may potentially result in increase ammonia emissions due to “ammonia slip.” Ammonia slip can worsen as the catalyst ages and becomes less effective. Ammonia slip from SCR equipment is continuously monitored and controlled. A limit on ammonia slip is normally included in permits to operate for stationary sources, which should minimize potential air quality impacts associated with ammonia slip from these sources.

FUG-05 would require emission reductions from fugitive emission sources at oil and gas production facilities, petroleum and chemical products processing and transfer facilities, refinery terminals, and other manufacturing facilities. MSC-08 would require emission reductions from large VOC sources. The methods to control fugitive emissions could include leakless valves and vapor recovery devices. Some vapor recovery devices, e.g., afterburners, incinerators, or flares, might also be installed resulting in combustion emissions, including NOx, CO, and CO_2 emissions. While some control measures may cause a small increase in CO and NOx emissions, the 2003 AQMP will achieve enough

NOx reductions overall to attain and maintain ambient air quality standards. The emissions from vapor recovery devices are generally controlled by using efficient combustion practices, so that the secondary impacts from these control measures are expected to be less than significant.

PRC-03 would result in VOC and PM10 emission reductions from restaurant operations that use charbroilers. Control measures could include grease extraction hoods, electrostatic precipitators or water scrubbers, adsorption filters, afterburners, catalyst filters, and replacement of under-fired charboilers with more efficient broilers. Afterburners have not been used extensively in restaurant operations due to fire/safety concerns and very high fuel usage and cost. Afterburners are not expected to be cost effective and not expected to be widely used at restaurants. The more likely control option is expected to be the replacement of the charboiler with more efficient broilers. Based on the fact that afterburners are not expected to be used as a compliance option, adverse secondary air quality impacts are not expected from this control measure.

Several of the measures to be implemented by CARB, e.g., ON-RD HVY DUTY-3, OFF-RD CI-1, etc., would require the use of diesel particulate filters, add-on devices that are mounted on the exhaust pipe. In the case of exhaust pollutants, Manufacturers of Emission Contols Association (MECA) reports that the use of oxidization catalysts to reduce PM10 emissions from diesel-fueled vehicles should not increase other exhaust pollutants. In fact, combining an oxidation catalyst with engine management techniques can be used to reduce NOx emissions from diesel engines. This is achieved by adjusting the engine for low NOx emissions, which is typically accompanied by increased CO, VOC, and PM10 emissions. An oxidation catalyst can be added to offset these increases, thereby lowering the exhaust levels for all of the pollutants. Often, the increases in CO, VOCs, and PM10 can be reduced to levels lower than otherwise could be achieved. In fact, a system which uses an oxidation catalyst combined with proprietary ceramic engine coatings and injection timing retard can achieve significant NOx reductions (e.g., greater than 40 percent) while maintaining low PM10 emissions (MECA, 1999).

SCR has been used to control NOx emissions from stationary sources for many years. More recently, it has been applied to mobile sources including trucks, marine vessels, and locomotives. Applying SCR to diesel-powered vehicles provides simultaneous reductions of NOx, PM10, and VOC emissions.

Like an oxidation catalyst, SCR promotes chemical reactions in the presence of a catalyst. However, unlike oxidation catalysts, a reductant is added to the exhaust stream in order to convert NOx to elemental nitrogen and oxygen in an oxidizing environment. The reductant can be ammonia but in mobile source applications, urea is normally preferred. As exhaust gases along with the reductant pass over the catalyst, 75 to 90 percent of NOx emissions, 50 to 90 percent of the VOC emissions, and 30 to 50 percent of the PM10 emissions are reduced. SCR also reduces the characteristic odor produced by a diesel engine and the diesel smoke.

Potential adverse air quality impacts associated with the use of SCRs in diesel-fueled vehicles could occur if this technology resulted in the increase of other exhaust pollutants at the expense of reducing PM10 or a reduction in fuel economy. Additionally, potential air quality impacts could arise if the use of ultra low sulfur diesel fuel in combination with oxidation catalysts could result in infrastructure changes (e.g., fuel supply or delivery).

In the case of exhaust pollutants, the catalyst composition of SCR and its mode of operation are such that sulfates could form. However, with the use of ultra low sulfur diesel fuel, sulfate formation should be negligible. In particular, even at temperatures in exceed 500 degrees Centigrade, only five percent of the sulfur in the fuel would be converted to sulfate, which still allows for significant net PM10 emission reductions.

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

No operational-related infrastructure changes are expected from the use of ultra low sulfur diesel fuel in combination with SCRs. Existing piping and storage tanks can be used to supply and store the additional demand for ultra low sulfur diesel fuel. Therefore, no significant adverse air quality impacts were identified from the use of SCRs in conjunction with ultra low sulfur diesel fuel to potentially reduce emissions from mobile sources.

PROJECT-SPECIFIC MITIGATION: No significant secondary air quality impacts from control of stationary source have been identified so no mitigation measures are required.

<u>Secondary Emissions from Consumer Products Regulations</u>

PROJECT-SPECIFIC IMPACTS: A consumer product is defined as a chemically formulated product used by household and institutional consumers. Consumer products include, but are not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products such as antiperspirants and hairsprays; home, lawn, and garden products; disinfectants; sanitizers; automotive specialty products; and aerosol paints. Other paint products, such as furniture or architectural coatings, are not part of CARB's consumer products programs because local air districts regulate them. Consumer products can come in different product forms including aerosol, liquid, solid, or gel.

The analysis of secondary emissions from consumer products is divided into two subsections: (1) emissions from household products (detergents, polishes, etc.) and personal care products such as hair spray; and (2) emissions from aerosol and other types of coatings and solvents. Control measures in this category include CONS-1, CONS-2, CTS-07, CTS-10, some long-term control measures, and some conceptual ideas for consideration as long-term control measures.

Household and Personal Care Products: CARB may seek reductions from many of the smaller regulated or currently unregulated categories of consumer products. For example, toilet/urinal care products, several categories of personal care products, such as nail polishes, certain hair styling aids, and other cleaning products that are not currently regulated will be evaluated to determine if it is feasible to established VOC limits. Some other categories that may considered are special purpose adhesives, footwear care products, and other products that were not included in the 1997 Consumer and Commercial Products Survey.

CARB is investigating the feasibility of using reactivity-based strategies to reduce the ozone forming potential of the products. CARB is also proposing to evaluate mass-based strategies, which may include reducing the ROG content of the products by reformulating with water or exempt solvents, using low vapor pressure VOC, or by replacing propellants with exempted hydrocarbons or compressed gases. CARB is conducting a detailed survey to obtain 2001 sales and formulation data to better understand the variety of products available, the basic function of these products, and potential reformulation alternatives.

Another approach that could be evaluated is to limit the use of hydrocarbon propellants. Lower limits may be set while still allowing the use of hydrocarbon propellants, such as in post-foaming products or by blending with exempt propellants. Specific exemptions contained in the regulation may be re-evaluated to see if they are still warranted. Because these types of consumer products are typically found in close proximity to consumers including children, it is expected that products would be reformulated with water or nontoxic formulations. Therefore, no significant adverse secondary emission impacts are anticipated from control measures regulating these types of consumer products.

Aerosol and Other Coating Products: To obtain further VOC emissions from aerosol paints (CONS-1 and CONS-2) and other coating products (CTS-07, CTS-10 AND LTM-ALL) it is expected that coatings would be reformulated with water-based or exempt compound formulations. The following subsection identifies potential air quality impacts from lowering the VOC content limit of coating products.

More Thickness

PROJECT SPECIFIC IMPACT: Reformulated compliant water- and solvent-borne coatings are very viscous (e.g., are formulated using a high-solids content) and, therefore, may be difficult to handle during application, tending to produce a thick film when applied directly from the can. A thicker film might indicate that a smaller surface area is covered with a given amount of material, thereby increasing VOC emissions per unit of area covered.

ANALYSIS: To evaluate this issue in connection with recent amendments to Rule 1113 – Architectural Coatings, SCAQMD staff evaluated product data sheets for approximately 340 conventional and low-VOC coatings to compare solids content by volume, coverage area, drying time, pot life, shelf life, and durability. The SCAQMD expects that the result of this analysis will be applicable to control measures CTS-07, CTS-10, and LTM-ALL, as well as the relevant portions of control measures CONS-1 and CONS-2. Table 4.1-5 is a summary of these coating characteristics grouped by coating categories as defined by Rule 1113. The SCAQMD has asserted in the past and continues to maintain that a coating with more solids will actually cover a greater surface area. This contention is generally supported for the Rule 1113 affected coating categories. Low-VOC quick-dry enamels; primers, sealers, and undercoatings; quick-dry primers, sealers, and undercoatings; rust preventative coatings; and, stains, on the average, generally have a lower solids content and a lower area of coverage than conventional coatings. Low-VOC nonflats have a solids content and area of coverage comparable to conventional coatings. Low-VOC floor coatings and industrial/maintenance coatings, on the average, have a higher solids content with a comparable to slightly less area of coverage than conventional coatings.

These results demonstrate that currently available low-VOC coatings are not necessarily formulated with a higher solids content. Further, a higher solids content does not result in a significant reduction in the coverage area. The information from the coating product data sheets tends to corroborate a positive correlation between solids content and the coverage area.

As a comparison, Table 4.1-6 shows that the 1998 CARB Survey yielded similar results for average VOC content as the random sampling of low-VOC coatings to their conventional counterparts. The survey showed a consistent trend of a sales-weighted average lower-percent solids by volume in coatings with lower-VOC content.

TABLE 4.1-5

Summary of Coating Characteristics

Coating Category	# of samples	Range of VOC Content (gm/l)	Average VOC Content (gm/l)	Average % Solids by| Volume	Average Coverage (sq ft/gal) @ ~3 mil	Average Drying Time hrs) Between Coats	Average Pot Life* @70 deg. (hrs)	Average Shelf Life (yrs)
Floor Coatings (420-100 g/l)	9	114-420	338	47.5	356	n/a	8.5	2.3
Floor Coatings (100-50 g/l)	13	56 -100	82	54.8	309	n/a	2.2	1.8
Floor Coatings (< 50 g/l)	24	0 - 29	2	79	328	n/a	1.5	1.3
Industrial Maintenance Coatings (420-250 g/l)	47	257-420	354	58.1	352	n/a	6.3	1.6

TABLE 4.1-5

Summary of Coating Characteristics (Continued)

Coating Category	# of samples	Range of VOC Content (gm/l)	Average VOC Content (gm/l)	Average % Solids by Volume	Average Coverage (sq ft/gal) @ ~3 mil	Average Drying Time (hrs) Between Coats	Average Pot Life* @70 deg. (hrs)	Average Shelf Life (yrs)
Industrial Maintenance Coatings (250-100 g/l)	45	101-250	188	55.2	296	n/a	7.4	1.9
Industrial Maintenance Coatings (<100 g/l)	114	0-108	24	82.8	391	n/a	1.4	1.3
Nonflats (250-150 g/l)	26	153-250	215	37.7	382	7.1	n/a	2.2
Nonflats (150-50 g/l)	69	56-150	106	35	346	7.8	n/a	2.7
Nonflats (<50 g/l)	37	0-50	4.4	40.6	385	5.7	n/a	1
Quick Dry Enamels (400-150 g/l)	11	164-400	267	48.3	365	4.9	n/a	1
Quick Dry Enamels (<150 g/l)	4	88-154	120	35.8	407	3.2	n/a	1
Primer, Sealer, Undercoater (350-200 g/l)	29	209-350	310	51.4	387	13	7.5	1.7
Primer, Sealer, Undercoater (200-100 g/l)	14	113-206	151.7	42.4	306	5	6	2.4
Primer, Sealer, Undercoater (<100 g/l)	51	0-109	70.6	41.3	346	5.1	2.4	2.1
Quick Dry Primer, Sealer, Undercoater (exempt – 200 g/l)	9	340-560	464	40.4	401	2	7	1.9
Quick Dry Primer, Sealer, Undercoater (200-100 g/l)	6	115-141	124	45.1	353	2.1	n/a	2.7

TABLE 4.1-5 (Concluded)

Summary of Coating Characteristics

Coating Category	# of samples	Range of VOC Content (gm/l)	Average VOC Content (gm/l)	Average % Solids by Volume	Average Coverage (sq ft/gal) @ ~3 mil	Average Drying Time (hrs) Between Coats	Average Pot Life* @70 deg. (hrs)	Average Shelf Life (yrs)
Quick Dry Primer, Sealer, Undercoater (<100 g/l)	21	0-108	67.7	39.3	370	3.9	n/a	1.1
Water Proofing Wood Sealer (400-250 g/l)	6	282-400	380	13.3	175	n/a	n/a	1.0
Water Proofing Wood Sealer (<250 g/l)	10	0-241	71.2	46.8	214	n/a	4.7	1.4
Stains (350-250 g/l)	4	350	350	49.2	350	18.8	n/a	5.3
Stains (<250 g/l)	23	0-250	116.5	25.7	275	4.2	n/a	4
Rust Preventative Coatings (350-100 g/l)	6	198-350	313	61.1	435	n/a	4	2.7
Rust Preventative Coatings (<100 g/l)	5	0-94	24.8	50	305	n/a	2.5	2.0

* For two-component coatings only

TABLE 4.1-6

1998 CARB Survey

Coating Types	**CARB SURVEY RESULTS** Average VOC Content (gm/l)	**CARB SURVEY RESULTS** Average Solids by Volume (%)
Floor Coatings (>250 g/l)	149	83
Floor Coatings (<250 g/l)	164	34
IM Coatings (>250 g/l)	436	56
IM Coatings (<250 g/l)	124	36.6
Nonflats (>250 g/l)	331	58
Nonflats (<250 g/l)	164	36
Quick Dry Enamels (>250 g/l)	403	50
Quick Dry Enamels (<250 g/l)	n/a	n/a
PSU* (>250 g/l)	384	46
PSU (<250 g/l)	101	31
Quick Dry PSU (>250 g/l)	432	45
Quick Dry PSU (>250 g/l)	136	41
Water Proofing Sealer (>250 g/l)	339	50
Water Proofing Sealer (<250 g/l)	227	30
Rust Preventive Coatings (>250 g/l)	382	48
Rust Preventive Coatings (<250 g/l)	144	39
Stains(>250 g/l)	412	47
Stains(<250 g/l)	203	30

* PSU = primers, sealers, and undercoatings

Based upon the results of the SCAQMD and CARB surveys, staff concludes that compliant low-VOC coatings are not necessarily formulated with a higher solids content than conventional coatings. Further, there is no evidence that there is an inverse correlation between solids content and coverage area.

Illegal Thinning

PROJECT SPECIFIC IMPACT: The SCAQMD has extensively analyzed the potential air quality impacts due to illegal thinning. In oral testimony received by the SCAQMD from a few industry representatives, it has been asserted that thinning occurs in the field in excess of what is allowed by the SCAQMD rule limits. It has also been asserted that, because reformulated compliant water- and solvent-borne coatings are more viscous (e.g., high-solids content), painters have to adjust the properties of the coatings to make them easier to handle and apply. In particular for solvent-borne coatings this adjustment consists of thinning the coating as supplied by the manufacturer by adding solvent to reduce its viscosity. The added solvent increases VOC emissions back to or sometimes above the level of higher VOC formulations.

It has been further asserted that manufacturers will formulate current noncompliant coatings by merely increasing the solids content, which would produce a thicker film. Industry claims that a thicker film means less coverage. Therefore, thinning will occur to get the same coverage area as high VOC coatings resulting in more VOC emissions per area covered. As shown in Table 4.1-6 (see also the "More Thickness" discussion), based upon manufacturer's claims regarding coverage, low-VOC coatings have comparable coverage area compared to conventional coatings. As a result, the data indicate that it is not true that a painter will have to thin low-VOC solvent-borne coatings to obtain the same coverage.

Many of the reformulated compliant coatings are water-borne formulations or will utilize exempt solvents, thereby eliminating any concerns of thinning the coating as supplied and increasing the VOC content as applied beyond the compliance limit. Since exempted solvents are not considered a reactive VOC, thinning with them would, therefore, not increase VOC emissions. Water based coatings are thinned with water and would also not result in increased VOC emissions.

Extensive research has been conducted prior to 1998 to determine whether or not thinning of materials beyond the allowable levels occurs in the field. As part of the SCAQMD's fact finding and data gathering phase of previous rule amendment processes, staff conducted site visits to various locations where lower-VOC, compliant coatings have been utilized, to observe on a first-hand basis, the challenges and issues related to use of the lower-VOC coatings. In addition, since January 1996, the SCAQMD staff has conducted over 100 unannounced site visits to evaluate contractor practices relating to thinning, application, and clean up. During these site visits, samples were collected for coatings actually being utilized, as applied and as supplied, for laboratory analysis and subsequent study of impacts of thinning.

Subsequent to the amendments to Rule 1113 in November 1996, actual samples were taken at 47 sites with ongoing painting operations. Of the 59 samples collected, 36 were waterborne and 23 were solvent-borne. Of the 23 solvent-borne coatings, six represented three sets, which were for the same coating as supplied and as applied. All three sets that were thinned with solvent prior to use were analyzed, with none exceeding the compliance limit. All three sets were Industrial Maintenance Coatings.

Phase II of the field study consisted of purchasing and analyzing paint samples from various retail outlets. Since January 1996, 42 samples, consisting of various coating categories, were purchased and analyzed. All of the coatings analyzed were found to be in compliance with the applicable rule limit. Laboratory tests indicated that the reported VOC content on the container was generally higher than the VOC content as tested. The difference in the actual VOC content versus the reported VOC content ranged from five percent to over 60 percent. A trend of listing a maximum VOC content at the actual compliance limit was noted to be the practice. Of the samples purchased, seven were found to be in violation of Rule 1113, mostly waterproofing sealers. The SCAQMD believes that part of the reason for these violations is confusion over the definition of waterproofing sealers, which was clarified as part of the December 2002 amendments to SCAQMD Rule 1113.

A number of additional studies have addressed the thinning issue. The results are detailed below:

- In mid-1991, CARB conducted a field study of thinning in regions of California that have established VOC limits for architectural coatings. A total of 85 sites where painting was in progress were investigated. A total of 121 coatings were in use at these sites, of which 52 were specialty coatings. The overall result of this study was that only six percent of the coatings were thinned in excess of the required VOC limit indicating a 94 percent compliance rate.

- The SCAQMD contracted with an environmental consulting firm, to study thinning practices in the district (SCAQMD 1993). In Phase I of the study, consumers who had just purchased paints were interviewed as they left one of a number of stores located in different areas of the district. Seventy solvent-borne paint users responded to the survey. One-third of consumers purchased solvent-borne coatings. Of those surveyed, three (four percent of all solvent-borne paint purchasers) indicated that they planned to thin their coatings before use. In Phase II of the study, the consultant contacted 36 paint contractors. The majority stated that they were using water-borne coatings. Four contractors using solvent-borne paints allowed the consultant to collect paint samples at their painting sites. None of the samples collected were thinned.

- During the 1996 rule amendments to Rule 1113, SCAQMD staff conducted over 60 unannounced site visits to industrial parks and new residential construction sites to survey contractors regarding their thinning practices, coating application techniques, and clean-up practices. Samples were also collected during these site visits for coatings as supplied and as applied, for laboratory analysis and subsequent study of thinning practices. The results of the study indicate that out of the 91 samples taken only nine were thinned with solvents. Out of the nine thinned samples, only two were thinned to the extent that the VOC content limit of the coating, as applied, would have exceeded the applicable rule limit. During pre-arranged visits, however, excessive thinning was observed at only one site at a 1:2 ratio. At this level, the coating was thinned to the point where, according to the professional contractor using it, it did not provide adequate hiding and he had to apply several coats. The practice of over-thinning is expected to inhibit hiding power, application properties, and drying time of a coating.

The SCAQMD has received no countervailing empirical data from other sources to indicate that thinning is occurring to a greater extent than the above data would indicate.

In summary, field investigations of actual painting sites in the district and other areas of California that have VOC limits for coatings indicate that thinning of specialty coatings exists but rarely beyond the actual compliance limits. Even in cases where thinning does occur, it is rarer still for paints to be thinned to levels that would exceed applicable VOC content limits. The conclusion is that widespread thinning does not occur often; when it does occur, it is unlikely to occur at a level that would lead to a substantial emissions increase when compared with emissions from higher VOC coatings. Professional contractors can receive Notices of Violation (NOVs) for the practice of over-thinning, as it is illegal under the current version of the rule to exceed the specified compliance limits. It is, therefore, not likely that the proposed rule amendments would increase this practice. During the numerous surprise site visits conducted by the SCAQMD over many years, inspectors did not observe excess thinning to the degree cited by the industry representatives.

Thinning is not expected to be a problem because a majority of the coatings that would comply with future limits will be waterborne formulations. Other compliant coatings are expected to be available and may be applied without thinning. Even if some thinning occurs, thinning would likely be done with water or exempt solvents. Finally, current practice indicates that coating applicators do not engage in widespread thinning, and even when thinning occurs, the coatings VOC content limits are usually not exceeded. As a result, claims of thinning resulting in significant adverse air quality impacts are unfounded.

More Priming

PROJECT SPECIFIC IMPACT: Conventional coatings are currently used as part of a three, four, or five part coating system, consisting of one or more of the following components; primer, midcoat, and topcoat. Coating manufacturers and coating contractors have asserted that reformulated compliant low-VOC water- and solvent-borne topcoats do not adhere as well as higher-VOC solvent-borne topcoats to unprimed substrates. Therefore, the substrates must be primed with typical solvent-borne primers to enhance the adherence quality. The SCAQMD has received testimony in the past that the use of water-borne compliant topcoats, could require more priming to promote adhesion. Additionally, it is has been asserted that water-borne sealers do not penetrate and seal porous substrates like wood, as well as traditional solvent-borne sealers. This allegedly results in three or four coats of the sealer per application, compared to one coat for a solvent-borne sealer that would be necessary, resulting in an overall increase in VOC emissions for the coating system.

Regarding surface preparation, staff evaluated this characteristic as part of the evaluation of coating product data sheets mentioned above and recent studies conducted. For additional information, the reader is referred to the detailed tables in Appendix D and status reports in Appendix G in the Final Subsequent Environmental Assessment for Proposed Amended Rule 1113 (SCAQMD, 2002). Information from the coating product data sheets indicated that low-VOC coatings do not require substantially different surface preparation than conventional coatings. According to the product data sheets, conventional and low-VOC coatings require similar measures for preparation of the surface (i.e. apply to clean, dry surfaces), and application of the coatings (i.e. brush, roller or spray). Both low-VOC coatings and conventional coatings for both architectural and industrial maintenance applications have demonstrated the ability to adhere to a variety of surfaces. As a part of the technology assessment, staff analyzed the product data sheets for a variety of low-VOC primers, including stain-blocking primers, primers that adhere to alkyds, and primers that have equal coverage to conventional solvent-borne primers, sealers, and undercoaters.

As a result, based on the coating manufacturer's coating product data sheets, the material needed and time necessary to prepare a surface for coating is approximately equivalent for conventional and low-VOC coatings. More primers are not needed because low-VOC coatings possess comparable coverage to conventional coatings, similar adhesion qualities and are consistently resistance to stains, chemicals and corrosion. Low-VOC coatings tend not to require any special surface preparation different from what is required before applying conventional coatings to a substrate. As part of good painting practices for any coating, water-borne or solvent-borne, the surface typically needs to be clean and dry for effective adhesion. Consequently, claims of significant adverse air quality impacts resulting from more priming are unfounded.

More Topcoats

PROJECT-SPECIFIC IMPACTS: Another issue raised in the past relative to low VOC coatings is the assertion that reformulated compliant water- and low-VOC solvent-borne topcoats may not cover, build, or flow-and-level as well as the solvent-borne formulations. Therefore, more coats are necessary to achieve equivalent cover and coating build-up.

Technology breakthroughs with additives used in recent formulations of low-VOC coatings have minimized or completely eliminated flow and leveling problems. These flow and leveling agents mitigate flow problems on a variety of substrates, including plastic, glass, concrete and resinous wood. These additives even assist in overcoming flow and leveling problems when coating oily or contaminated substrates. According to the product data sheets for the sampled coatings, water-borne coatings have proven durability qualities. Comparable to conventional coatings, water-borne coatings for architectural applications are resistant to scrubbing, stains, blocking and UV exposure. Coating manufacturers, such as Dunn-Edwards, ICI, Pittsburgh Paints and Sherwin Williams, formulate low-VOC nonflat coatings (<150 g/l) with high build and excellent scrubability. Most of the coatings are mildew resistant and demonstrate excellent washability characteristics. The coverage of the coatings average around 400 square feet per gallon, which is equivalent to the coverage of the conventional nonflat coatings. Con-Lux, Griggs Paint and Spectra-Tone also formulate even lower VOC (<50 g/l) coatings that also demonstrate excellent durability, washability, scrubability and excellent hide. The coverage is again equivalent to the conventional coatings around 400 square foot per gallon. As already noted in the "More Thickness" discussion, low-VOC coatings that have a high solids content have equivalent or slightly superior coverage compared to high VOC coatings.

According the other coating manufacturer's product data sheets, water-borne coatings for IM applications are resistant to chemicals, corrosion, chalk and abrasion. Both water-based and low-VOC solvent-based IM coating formulations have passed abrasion and impact resistance tests, such as ASTM test methods D4060 and G14, respectively. Similar to their conventional counterparts, water-borne IM coatings also tend to retain gloss and color, as well as have good adhesion to a variety of substrates. A majority of the low-VOC (<250 g/l) IM coatings passed adhesion tests, such as ASTM test methods D4541, D3359-78, D2197 or D412. Low-VOC IM coatings tend to have comparable coverage (approximately 300 square feet per gallon) to conventional IM coatings.

Both low-VOC and conventional coatings have comparable coverage and superior performance. These low-VOC coatings possess scrub and stain resistant qualities, blocking and resistance to ultraviolet (UV) exposure for the exterior coatings. Both low-VOC and conventional IM coatings tend to have chemical and abrasion resistant qualities, gloss and color retention, and comparable adhesion qualities. With comparable coverage and equivalent durability qualities, additional topcoats for low-VOC coatings should not be required.

More Touch-Ups and Repair Work

PROJECT-SPECIFIC IMPACTS: Another potential issue related to low VOC coatings is the assertion that reformulated compliant water- and low-VOC solvent-borne formulations dry slowly, and are susceptible to damage such as sagging, wrinkling, alligatoring, or becoming scraped and scratched. It is also claimed that the high-solids solvent-borne alkyd enamels tend to yellow in dark areas, and that water-borne coatings tend to blister or peel, and also result in severe blocking problems. As a result, additional coatings for repair and touch-up would be necessary.

Extra touch-up and repair and more frequent coating applications are related to durability characteristics of coatings. As part of previous rulemaking related to architectural coating, the SCAQMD Staff met with numerous resin and coatings manufacturers to discuss this issue, and also reviewed coating product data sheets and recent studies conducted (see the detailed tables in Appendix D and status reports in Appendix G in the Final Subsequent Environmental Assessment for Proposed Amended Rule 1113, SCAQMD 2002) to obtain durability information for low-VOC coatings and conventional coatings. Based on information in the coating product data sheets, comparable to conventional coatings, water-borne coatings for architectural applications are resistant to scrubbing, staining, blocking and UV exposure. They were noted for excellent scrubability and resistant to mildew. The average drying time between coats for the low-VOC coatings (<150 g/l) was less than the average drying time for the conventional coatings (250 g/l). The average drying time for the lower-VOC coatings (<50 g/l) did increase more than the conventional coatings. However, with the development of non-volatile, reactive diluents combined with hypersurfactants, performance of these nearly zero-VOC coatings has equaled, and for some characteristics, outperformed traditional, solvent containing coatings.

Water-borne coatings for industrial/maintenance applications are resistant to chemicals, corrosion, chalk, impact and abrasion. Similar to their conventional counterparts, water-borne industrial/maintenance coatings also tend to retain gloss and color, as well as have good adhesion to a variety of substrates. Further, both low-VOC coatings and conventional coatings tend to be comparable with regards to passing abrasion and impact resistance tests, and are considered to have proven durability qualities. Some industrial/maintenance low-VOC epoxy and urethane systems perform significantly better than their alkyd-based counterparts. Examples of these coatings can be found in Appendix D and in the status reports in Appendix G in the Final Subsequent Environmental Assessment for Proposed Amended Rule 1113 (SCAQMD 2002).

Therefore, based on the durability characteristics information contained in the coating product data sheets, low-VOC coatings and conventional coatings have comparable durability characteristics. As a result, it is not anticipated that more touch up and repair work will need to be conducted with usage of low-VOC coatings. Consequently, claims of significant adverse air quality impacts resulting from touch-up and repair for low-VOC coatings are unfounded.

More Frequent Recoating

PROJECT-SPECIFIC IMPACT: An issue raised in past rulemaking is the assertion that the durability of the reformulated compliant water- and low-VOC solvent-borne coatings is inferior to the durability of the traditional solvent-borne coatings. Durability problems include cracking, peeling, excessive chalking, and color fading, which all typically result in more frequent recoating. As a result, it is possible more frequent recoating would be necessary resulting in greater total emissions than would be the case for conventional coatings.

The durability of a coating is dependent on many factors, including surface preparation, application technique, substrate coated, and exposure conditions. Again, as mentioned above, key durability characteristics, as discussed in coating product data sheets, include resistance to scrub or abrasion, corrosion-, chemicals-, impact-, stain-, and UV-resistance, are similar between conventional and low-VOC coatings. Both coating types pass abrasion and impact resistance tests, and have similar durability qualities. According to the coating product data sheets, low-VOC coatings repeatedly would not need additional surface preparation than what needs to be done to prime the surface for conventional coatings (see also “More Priming” discussion above). The technique to applying the coatings did not significantly differ either. It is expected that if applied using manufacturers’ recommendations, compliant low-VOC coatings should be as durable as conventional coatings and, therefore, no additional recoating is required from the usage of low-VOC coatings. Furthermore, overall durability is dependent on the resin used in the formulation as well as the quality of pigment, instead of just the VOC content of the coating.

The durability of a coating is governed by the nature of the binder used in its formulation, which are also known as film formers or resins. Table 4.1-7 shows the two main resin types currently in use. Acrylic resins are generally associated with low VOC coatings and alkyd resins are typically associated with high VOC coatings. These coatings are exposed to a variety of influences of daily life, including mechanical stresses, chemicals and weathering, against which they serve to protect the substrate. The major impact on the coating film is oxidation by exposure to light, causing the film to first lose color and gloss, and gradually become brittle and incoherent. This is mainly caused by a process known as photochemical degradation. This is especially the case for coatings used for exterior painting.

The coatings industry has developed a variety of additives that act as UV light absorbers or free radical scavengers that ultimately slow down the photo-oxidative process, thereby increasing the coating life. Antioxidants and sterically hindered amines are two classes of free radical scavengers, also known as hindered amine light stabilizers (HALS). These can be used with solvent-free or waterborne coatings. Other additives that have positive effect on durability of coatings include adhesion promoters, corrosion inhibitors, curing agents, reactive diluents, optical brightners, and algicides/mildewcides.

There are numerous types of binders used in the formulation of coatings. However for architectural uses, acrylics and alkyds are the two most commonly used. Table 4.1-7, extracted from material provided as part of the Durability and Performance of Coatings seminar held by Eastern Michigan University, describes some typical characteristics of the two main resin types and highlights strengths and weaknesses of each resin type. But, clearly Table 4.1-7 emphasizes the superior durability of acrylic coatings. Utilizing the additives available for improving application and durability characteristics, waterborne acrylic systems have overcome their limitations, and generally outperform solvent-borne coatings, when properly formulated.

TABLE 4.1-7

Performance Comparison of Acrylic (Low VOC)
and Alkyd (High VOC) Resin Systems

Acrylic Coatings	Alkyd Coatings
Low-VOC and solvent-free formulations available	Higher VOC formulations
Excellent exterior durability because of high degree of resistance to thermal, photooxidation, and hydrolysis – Pendant groups are ester bonds, but body is C-C bonds, which are much harder to break.	Limited exterior durability because prone to hydrolysis.
Very good color and gloss retention, and resistance to embrittlement	Embrittlement and discoloration issues with age
Require good surface preparation. Since the surface tension is high, the substrate surface needs to be cleaner before application	Minimal surface preparation requirements due to low surface tension. Relatively foolproof applications
Acrylic coatings are generally higher in cost	Lower costs
Polyurethane modified acrylics perform even better, especially in flexibility	Rapid drying, good adhesion, and mar resistance. Silicone modified alkyds have higher performance

Coatings manufacturers' own data sheets indicate that the low-VOC coatings for both architectural and industrial maintenance applications are durable and long lasting. Any durability problems experienced by the low-VOC coatings are not different than those seen with conventional coatings. Recent coating technology has improved the durability of new coatings. Because the durability qualities of the low-VOC coatings are comparable to the conventional coatings, more frequent recoatings would not be necessary.

Substitution

PROJECT-SPECIFIC IMPACT: Substitution is the assertion that since reformulated compliant water- and low-VOC solvent-borne coatings are inferior in durability and are more difficult to apply, consumers and contractors will substitute better performing high VOC coatings in other categories for use in categories with low compliance limits. An example of this substitution could be the use of a rust preventative coating, which has a higher VOC content limit requirement, in place of an industrial/maintenance coating or a nonflat coating.

There are several reasons why widespread substitution is not expected too occur. First and foremost, based on staff research of resin manufacturers' and coating formulators' product data sheets as well as recent studies conducted, there are, generally, a substantial number of low-VOC coatings in a wide variety of coating categories that are currently available, that have performance characteristics comparable to conventional coatings (see the tables in Appendix D, status reports in Appendix G, SCAQMD 2002 and Table 4.1-5 herein). Second, Rule 1113 prohibits the application of certain coatings in specific settings. For example, industrial maintenance coatings cannot be used in residential, commercial, or institutional setting. Also, rust preventive coatings cannot be used in industrial settings. Third, the type of performance (e.g., durability) desired in some settings would prohibit the use of certain coatings. For example, in an industrial/maintenance setting a coating with a life of 10 years or more is typically desired due to the harshness of the environment. Therefore, it is unlikely that an alkyd-based rust preventive coating with a typical life of five years would be used in place of an industrial/maintenance coating. Fourth, SCAQMD coatings rules typically require that when a coating can be used in more than one coating category the lower limit of the two categories is applicable. For example, a rust preventive coating substituted for an industrial/maintenance coating in the interim year would have to meet the lower industrial/maintenance interim limit. Lastly, SCAQMD enforcement records reveal that there is greater than 99 percent compliance rate with Rule 1113. Thus, it highly unlikely that coating applicators will violate future coatings rules by substituting higher-VOC coatings for lower-VOC coatings.

As discussed above, the SCAQMD does not expect that low-VOC coatings used for specific coating applications will be substituted for by higher-VOC coatings used for other specific types of coating applications. Currently, there are a substantial number of low-VOC coatings in a wide variety of coating categories that have performance characteristics comparable to conventional coatings. Moreover, the type of performance desired in some settings would prohibit the use of certain coatings in those settings. SCAQMD rules typically require that when a coating can be used in more than one coating category the lower limit of the two categories is applicable. Lastly, SCAQMD enforcement records reveal that there is greater than 99 percent compliance rate with Rule 1113. It is expected that future coatings rules will have an equivalent compliance rate.

If in the rare event that substitution does occur, it is expected that future coatings would still achieve overall VOC emission reductions. Substitution would only result in lesser emission reductions than expected, it would not increase emissions as compared to the existing setting. Consequently, it is not expected that control measures requiring a lower overall VOC content of coatings will result in significant adverse air quality impacts from the substitution of low-VOC coatings with higher-VOC coatings.

More Reactivity

Different types of solvents have different degrees of "reactivity," which is the ability to accelerate the formation of ground-level ozone. Coating manufacturers and coating contractors assert that the reformulated compliant low-VOC water- and solvent-borne coatings contain solvents that are more reactive than the solvents used in conventional coating formulations. Furthermore, water-borne coatings perform best under warm, dry weather conditions, and are typically recommended for use between May and October. Since ozone formation is also dependent on the meteorological conditions, use of waterborne coatings during this period increases the formation of ozone.

The use of reactivity as a regulatory tool has been debated at the local, state, and national level for over 20 years. For example, CARB incorporated a reactivity-based control strategy into its California Clean Fuel/Low Emissions Vehicle regulations, where reactivity adjustment factors are employed to place regulations of exhaust emissions from vehicles using alternative fuels on an equal ozone impact basis. As noted in the "Household and Personal Care Products" subsection, CARB is evaluating a similar strategy for consumer products and industrial emissions, and contracted with Dr. William Carter, University of California at Riverside, Center for Environmental Research and Technology, College of Engineering, for a two-year study to assess the reactivities of VOC species found in the consumer products emissions inventory. Dr. Carter, one of the principal researchers of reactivities of various VOC species, plans to further study VOC species, more specifically glycol ethers, esters, isopropyl alcohol, methyl ethyl ketone (MEK), and an octanol, since these are typically found in either waterborne coatings, solvent-borne coatings, or both. These specific VOCs have been prioritized based on emissions inventory estimates, mechanistic uncertainties, and lack of information in the current reactivity data. Under the current models and ozone chamber studies, however, Dr. Carter has been unable to assess the reactivity of low volatility compounds, and has not succeeded in reducing the uncertainties of key VOC species used in AIM coatings. He did identify the state of science with respect to VOC reactivity and described areas where additional work is needed in order to reduce the uncertainty associated with different approaches to assessing reactivity.

Another factor to be considered in the reactivity based approach, and probably the most important, is an accurate speciation profile of waterborne and solvent-borne coatings. CARB, in its effort to get more detailed information about the speciation profiles, required speciation profiles of all coatings included in the 1998 CARB Survey. The results of the speciation data are still under evaluation, and could potentially be used for future reactivity-based architectural coatings control.

CARB did propose an alternative reactivity-based approach in its recent proposed Aerosol Coatings rule amendment, but has delayed the reactivity-based alternative, until after a complete peer review of the modeling assumptions and reactivity data included in Dr. Carter's research.

The contention that more reactive solvents will be used in lieu of traditional less reactive solvents is somewhat misleading because the coating categories affected by these rule amendments currently contain reactive and highly toxic solvents such as toluene, xylene, MEK, etc. Furthermore, Harley, et al., (1992) noted, "The speciated organic gas emissions from use of solvent-borne architectural coatings are 24 percent more reactive than the official [VOC] inventory would suggest." This observation suggests that solvent-borne architectural coatings may actually be more reactive than low-VOC coatings especially water-based coatings. Therefore, there is a need for further study of the chemical composition of industrial surface coatings and the detailed composition of petroleum distillate solvents incorporated in surface coatings.

To date, Dr. Carter has compiled some information regarding the reactivity of VOCs and has established several different reactivity scales. However, he cautions the use of these scales due to the uncertainties involved; for example, "Deriving such numbers is not a straightforward matter and there are a number of uncertainties involved. One source of uncertainty in the reactivity scales comes from the fact that ozone impacts of VOCs depend on the environment where the VOC is emitted. A second source of uncertainty is variability in the chemical composition of the VOC source being considered. Complex mixtures such as "mineral spirits" may be more difficult to characterize and may vary from manufacturer to manufacturer though in principal the composition of a given lot can be determined and reasonably assumed to be constant regardless of how the product is used. A third source of uncertainty comes from the complexity and uncertainties in the atmospheric processes by which emitted VOCs react to form ozone (Carter, 1995).

According to Dr. Carter, reliable reactivity numbers do not currently exist from which accurate air quality policy can be derived based on reactivity and not total VOC emissions. Further, Dr. Carter, asserts that ketones are the most important class of consumer emissions for which there are no environmental chamber reactivity data suitable for evaluating reactivity predictions. He also finds no experimental reactivity data for glycols or alcohols suitable for mechanism evaluation. (Carter, 1995, page 6).

Another factor to be considered in the reactivity based approach, and probably the most important, is an accurate speciation profile of water-borne and solvent-borne coatings. Dr. Albert C. Censullo, Professor of Chemistry, California Polytechnic State University, San Luis Obispo, conducted a comprehensive assessment of species profiles for a number of sources within the general categories of industrial and architectural coating operations. The study was intended to upgrade the existing species profiles, which were last analyzed in 1991. The compositions of industrial and architectural coatings have changed significantly in the last few years due to regulatory changes at the national, state, and local levels.

As a part of the Censullo study, 52 water-borne coating samples were analyzed and species profiles were determined by using an average of at least two analyses. The four most common solvents in water-borne coatings were identified as texanol, propylene glycol, diethylene glycol butyl ether, and ethylene glycol, all of which were identified by Dr. Carter as needing further reactivity assessment.

Additionally, the Censullo study obtained emission profiles for 54 solvent-borne coating samples. The results were significantly more complex compared to the species profiles for the water-borne samples, due primarily to the various petroleum fractions used in solvent-borne coatings. Some of the species profiles resulted in several hundred components from one sample. Dr. Carter has compiled reactivity data on several of the specifies identified, but has also indicated the need to further assess the reactivity of MEK, isopropyl alcohol, other alcohols, and esters found in solvent-borne coatings. Subsequently, the 1998 CARB survey included a section to obtain specification profiles from coating manufacturers. This updated species profile is an important first step in focusing the attention of researchers in assessing overall reactivity and its contribution to ozone formation. The information in the original survey questionnaire will be used to study whether or not additional flexibility can be built into regulations based on the reactivity of the ingredients.

In spite of the studies identified above, reactivity data for VOCs, especially those compounds used to formulate consumer and commercial products, are extremely limited. This is essentially the conclusion reached by U.S. EPA in a report to Congress which states, “better data, which can be obtained only at great expense, is needed if the U.S. EPA is to consider relative photochemical reactivity in any VOC control strategy.” (U.S. EPA, 1995). Current studies are underway with more work being planned for the future with respect to assigning reactivity numbers for various key chemical compounds found in coatings.

With respect to water-borne reformulated coatings, some members of the architectural coating industry also concurs with the SCAQMD’s technical assessment that reactivity will not significantly affect the reaction of total VOC reductions on reducing ozone formation in the district. At a 1991 joint SCAQMD/CARB Conference on Reactivity-Based Hydrocarbon Controls: Scientific Issues and Potential Regulatory Applications, a paper was presented by coating industry representatives entitled, *“Application of Reactivity Criteria to Architectural Coatings.”* This paper asserts that “...approximately 68 percent of the volume of architectural coatings made and used in California are waterborne flat coatings and waterborne primers, sealers, and undercoaters, with a weighted average VOC content of 80 g/L. This is so much lower than the VOC content of the solvent-borne flat coatings replaced...that reactivity is probably not a significant issue with regard to these coatings."

To address the issue of reactivity of VOCs, the SCAQMD is participating in CARB's Reactivity Research Advisory Committee, which is monitoring the progress of the North American Research Strategy for Tropospheric Ozone with regard to evaluating research studies on reactivity conducted at the national level. In addition to the SCAQMD's participation in the aforementioned studies, Dr. Carter has been retained by CARB to carry out an experimental and computer modeling study to investigate the atmospheric ozone formation potential of selected VOCs emitted from consumer products and industrial sources.

Although the science of VOC reactivity has matured over the past few years, more comprehensive studies are still being conducted to resolve the uncertainties of reactivity data. The experts in the field, including Dr. Carter, have indicated the need to improve estimates of atmospheric ozone reactivity factors for selected major classes of compounds in the consumer product emissions inventory. They also feel the need to improve the quantification of the uncertainty ranges of atmospheric reactivity factors for the classes of species typically found in coatings. In the near future, with funding from U.S. EPA and private sources, a new, state-of-the-art ozone chamber will be developed and used for future studies. It was agreed at a March 1, 2001 CARB meeting that first two compounds to be modeled in the ozone chamber would be texanol ester alcohol and mineral spirits because they were at the top of the usage list from CARB's surveys. Furthermore, the architectural coatings industry is funding additional studies to further understand the mechanistic and kinetic reactivities of different VOC species. The results of all the aforementioned research and studies will be invaluable in determining the extent to which a reactivity based approach can be relied on for regulating VOC emissions from the application of coatings and the use of solvents.

Until the results of this research and studies are completed and peer reviewed, the SCAQMD believes that it would not be prudent to implement a reactivity-based ozone reduction strategy based on incomplete science. Therefore, the SCAQMD will continue to monitor and participate in all studies related to enhanced reactivity data for VOC species, including directly participating in studies pertaining to reactivity of solvents in architectural coatings.

In the absence of actual reactivity numbers for the compounds contained in "traditional" solvent formulations and compliant, low-VOC coatings, emissions must be calculated in the standard manner of total VOC per unit of coating applied manner. Based upon the current state of knowledge regarding VOC reactivity, it is speculative to conclude that the proposed amendments will generate significant adverse air quality impacts due to increased reactivity.

On June 16, 1995, the U.S. EPA determined that acetone, p-chlorobenzotriflouride (PCBTF), VMS as well as other solvents have low photochemical reactivity and should be exempted from consideration as a VOC. The SCAQMD subsequently amended Rule 102 on November 17, 1995, to add acetone and other solvents to the definition of Group I exempt compounds, which are non-VOC by definition.

Oxsol 100 (PCBTF), manufactured by Occidental Chemical Corporation, was also delisted as a VOC in 1995. This solvent can be used to extend or replace many organic solvents, including toluene, xylene, mineral spirits, acetone, methyl ethyl ketone, trichloroethylene, and perchloroethylene. Toxicity data of PCBTF was assessed by OEHHA and it was not considered to have a significant toxic risk. This product is less toxic than toluene, is not considered a Hazardous Air Pollutant or an Ozone-Depleting Substance. The U.S. EPA is also in the process of delisting t-butyl acetate, which may also help coating formulators in utilizing exempt solvents in their formulations.

Synergistic Effects of the Eight Issues

It has been asserted in the past that not only should each of the eight issues (e.g., more thickness, illegal thinning, more priming, more topcoats, more touch-up and repair, more frequent recoating, more substitution, and more reactivity) be analyzed separately but that the synergetic effect of all issues be analyzed. As discussed above, the SCAQMD's research and analysis of resin manufacturers' and coating formulators' product information sheets concludes that on each separate issue that the low-VOC compliant coatings have comparable performance as current coatings or industry's specific assertions are unfounded. Therefore, since individually each issue does not result in a significant adverse air quality impact, the synergistic effect of all eight issues will not result in significant adverse air quality impacts. Even if it is assumed that some of the alleged activities do occur, e.g., illegal thinning, substitution, etc., the net overall effect of the proposed amendments is expected to be a reduction in VOC emissions.

Low Vapor Pressure

Some coatings manufacturers have asserted that coating solvents should not be regulated as a VOC at all. These solvents currently used in consumer products and architectural coatings are considered low volatility compounds, meaning that they have a vapor pressure of less than 0.1 millimeter of mercury (mm of Hg) at 20 degrees Celsius. While CARB has included a low vapor pressure (LVP) exemption in its Consumer Products regulation, its staff indicate that the LVP exemption was placed into the proposed rule for some additives found in consumer products, such as surfactants, paraffin, and other heavier compounds that do not readily evaporate into the atmosphere and are typically washed away into the sewer. Since the VOCs in paints do and are intended to evaporate into the atmosphere, CARB does not support the LVP exemption for architectural coatings and did not include the LVP exemption into its Aerosol Coatings rule. U.S.EPA staff also does not support an LVP exemption for the architectural coatings rule and did not include such an exemption in the National Architectural Coatings Rule. Based upon its test methodology, U.S.EPA concludes that VOCs from architectural coatings do evaporate into the air and therefore should not be exempted. The SCAQMD concurs with U.S.EPA and CARB decisions to not include a LVP exemption for architectural coatings. Nevertheless, the SCAQMD will continue to work with CARB staff in identifying issues, participating in future studies, and monitoring the result of any studies.

NTS Study

A study by the National Technical System (NTS) was initiated to assess application and durability characteristics of zero-VOC, low-VOC, and high-VOC coatings in order to supplement information collected by the SCAQMD, as part of a technology assessment. The laboratory testing of the NTS study is complete, and the Preliminary Test Data/Project Status Report #3 was released April 5, 1999.

The results from the NTS study are consistent with SCAQMD's own technology assessment. The results of the study show that zero-VOC coatings available today, when compared to high-VOC coatings are equal, and in some cases, superior in performance characteristics, including coverage, mar resistance, adhesion, abrasion resistance, and corrosion protection. However, the NTS results also highlight application characteristics of some zero-VOC nonflat and PSU coatings that are somewhat limited when compared to solvent-based, high-VOC coatings. Those include lower rankings for leveling, sagging and brushing properties. However, for industrial/maintenance coatings, zero and low-VOC coatings performed better than high-VOC coatings. In addition to the laboratory results, the NTS study was expanded with additional testing, including accelerated actual exposure, real time actual exposure, and actual field application characteristics. In sum, the results of the NTS study indicates that some, but not all of the zero-VOC coatings may have some application characteristics. This means that when promulgating coatings rules or rule amendments sufficient research and development time should be allowed to correct potential coating application problems.

Overall Conclusion

Based on the preceding analysis of potential air quality impacts from implementing future coatings rules, it is concluded that the overall air quality effects will be a VOC emission reduction.

PROJECT-SPECIFIC MITIGATION: No significant secondary air quality impacts from consumer products have been identified so no mitigation measures are required.

Dust Suppression

PROJECT-SPECIFIC IMPACTS: Several control measures are aimed at suppressing dust formation including BCM-07 Further PM10 Reductions from Fugitive Dust Emission Sources, BCM-08 – Further Emission Reductions from Aggregate and Cement Plant Manufacturing Operations, and TCB-01 – Transportation Conformity Budget Backstop Control Measures.

BCM-07, BCM-08 and TCB-01 could result in an increase in water truck trips for dust suppression. Additional truck trips could cause an increase in mobile source emissions of VOC, NOx, CO and PM10. Water trucks are generally supplied water from a site source, thereby, allowing the truck to remain on the site for the duration of the facility operation. The emissions to and from the site are considered negligible as the trucks otherwise would be used to travel to another unrelated site.

PROJECT-SPECIFIC MITIGATION: No significant secondary air quality impacts from dust suppression activities have been identified so no mitigation measures are required.

Secondary Impacts from Miscellaneous Sources

PROJECT-SPECIFIC IMPACTS: Miscellaneous sources control measures would regulate a variety of different types of emission sources including both area and point sources. As a result, these control measures are expected to reduce VOC, criteria pollutant, and precursor emissions. The following control measures were identified as having the potential to generate secondary air quality impacts.

WST-01 would require control of ammonia and VOC emissions from handling of livestock waste. The predominant control options are shipping manure to composting facilities within or out of the district, processing it at anaerobic digestors, or processing it at a controlled composting facility. The most likely compliance option for this control measure is to haul manure out of the district to the San Joaquin Valley. The amount of emissions generated would depend on the amount of manure (and, thus, number of trucks) that would be transported to other facilities or out of the district. The estimate increase in vehicle mile traveled per trip is about 150 miles. Because hauling is expected to substantially increase the number of vehicle miles traveled currently associated with manure management, haul truck NOx emissions could exceed regional mass emission significance thresholds for NOx. Also, WST-01 will reduce VOC and ammonia emissions while the haul trucks will result in significant NOx emissions.

WST-02 – Emissions Reductions from Composting, is expected to control emissions of VOC and ammonia, which are PM10 precursors. The composting control methods available to control emissions from composting include enclosures, forced aeration systems, and in-vessel composting. Emissions from composting operations conducted inside enclosures or using forced aeration systems and in-vessel systems can be vented to emission control equipment such as biofilters. Forced aeration and in-vessel systems can also be enclosed, with all emissions vented to control equipment. Based on the analysis for 1133 rules, windrows are not a compliance option. The compliance options are: (1) enclosure vented to a biofilter; (2) in-vessel composting; and (3) aerated static piles. The primary impact (aside from construction) is emissions from energy to operate the control equipment. Afterburners are not currently under consideration as a compliance option. Greater use of front-end loaders is not anticipated (SCAQMD, 2003b). Emissions from these sources can be controlled through permit conditions and are expected to be insignificant compared to the documented benefits, including reductions in emissions (VOC, methane, ammonia and odors) (CARB, 2002).

MSC-04 – Emission Reductions from Miscellaneous Ammonia Sources, includes a number of control measures, the implementation for some of these control measures would generate secondary emissions. Specifically, this control measure would go beyond the requirements of WST-01 by requiring the transport of other types of livestock waste (e.g., poultry, etc.) out of the district, generating additional emissions from trucks. As explained in the discussion for WST-01, hauling animal wastes out of the district is the most likely compliance option expected to be used. As a result, it is possible that MSC-04 could contribute to a significant adverse air quality impact, thereby making it substantially worse.

PROJECT-SPECIFIC MITIGATION: Incentive programs to use alternative clean fuels or install particulate transport and oxidation may reduce NOx emissions from haul trucks to less than significant. However, because incentive programs are voluntary, NOx emission reductions are not guaranteed. No other feasible mitigation measures were identified so NOx emission increases from this control measure remain significant.

<u>Mobile Sources</u>

PROJECT-SPECIFIC IMPACTS: A number of control measures would require the use of alternative fuels which could include low sulfur diesel fuels, increased oxygenated fuels, such as compressed natural gas, additional use of oxygenates in fuels, and could include other types of alternative fuels. These control measures include FSS-06, ON-RD HVY DUTY-3, OFF-RD CI-1, , OFF-RD LSI-1, OFF-RD LSI-2, MARINE-1, MARINE-2, FUEL-2, and some of the long-term control measures or conceptual long-term control measures. These types of control measures may require modifications to refineries to produce additional fuels. Low sulfur diesel fuels could require additional hydrodesulfurization which would require new or expansion of existing hydrotreaters, hydrogen plants, and sulfur recovery plants. However, the environmental effects of refinery modifications to produce low sulfur diesel fuels have already been addressed as part of the September 2000 amendments to SCAQMD Rule 431.2. The reader is referred to the June 5, 2000, Final program Environmental Assessment for the Proposed Fleet Vehicle Rules and Related Amendments (SCAQMD 2000). This Final Environmental Assessment concluded that refinery modifications to produce low sulfur diesel would generate significant adverse construction and operation air quality impacts.

Ethanol is currently the only approved oxygenate for use in fuels in California. Control measures that would require additional ethanol would result in increased emissions associated with transport of ethanol via railcar, marine vessel and/or trucks. The emissions from refinery modifications would require the use of Best Available Control Technology, and require offsets. (It should be noted that there are exemptions from the SCAQMD offset requirements for projects required to comply with local, state or federal rules and regulations. Typically, refinery projects designed to comply with reformulated fuel requirements have been exempt from offsets). All refineries in the district are subject to RECLAIM regulations, including the RECLAIM emission cap, although the cap can be adjusted for projects required to comply with local, state and federal rules and regulations. Most of the projects completed at refineries for compliance with CARB Phase 2 and CARB Phase 3 compliance were significant for air quality impacts on an individual project basis. It is expected that refinery modifications to comply with certain reformulated or alternative fuels also would be significant, i.e., exceed the SCAQMD significance thresholds. However, the indirect impacts of the reformulated fuels programs have resulted in large emission reductions from mobile sources using the fuels which serve to offset the emission increases from the refineries to a certain extent.

The use of additional oxygenates (ethanol) in fuel would require the additional transport of ethanol via railcar from the mid-western portion of the United States, or via marine vessel from other countries. The emissions from the transport of oxygenates via railcar and marine vessel would generally exceed SCAQMD thresholds and would be considered significant.

Overall, the emission benefits associated with the use of reformulated fuels can be compared to the emission increases from refinery modifications. In general, the overall use of reformulated fuels can result in large emission decreases associated with its use in mobile sources. The use of alternative fuels is a potential control measure for trucks, marine vessels, airplanes, and railcars which are large sources of emissions. Therefore, the overall impacts of reformulated/alternative fuel control measures would be expected to have large overall emission reductions on mobile sources that use the fuels so that overall emission benefits are expected.

Biodiesel is the generic name for a variety of diesel fuel alternatives based on methyl esters of vegetable oil or fats. Biodiesel fits under the category of a renewable fuel because it is made from agricultural feedstocks such as soybean or grapeseed. Other possible feedstocks for biodiesel include bio-oils from corn, cottonseed, peanut, sunflower, canola, and rendered animal fat (SCAQMD, 2000).

Biodiesel is made by a catalytic chemical process called transesterfication, using an alcohol (such as methanol) and a catalyst. Methanol is mixed with sodium hydroxide and then with soybean oil, letting the glycerine that is formed settle. This process forms fatty esters, which are then separated into two phases, which allows easy removal of glycerol in the first phase. The remaining alcohol/ester mixture called methyl soyate is then separated, and the excess alcohol is recycled. The esters are sent to the clean-up or purification processes which consists of water washing, vacuum drying, and filtration.

The final fuel closely resembles conventional diesel fuel, with higher cetane number (a number that rates its starting ability and antiknock properties). Energy content, viscosity and phase changes are similar to petroleum-based diesel fuel. The fuel is typically blended with 20 percent low sulfur diesel fuel.

The fuel is essentially sulfur free, emits significantly less smoke, hydrocarbons, and carbon monoxide. NOx emissions are similar to or slightly higher when compared to diesel. Biodiesel has a high flash point and has very low toxicity if digested. It is also biodegradable.

The biggest drawback of biodiesel is cost. Before biodiesel can be a major fuel for vehicle use, the price needs to become much more competitive with diesel. Other drawbacks are that vehicle fuel lines and other components that would come in contacts with the fuel would have to be changed because biodiesel can dissolve some rubber. The fuel also clouds and stops flowing at higher temperatures than diesel, so fuel-heating systems or blends with diesel fuel would be needed in lower temperature climates (SCAQMD, 2000).

The 2003 AQMP includes strategies to reduce NOx from diesel engines that may include using SCR. SCR has been used to control NOx emissions from stationary sources for many years. More recently, it has been applied to mobile sources including trucks, marine vessels, and locomotives. Applying SCR to diesel-powered vehicles provides simultaneous reductions of NOx, PM10, and HC emissions.

Like an oxidation catalyst, SCR promotes chemical reactions in the presence of a catalyst. However, unlike oxidation catalysts, a reductant is added to the exhaust stream in order to convert NOx to elemental nitrogen and oxygen in an oxidizing environment. The reductant can be ammonia but in mobile source applications, urea is normally preferred. The reductant is added at a rate calculated from an algorithm which estimates the amount of NOx present in the exhaust stream as a function of the engine operating conditions (e.g., vehicle speed and load). As exhaust gases along with the reductant pass over a catalyst, which is applied to either a ceramic or metallic substrate, 75 to 90 percent of NOx emissions, 50 to 90 percent of VOC emissions, and 30 to 50 percent of PM10 emissions are reduced. SCR also reduces the characteristic odor produced by a diesel engine and the diesel smoke.

Potential adverse air quality impacts associated with the use of SCRs in diesel-fueled vehicles could occur if this technology resulted in the increase of other exhaust pollutants at the expense of reducing PM10 or a reduction in fuel economy. Additionally, potential air quality impacts could arise if the use of ultra low sulfur diesel fuel in combination with oxidation catalysts could result in infrastructure changes (e.g., fuel supply or delivery).

In the case of exhaust pollutants, the catalyst composition of SCR and its mode of operation are such that sulfates could form. However, with the use of ultra low sulfur diesel fuel sulfate formation should be negligible. In particular, even at temperatures in excess of 500 degrees Centigrade, only five percent of the sulfur in the fuel would be converted to sulfate, which still allows for significant net PM10 emission reductions.

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

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

Therefore, no significant adverse air quality impacts were identified from the use of SCRs in conjunction with ultra low sulfur diesel fuel to potentially comply with the applicable control measures

The 2003 AQMP includes control strategies for the roadside testing of heavy-duty diesel engines on portable dynamometers to measure NOx emissions while under load as well as strategies for loaded-mode testing of heavy-duty gas vehicles in the Smog Check program (LT/MED-DUTY2). The tests could generate some increase in combustion emissions in the immediate area of the dynamometers. Roadside testing may normally be conducted at highway weight stations, which are generally not located near population centers, and are located adjacent to the highways. The changes to the testing and Smog Check programs are expected to result in overall reductions in VOC and NOx emissions of 5.6 to 5.8 tons per day and 8.0 to 8.4 tons per day, respectively, associated with more frequent inspection and repairs. Therefore, the emission increases are expected to be small in comparison to the overall emission benefits.

PROJECT-SPECIFIC MITIGATION: In general, significant adverse secondary air quality impacts could be generated related to the manufacture of clean fuels in two areas. The first area is operational air quality impacts at local refineries resulting from modifications of existing equipment or installation of new equipment that would be necessary to manufacture clean fuels. Modifications of existing equipment and installation of new equipment would both be subject to Regulation XIII – New Source Review, or Rule 2005 – New Source Review for RECLAIM, and Lowest Achievable Emission Rate (LAER) requirements. Since new or modified equipment is already subject to LAER, by definition no additional emission reductions can be achieved by this equipment. Therefore, additional mitigation measures to reduce stationary source equipment emissions related to the production of clean fuels are not available.

The second source of emissions related to the production of clean fuels is emissions from marine vessels and trains importing oxygenates and other refinery feedstocks into the district. Because marine vessels and trains are under the jurisdiction authority of U. S. EPA, the SCAQMD is specifically pre-empted from regulating emissions from these sources.

CEQA Guidelines §15040(b) states, "CEQA does not grant an agency new powers independent of the powers granted to the agency by other laws." As indicated in the following discussions, due to state and federal regulations, the SCAQMD has little or no authority to regulate marine vessel emissions. The U.S. EPA and CARB have the authority to regulate marine vessels.

Mitigation Measures for Marine Vessels

Regulation of Marine Vessels: The regulation of oceangoing marine vessels registered in the U.S. has been traditionally undertaken by the United States Coast Guard (USCG) and the International Maritime Organization (IMO) for ships registered outside the United States. The CAA refers to the regulation of marine vessels under Sections 209 and 213 which indicate that the U. S. EPA can establish controls for non-road engines which includes marine vessels.

The U.S. EPA promulgated final exhaust emission standards for new diesel engines over 37 kW (50 hp) on December 29, 1999. The standards apply primarily to commercial harbor craft and limit NOx, VOC, and CO emissions. The specific standard and implementation date depends on the engine cylinder displacement. The NOx and VOC standards range from 7.2 to 11 g/kW-hr, the particulate matter standards range from 0.20 to 0.50 g/kW-hr, and the CO standard is 5.0 g/kW-hr. The implementation dates range from 2004 to 2007, depending on engine size.

With regard to ocean-going ships, the U.S. EPA finalized a rule for new marine compression-ignition engines at or above 30 liters per cylinder (Category 3 engines) on February 28,-2003 (68 FR 9745). Under the proposed rule, new Category 3 engines built in 2004 or later on U.S. flagged vessels would be subject to the IMO NOx standards established in 1997. As currently adopted, the proposed rule is not expected to achieve significant emission reductions because some manufacturers are already making IMO compliant engines. In addition, the majority of ocean-going ships calling on the local ports are foreign-flagged vessels, which are not regulated under this Rule.

Authority to Regulate Marine Vessels – CARB : The Ports and Waterways Safety Act (PWSA) was passed by the U.S. Congress in 1972 and among the matters it regulates is tanker design and construction. Title II of the PWSA indicates that the protection of life, property and the marine environment from harm requires the promulgation of regulations for the design, construction, alteration, repair, maintenance, and operation of vessels carrying certain cargoes in bulk, primarily oil and fuel tankers (46 U.S.C. Section 3703, formerly 46 U.S.C. Section 391a(1)). To implement the two goals of providing for vessel safety and protecting the marine environment, it is provided that the Secretary of the Department in which the Coast Guard is located "shall prescribe" such rules and regulations as may be necessary with respect to the design, construction, and operation of, among other things, the "propulsion machinery, auxiliary machinery, and boilers" on the covered vessels (46 U.S.C. Section 3703, formerly 46 U.S.C. Section 391a(1)). In prescribing regulations, the Secretary must consult with numerous federal departments, state, and local governments, port and harbor authorities and representatives of environmental groups (46 U.S.C. Section 3703(c)).

The PWSA preempts state regulation regarding the design, construction and operation of ships to the extent that such regulation would interfere with the dual goals of vessel safety and protecting the marine environment. The California Clean Air Act added several sections to the Health and Safety Code addressing the authority CARB has over marine vessels. Health and Safety Code (§43013(b)) states that CARB "may, consistent with subdivision (a), adopt standards and regulations to the extent permitted by federal law, for marine vessels. The adoption of standards or regulations must be found to be necessary, cost effective and technologically feasible." The U.S. Coast Guard's authority to regulate vessel safety does not prevent California from adopting emission controls for marine vessels as long as the controls or regulations do not constitute vessel "construction and design requirements." CARB believes that general performance standards, which do not mandate specific technologies or equipment, do not constitute design or construction requirements. Mitigation measures that would affect the design of the engine or require modification to the engine would be expected to occur in a manner consistent with the PWSA.

Authority to Regulate Marine Vessels – SCAQMD: Section 209(e) of the federal Clean Air Act (42 U.S.C. Section 7543(e)(2)) preempts the SCAQMD from developing and imposing emissions limits on a class of marine engines at this time. Under Section 209(e) of the Act (42 U.S.C. Section 7543(e)(2)), U.S. EPA may authorize California (and thus the local air districts) to adopt and enforce emission standards for certain non-road engines only after the adoption of U.S. EPA regulations, notice and opportunity for pubic comment, and presentation of information and data supporting certain findings. Marine diesel engines are internal combustion engines which fall within the definition of non-road engines. Thus, California and the local air districts may not adopt emission standards for marine diesel engines unless the requirements of Section 209(e) are met.

The SCAQMD is not preempted through Section 209(e) of the Clean Air Act from mitigation measures that are considered to be "in use" measures, i.e., mitigation measures that do not involve design changes or modifications to the engines. Other types of in-use mitigation measures have been evaluated (SCAQMD, 1998). and some of these are summarized below.

Use Steamships in Place of Diesel Ships: Requiring the use of steamships in lieu of diesel ships was evaluated to determine if such a measure would reduce NOx emissions. Changing from diesel ships to steamships would not necessarily be desirable, however, since it would increase emissions of other pollutants. In addition, limits on vessel availability and lack of control over vessel charters makes a steamship mandate infeasible as a CEQA mitigation measure.

Emission Limits on Marine Vessels: There are a limited number of methods that a vessel owner or operator might be able to use to comply with an emission limit, whether it be stated as a maximum pollutant concentration or mass limit on emissions per day, per visit, or per year. This section discusses compliance through engine retrofits and engine design.

As previously discussed, Section 209(e) of the federal Clean Air Act preempts the SCAQMD from developing and imposing emission limits on diesel engines. The preemption in Section 209(e) does not extend to steamships. However, for both steamships and diesel ships, to the extent that an emission limit would have to be achieved through retrofits of existing engines or the design of new engines, the limit implicates preemption under the PWSA and controls would need to be imposed by the U.S. EPA or CARB.

Regulation of new vessel engines, as agreed to on the international level, will eventually reduce the marine vessel emissions associated with this project. The United States is a signatory to the International Convention for the Prevention of Pollution from Ships. The original 1973 treaty, together with an important protocol added in 1978, are referred to as "MARPOL 73/78". MARPOL 73/78 attempts to achieve the elimination of international pollution of the marine environment by oil and other harmful substances from marine vessels. Annexes I through IV of the treaty establish specific standards for the discharge of oil, hazardous substances and sewage into the water.

Under the auspices of the IMO, an agency of the United Nations, the signatory countries adopted Annex VI to MARPOL 73/78 on September 26, 1997 to reduce worldwide NOx emissions from ships by about 30 percent, as well as additional reductions in SOx emissions. Annex VI established the Technical Code on Emission of Nitrogen Oxides from Marine Diesel Engines. This resolution requires that marine diesel engines to which the regulation applies, must comply with the NOx limitations developed by the Technical Code. The Technical Code established mandatory procedures for the testing, survey, and certification of marine diesel engines which will enable engine manufacturers, ship owners and administrations to ensure that all applicable marine diesel engines comply with the relevant emission limits for NOx. SOx emissions will be reduced by limiting the sulfur content in fuels. This regulation applies to diesel engines with a power output of more than 130 kW manufactured after January 1, 2000. Only Congress or the U.S. EPA has the authority to implement the international emissions standards through new laws or regulations.

Emission controls and emission reductions are expected to occur in the long term through international agreements. The U.S. EPA has estimated that the total reduction of NOx emissions from the main engines of vessels associated with implementation of the IMO standards is estimated to be about 2,200 pounds per day in the South Coast Air District by 2010. Additional reductions from the effect of IMO standards on the NOx emissions from auxiliary engines are expected to be about 2,400 pounds per day by 2010 (U.S. EPA, 1997). The control of emissions through international agreements is the preferred mechanism to efficiently and effectively control emissions from marine vessels especially since about 80 percent of the vessels that arrive at the Ports of Los Angeles/Long Beach are foreign-owned. Over time these international standards will reduce emissions associated with marine vessels that visit the Port of Los Angeles/Long Beach, although significant emission reductions are not expected to be achieved because manufacturers are already making IMO compliant engines.

In addition, CARB staff are working with the U.S. EPA, the Maritime Administration, and several other regulatory agencies, shipping operators and port representatives to provide funding for demonstration projects that will test emission control technologies on ocean-going ships. It is expected that successful demonstration projects will support federal economic incentive programs by providing information on the feasibility of currently available technologies.

Limitations on Hours of Use or Number of Engines: If a limit is imposed on the number of hours a ship can unload in a day, the unloading operation must be spread over a greater number of days. During the periods the ship could not unload, it would remain docked at the terminal, continuing to operate its engines, consume fuel, and emit pollutants. This measure is considered infeasible because it would increase total emissions rather than mitigate (decrease) emissions from vessels.

Limiting the number of engines while under way would not be feasible because of safety concerns. Additionally, diesel vessels at berth generally operate auxiliary engines and not the main engine(s), i.e., they do not use full power. Reducing the number of engines in use at berth even further is not feasible because: (1) the ships are already operating under reduced power consumption; (2) power is still required to operate the pumps and unload the material in the ship; and (3) minimum power requirements are required to be maintained due to USCG regulations that require ships to have the ability to move away from the dock within only a 30-minute period.

Prohibit Tanker Visits During First or Second Stage Smog Alerts: A prohibition on tanker visits during first or second stage smog alerts would not mitigate impacts and could be counterproductive. It would force vessels to linger outside the district's boundaries three miles offshore or at other marine terminals until they could visit their destination terminal to unload. "CARB has suggested that emissions from up to 100 miles out from the coastline have a significant impact on ozone concentration in the California coastal air districts." (59 Federal Register 23382). Other studies have indicated that emissions 25 miles from the coastline would have little impact on air quality in the district (CARB, 1991). Nonetheless, by increasing the time a tanker is in the vicinity of the marine terminal, this measure would increase total emissions per tanker visit.

Fuel Specifications: Another mitigation measure which has been evaluated is establishing special fuel specifications for ships delivering products. The sulfur content of fuel used by vessels, based on data collected for other studies, is assumed to be 2.3 percent (Acurex, 1996). Some of the AQMP control measures, e.g., MARINE-1, and some of the long-term and conceptual long-term measures would require the use of low sulfur diesel fuel, resulting in reduced emissions from ships and other harbor craft vessels. Fuel specifications are regulated on a state-wide basis, when regulated by CARB, and only impact fuel purchased in California. It is difficult to regulate the fuel specifications of vessels traveling from other countries. Implementation of fuel specifications for marine vessels would present challenges, as a ship would require multiple, segregated fuel storage facilities.

Engine Timing Retard: Retarding the injection of fuel into the cylinder has been shown to reduce levels of NOx emissions in diesel engines. An engine's fuel injection is normally tuned for optimum efficiency and longevity. Retarding the fuel injection timing essentially detunes the engine, decreasing the peak temperature and pressure in the cylinder during the combustion process. This has the effect of reducing the thermal disassociation of atmospheric nitrogen and the subsequent formation of NOx, thereby reducing NOx emissions. Since injection timing retard results in the combustion process occurring at a lower temperature all of the fuel may not be burned resulting in an increase in VOC, particulate, and smoke emissions.

The potential NOx control efficiency of injection timing retard of diesel internal combustion engines is generally listed as between 25 and 30 percent. However, very large marine diesel engines are not expected to achieve this high of a reduction. The control system on large slow speed engines typically limit retardation to less than a degree or two to avoid destabilizing the engine and related safety and reliability problems. As a result, NOx reductions due to retardation are relatively small on ship engines. Sulzer, a ship engine manufacturer, estimates that the use of engine timing retard may reduce NOx emissions by up to 15 percent (PLAX/PLB, 1994).

A complication with injection timing retard on slow speed marine diesel engines is that timing retardation may affect the reversing of the engine direction, resulting in the possible loss of power. A loss of power while maneuvering in a constrained area such as a busy port would create a substantial safety hazard and may lead to damage of land-side infrastructure. Therefore, this control method may not be practical for marine vessels operating at low speeds. In addition, timing retardation results in decreased engine efficiency, decreased power, a two to five percent increase in fuel consumption, increased engine wear and maintenance requirements, and may also make the engine more difficult to start.

The use of engine timing retard on marine vessels marine terminal is considered infeasible because: (1) the use of engine timing retard for the control of NOx emissions on marine vessels has not been demonstrated to be effective; (2) additional research on timing retard is required to address the loss of power that may occur at slow speeds and the related safety concerns; (3) the SCAQMD does not currently have the authority to require the modification to marine diesel engines; and (4) a regulation requiring engine timing retard would unduly burden interstate commerce.

25 Mile Off-Shore Shipping Lane: In another context, the concept of moving ships further off-shore to reduce on-shore air quality impacts in the Ventura area has been evaluated (Acurex, 1996). The impact of moving shipping lanes further offshore on the onshore flux of NOx emissions is more sensitive to meteorological conditions. On some days there is an emission reduction benefit and on other days there is a disbenefit, depending on the specific weather and wind conditions (CARB, 2000).

The main increase in marine vessels associated with the 2003 AQMP is due to the potential additional transport of oxygenates. This measure is not expected to be relevant to impacts associated with the AQMP because of the sources and ports of origin and direction of travel of the vessels that would deliver oxygenates and blending stocks. Most ethanol is currently shipped via railcar from the mid-western portion of the United States. The ships transporting gasoline blending stocks are expected to be sent from foreign sources and proceed directly into the Port, i.e., do not traverse north/south along the coast of California. There are no known major sources of ethanol along the western coast of the United States. Ships transporting domestic sources of oxygenate would be expected to come through the Panama Canal and approach the ports from the south. Therefore, this measure would not reduce emissions associated with ships traveling to and from terminals in southern California. Further, enforcing this mitigation measure would be difficult.

Reducing Ship Cruising Speed: Speed reduction, for the same conditions of wind, seas, and current, will reduce NOx emissions. The U.S. EPA assisted in the development of a voluntary speed reduction demonstration project that was initiated in May 2001 at the Ports of Los Angeles and Long Beach. The MOU that initiated the program calls for ocean-going vessels entering or leaving the ports to slow to 12 knots within 20 nautical miles of the ports. The speed reduction results in lower engine speeds, power, and associated NOx emissions. If all vessels fully complied with the MOU, it is possible to obtain an emission reduction of over two tons of NOx per day. The parties to the MOU are developing data under the MOU that could serve as the basis for achieving emission reductions that could be credited towards progress to the State Implementation Plan.

The speed of marine tankers already is 12 knots or less in the vicinity of the port areas. Vessels are assisted by tugboats as soon as they reach the outer harbor area. Therefore, the speed of marine vessels within the port is less than 12 knots, closer to about five knots. A further reduction in vessel speed within the Port as a mitigation measure is not considered feasible, nor would it provide additional environmental benefits. Vessel speeds within the Port are controlled by the harbor pilot, vary from ship to ship, and are determined by what is considered safe for the ship. The speed that is considered safe within the Port can vary depending on the type of ship, the weight of the ship, tides, winds, currents, traffic conditions, and so forth. Ships maneuvering within the Port are required to have their engines on but are often in idle mode and are being assisted and maneuvered by tug boats. Further, most large ships have difficulty monitoring slow speeds and may be required to increase and decrease the throttle sporadically to maintain slower speeds. Maneuvering speeds within the Port are assumed to be about five knots. The harbor pilot enforces a maximum speed limit of six knots. Ship speeds below five knots are not expected to provide further NOx emission reductions (SCAQMD, 1998)

Marine Vessel Credit Programs: There are some local marine vessels that have been voluntarily repowered under the Carl Moyer incentive program, AQIPs, RECLAIM, Rule 1631, etc. The Carl Moyer program provides grants to pay for the extra cost of replacing existing diesel engines with lower-emission engines, including new cleaner diesels, or engines powered by alternative fuels or electricity. The marine vessel projects funded under the Carl Moyer Program are primarily repower projects where older diesel engines are replaced with cleaner diesel engines on fishing vessels and tugboats. During 1998, the Carl Moyer Program funded marine vessel projects that resulted in NOx emission reductions of 357 tons per year and will continue to generate emission reductions over the estimated 20-year life of the projects. During the 1999-2000 fiscal year, additional marine vessel projects generated an additional 29 tons per year of NOx.

The SCAQMD has developed a protocol for obtaining NOx credits for repowering or retrofitting marine vessels (Rule 1631 – Pilot Credit Generation Program for Marine Vessels). Marine retrofit or repowering projects are all voluntary projects to generate NOx credits applicable to the RECLAIM program.

Based on the above, the SCAQMD does not have authority to directly regulate marine vessel emissions and the SCAQMD cannot require retrofitting, repowering or controlling emissions from marine vessels. However, CARB and the U.S. EPA have authority to regulate these sources and some of the control measures proposed in the 2003 AQMP would reduce emissions from marine vessels. No additional feasible mitigation measures for the control of emissions from marine vessels have been identified, over and above the control measures included in the 2003 AQMP.

Emission Standards for Railcars

The U.S. EPA has established emission standards for NOx, VOCs, CO, particulate matter, and smoke for newly manufactured and remanufactured diesel-powered locomotives and locomotive engines which have been previously unregulated. Three separate sets of emission standards have been adopted, with applicability of the standards dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) apply to locomotives and locomotive engines manufactured from 1973 through 2001. The second set of standards (Tier 1) applies to locomotives and locomotive engines manufactured from 2002 through 2004. The final set of standards (Tier 2) apply to locomotives and locomotive engines originally manufactured in 2005 and later (U.S. EPA, 1997). With the new national emission standards for both newly manufactured and remanufactured locomotives originally built after 1972, future locomotive emission rates are projected to be much lower than the current emission rates. The U.S. EPA estimates that the NOx emissions will be reduced by about 62 percent from their current levels for locomotives manufactured after 2004 (U.S. EPA, 1997). The SCAQMD cannot require these sources be retrofitted or their engines replaced.

There are incentive programs to purchase/retrofit diesel ship engines to clean fuels, e.g., the Carl Moyer Program, Rules 1631 and 1632, etc., but since these are voluntary programs they do not guarantee that marine vessel and train emissions will be reduced to less than significant levels. Since no other feasible mitigation measures have been identified, air quality impacts from these sources remain significant.

Transportation Control Measures

TCMs are defined as strategies which adjust trip patterns or otherwise modify vehicle use in ways that reduce air pollutant emissions, and which are specifically identified and committed to in the 2003 AQMP. TCMs are included in the AQMP as part of the overall control strategy to demonstrate the region's ability to come into attainment with the

NAAQS. It is SCAG's responsibility to ensure that TCM strategies are funded in a manner consistent with the AQMP's implementation schedule.

SCAG has proposed three TCMs which are described below:

- <u>High Occupancy Vehicle interventions</u>: These are interventions that attempt to shift the proportion of work trips made using single occupancy vehicles—the clearly preferred mode of travel within the Southern California region, constituting 90 percent of all home-to-work trips, according to the 2000 U.S. Census—by increasing the share of HOV ridership within the Region. HOV lanes are one example of such projects, where particular segments of heavily used freeways are designated for exclusive use by HOV vehicles, particularly during rush hour traffic. The purpose of such measures is to make car-pooling and ride-sharing practices more attractive to individuals who may otherwise prefer the convenience of a single occupancy vehicle commute trip.

- <u>Transit and Systems Management interventions</u>: These are interventions that rely primarily on the provision of facilities and infrastructure that incentivize an increase in the proportion of regional trips that make use of transit as a transportation mode. Such measures also promote the use of alternative modes of transportation—such as bicycle and pedestrian modes—and seek to incentivize increases in the average vehicle occupancy (AVO) or ridership (AVR) by facilitating van-pools, smart shuttles and other such strategies.

- <u>Information Based Transportation Interventions</u>: These are interventions that rely primarily on the innovative provision of information in a manner that successfully influences the ways in which individuals use the regional transportation system. Typically, such measures seek to induce changes in trip behavior that beneficially influence the congestion and air pollution impacts of travel. One set of strategies attempt to increase the proportion of ride-sharing and car-pooling trips by providing information that makes it easier to match up people traveling to and from particular sets of origin and destination points. Another set of strategies attempts to shift the time-profile of demand—thus, TDM—by redistributing traffic flows from peak to off-peak hours. These strategies rely on providing single occupancy vehicle operators with realistic and near-real time estimates of congestion using internet-based information networks, in an effort to influence their decision to defer traveling to some other, less congested time of day.

As addressed in the 2001 RTP (SCAG, 2001), the main adverse air impacts associated with implementation of the TCMs are related to construction impacts. The construction impacts are specifically addressed in the next subsection below.

The TCMs are expected to result in changes in emissions related to mobile sources. The inventory prepared for the 2003 AQMP includes emissions estimates associated with mobile sources, which are summarized in Table 4.1-8.

TABLE 4.1-8

Annual Average Emissions by for On-Road Mobile Sources in the District (Tons/Day)

Source Category	VOC	CO	NOx	SOx	PM10
2002 Emission Inventory					
Total On-Road Motor Vehicles	344.77	3,447.88	679.79	4.85	18.70
2010 Emission Inventory					
Total On-Road Motor Vehicles	212.34	2,048.06	434.48	2.16	20.76
Emissions Reductions (emissions in 2002 - emissions in 2010)	132.43	1,399.82	245.31	2.69	(2.06)(1)
Pounds per Day	264,860	2,799,640	490,620	5,380	(4,120)
SCAQMD Significance Thresholds (lbs/day)	75	550	100	150	150
Significant?	NO	NO	NO	NO	YES

Source: SCAQMD, 2003 AQMP, Appendix III
(1) Numbers in parenthesis represent emission increases.

The inventory prepared for the 2003 AQMP includes estimates of on-road motor vehicles in 2002 and 2010. It is assumed that the TCMs that are part of the AQMP control measures would partially contribute to the emission changes identified in the emission inventories. The inventory also accounts for growth in population that also includes growth in the number of mobile sources and an increase in the vehicle miles traveled. The estimated VOC, CO, NOx, and SOx emissions associated with on-road mobile sources in the district are expected to be reduced between the 2002 and 2010 inventories. A portion of the emission reductions is expected to be associated with implementation of the TCMs.

Although Table 4.1-8 appears to indicate that implementing SCAG's TCMs will increase PM10 emissions, this artifact is a result of future growth in vehicle miles traveled. TCM strategies such as park-and-ride facilities; bus, rail, and shuttle transit improvements; vanpool and carpool programs; etc., are expected to slow future growth in vehicle miles traveled; however, growth is still expected to occur. In addition, although vehicle PM10 exhaust emissions decline slightly by 2010 (see Table E-10, AQMP Appendix III) the future growth in vehicle miles traveled is expected to result in an increase in tire wear and brake wear PM10 emissions. The net effect is that PM10 emissions from mobile sources increase by 2010. Without implementing the TCMs, PM10 emissions would likely increase to a greater extent.

PROJECT-SPECIFIC MITIGATION: Operational project specific impacts associated with the transportation control measures are not expected to exceed any SCAQMD significant thresholds. Therefore, mitigation measures are not required. Secondary Air Quality Impacts from Construction Activities

While implementing the 2003 AQMP control measures is expected to reduce operational emissions, construction-related activities associated with installing or replacing equipment, for example, are expected to generate emissions from construction worker vehicles, trucks, and construction equipment. Implementation of some of the measures in the 2003 AQMP will require construction of new infrastructure including: (1) additional infrastructure to support electric vehicles; (2) additional infrastructure to support electrification of new sources (e.g., truck stops, marine vessels, and forklifts); (3) construction of controls at stationary sources (e.g.,. electrostatic precipitators and vapor recovery systems at marinas); (4) modifications to refineries to manufacture reformulated fuels; (5) additional infrastructure at airports; and (6) construction associated with the TCMs including construction of HOV improvement projects (e.g., new carpool lanes and HOV lanes at interchanges).

The inventory prepared for the 2003 AQMP includes emissions estimates associated with construction activities, which are summarized in Table 4.1-9.

The inventory prepared for the 2003 AQMP includes estimates of construction emission inventory for construction activities in 2002 and 2010. It is assumed that construction activities to implement AQMP control measures, e.g., (1) additional infrastructure to support electric and alternative fuel vehicles; (2) additional infrastructure to support new HOV lanes; and (3) additional infrastructure to support electrification of new sources contribute to construction activities emission inventories.

It is expected that 2003 AQMP control measures, in particular emission standards for off-road mobile sources, contribute to the reduction in combustion emissions from off-road equipment. It is also assumed that implementing the 2003 AQMP control measures contributes to the construction and demolition emissions. The estimated VOC, CO, NOx, and SOx emissions associated with construction and demolition in the district are expected to be reduced between the 2002 and 2010 inventories, resulting in an air quality benefit. The estimated PM10 emissions associated with construction activities are expected to increase between 2002 and 2010, and exceed the SCAQMD daily PM10 significance thresholds.

TABLE 4.1-9

Annual Average Emissions by Source Category in the District (Tons/Day)

Source Category	VOC	CO	NOx	SOx	PM10
2002 Emission Inventory					
Construction and Demolition	-	-	-	-	39.91
Off-Road Equipment	105.03	962.99	185.92	1.18	12.95
Total	105.03	962.99	185.92	1.18	52.86

TABLE 4.1-9 (Concluded)

Annual Average Emissions by Source Category in the District
(Tons/Day)

Source Category	VOC	CO	NOx	SOx	PM10
2010 Emission Inventory					
Construction and Demolition	-	-	-	-	47.44
Off-Road Equipment	72.08	792.22	130.95	0.38	10.26
Total	72.08	792.22	130.95	0.38	57.70
Emissions Reductions (emissions in 2002 - emissions in 2010)	32.95	170.77	54.97	0.8	(4.84)[(1)]
2010 Emission Inventory (concluded)					
Pounds per Day	65,900	341,540	109,940	1,600	(9,680)
SCAQMD Significance Thresholds (lbs/day)	75	550	100	150	150
Significant?	NO	NO	NO	NO	YES

Source: SCAQMD, 2003 AQMP, Appendix III
(1) Numbers in parenthesis represent emission increases.

significance thresholds (see Table 4.1-9). Since a portion of the PM10 construction air quality impacts are associated with implementing the 2003 AQMP control measures, the PM10 construction emissions are considered to be significant.

New Conceptual Ideas – Expand Fleet Rules to Private Fleets

Because of the significant emission reductions required for the attainment demonstration, in April 2003 the SCAQMD's AQMP Advisory Group established an Advisors' Technical Subcommittee to explore additional control technologies and innovative approaches to achieve further emission reductions beyond the defined control measures to decrease the size of the "black box." One of the conceptual ideas for possible consideration was to expand the fleet vehicle rules (Rule 1190 series of SCAQMD rules) to private fleets.

To evaluate potential adverse environmental impacts from this conceptual idea, the SCAQMD reviewed the CEQA document prepared for the fleet vehicle rules (Final Program Environmental Assessment for: Proposed Fleet Vehicle Rules and Related Amendments; 6/5/2000; SCAQMD No. 000307DWS) as a basis for identifying potential adverse impacts. The primary air quality impact from the fleet vehicle portion of the proposed project[1] included construction impacts from building alternative fuel refueling stations. The analysis of construction impacts from expanding the fleet vehicle rules to private fleets is provided in the following subsections.

[1] The proposed project also included requirements related to the sulfur content of diesel fuels. Construction impacts from this component included modifications at local refineries necessary to produce low sulfur diesel. This type of impact is associated with the concept to require cleaner fleets and will not be considered further.

Estimating Affected Universe of Vehicles Subject to Private Fleet Regulation

Light to Medium duty vehicles weighing greater than 8,000 pounds are typically gasoline-fueled (Table 4.1-10), which will most likely not switch to alternative fuels but rather upgrade with new low-emitting engines and/or hybrid vehicles to satisfy the new state standards and the private fleet rules. No construction of refueling stations and their resultant construction emissions are anticipated. This conclusion is consistent with the analysis of impacts for this category of vehicles (Rule 1191) in the Final Program Environmental Assessment (PEA) for the previously adopted fleet vehicle rules.

Heavy duty vehicles weighing greater than 8,000 pounds (Table 4.1-10) could potentially be gasoline- or diesel-fueled and the private fleet rules may require a reduction in emissions lower than the established state and federal standards. This may require an eventual conversion to alternative fuel usage and the need for the appropriate refueling station. Adverse air quality impacts may result from the construction of the refueling station.

TABLE 4.1-10
Vehicle Categories

Vehicle Weight	Vehicle Type
<8,000 pounds	Light Duty Autos, Light Duty Trucks, Medium Duty Trucks
>8,000 pounds	Light-Heavy Duty Trucks, Medium-Heavy Duty Trucks, Heavy-Heavy Duty Trucks

Source: California Air Resources Board
< = less than
> = greater than

From the CARB's EMFAC 2002 burden model, 2003 Summer Inventory, there are approximately 280,000 vehicles greater than 8,000 pounds (heavy duty vehicles). The SCAQMD assumes, as a "worst-case" scenario, that 50 percent of all heavy duty vehicles (140,000 vehicles) in the Basin will be affected by future private fleet vehicle rules. The assumption that 50 percent of the vehicle inventory would be affected by future private fleet vehicle rules is based on the following factors:

1. Not all the 280,000 heavy-duty vehicles are owned by private companies.
2. Not all private companies who own heavy duty vehicles have a fleet of 15 or more (the minimum size of fleets that can be regulated by the SCAQMD).
3. Some facilities already have constructed refueling stations.
4. Number of refueling stations per number of alternative-fueled vehicles was based on conservative assumptions in the air quality analysis of the Final PEA for the public fleet vehicle rules (SCAQMD, 2000).

Construction Emissions from Potential Future Private Fleet Regulations

The analysis of construction impacts from the Draft 2003 AQMP contained in the Draft PEIR evaluated construction and demolition emissions, as well as a reduction in combustion emissions from off-road (construction) equipment. Overall, Basinwide construction emissions are expected to be reduced between the 2002 and 2010 inventories, except for PM10 emissions. Since it is expected construction related to implementing AQMP control measures will contribute to construction PM10 emissions, it was concluded in the Draft PEIR that the 2003 AQMP would contribute to significant adverse PM10 construction air quality impacts (Table 4.1-9).

The estimated number of vehicles affected by the private fleet rules (140,000 vehicles) is 1.2 times larger than those affected by the public fleet rules (112,000 vehicles). Using the same assumptions when evaluating the construction emissions from constructing refueling facilities for public fleets in the 2000 Final PEA, the air quality impacts from constructing refueling facilities for private fleets were linearly estimated in Table 4.1-11.

TABLE 4.1-11

Construction Emissions from the Public Fleet Vehicle Rules and Estimated Construction Emissions from Potential Future Private Fleet Vehicle Rules

	Construction Emissions			
Pollutant	**Public Fleet Rules**[a] (pounds per day)	**Private Fleet Rules**[b] (pounds per day)	**Significance Thresholds** (pounds per day)	**Significant?**
VOC	61	73	75	No
CO	11	13	550	No
NOx	71	85	100	No
SOx	6	7	150	No
PM10	34	41	150	No

[a] Source: Final Program Environmental Assessment for: Proposed Fleet Vehicle Rules and Related Amendments; 6/5/200; SCAQMD No. 000307DWS
[b] Private Fleet Vehicle Construction Emissions = Public Fleet Vehicle Construction Emissions x 1.2

The overall effect of construction emissions from potential future private fleet vehicle rules on the AQMP construction inventory is shown in Table 4.1-12. As shown in Table 4.1-12, adding the concept of potential future private fleet vehicle rules is not expected to substantially increase construction air quality impacts originally identified in the Draft PEIR.

TABLE 4.1-12

Overall Effect on AQMP Construction Emissions Inventory from the Conceptual Idea to Expand the Fleet Vehicle Rules to Include Private Fleets

Pollutant	**Emission Reductions in 2003 Draft PEIR** (pounds per day)	**Construction Emissions from Private Fleet Rules** (pounds per day)	**Emission Reductions in 2003 Final PEIR** (pounds per day)	**SCAQMD CEQA Significance Thresholds** (pounds per day)	**Significant?**
VOC	65,900	73	65,827	75	No
CO	341,540	13	341,527	550	No
NOx	109,940	85	109,855	100	No
SOx	1,600	7	1,593	150	No
PM10	-9,680	41	-9,721	150	Yes

While the above suggested conceptual idea regarding expanding fleet vehicle rules to private fleets is new, the new information does not alter the conclusions made in the Draft PEIR. Further, the revised construction emission information from the conceptual idea of expanding the fleet vehicle rules to private fleets does not constitute substantial new information because it does not create a new significant adverse impact or make an existing significant adverse impact substantially worse. The conditions requiring recirculation of a draft EIR pursuant to CEQA Guidelines §15088.5 are not present, so recirculation of the Draft PEIR is not required.

PROJECT-SPECIFIC MITIGATION: Mitigation measures are required to minimize the significant air quality impacts associated with the construction phase of the proposed project. Mitigation measures focus on the construction emissions of CO, VOC, NOx, and PM10. The following feasible mitigation measures are required:

On-Road Mobile Sources:

AQ-1 Develop a Construction Traffic Emission Management Plan for the proposed project. The Plan shall include measures to minimize emissions from vehicles including, but not limited to: scheduling truck deliveries to avoid peak hour traffic conditions, consolidating truck deliveries, and prohibiting truck idling in excess of 10 minutes.

Off-Road Mobile Sources:

AQ-2 Prohibit trucks from idling longer than 10 minutes at construction sites.

AQ-3 Use electricity or alternate fuels for on-site mobile equipment instead of diesel equipment to the extent feasible.

AQ-4 Maintain construction equipment by conducting regular tune ups and retard diesel engine timing.

AQ-5 Use electric welders to avoid emissions from gas or diesel welders at sites where electricity is available.

AQ-6 Use on-site electricity rather than temporary power generators in portions of the project sites where electricity is available.

AQ-7 Prior to construction, operators of affected facilities will evaluate the feasibility of retrofitting the large off-road construction equipment that will be operating for significant periods. Retrofit technologies such as particulate traps, selective catalytic reduction, oxidation catalysts, air enhancement technologies, etc. will be evaluated. These technologies will be required if they are certified by CARB and/or the U.S. EPA and are commercially available and can feasibly be retrofitted onto construction equipment.

AQ-8 Diesel-powered construction equipment shall use low sulfur diesel, as defined in SCAQMD Rule 431.2, to the maximum extent feasible.

AQ-9 Suspend the use of all construction activities during first stage smog alerts. This mitigation measure does not apply to emergency activities associated with essential public services.

Secondary Air Quality Impacts from Long-Term Control Measures

Additional control measures and additional secondary air quality impacts associated with the long-term strategy (also called “black box” measures) may also be expected. The long-term control measures are expected to include aggressive development and commercialization of advanced mobile source control technologies. Significant penetration of low-emission retrofit technologies into in-use applications will also be needed. Examples of the potential control options for mobile sources under the long-term strategy include: (1) accelerated retirement of older vehicles, since these vehicles (12 years and older) representing 25 percent of the vehicle miles traveled contribute over 75 percent of the emissions; (2) retrofit of existing vehicles such as passenger cars and light and medium-duty trucks with advanced emission controls (e.g., OEM catalytic converters, oxygen sensors); (3) retrofitting heavy-duty diesel trucks and buses with NOx reducing catalysts; (4) repowering construction and industrial equipment with cleaner diesel engines or alternative fuels with oxidation catalysts; and (5) replacing two-stroke lawn and garden equipment and recreational boats with four-stroke or electric alternatives (where feasible). Additional control of federal emissions sources (e.g., planes, trains, ships, trucks, farm equipment, and construction equipment) would also be required, which are expected to include more stringent emission standards for new engines and retrofit controls for existing engines.

Implementation of the long-term control measures would be expected to result in additional impact secondary air impacts. The specific details of the long-term control measures have not yet been developed and will need to be developed as part of the rulemaking process. Therefore, the impacts related to the long-term control measures are discussed qualitatively since detailed information for a quantitative analysis is not available. The potential secondary air quality impacts from the long-term measures for each of the resources discussed in this subchapter are evaluated below.

- Secondary Emissions from Increased Electricity Demand: The long-term control measures, including possible consideration of controlled emissions at port operations, are not expected to result in an increase in electricity demand materially different from that evaluated for the short-term measures. While there may be an increase in electricity over that evaluated for short-term control measures, the existing air quality rules and regulations are expected to minimize emissions associated with increased generation of electricity. No additional significant impacts from implementation of long-term control measures are expected due to increased electricity demand.

- Secondary Emissions from the Control of Stationary Sources: The long-term control measures are not expected to result in an increase in the secondary emissions associated with the control of stationary sources. Essentially all feasible control measures for stationary sources have been proposed as short-term control measures and are not included as long term control measures (see Table 2.5-9). So no additional impacts are expected as part of long-term control measures.

- Secondary Emissions from Consumer Products: The long-term control measures could result in additional control of consumer products. The additional control measures are expected to be more strict standards (e.g., lower vapor pressure) on consumer products than evaluated under the short-term measures. The secondary air quality impacts associated with reformulated consumer products under the short-term control measures are expected to be less than significant. The long-term control measures are expected to result in some additional secondary air quality impacts. However, as the analysis for the short-term measures indicate, such impacts are not expected to be significant.

- Secondary Emissions from Dust Suppression: The long-term control measures are not expected to result in an increase in the secondary emissions associated with dust suppression so no additional impacts are expected.

- Secondary Emissions from Miscellaneous Sources: The impacts of the short-term control measures on secondary emissions from miscellaneous sources was determined to be significant due to an increase in NOx emissions from trucks hauling manure out of the district. No long-term control measures have been identified that would result in emission increases from miscellaneous sources so no additional impacts are expected from implementation of long-term control measures.

- Secondary Emissions from Mobile Sources: The long-term control measures are primarily aimed at additional emission reductions from mobile sources. Some of these control measures would be more stringent standards (e.g., stricter emission limits on engines and enhanced smog check programs), which would not be expected to have any additional impacts on secondary emissions. Other control measures could result in add on controls or use of reformulated fuels. The overall impact of mobile sources due to short-term control measures has been considered significant for PM10 emissions. Implementation of additional long-term measures associated with mobile sources is expected to result in greater emission reductions associated with mobile source, including emission reductions of PM10. These emissions were largely associated with the increased transportation of oxygenates. Implementation of the additional long-term measures could result in increased use of alternative or reformulated fuels, requiring increased transport of oxygenates of other fuel additive or material (e.g., gasoline blending stocks). Therefore, some long-term control measures could result in additional emissions associated with transportation of oxygenates and other similar materials, over and above those evaluated for the short-term control measures. This impact would be considered significant.

  In should be noted that implementation of the additional long-term control strategies should result in additional reductions in emissions and could reduce potentially significant impacts identified under the short-term measures. To be conservative, PM10 emissions from mobile sources will be considered to remain significant.

- Secondary Emissions from Transportation Control Measures: The TCMs are considered to be short-term control measures so no additional long-term control measures are proposed under this category and no additional impacts are expected.

- Construction Activities: The emissions associated with construction activities from the short-term control measures were considered to be significant for PM10 emissions. Implementation of the long-term control measures are expected to result in additional construction activities associated with the development of additional infrastructure (e.g., new power requirements, alternative fueling sites, etc.), thus resulting in additional emissions from construction activities. Therefore, implementation of the long-term control measures will generate additional construction emissions, which would be considered significant.

PROJECT-SPECIFIC MITIGATION: Additional secondary air quality impacts are associated with implementation of the long-term control measures were identified for secondary emissions from mobile sources and construction activities (over and above those discussed in other portions of the EIR). The mitigation measures identified under the discussion of short-term measures for mobile sources and construction activities would be required for the long-term measures as well. No additional feasible mitigation measures have been identified.

4.1.4.2 Non-Criteria Pollutants

PROJECT SPECIFIC IMPACTS: A number of control measures that are proposed in the 2003 AQMP may result in the substitution of reactive solvents with exempt compounds. A number of VOCs currently used in consumer product formulations have also been identified as TACs, such as ethylene-based glycol ethers, TCE, and toluene. When a product is reformulated to meet new VOC limits, however, a manufacturer could use a chemical, not used before, that may be a toxic air contaminant. This potential impact will need to be evaluated and mitigated as reformulation options are reviewed during the development of new VOC limits.

Two particular TACs used in some consumer products, methylene chloride and perchloroethylene, are specifically exempted from the VOC definition because of their very low ozone-forming capabilities. As a result, some manufacturers may choose to use methylene chloride or perchloroethylene in the reformulations to reduce the VOC content in meeting future limits.

A pesticide control measure would reduce organic gas emissions by potentially requiring reformulation to reduce VOC content. A number of chemicals currently used in pesticide formulations have been identified as TACs. When a product is reformulated to meet new VOC limits, a manufacturer could use chemicals that may be considered TACs. Product liability and regulations such as California’s Proposition 65 are expected to minimize the use of toxic materials because manufacturer’s would have to provide public notices if any Proposition 65 listed-material is used. In addition, SCAQMD’s Rule 1401 sets forth limitations of certain TACs that would be expected to minimize TACs at stationary sources.

There is a potential that the exempt compounds may create air quality impacts if the exempt solvents contain toxic compounds that are not regulated by the state and federal TAC programs or by the SCAQMD’s TAC rules. The potential impacts will need to be analyzed for each control measure during the rulemaking process.

The Final EIR for the 1994 AQMP concluded that most of the AQMP control measures reduce emissions of TACs. The basis for this conclusion is that many TACs are also classified as VOCs. To the extent that control measures reduce VOC emissions, associated TAC emission reductions could occur as well. The same conclusion holds for the control measures proposed in the 2003 AQMP. Further, a separate SCAQMD program, Air Toxics Control Plan for the Next Ten Years, identifies measures to control TAC emissions from specific source categories. Some measures for motor vehicle and transportation source categories would reduce emissions of toxic components of gasoline such as benzene, toluene, and xylene. Use of alternative fuels may increase methanol and aldehyde emissions. Electrification may cause greater emissions of benzene, aldehydes, metals, and polynuclear aromatic hydrocarbons from fuel-based power generating facilities. However, if the process being electrified was previously powered by direct combustion of fossil fuels, then electrification may result in an overall decrease in toxic emissions.

The overall impacts associated with implementation of the 2003 AQMP is an overall reduction in non-criteria pollutants. Therefore, no significant impacts on non-criteria pollutants have been identified.

PROJECT-SPECIFIC MITIGATION: No significant secondary air quality impacts were identified from non-criteria pollutants so no mitigation measures are required.

4.1.4.3 Global Warming and Ozone Depletion

The 2003 AQMP as a whole will promote a net decrease in greenhouse gases. The transportation control measures are intended to reduce vehicle miles traveled and will consequently reduce carbon dioxide production from motor vehicles. Other strategies that promote fuel efficiency and pollution prevention will also reduce greenhouse gas emissions. Measures that stimulate the development and use of new technologies such as fuel cells will also be beneficial. In general, strategies that conserve energy and promote clean technologies usually also reduce greenhouse gas emissions.

Some of the individual control measures may result in an increase in the release of greenhouse gases. Since the 1991 AQMP was adopted, SCAQMD rules that have the potential to impact global warming or ozone depletion are evaluated for such impacts during the rulemaking process. The proposed 2003 AQMP control measures will undergo the same evaluation in the rulemaking process. The proposed AQMP is consistent with the SCAQMD policy on Global Warming and Stratospheric Ozone Depletion and the Montreal Protocol. Due to the phaseout schedule contained in the SCAQMD's Global Warming Policy, which is considered during the development of the rules, the 2003 AQMP is expected to have a net effect of reducing emissions of compounds that contribute to global warming and ozone depletion.

4.1.5 AMBIENT AIR QUALITY

4.1.5.1 Ozone Air Quality

Ozone modeling techniques described in the 2003 AQMP (see Appendix V) were used to assess the effects of the 2003 AQMP on ozone concentrations. The projected peak ozone air quality in the year 2010 is shown in Figure 4.1-3 for the 2003 AQMP control (i.e., implementation of the 2003 AQMP). Based on the modeling results, the federal peak one-hour standard (125 ppb) is expected to be attained by 2010 under control case at all monitoring stations (see Figure 4.1-3).

4.1.5.2 NO_2 Air Quality

The SCAQMD is currently in compliance with state and federal ambient air quality standards for NO_2. Since the 2003 AQMP includes further reductions in NO_2 emissions, it is expected that the SCAQMD will remain in compliance with state and federal NO_2 standards. NO_2 emissions, however, contribute to PM10 formation. The PM10 air quality impacts are discussed below.

4.1.5.3 SO_2 Air Quality

The district is currently in compliance with state and federal ambient air quality standards for SO_2. Since the 2003 AQMP includes further reductions in SO_2 emissions, it is expected that the district will remain in compliance with state and federal SO_2 standards. SO_2 emissions, however, contribute to PM10 formation. The PM10 air quality impacts are discussed below.

4.1.5.4 PM10 Air Quality

PM10 modeling techniques described in the 2003 AQMP (see Appendix V) were used to assess the effects of the 2003 AQMP on PM10 concentrations. The projected annual average PM10 air quality in the year 2006 and 2010 are shown in Figures 4.1-4 and 4.1-5, respectively for the 2003 AQMP baseline (no control) and the control (i.e., implementation of the 2003 AQMP). Based on the modeling results, the federal annual average PM10 standard (50 ug/m^3, arithmetic mean) is expected to be attained by 2006 under both the base case and the control case at all monitoring stations (see Figure 4.1-4). Compliance with the federal annual average PM10 concentrations is expected to continue into 2010, assuming implementation of the 2003 AQMP (control case) (see Figure 4.1-5).

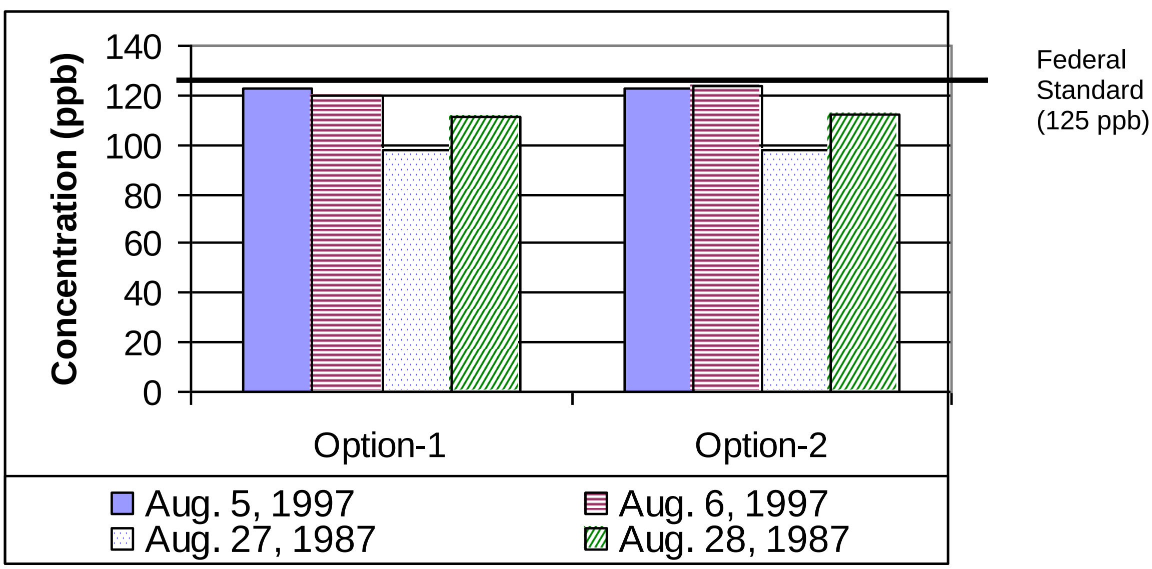


FIGURE 4.1-3

2010 Basinwide Maximum 1-Hour Average Ozone Concentrations: SCAQMD Proposed Emissions Control Scenario: Option-1, and Backstop Emissions Control Scenario: Option 2

The maximum 24-hour average PM10 concentrations for the baseline and control case are shown in Figures 4.1-6 and 4.1-7 for 2006 and 2010, respectively. Modeling indicates that the 24-hour federal standard (150 ug/m^3) will be attained in 2006 (see Figure 4.1-6) at all locations in the district. Both base and control cases demonstrate compliance with the federal 24-hour standard by 2010 at all stations in the district, including Rubidoux (see Figure 4.1-7).

4.1.5.5 CO Air Quality

The district is currently in compliance with the federal ambient air quality standards for CO because it has not had more than one exceedance of any federal ambient air quality standard in the last three years. A petition for redesignation U.S. EPA will be submitted later in 2003. The state 8-hour CO standard; however, has not yet been attained. The 2003 AQMP identifies continuous CO emissions reductions that are predicted to bring the district into attainment with the state CO ambient air quality standard and maintain compliance with the federal CO ambient air quality standard with a margin of safety.

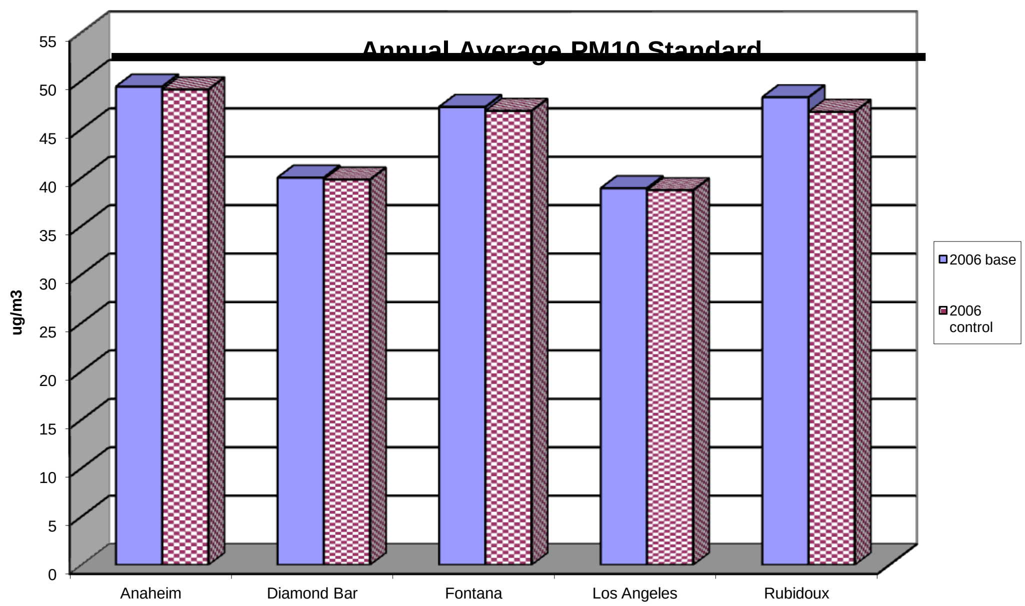


FIGURE 4.1-4

Annual Average PM10 for the Year 2006

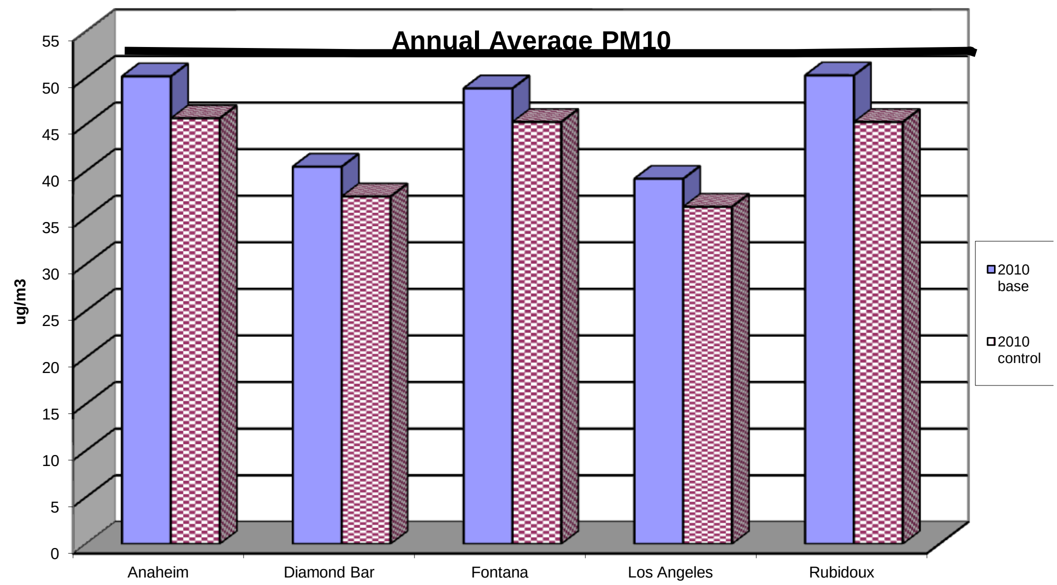


FIGURE 4.1-5

Annual Average PM10 for the Year 2010

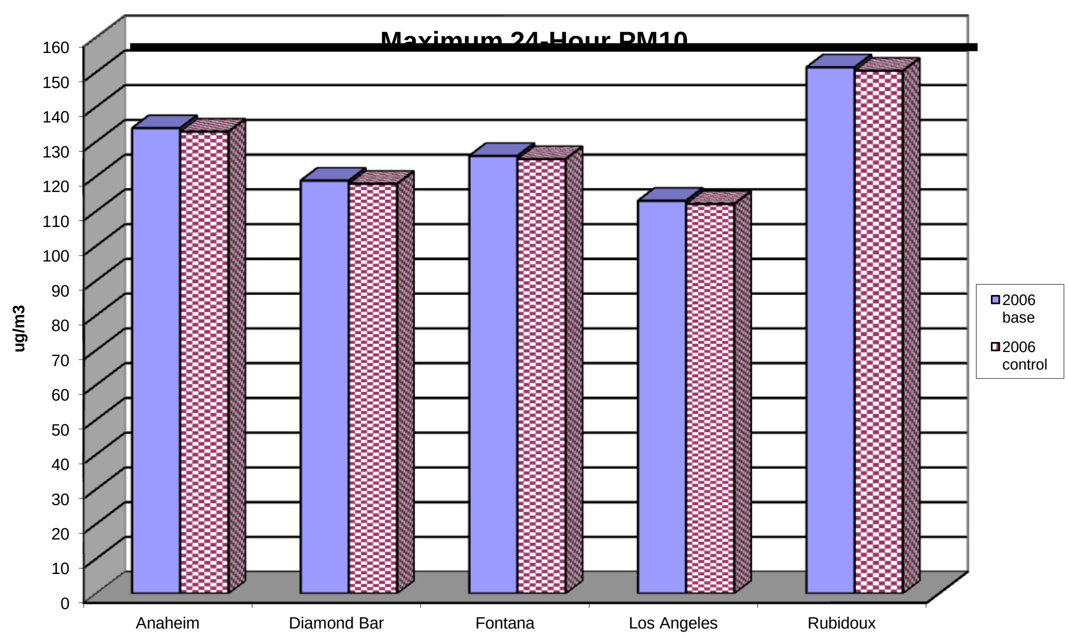


FIGURE 4.1-6

Maximum 24-Hour PM10 for the Year 2006

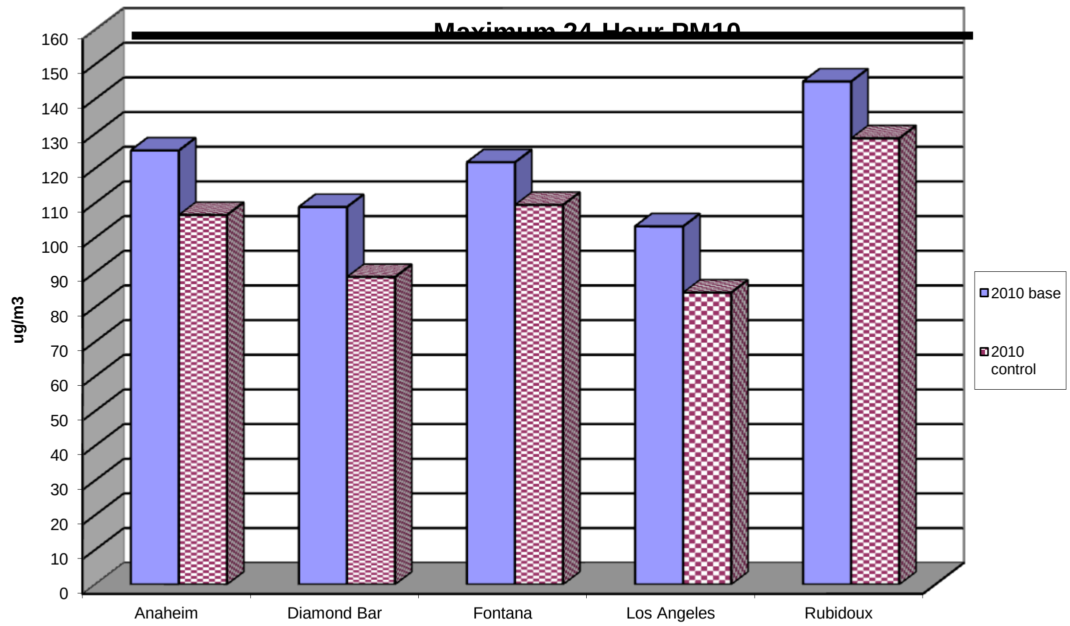


FIGURE 4.1-7

Maximum 24-Hour PM10 for the 2010

4.1.6 CUMULATIVE AIR QUALITY IMPACTS

4.1.6.1 Criteria Pollutants

Some secondary emissions may occur as a result of implementing one or more control measures in the 2003 AQMP and certain of these impacts are considered significant. The overall emission reductions gained by the 2003 AQMP are expected to far outweigh any potential secondary adverse air quality impacts that may occur. Each control measure will be subject to more detailed environmental analyses when specific rules or rule amendments are promulgated by the SCAQMD to evaluate the specific technology, identify secondary impacts, and identify feasible mitigation measures, as necessary. Rules implemented by the SCAQMD and other agencies are expected to have a cumulative beneficial impact on air quality by lowering criteria pollutant emissions.

The control measures proposed by the SCAQMD as part of the 2003 AQMP are estimated to achieve a total of 21.5 tons per day of VOC, 5 tons per day of NOx, and 2.2 to 6.2 tons per day of PM10, 2.1 tons per day of SOx, and 10.6 tons per day of ammonia reductions by 2010 (see Table 2.5-2) and have proposed rule adoption schedules between 2003 and 2007 with implementation dates between 2004 and 2010. The SCAQMD's control strategy as currently proposed will achieve emissions approximately 70 tons per day of VOC below the 1997/1999 SIP target.

Control measures to be implemented by CARB and/or the U.S. EPA are expected to reduce VOC emissions by an additional 118 tons per day in the district by 2010, and to provide up to 69 tons per day of further NOx reductions beyond the prior commitment. New State and federal measures defined in Table 2.5-6 would cut VOC emissions by 33-72 tons per day, leaving 85-47 tons per day of VOC reductions to be developed via a long-term strategy. The defined measures and long-term strategy would seek reductions from the on-road vehicles, off-road equipment, fuels and the refueling process, marine and airport sources, consumer products, and pesticides under State and federal jurisdiction.

Therefore, the emission reductions gained by the control measures identified in the 2003 AQMP are expected to outweigh any potential secondary impacts. As noted as part of the above discussion on ambient air quality, implementation of the control measures identified in the 2003 AQMP is expected to result in sufficient emission reductions to: (1) attain the one-hour federal ozone standard by 2010 (see Figure 4.1-3); (2) maintain compliance with state and federal NO_2 standards (even considering the increase in population growth); (3) maintain compliance with state and federal SO_2 standards (even considering the increase in population growth); (4) attain the federal annual average PM10 standard by 2006; and, (5) attain the federal 24-hour PM10 standard by 2101. Considering the air quality benefits provided by the plan, no significant cumulative adverse impacts are expected.

CUMULATIVE IMPACT MITIGATION FOR CRITERIA POLLUTANTS: No significant cumulative impacts for criteria pollutants were identified so that no mitigation measures are proposed.

4.1.6.2 Toxic Pollutants

Implementing the 2003 AQMP may contribute to new or additional non-criteria pollutant emissions. For example, increases in the use methylene chloride and perchloroethylene could occur in consumer products because they are specifically exempted from the VOC definition due to their very low ozone-forming capabilities. As a result, some manufacturers may choose to use methylene chloride or perchloroethylene in the reformulations to reduce the VOC content in meeting future limits, thus increasing ambient levels of methylene chloride and perchloroethylene, which are carcinogens.

There is a potential that the exempt compounds may create air quality impacts if the exempt solvents contain toxic compounds that are not regulated by the state and federal TAC programs or by the SCAQMD's TAC rules. The potential impacts will need to be analyzed for each control measure during the rulemaking process. The cumulative impacts associated with TACs are potentially significant.

CUMULATIVE IMPACT MITIGATION FOR NON-CRITERIA POLLUTANTS: Potentially significant cumulative impacts for non-criteria pollutants were identified so the following mitigation measures is proposed.

AQ-10 During promulgation of new rules and rule amendments, the SCAQMD will continue implementing SCAQMD environmental justice enhancement II-1 – "Lowest Air Toxics" Assessment Alternative, to evaluate ways to eliminate or reduce the use of substances that could contribute to TAC emissions.

Implementation of the mitigation measure should reduce the impacts to less than significant.

4.1.7 SUMMARY OF SECONDARY AIR QUALITY IMPACTS

The following is the summary of the conclusions of the analysis of secondary impacts associated with implementation of the 2003 AQMP.

- Secondary Emissions from Increased Electricity Demand: While there may be an increase in electricity, the existing air quality rules and regulations are expected to minimize emissions associated with increased generation of electricity. The impacts associated with secondary emissions from increased electricity demand are expected to be less than significant.

- Secondary Emissions from the Control of Stationary Sources: No significant secondary air quality impacts from control of stationary sources were identified associated with implementation of the 2003 AQMP.

- Secondary Emissions from Consumer Products: The secondary air quality impacts associated with reformulated consumer products under the short-term control measures are expected to be less than significant.

- Secondary Emissions from Dust Suppression: No significant secondary air quality impacts from dust suppression activities were identified.

- Secondary Emissions from Miscellaneous Sources: The impacts of the short-term control measures on secondary emissions from miscellaneous sources were determined to be significant due to an increase in NOx emissions from trucks hauling manure out of the district. The impacts associated with other pollutants are considered to be less than significant.

- Secondary Emissions from Mobile Sources: The overall impact of mobile sources due implementation of the control measures has been considered significant for PM10 emissions. These emissions were largely associated with the increased transportation of oxygenates.

- Secondary Emissions from Transportation Control Measures: The project-specific impacts associated with the TCMs would be considered less than significant. The feasible mitigation measures for control of PM10 from mobile sources have been included in the 2003 AQMP.

- Construction Activities: The emissions associated with construction activities due to the implementation of the control measures in the 2003 AQMP were considered to be significant for PM10 emissions.

- Secondary Impacts from Long-Term Control Measures: Additional secondary air quality impacts associated with implementation of the long-term control measures were identified for secondary emissions from mobile sources and construction activities (over and above those discussed in other portions of the EIR). The mitigation measures identified under the discussion of short-term measures for mobile sources and construction activities would be required for the long-term measures as well. No additional feasible mitigation measures have been identified and these impacts remain significant.

- Non-Criteria Pollutants: There is a potential that the exempt compounds may create air quality impacts if the exempt solvents contain toxic compounds that are not regulated by the state and federal TAC programs or by the SCAQMD's TAC rules. The potential impacts will need to be analyzed for each control measure during the rulemaking process. Some measures for motor vehicle and transportation source categories would reduce emissions of toxic components of gasoline such as benzene, toluene, and xylene. Use of alternative fuels may increase methanol and aldehyde emissions. Electrification may cause greater emissions of benzene, aldehydes, metals, and polynuclear aromatic hydrocarbons from fuel-based power generating facilities. However, if the process being electrified was previously powered by direct combustion of fossil fuels, then electrification may result in an overall decrease in toxic emissions. No significant secondary air quality impacts were identified from non-criteria pollutants, so no mitigation measures are required.

- Global Warming and Ozone Depletion: The 2003 AQMP is expected to have a net effect of reducing emissions of compounds that contribute to global warming and ozone depletion so that no significant impacts are expected.

- Ambient Air Quality: The 2003 AQMP is expected to (1) attain the 1-hour federal ozone standard by 2010 (see Figure 4.1-3); (2) maintain compliance with state and federal NO_2 standards (even considering the increase in population growth); (3) maintain compliance with state and federal SO_2 standards (even considering the increase in population growth); (4) attain the federal annual average PM10 standard by 2006; and (5) attain the federal 24-hour PM10 standard by 2010.

- Cumulative Air Quality Impacts for Criteria Pollutants: The emission reductions gained by the control measures identified in the 2003 AQMP are expected to outweigh any potential secondary impacts. Implementation of the control measures identified in the 2003 AQMP is expected to result in sufficient emission reductions to attain and maintain compliance with applicable state and federal ambient air quality standards. Considering the air quality benefits provided by the plan, no significant cumulative adverse impacts are expected.

- Cumulative Air Quality Impacts for Non-Criteria Pollutants: There is a potential that the exempt compounds may create air quality impacts if the exempt solvents contain toxic compounds that are not regulated by the state and federal TAC programs or by the SCAQMD's TAC rules. The potential impacts will need to be analyzed for each control measure during the rulemaking process. The cumulative impacts associated with toxic air contaminants are potentially significant and a mitigation measure was developed. Implementation of the mitigation measure should reduce the potential for significant impacts to less than significant.