

## **CHAPTER 3**

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### **ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES**

Introduction

Air Quality

Utilities and Service Systems



## **3.0 ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES**

### **3.1 INTRODUCTION**

CEQA Guidelines §15125(a) requires that an EIR include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant. The description of the environmental setting shall be no longer than is necessary to convey an understanding of the significant effects of the proposed project and its alternatives.

The CEQA Guidelines also 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 sub-regional level, and impacts on the level of individual industrial or individual facilities only where feasible.

This chapter describes the existing environmental setting, analyzes the potential environmental impacts, and recommends mitigation measures when significant environmental impacts have been identified. Each of the resources identified in the CEQA checklist (CCR Title 14, Chapter 3, §15000 et seq., Appendix G) have been reviewed in preparation of this chapter. In the NOP/IS, it was determined that impacts to aesthetics, agricultural resources, biological resources, cultural resources, geology/soils, hazards and hazardous materials, hydrology/water quality, land use/planning, mineral resources, noise, population/housing, public services, recreation and transportation/traffic

are less than significant. In the NOP/IS, impacts to air quality and utilities/services systems were determined to be significant (see Appendix A).

Included for each impact category is a discussion of the environmental setting, 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. 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 rules requirements, 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 Plan was evaluated to determine whether or not it has the potential to generate adverse environmental impacts (see Table 1-1). A table has been prepared in each subchapter where control measures have been identified as having the potential to generate significant adverse impacts to that environmental resource. Table 3.1-1 lists the various control measures, which were evaluated and determined not to have significant adverse impacts on the environment.

There are several reasons why the control measures in Table 3.1-1 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, Control Measure A - Oil and Gas Fugitives and Control Measure B – Refinery Chemical Fugitives would require lowering the gaseous leak threshold, elimination of some exemptions, improving the existing inspection and repair programs by increasing the frequency of inspection, and shortening the report period for leaking components. Better inspection, maintenance, and housekeeping practices are not expected to generate secondary impacts because these are procedures to ensure proper operation of equipment. Other control measures that would fall under this category include Control Measure T – Gasoline Storage and Transfer and some of the District incentive programs.

TABLE 3.1-1

Control Measures with No Significant Adverse Environmental Impacts

Control Measure	Control Measure Description	Reason Not Significant
<b>2004 – 2007 Control Measures</b>		
A	Oil and Gas Fugitives	1,3
B	Refinery and Chemical Fugitives	1,3
T	Storage and Transfer of Gasoline and Organic Liquid Loading	3
<b>Control Measures Requiring Further Study</b>		
D	Fugitive Emissions – Heavy Oil Stream	2,3
I	Residential Water Heaters	1
<b>District Incentive Programs</b>		
	Mobile Source Emission Reduction Incentive Program	1

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.

Another reason control measures in Table 3.1-1 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, Public Transportation and Commuter Vanpool Subsidies and Electronic Mobility contemplated by the Mobile Source Emission Reduction Incentive Program would promote the use of commute alternatives by their employees, through education or incentives. Better education or increased incentives would not generate secondary impacts. Further Study Control Measure I – Residential Water Heaters is expected to set emission standards for new water heaters which would be phased in as new water heaters are purchased so that no secondary impacts would be expected from this control measure.

In addition, the control measures proposed in the Extreme Ozone Attainment Demonstration Plan as Future Study Measures do not contain sufficient information for evaluation of potential impacts (see Table 3.1-2). The SJVUAPCD has included these measures as measures that need to be evaluated to determine if they are feasible. The feasibility and emission benefits associated with these Future Study Measures have not yet been determined. Therefore, 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 Future Study Measures are considered speculative and no further environmental analysis is required (CEQA Guidelines §15145).

**TABLE 3.1-2**

**Control Measure Whose Impacts are Speculative**

<b>Control Measure Description</b>
<b>Future Study Measures</b>
Additional CHP Enforcement On State Route 99
Increased Heavy-duty Vehicle Inspections along State Route 99 and Interstate 5
Designating State Route 99 as a “No Through Truck Route”
Incentives for Repair or Replacement of Gross Polluters
Auxiliary Power Systems at Truck Stops
Increase in License and Registration Fees for Older Vehicles

## **SUBCHAPTER 3.2**

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### **AIR QUALITY**

Environmental Setting  
Significance Criteria  
Environmental Impacts and Mitigation Measures  
Cumulative Utilities and Service System Impacts





## 3.2 AIR QUALITY

### 3.2.1 ENVIRONMENTAL SETTING

#### 3.2.1.1 Criteria Air Pollutants

##### 3.2.1.1.1 Ambient Air Quality Standards and Health Effects

Health-based air quality standards have been established by California and the federal government for the following criteria pollutants: ozone, carbon dioxide (CO), nitrogen dioxide (NO<sub>2</sub>), PM<sub>10</sub>, sulfur dioxide (SO<sub>2</sub>), and lead. The federal primary standards were established to protect from adverse health impacts due to exposure to air pollution. In addition, federal secondary standards were established to protect public welfare, including protection against decrease visibility, damage to animals, crops, vegetation, and buildings. In all instances except SO<sub>2</sub>, the secondary standard is equal to the primary standard. The California standards are more stringent than the federal standards and in the case of PM<sub>10</sub> and SO<sub>2</sub>, far more stringent. The state and National Ambient Air Quality Standards (NAAQS) for each of these pollutants and their effects on health are summarized in Table 3.2-1.

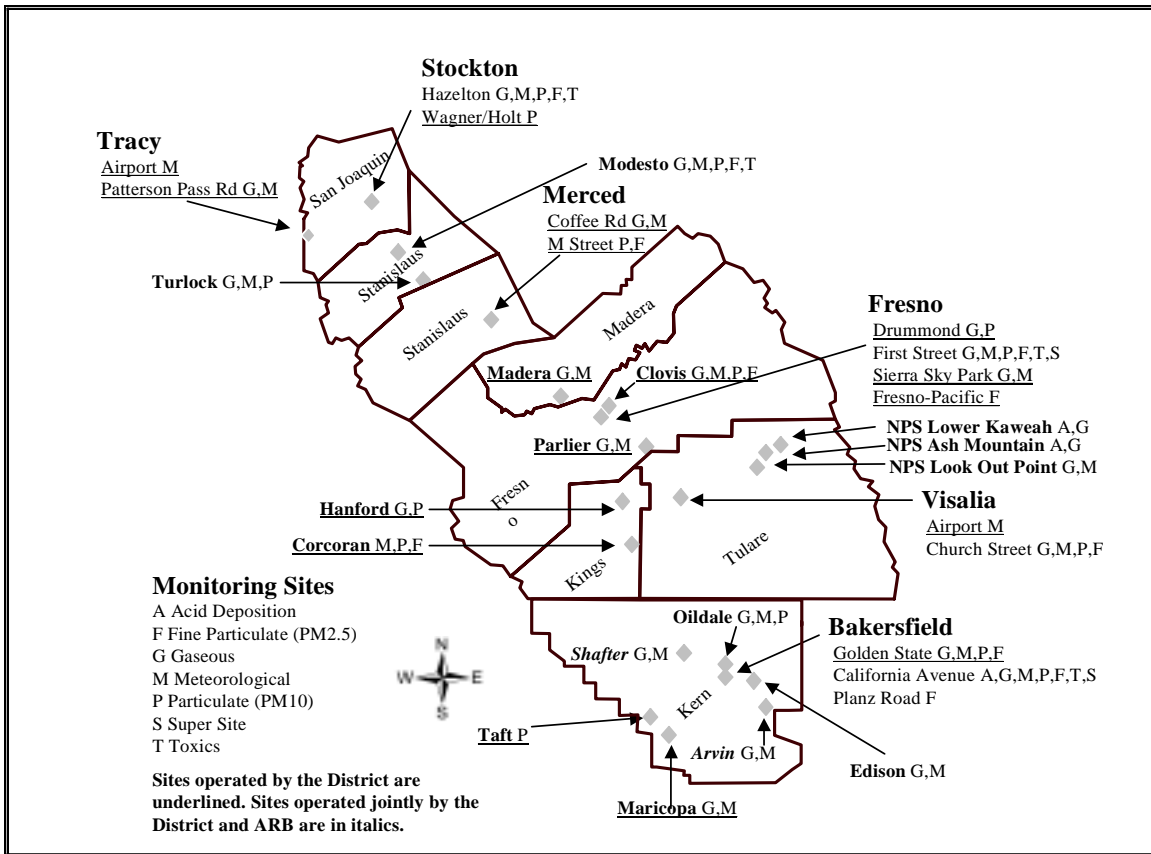
To reduce criteria pollutant emissions, the SJVUAPCD has regulated criteria air pollutants using either a technology-based or an emissions limit approach. The technology-based approach defines specific control technologies that may be installed to reduce pollutant emissions. The emission limit approach establishes an emission limit, and allows industry to use any emission control equipment, as long as the emission requirements are met.

Since the Extreme Ozone Attainment Demonstration Plan focuses on ozone, the inventory discussion is focused on ozone and "ozone precursors". Ozone is the product of a series of chemical reactions involving sunlight, reactive organic gases (ROG) and NO<sub>x</sub>. VOCs and NO<sub>x</sub> are "ozone precursors" and are primary pollutants because they are emitted directly into the atmosphere. CARB originally expressed the December 5, 2001 hydrocarbon emission data as ROG rather than the currently used VOCs. Since CARB now considers the terms to be synonymous ROG is referred to as VOCs in this report.

U.S. EPA requires CARB and SJVUAPCD to measure the ambient levels of air pollution to determine compliance with the NAAQS. To comply with this mandate, SJVUAPCD and CARB operate an ambient monitoring network that consists of 28 sites located throughout the SJVAB (see Figure 3.2-1). Not all stations monitor the same air quality or meteorological parameters, as indicated. Stations identified by a "G" designation in Figure 3.2-1 measure levels of ozone in the SJVAB atmosphere.

**TABLE 3.2-1  
Federal and State Ambient Air Quality Standards**

	STATE STANDARD	FEDERAL PRIMARY STANDARD	MOST RELEVANT EFFECTS
AIR POLLUTANT	CONCENTRATION/ AVERAGING TIME	CONCENTRATION/ AVERAGING TIME	
Ozone	0.09 ppm, 1-hr. avg. >	0.12 ppm, 1-hr avg.> 0.08 ppm, 8-hr avg>	(a) Short-term exposures: (1) Pulmonary function decrements and localized lung edema in humans and animals (2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; (d) Property damage
Carbon Monoxide	9.0 ppm, 8-hr avg. > 20 ppm, 1-hr avg. >	9 ppm, 8-hr avg.> 35 ppm, 1-hr avg.>	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide	0.25 ppm, 1-hr avg. >	0.053 ppm, ann. avg.>	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide	0.04 ppm, 24-hr avg.> 0.25 ppm, 1-hr. avg. >	0.03 ppm, ann. avg.> 0.14 ppm, 24-hr avg.>	(a) Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM10)	30 $\mu\text{g}/\text{m}^3$ , ann. geometric mean > 50 $\mu\text{g}/\text{m}^3$ , 24-hr average>	50 $\mu\text{g}/\text{m}^3$ , annual arithmetic mean > 150 $\mu\text{g}/\text{m}^3$ , 24-hr avg.>	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; (b) Excess seasonal declines in pulmonary function, especially in children
Suspended Particulate Matter (PM2.5)		15 $\mu\text{g}/\text{m}^3$ , annual arithmetic mean> 150 $\mu\text{g}/\text{m}^3$ , 24-hour average>	Decreased lung function from exposures and exacerbation of symptoms in sensitive patients with respiratory disease; elderly; children.
Sulfates	25 $\mu\text{g}/\text{m}^3$ , 24-hr avg. >=		(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	1.5 $\mu\text{g}/\text{m}^3$ , 30-day avg. >=	1.5 $\mu\text{g}/\text{m}^3$ , calendar quarter>	(a) Increased body burden; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount to give an extinction coefficient >0.23 inverse kilometers (visual range to less than 10 miles) with relative humidity less than 70%, 8-hour average (10am – 6pm PST)		Visibility reduction



**FIGURE 3.2-1**  
**San Joaquin Valley Air Basin Air Quality Monitoring Network**

The SJVAB has 23 ozone monitoring stations, with eleven operated by SJVUAPCD personnel, three by the National Park Service, and nine by CARB. All ozone monitors are continuous analyzers and operated on the principle of ultraviolet absorption (40 CFR Part 50). The air quality data for the past three years for the SJVAB from the monitoring network are presented in Table 3.2-2.

**TABLE 3.2-2**  
**2000 – 2002 Air Quality Data - San Joaquin Valley Air Basin<sup>(1)</sup>**

<b>Type of Indicator</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
Ozone Maximum Peak 1-Hour Indicator(ppm)	0.158	0.146	0.151
Days Above National 1-Hour Standard	30	32	31
Ozone Maximum 8-Hour Concentration (ppm)	0.131	0.120	0.132
Days Above State Standard	114	123	127
Days Above National 8-Hour Standard	103	109	125
PM10 Maximum 24-Hour Concentration (State) ( $\mu\text{g}/\text{m}^3$ )	153	221	194
Maximum 24-Hour Concentration (Federal) ( $\mu\text{g}/\text{m}^3$ )	145	205	189
Maximum Annual Average of Quarters (State) ( $\mu\text{g}/\text{m}^3$ )	53.9	52.3	59.9
Maximum Annual Average of Quarters (Federal) ( $\mu\text{g}/\text{m}^3$ )	53.1	57.4	59.2
Days Above State 24-Hour Standard	237	236	267
Days Above Federal 24-Hour Standard	0	12	8
CO Peak 8-Hour Indicator	8.3	6.3	5.3
Days Above State 8-Hour Standard	0	0	0
Days Above Federal 8-Hour Standard	0	0	0
NO <sub>2</sub> Peak 1-Hour Indicator	0.106	0.109	0.107
SO <sub>2</sub> Peak 1-Hour Indicator	0.02	0.02	--

(1) Source: 2004 California Almanac of Emissions and Air Quality, Appendix B, CARB, 2004.

### Ozone

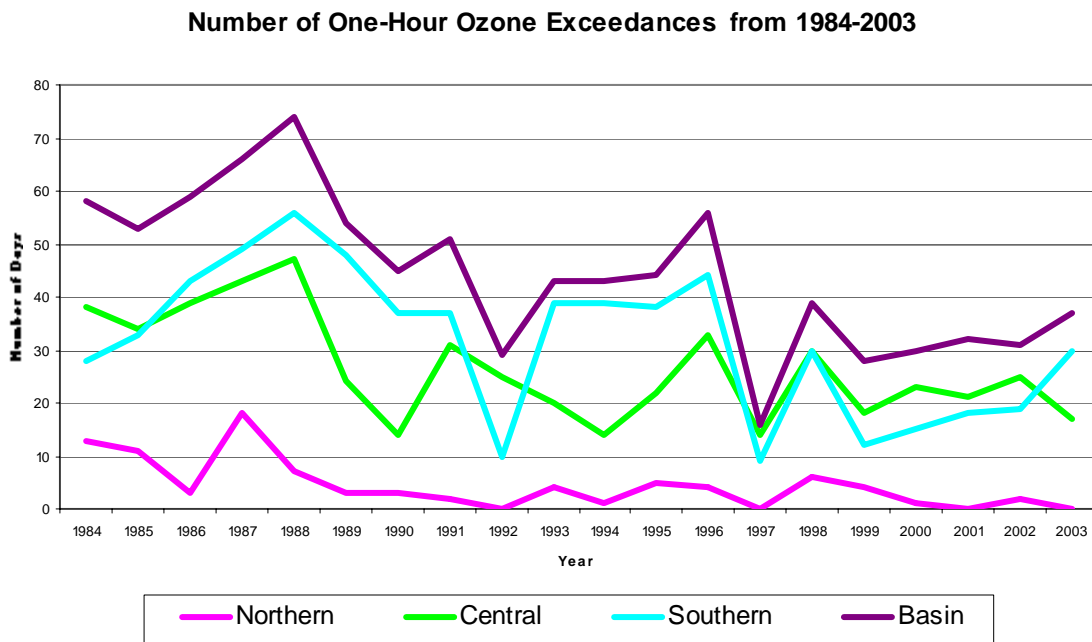
Ozone (O<sub>3</sub>), a colorless gas with a sharp odor, is a highly reactive form of oxygen. High ozone concentrations exist naturally in the stratosphere. Some mixing of stratospheric ozone downward through the troposphere to the earth's surface does occur; however, the extent of ozone transport is limited. At the earth's surface in sites remote from urban areas ozone concentrations are normally very low (0.03-0.05 ppm).

While ozone is beneficial in the stratosphere because it filters out skin-cancer-causing ultraviolet radiation, it is a highly reactive oxidant. It is this reactivity which accounts for its damaging effects on materials, plants, and human health at the earth's surface.

Ozone is monitored in the SJVAB in the four major metropolitan areas, (Stockton, Modesto, Fresno, and Bakersfield). Each have ozone monitors to better characterize the ozone distribution in the metropolitan area. The Fresno and Bakersfield areas each have ozone monitors to measure upwind transport (Madera-Pump Yard and Shafter-Walker Street), middle-city concentrations (Fresno-First, Bakersfield-California, and Bakersfield-Golden State), downwind maximum concentrations (Parlier and Arvin). The upwind transport and middle-city ozone monitors measure representative concentrations while the downwind city-edge and downwind maximum monitors measure maximum concentrations. The Clovis-Villa and Oildale-Manor ozone monitors, located in the northeast quadrant of the Fresno and Bakersfield metropolitan areas, respectively, are

sited for maximum concentrations. The remaining ozone monitors are located in smaller urban areas and several remote locations. These monitors are located for representative concentrations (with the exception of the Merced-Coffee Avenue station) since the areas where they are located are not capable of producing high concentrations of ozone.

Figure 3.2-2 shows the long-term trends in the SJVAB for the number of days over the federal one-hour ozone standard, by region in the SJVAB (northern, central, southern), as well as by the basin as a whole. The Northern Region consists of San Joaquin, Stanislaus, and Merced counties. The Central Region consists of Madera, Fresno and Kings counties. The Southern Region consists of the western part of Kern County as well as Tulare County. As can be seen, the number of days over the standard has decreased basin-wide from a peak of over 70 in the late 1980's to a level of 37 in 2003. However, short-term trends show an increase in the number of days over the standard basin-wide: from below 30 days in 1999 to 37 in 2003. A similar trend is observed for the Southern Region. Northern and Central Regions show a downward trend in this time frame.



**FIGURE 3.2-2**  
**Number of Days Over the Federal One-Hour Ozone Standard in the**  
**San Joaquin Valley Air Basin by Region**

Ozone Precursors

NOx and VOC emissions are decreasing state-wide (CARB 2004). Most NOx emissions are produced by the combustion of fuels. Mobile sources of NOx include motor vehicles aircraft, trains, ships, recreation boats, industrial and construction equipment, farm

equipment, off-road recreational vehicles, and other equipment. Stationary sources of NO<sub>x</sub> include both internal and external combustion processes in industries such as manufacturing, food processing, electric utilities, and petroleum refining. Area-wide sources, which include residential fuel combustion, waste burning, and fires, contribute only a small portion to the total NO<sub>x</sub> emissions.

VOC emissions result primarily from incomplete fuel combustion and the evaporation of chemical solvents and fuels. Mobile sources are the largest contributors to VOC emissions. Stationary sources include processes that use solvents (such as dry cleaning, degreasing, and coating operations) and petroleum refining, marketing, and oil and gas extraction. Area-wide VOC sources include consumer products, pesticides, aerosol and architectural coatings, asphalt paving and roofing, and other evaporative emissions.

Both stationary source and motor vehicle NO<sub>x</sub> emissions have been reduced by the adoption of more stringent emission standards. VOC emissions from motor vehicles have been reduced due to stricter standards even though vehicle miles traveled (VMT) have increased.

The SJVAB and state are in attainment with the NAAQS for nitrogen dioxide (NO<sub>2</sub>). NO<sub>2</sub> is a component of NO<sub>x</sub>, and its presence in the atmosphere can be correlated with emissions of NO<sub>x</sub>.

#### Adverse Health Effects

The propensity of ozone for reacting with organic materials causes it to be damaging to living cells, and ambient ozone concentrations in the Basin are frequently sufficient to cause health effects. Ozone enters the human body primarily through the respiratory tract and causes respiratory irritation and discomfort, makes breathing more difficult during exercise, and reduces the respiratory system's ability to remove inhaled particles and fight infection. People with respiratory diseases, children, the elderly, and people who exercise heavily are more susceptible to the effects of ozone.

Plants are sensitive to ozone at concentrations well below the health-based standards and ozone is responsible for significant crop damage. Ozone is also responsible for damage to forests and other ecosystems.

#### 3.2.1.1.2 Current Emissions Inventories

Emission inventories developed for the Plan use 2000 as the base year. Future projected emissions incorporate current levels of control on sources, growth in activity in SJVUAPCD, use of emission reduction credits (ERCs), and implementation of future programs that affect emissions of air pollutants.

Ozone is formed from atmospheric, photochemical reaction involving primarily NO<sub>x</sub> and VOCs, so it is not inventoried. The emissions inventory contains ozone precursors NO<sub>x</sub>

and VOCs. CO is also included as it can participate in photochemical reaction producing ozone (though not typically described as an ozone precursor).

### Stationary Sources

Stationary sources of emissions are grouped into two categories: point sources and area sources.

#### Point Sources

Point source emissions are from large emitting facilities with an identified location having one or more pieces of equipment registered and permitted with SJVUAPCD. Examples of point sources are food processing facilities, oil production and refinery facilities, steam generators, boilers, process heaters, stationary engines, glass manufacturing, and mining operations. Therefore, SJVUAPCD is able to collect facility emissions related information. The 2000 point source emissions inventory is based on the emissions data reported by point source facilities.

#### Area Sources

CARB and SJVUAPCD share the responsibility of developing the area source emissions inventory with CARB responsible for approximately two-thirds of the sources and SJVUAPCD responsible for the remaining third. Area sources are subdivided into two categories: aggregated point and area-wide sources. Aggregated point source emissions are from numerous small facilities or pieces of equipment, such as residential water heaters, dry cleaning operations, and automobile service stations. Area-wide sources include consumer products, home use pesticides, asphalt paving, pavement marking paints, off-gassing of manufactured products, residential fuel combustion, farming operations, construction and demolition, road dust, fires, and utility equipment, for which locations are not specifically identified.

### Mobile Sources

CARB develops on-road and non-road mobile source emissions estimates, and maintains a comprehensive compilation of emission factors. These factors are combined with appropriate activity levels and estimates of control measure effectiveness to calculate the emissions (the computer tool used to calculate mobile emissions is referred to as “EMFAC”, although the term “EMFAC” is often used to also describe the final calculated emission estimates). As CARB releases new versions of EMFAC, they are named with the year of release and usually version number within a given year (e.g., EMFAC2002, v. 2.2).

The mobile source category “on-road motor vehicles” includes light duty passenger vehicles, light- and medium-duty trucks, heavy-duty trucks (gas and diesel), heavy-duty urban buses (diesel) and motorcycles. Motor vehicle emissions occur both through the

exhaust pipe and from fuel evaporation. CARB uses EMFAC to develop on-road motor vehicle emission estimates using estimated vehicle miles traveled.

Non-road mobile sources include off-road vehicles such as construction equipment, farm tractors, trains, ships, aircraft (both government, commercial, and private), mobile equipment (forklifts, etc.), and utility equipment (lawn and garden equipment and chain saws). Emission estimates of non-road mobile sources are calculated by various methods depending upon the source.

### Natural Sources

In addition to man-made air pollution, there are natural sources of emissions, also known as biogenic sources (i.e., plants, molds, and animals,) and geogenic sources (such as oil seeps and other earth processes). These natural sources emit significant quantities of pollutants. For example, certain types of vegetation emit large amounts of isoprene, terpenes, and other organic compounds that are VOCs. Emission rates depend upon plant species, season, biomass density, time of day, local temperature, moisture, and other factors.

The biogenic inventory for the San Joaquin Valley has been the subject of recent research and refinements. The biogenic VOC emission inventory is estimated at about 380 tons per day for the District. Seasonal or annual estimates have not been prepared using this updated methodology, but it provides a sense of the magnitude of biogenic emissions during the summer.

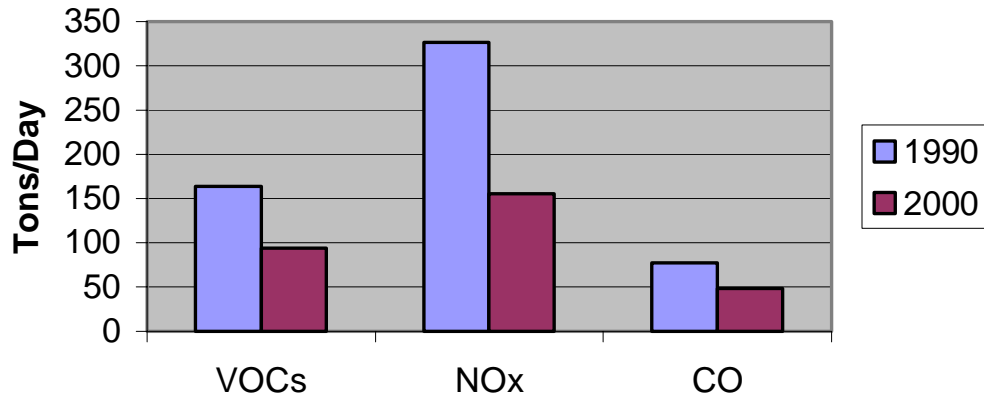
### Comparison of 1990 and 2000 Inventories

The 1990 emission inventory is compared to the 2000 base year inventory. Figures 3.2-3, 3.2-4, and 3.2-5 compare the stationary, area, and mobiles source inventories for VOCs, NO<sub>x</sub>, and CO. The reduction in stationary source emissions can be attributed to the improved control of stationary sources and improved inventory methodologies. The area source emissions remain effectively constant with a slight increase in the CO emissions primarily from waste burning, agricultural burning, and disposal. The reduction in mobile source emissions is primarily attributed to the retirement of older, higher emitting vehicles and the use of cleaner burning fuels.

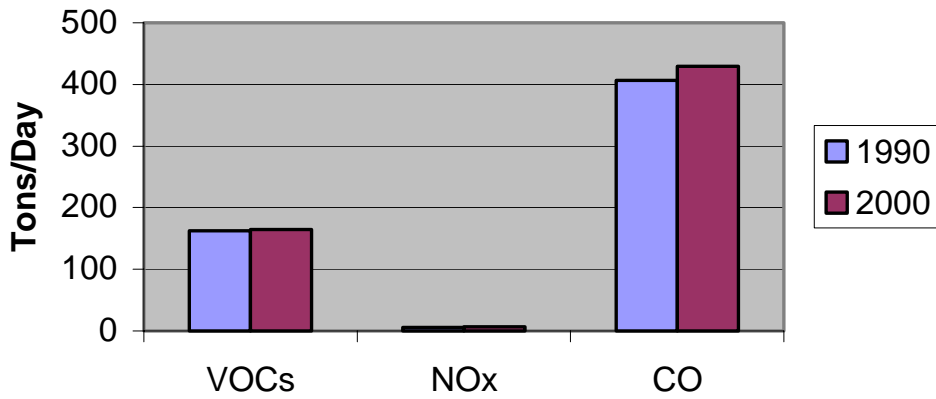
#### 3.2.1.1.3 Base Year Emissions

The amount of the criteria pollutant emitted for VOCs, NO<sub>x</sub>, and CO into the atmosphere of the Basin in 2000 is shown in Figure 3.2-6. In 2000, approximately 443 tons per day of VOCs, 557 tons per day of NO<sub>x</sub>, and 2139 tons per day of CO were emitted in the Basin.

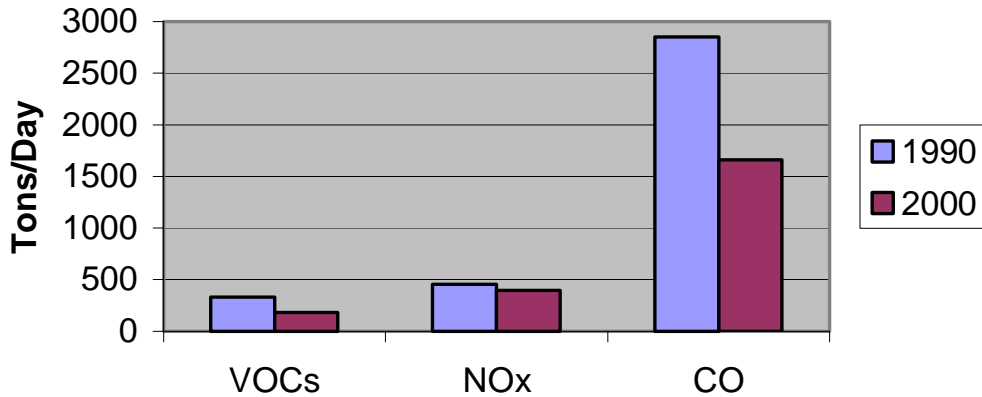




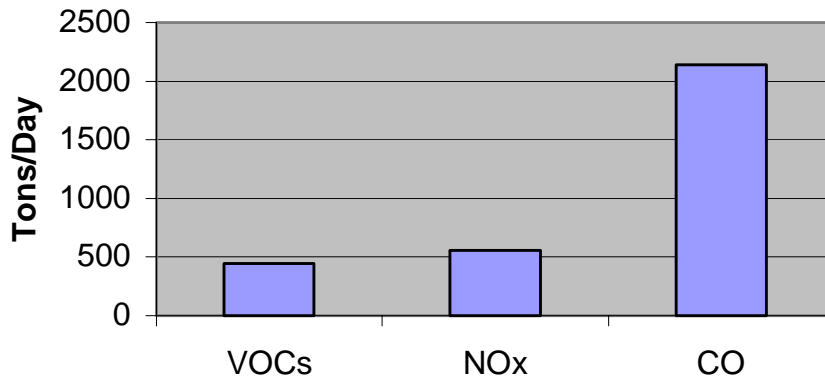
**FIGURE 3.2-3**  
Comparison of 1990 and 2000 Total Stationary Source Emissions



**FIGURE 3.2-4**  
Comparison of 1990 and 2000 Total Area Source Emissions

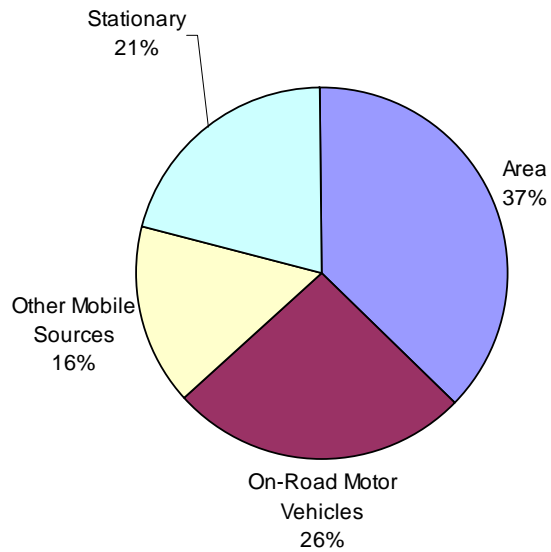


**FIGURE 3.2-5**  
**Comparison of 1990 and 2000 Total Mobile Source Emissions**

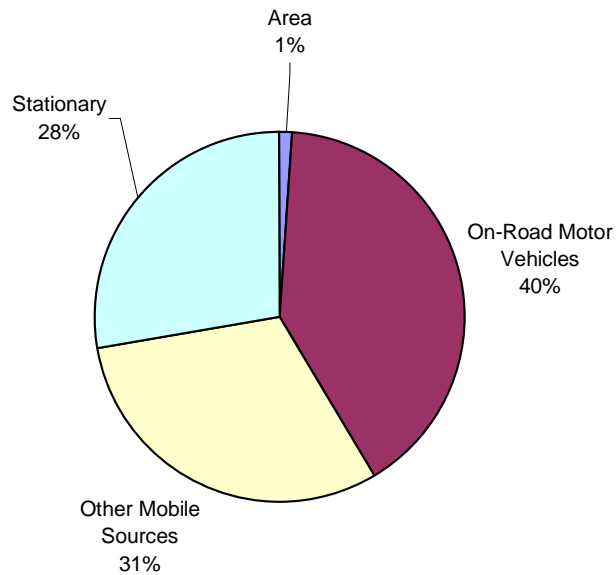


**FIGURE 3.2-6**  
**2000 Average Daily Emissions in the Basin**

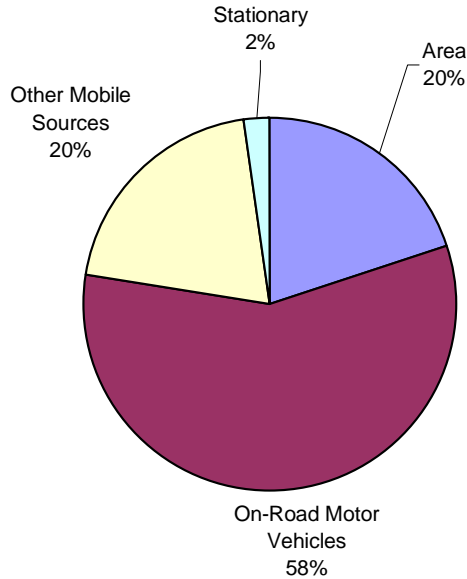
Figures 3.2-7, 3.2-8, and 3.2-9 show the contribution by source type to the VOC, NOx and CO emissions in 2000. The major contribution to VOC emissions is from area sources with approximately 37 percent (see Figure 3.2-7), while mobile sources are the major contributor to NOx and CO emissions with approximately 71 percent (see Figure 3.2-8), and 78 percent (see Table 3.2-9), respectively.



**FIGURE 3.2-7**  
**Relative Contribution by Source Category to**  
**2000 Average Daily Emissions VOC Inventory**



**FIGURE 3.2-8**  
**Relative Contribution by Source Category to**  
**2000 Average Daily Emissions NOx Inventory**



**FIGURE 3.2-9**  
**Relative Contribution by Source Category to**  
**2000 Average Daily Emissions CO Inventory**

#### 3.2.1.1.4 Summary

In 2000, there were a total of 30 days on which the federal standard for one-hour ozone was exceeded in the SJVAB. In addition, the federal standard for 8-hour ozone was exceeded 103 days in the SJVAB.

In 2000, PM10 and CO concentrations did not exceed the federal standards in the SJVAB.

#### 3.2.1.2 Non-Criteria Air Pollutants

Although the primary mandate of the SJVUAPCD is attaining the NAAQS for criteria pollutants within the SJVAB, the SJVUAPCD also has a general responsibility pursuant to the California Health and Safety Code, Section 41700, to control emissions of air contaminants and prevent endangerment to public health. As a result, over the last few decades, the SJVUAPCD regulated pollutants other than criteria pollutants such as toxic air contaminants (TACs). The SJVUAPCD has developed a number of rules to control non-criteria pollutants from both new and existing sources. These rules originated through State directives, CAA amendments, or the SJVUAPCD rulemaking process.

The SJVUAPCD has been evaluating control measures as well as existing rules to determine whether or not they would affect, positively or negatively, emissions of non-criteria pollutants. For example, rules in which VOC components of coating materials are replaced by a non-photochemically reactive chlorinated substance would reduce the impacts resulting from ozone formation, but could increase emissions of TACs or other substances that may have adverse impacts on human health.

Historically, the SJVUAPCD has regulated criteria air pollutants using either a technology-based or an emissions limit approach. The technology-based approach defines specific control technologies that may be installed to reduce pollutant emissions. The emission limit approach establishes an emission limit, and allows industry to use any emission control equipment, as long as the emission requirements are met. The regulation of TACs requires a different regulatory approach as explained in the following subsections.

#### 3.2.1.2.1 Federal HAPs Program

TACs are regulated in the SJVUAPCD through federal, state, and local programs. At the federal level, TACs are regulated primarily under the authority of the CAA. Prior to the 1990 CAA amendment, source-specific National Emission Standards for Hazardous Air Pollutants (NESHAPs) were promulgated under Section 112 of the CAA for certain sources of radionuclides and six hazardous air pollutants (HAPs). The six HAPs were asbestos, benzene, beryllium, inorganic arsenic, mercury, and vinyl chloride.

The 1990 CAA amendments, Title III, requires U.S. EPA to promulgate NESHAPs on a specified schedule for certain categories of sources identified as emitting one or more of the 189 listed HAPs. Emission standards for major sources require the maximum achievable control technology (MACT). MACT is defined as the maximum degree of emission reduction achievable considering cost, non-air quality health and environmental impacts, and energy requirements. All NESHAPs were to be promulgated in phases and to be completed by 2000. However, only the source categories from the first phase were promulgated (at least 40 source categories). The remaining standards have been rescheduled based on court-ordered deadline or the aim to satisfy all amended Section 112 requirements in a timely manner.

#### 3.2.1.2.2 State

Many of the sources of TACs that have been identified under the CAA are also subject to the California TAC regulatory programs. CARB developed three regulatory programs for the control of TACs – TAC identification and control program, the Air Toxic "Hot Spots" Act (AB 2588), and the risk reduction audits and plan requirements.

#### TAC Identification and Control Program

The California TAC identification and control program, adopted in 1983 as Assembly Bill (AB) 1807 and codified as Health and Safety Code Section 39662, is a two-step

program in which substances are identified as TACs, and airborne toxic control measures (ATCMs) are adopted to control emissions from specific sources. Since adoption of the program, CARB has identified 18 TACs and adopted a regulation designating all 189 federal HAPs as TACs.

ATCMs are developed by CARB and implemented by SJVUAPCD and other districts through the adoption of regulations of equal or greater stringency. Generally, ATCMs reduce emissions to achieve exposure levels below a determined health threshold. If no such threshold level is determined, emissions are reduced to the lowest achievable level through the best available control technology unless it is determined that an alternative level of emission reduction is adequate to protect public health. The ATCMs developed by CARB have been implemented by SJVUAPCD in Regulation VII and Rule 4621.

#### Air Toxic "Hot Spots" Act

The Air Toxics Hot Spot Information and Assessment Act of 1987 (AB 2588) (California Health and Safety Code, Section 39656) establishes a state-wide program to inventory and assess the risks from facilities that emit TACs and to notify the public about significant health risks associated with those emissions. Facilities are phased into the AB 2588 program based on their emissions of criteria pollutants. Inventory reports are required to be updated every four years under current state law. SJVUAPCD has adopted procedures for the implementation of AB 2588 throughout the SJVAB. As of 1993, more than 3,000 facilities in the SJVAB have worked with SJVUAPCD officials to submit the required information.

#### Control of TACs with Risk Reduction Audits and Plans

Senate Bill (SB) 1731, enacted in 1992 and codified in Health and Safety Code Sections 44390 et. seq., amended AB 2588 to include a requirement for facilities with significant risks to prepare and implement a risk reduction plan. The risk reduction plan will reduce the risk below a defined significant risk level within specified time limits.

#### 3.2.1.2.3 Health Effects

The primary health risk of concern due to exposure to TACs is the risk of contracting cancer. The carcinogenic potential of TACs is a particular public health concern because many scientists currently believe that there is not "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk to causing cancer. It is currently estimated that about one in four deaths in the U.S. is attributable to environmental pollution (Doll and Peto, 1981). The proportion of cancer deaths attributable to air pollution has not been estimated using epidemiological methods. Although exposure to environmental pollution only accounts for an estimated two percent of cancer cases, this exposure is largely involuntary and preventable, and therefore warrants reasonable attempts at mitigation.

Non-carcinogenic health effects due to exposure to TACs are also evaluated. In the analyses of non-carcinogenic health effects, generally it is assumed that a threshold exists below which no health impacts are expected. The types of non-carcinogenic health effects resulting from exposure to compounds vary according to the substance, the magnitude of exposure, and the period of exposure. These health effects generally can be classified into acute exposures (short-term exposures) and chronic exposures (long-term exposures, generally years). The substances evaluated for non-carcinogenic risks can produce health effects due to acute or chronic exposures, although the concentration required to produce such effects may vary greatly depending on the compound. The concept of a threshold is based on studies, which indicate that the body can tolerate compounds at low levels of exposures.

#### 3.2.1.2.4 Health Risk for Ten TACs

CARB has been tracking ten TAC emissions since 1990 and evaluating cancer health risk by county and air basin. The ten TACs are acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, 1,4-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel particulate matter. From 1990 to 2000, the average health risk in the SJVAB from the ten TACs has decreased approximately 56 percent. Table 3.2-3 shows the average health risk has decreased from 2000 to 2002.

**TABLE 3.2-3  
2000 – 2002 TAC Concentrations and Health Risk Data  
- San Joaquin Valley Air Basin<sup>(1)</sup>**

TAC	Conc. <sup>(2)</sup> /Risk <sup>(3)</sup>	2000	2001	2002
Acetaldehyde	Annual Avg. (ppb)	1.09	1.15	1.24
	Health Risk	5	6	6
Benzene	Annual Avg. (ppb)	0.63	0.54	0.55
	Health Risk	58	50	51
1,3-Butadiene	Annual Avg. (ppb)	0.16	0.15	0.15
	Health Risk	59	56	55
Carbon Tetrachloride	Annual Avg. (ppb)	0.10	0.09	0.09
	Health Risk	25	23	24
Hexavalent Chromium	Annual Avg. (ng/m <sup>3</sup> )	0.12	--	--
	Health Risk	18	--	--
1,4-Dichlorobenzene	Annual Avg. (ppb)	0.11	0.13	0.15
	Health Risk	7	9	10
Formaldehyde	Annual Avg. (ppb)	2.61	3.08	3.13
	Health Risk	19	23	23
Methylene Chloride	Annual Avg. (ppb)	0.53	0.27	0.16
	Health Risk	2	1	1
Perchloroethylene	Annual Avg. (ppb)	0.08	0.05	0.04
	Health Risk	3	2	2
Diesel PM <sup>(4)</sup>	Annual Avg. (μg/m <sup>3</sup> )	(1.3)	--	--
	Health Risk	(390)		
Average Basin Health Risk		196	170	172

(1) Source: 2004 California Almanac of Emissions and Air Quality, Appendix B, CARB, 2004.

(2) Concentration in parts per billion (ppb), nanograms per cubic meter (ng/m<sup>3</sup>), or micrograms per cubic meter (μg/m<sup>3</sup>) as noted by TAC.

(3) Health Risk represents the number of excess cancer cases per million people based on a lifetime (70-year) exposure to the annual average concentration. Total Health Risk represents only those TACs listed in the table and only those TACs with data for the year. There may be other significant compounds for which monitoring and/or health risk information are not available.

(4) The Diesel PM concentration is an estimate based on receptor modeling. Because data are not available for all years, Diesel PM is not included in the Average Basin Health Risk number.

### 3.2.1.3 Transport of Air Pollutants

Since 1989, CARB has evaluated the impacts of the transport of ozone and ozone precursor emissions from upwind areas to the ozone concentration in downwind areas. These analyses demonstrate that the air basin boundaries are not true boundaries of air masses. All urban areas are upwind contributors to their downwind neighbors with the exception of San Diego.

The SJVAB is both a contributor and a receptor for ozone transport. Ozone generated in the San Joaquin Valley is transported into the Mojave Desert, the Great Basin Valley, the



South Central Coast, the North Central Coast, the Mountain Counties, and the Sacramento Valley (see Figure 3.2-10). The SJVAB is a receptor area for ozone transported from the broader Sacramento area and the San Francisco Bay Area (CARB 2004) (see Figure 3.2-10).



**FIGURE 3.2-10**  
**Ozone Transport from the SJVAB**  
 Source: CARB 2001

Transport of pollutants within the San Joaquin Valley plays a significant role in ozone violations. Prevailing winds blow from the northern part of the Valley to the south, and can carry pollutants from San Joaquin and Stanislaus Counties to the Fresno area. Pollutants transported from the San Francisco Bay Area south to Fresno must pass through the northern Valley so transport from the San Francisco Bay Area to Fresno is combined with a northern Valley contribution. Further south, eddy currents can carry pollutants along the east side of the Valley from Tulare County and Northern Kern County to the Fresno Area.

On some some days, pollutants transported from the Bay Area impact the northern San Joaquin Valley, mixing with local emissions to contribute to State and federal violations at Stockton and Modesto. On other days, violations of the State standard are due entirely to local emissions. The impact of Bay Area transport diminishes with distance, so metropolitan areas such as Fresno and Bakersfield to the south are less affected (CARB 2001).

Under certain conditions, winds blowing from the south and southwest can carry pollutants from the northern Valley towards Sacramento. Although there is a potential for transport impacts, transport from the northern Valley to the southern part of Sacramento occurs infrequently (CARB 2001).

The delta breeze typically carries polluted air from the Valley into the Sierra Nevada foothills to the southeast, causing ozone violations in the foothill areas such as Sonora, in Tuolumne County, and in Yosemite National Park. In the foothills further to the north, pollutants from the Valley combine with pollutants transported from the San Francisco Bay Area and Broader Sacramento Area to cause ozone violations in Amador and Calaveras Counties. Since the foothill communities are small and do not generate significant local emissions, these violations are considered to be entirely the result of transport (CARB 2001).

Occasionally, winds aloft carry pollutants from the northern Valley westward to the Hollister area, in the North Central Coast Air Basin. There, they mix down to the ground and combine with local emissions and pollutants transported from the San Francisco Bay Area to cause ozone violations. The San Francisco Bay Area is believed to contribute the largest share of pollutants (CARB 2001).

Transport from the central portion of the Valley is responsible for ozone violations in Mammoth Lakes, on the eastern slope of the Sierra Nevada. From the Valley, winds carry pollution eastward up the canyons of the western Sierra Nevada during the day, as far as the crest of the Sierra. From there, pollutants flow east to the mammoth Lakes area via gaps in the crest. Typically, the violations in Mammoth Lakes occur late at night or in the early morning; a pattern always associated with transported emissions (CARB 2001).

Winds also carry pollutants from the Valley to the west. Under rare weather conditions these pollutants can combine with local emissions and ozone transported south from the San Francisco Bay Area to cause ozone violations in northern San Luis Obispo County. The communities of Paso Robles and Atascadero are separated from the San Joaquin Valley by the Cholame Hills and the Temblor Range, which run northwest-southeast almost in a straight line (CARB 2001).

Infrequently, as ozone from the Valley rises, it is carried west over the intervening mountains by the wind, and arrives at Paso Robles by midday. There, it mixes down to the ground and combines with ozone flowing southward from the San Francisco Bay Area to cause violations at ground level. This polluted air mass can then gather local emissions and flow south to Atascadero. Thus, violations at Paso Robles can be caused by transported pollutants, while violations on the same day at Atascadero are caused by a mixture of local emissions and transport (CARB 2001).

In the summer, persistent winds blow from the San Joaquin Valley southeastward through the Tehachapi Pass into the Mojave Desert. Ozone violations in eastern Kern County, immediately downwind of the pass, have been shown to be caused by this

transport. The emissions from eastern Kern County are too small to constitute a significant source of local emissions. Further downwind at Lancaster, in the Mojave Desert portion of Los Angeles County, violations have been caused by transport from the southern Valley. However, air quality in the Lancaster area is dominated by transport from the South Coast Air Basin, and local emissions also make a substantial contribution (CARB, 2001).

## **3.2.2 ENVIRONMENTAL IMPACTS/MITIGATION MEASURES**

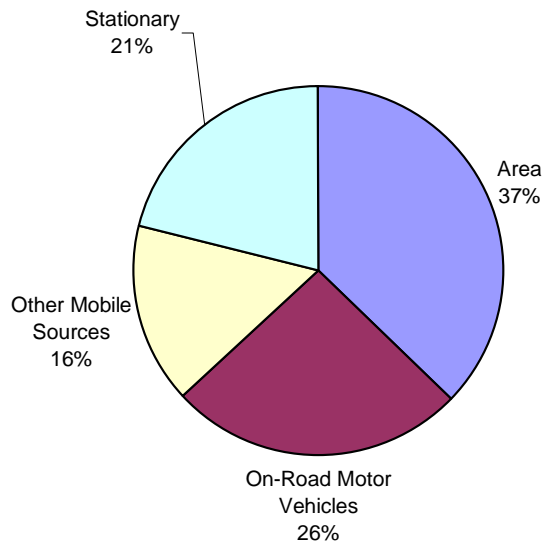
### **3.2.2.1 Introduction**

The purpose of the Extreme Ozone Attainment Demonstration Plan is to establish a comprehensive program to attain the federal one-hour ozone ambient air quality standards through implementation of different categories of control measures. To achieve emission reductions necessary to meet the federal one-hour ambient air quality standards, the Plan also relies on advances in technology that are reasonably expected to be available by the year 2010.

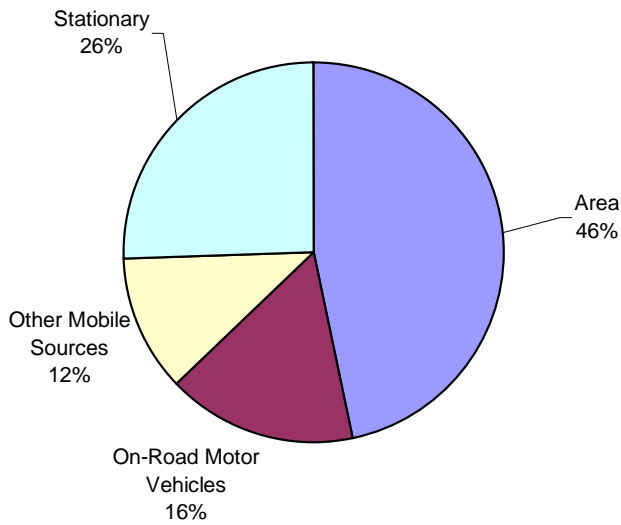
This subchapter evaluates secondary air pollutant emissions that could occur as a consequence of efforts to improve air quality (e.g., emissions from control equipment such as afterburners). The analysis is divided into the following sections: Future Air Quality Baseline, Significance Criteria, Potential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

### **3.2.2.2 Future Air Quality Baseline**

Figures 3.2-11, 3.2-12, and 3.2-13 show baseline and future for VOCs, NO<sub>x</sub>, and CO, 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., stationary, area, on-road mobile, and other mobile) in 2000 and 2010 with control measures in the Plan implemented. As shown in Figure 3.2-11, VOC emissions shift with area sources contributing 37 percent in 2000 to 46 percent in 2010, stationary sources increasing from 21 percent in 2000 to 26 percent in 2010, and on-road and other mobile sources decreasing from 26 and 16 percent, respectively, in 2000 to 16 and 12 percent, respectively, in 2010. As shown in Figure 3.2-12 NO<sub>x</sub> emissions shift with stationary sources contributing 28 percent in 2000 to 34 percent in 2010, area sources remaining constant at one percent, and on-road and other mobile sources shifting from 40 and 31 percent, respectively, in 2000 to 35 and 30 percent, respectively, in 2010. As shown in Figure 3.2-13, CO emissions on-road mobile sources decrease from 58 percent in 2000 to 41 percent in 2010, other mobile sources increase from 20 percent in 2000 to 26 percent in 2010, area sources increase from 20 percent in 2000 to 29 percent in 2010, and stationary sources increase for two percent in 2000 to four percent in 2010.

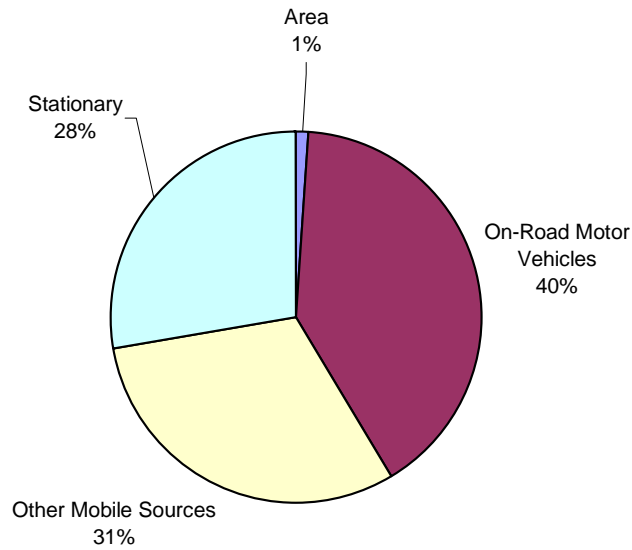


2000 VOC Emissions  
(443 tons/day)

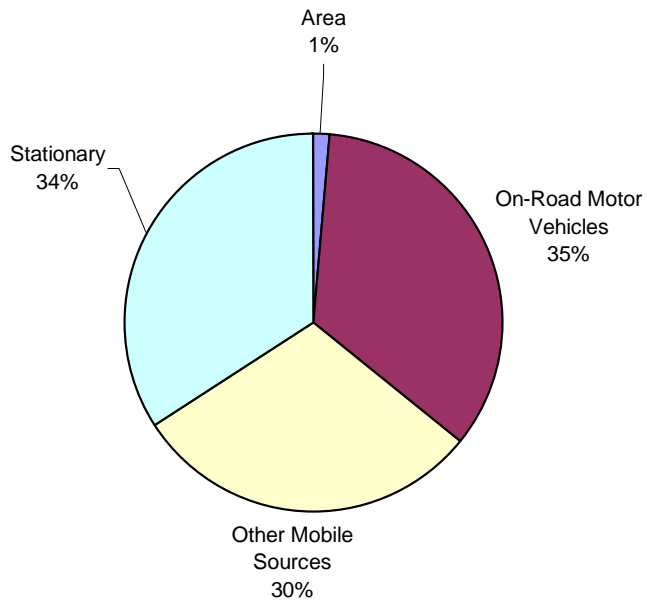


2010 VOC Emissions  
(366 tons/day)

**FIGURE 3.2-11**  
**Comparison of 2000 and 2010 VOC Emissions by Source Type**  
**(average annual day)**

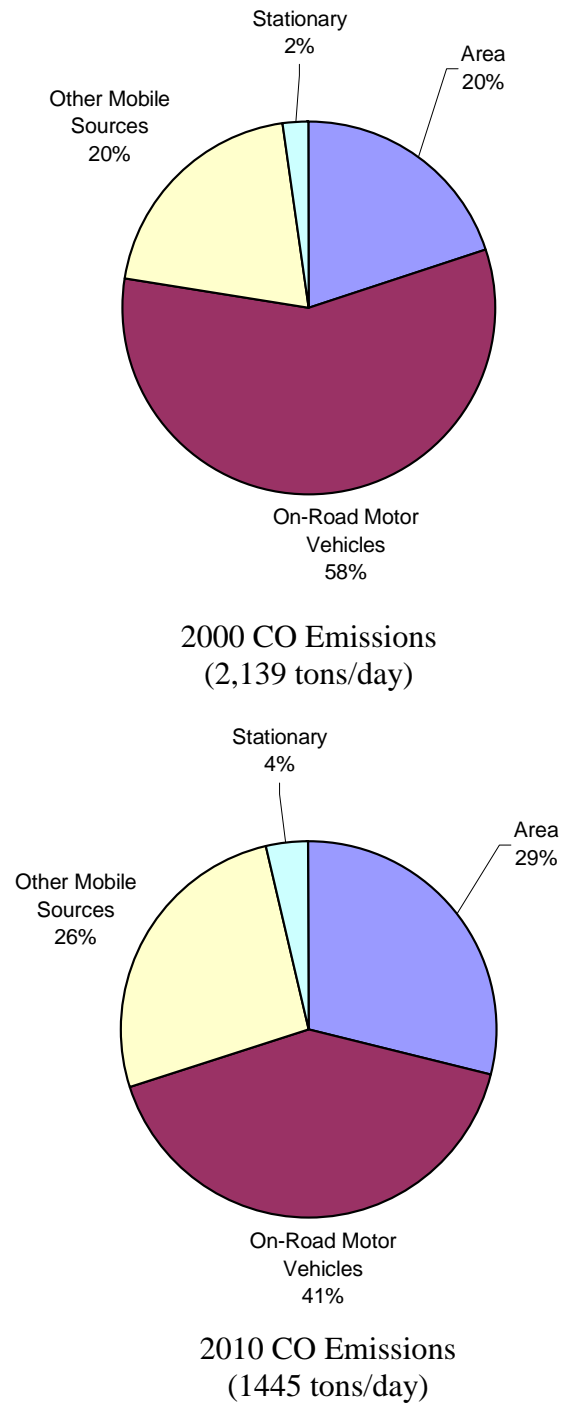


2000 NOx Emissions  
(557 tons/day)



2010 NOx Emissions  
(400 tons/day)

**FIGURE 3.2-12**  
**Comparison of 2000 and 2010 NOx Emissions by Source Type**  
**(average annual day)**



**FIGURE 3.2-13**  
**Comparison of 2000 and 2010 CO Emissions by Source Type**  
**(average annual day)**

Figure 3.2-14 shows the comparison by source to the VOCs, NO<sub>x</sub>, and CO emissions in tons per day. As shown in Figure 3.2-14, stationary and mobile source VOCs and NO<sub>x</sub> emissions and mobile source CO emissions decrease while stationary source CO emissions increase from approximately 48 tons per day to approximately 54 tons per day between the 2000 baseline year and the 2010 future baseline year. Area source CO emissions also decrease, with NO<sub>x</sub> emissions remaining relatively constant, but VOCs emissions increase slightly from approximately 165 tons per day in 2000 to approximately 171 tons per day in 2010.

### **3.2.2.3 Significance Criteria**

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

- Ozone precursor emissions from project construction or operations are considered significant if they meet or exceed the thresholds identified in Table 3.2-4.

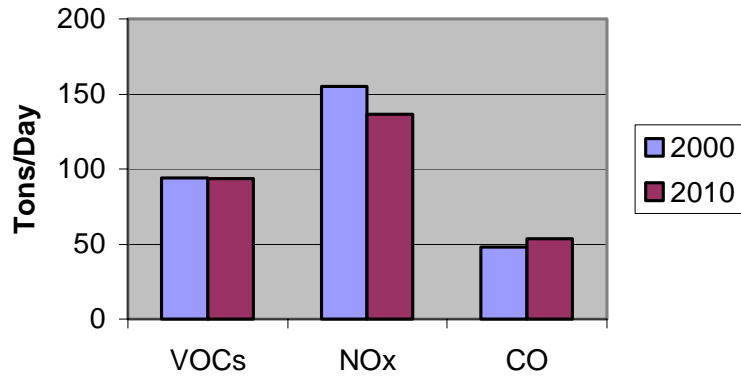
**TABLE 3.2-4**

#### **OZONE PRECURSOR EMISSION THRESHOLDS**

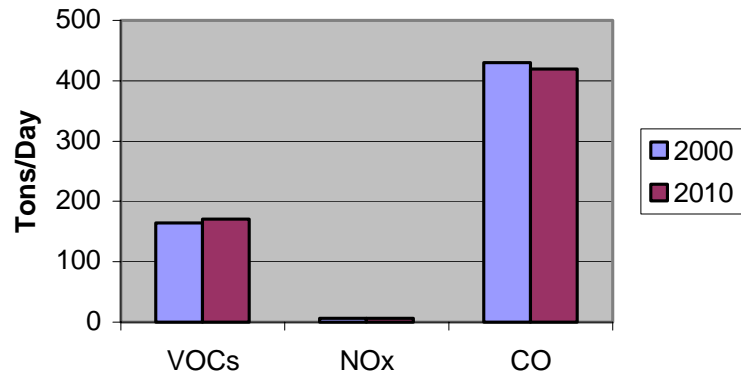
<b>Pollutant</b>	<b>Tons/year</b>
<b>VOC</b>	<b>10</b>
<b>NO<sub>x</sub></b>	<b>10</b>

- CO concentrations, as determined by an appropriate model, exceeding the California Ambient Air Quality Standard of 9 parts per million (ppm) averaged over eight hours or 20 ppm for one-hour will be considered to be significant.
- Projects with the potential to frequently expose members of the public to objectionable odors will be deemed to have a significant impact.
- Toxic air contaminant (TAC) emissions of carcinogenic compounds that increase the probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds 10 per million.
- TAC emissions that result in a Hazard Index for non-carcinogenic TACs greater than one for the MEI.

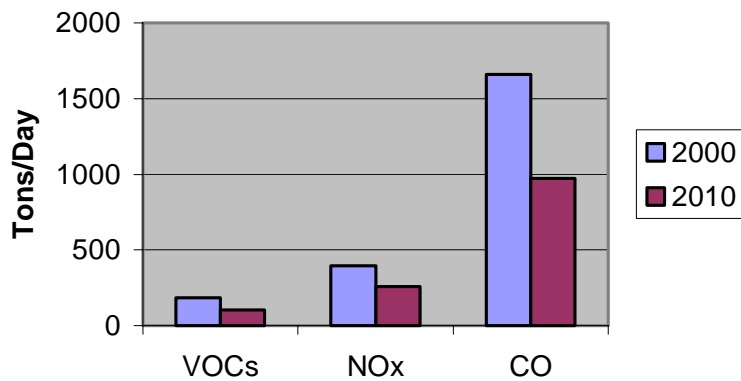
Other indicators of significance include emissions that cause a CO hotspot or cause or contribute to an exceedance of any ambient air quality standard.



Stationary Sources



Area Sources



Mobile Sources

**FIGURE 3.2-14**  
**Comparison of 2000 and 2010 Emissions by Source Type**  
**(tons/day)**



### 3.2.2.4 Potential Impacts and Mitigation

The objective of the Extreme Ozone Attainment Demonstration Plan is to attain and maintain the federal one-hour ozone ambient air quality standards. Based upon the modeling analyses described in Subsection 3.2.2.4.5, Future Ambient Air Quality/Attainment Demonstration of this document, implementation of all control measures contained in the Plan is anticipated to bring the SJVAB into compliance for the federal ozone one-hour ambient air quality standard by the year 2010.

Secondary air quality impacts are potential increases in air pollutants that occur indirectly from implementation of control measures in the Extreme Ozone Attainment Demonstration Plan. Table 3.2-5 lists the control measures with potential secondary air quality impacts.

#### 3.2.2.4.1 Criteria Pollutants

As identified in Table 3.2-5, potential secondary air quality impacts are associated with: (1) increase electricity demand; (2) control of stationary sources; (3) change in use of VOCs; (4) construction activities; (5) miscellaneous sources; (5) mobile sources; (6) transport of air pollutants; and (7) non-criteria pollutants. These potential secondary air quality impacts are evaluated in this section.

#### **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 vapor recovery systems, temperature control equipment, coating application equipment, electrostatic precipitators, 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 SJVAB 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 3.2-5.

Control Measures E – Small Boilers, Process Heaters, and Steam Generators; F – Wineries Fermentation; G – Solid Fuel Fired Boiler, Steam Generators and Process Heaters; H – Stationary IC Engines; I – Commercial Dryers; J – Composting/Biosolids Operations; N- Water Heaters; O – Steam-Enhanced Oil Well Vents; P – Soil Decontamination; R – Polymeric Foam Manufacturing; S – Stationary Gas Turbines; and U – Aviation Fuel Transfer. Some of the Potential Control Measures Requiring Further Study and the District Incentive Program also call for emission reductions due to add-on control equipment. 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 Extreme Ozone Attainment Demonstration Plan can be found in Subchapter 3.3 of this EIR.

**TABLE 3.2-5**

**Control Measures with Potential Secondary Air Quality Impacts**

<b>Control Measures</b>	<b>Control Measure Description</b>	<b>Control Methodology</b>	<b>Secondary Air Quality Impact</b>
<b>2004 – 2007 Control Measures</b>			
C	Fleet Rule – School Buses	Replacing existing buses, replacing older engines, retrofitting emission controls, use cleaner-burning diesel or alternate fuels	Compliance with this control measure is expected through engine replacement. New engines are more efficient than older engines.
E	Small Boilers, Process Heaters, and Steam Generators (2-5 mmBtu/hr)	Combustion modifications include low excess air, low NOx burners, water/steam injection, flue gas recirculation, selective catalytic reduction (SCR), and selective non-catalytic reduction (SNCR)	Electricity generation to operate air pollution control equipment
F	Wineries – Fermentation	Use of vapor collection and control systems, carbon adsorption, water scrubbers, catalytic incineration, condensation and temperature control	Electricity generation to operate equipment, afterburner combustion emissions
G	Solid Fuel Fired Boiler, Steam Generators and Process Heaters	Low excess air, low NOx burners, SNCR, SCR and thermal de-NOx	Electricity generation to operate equipment
H	Stationary IC Engines	Use electric motors, replace old engines, retrofit older engines with add-on control devices, use cleaner-burning diesel or alternate fuels	Electricity generation to operate equipment, potential decrease in engine efficiency could reduce fuel economy and increase emissions
I	Commercial Dryers	Use of natural gas, excess air controllers, low NOx burners, and flue gas recirculation	Electricity generation to operate equipment, potential reduction in fuel economy
J	Composting/Biosolids Operations	Vapor collection and control systems, forced aeration, and windrow of material	Electricity generation to operate equipment
K	Automotive Coating	VOC limits, application equipment, and add-on control devices	Potential change in the use of VOCs and toxic air contaminants
L	Concentrated Animal Feeding Operations	Removal and disposal of livestock wastes	Increase in transportation emissions
M	Various Coating Rules	VOC limits, application equipment, and add-on control devices	Potential change in the use of VOCs and toxic air contaminants
N	Water Heaters	Low NOx burners, SNCR, SCR, and Thermal De-NOx	Electricity generation to operate equipment

TABLE 3.2-5

Control Measures with Potential Secondary Air Quality Impacts (cont.)

Control Measures	Control Measure Description	Control Methodology	Secondary Air Quality Impact
O	Steam-Enhanced Oil Well Vents	Additional VOC vapor recovery systems	Electricity generation to operate equipment, afterburner combustion emissions
P	Soil Decontamination	Thermal destruction, biofiltration beds, carbon adsorption, condensation, and burial in sealed drums or in impermeable landfills	Electricity generation to operate equipment, afterburner combustion emissions
Q	Open Burning	Phase out open burning	Additional emissions associated with the transport of wastes to disposal facilities
R	Polymeric Foam Manufacturing	Alternative, non-VOC blowing agent, add-on controls	Electricity generation to operate equipment, combustion emissions
S	Stationary Gas Turbines	Use water or steam injection, low NO <sub>x</sub> burners, SCR, or some combination of these technologies	Electricity generation to operate equipment
U	Aviation Fuel Transfer (Phase 1)	Pressure-vacuum relief valves on storage tanks, submerged fill tubes to reduce splashing, vapor recovery destruction systems	Electricity generation to operate equipment, afterburner combustion emissions
<b>Potential Control Measures Requiring Further Study</b>			
A	Portable Equipment Registration	Diesel oxidation catalyst, catalyzed diesel particulate filters, early retirement of older portable engines	Potential decrease in engine efficiency could reduce fuel economy and increase emissions
C	Sumps, Pits and Wastewater Processing Equipment	Additional VOC Control Measures	Electricity generation to operate air pollution control equipment, combustion emissions
E	Adhesives	VOC limits, application equipment, and add-on control devices	Potential change in the use of VOCs and toxic air contaminants, electricity to operate equipment
F	Graphic Arts	VOC limits on coating material, solvent VOC limits, allowable application equipment, evaporative loss minimization practices, and add-on controls	Potential change in use of VOCs and toxic air contaminants, electricity generation to operate equipment
G	Cutback Asphalt Application	Close-fitting lids on kettles, controlled operating temperatures, and after burners	Afterburner combustion emissions

**TABLE 3.2-5**

**Control Measures with Potential Secondary Air Quality Impacts (cont.)**

<b>Control Measures</b>	<b>Control Measure Description</b>	<b>Control Methodology</b>	<b>Secondary Air Quality Impact</b>
H	Restaurants, Under-fired Charbroilers	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)	Electricity generation to operate equipment; afterburner combustion emissions
J	Furnaces	Clean burning fuel, low NOx burners, catalytic filters	Electricity generation to operate equipment
K	Brandy Production	Use of vapor collection and control systems, carbon adsorption, water scrubbers, catalytic incineration, condensation, and additional temperature control	Electricity generation to operate equipment, afterburner combustion emissions
<b>District Incentive Programs</b>			
	Heavy-Duty Engine Incentive Program	Replacing older engines, retrofitting emission controls, use cleaner-burning diesel or alternate fuels.	Compliance with this control measure is expected through engine replacement. New engines are more efficient than older engines.
	Light and Medium-Duty Vehicle Incentive Program	Encourage the use of alternative fuel vehicles and low to zero emission vehicles	Potential increase in electricity
	Electric Lawnmower Incentives	Exchange old lawnmowers for electric, rechargeable mowers	Potential increase in electricity

Electrification of equipment (e.g., stationary IC engines) will 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. If electricity demand exceeds available power, additional sources of electricity would be required. Electricity generation within the District is subject to applicable SJVUAPCD rules such as Rule 4703 – Stationary Gas Turbines which regulates NOx emissions (the primary pollutant of concern from combustion to generate electricity) from existing power generating equipment. As a result, NOx emissions from new or existing electric generating facilities will not increase significantly, regardless of increased power generation for add-on control equipment or electrification activities. It is expected that the NOx emission reductions from IC engines will outweigh the NOx emission increases from power plants since power plants use natural gas which is cleaner burner than diesel-fuel IC engines.

New power generation equipment would be subject to Rule 2201 – New and Modified Stationary Source Review. 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 before permits could be issued. [Note: to offset emission increases, equivalent (or greater) emission reductions are required from other sources within the SJVAB so that there is no net increase in emissions.] 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 (e.g., stationary IC engines). Emissions from diesel combustion (e.g., stationary IC engines) are orders of magnitude higher than emissions from the combustion of natural gas.

The emissions from electrical generation have been included in the emissions inventory prepared for the Extreme Ozone Attainment Demonstration Plan. It is assumed that the major increase in electricity generation will be through the use of natural gas to provide a conservative impact analysis. However, the Pacific Gas and Electric Company receives a portion of its electricity from hydroelectric plants in the Sierra Nevada Mountains (see Subchapter 3.3 – Utilities for further information). Table 3.2-6 summarizes the emissions associated with electric generation in 2002 and 2010.

**TABLE 3.2-6  
Annual Average Emissions for Electric Generation in the District (tons/day)**

<b>Source Category</b>	<b>VOC</b>	<b>CO</b>	<b>NOx</b>
<b>2000 Emissions Inventory</b>			
Electric Utilities	0.4	2.4	3.1
Cogeneration	0.8	7.0	9.0
Total 2000	1.2	9.4	12.1
<b>2010 Emissions Inventory</b>			
Electric Utilities	0.5	2.8	3.1
Cogeneration	1.0	9.6	6.3
Total 2010	1.5	12.4	9.4
Emission Changes (emissions in 2002-emissions in 2010, tons/day)	(0.3) <sup>(1)</sup>	(3.0)	2.7
Emission Changes (tons/year)	(109.5)	(1,095)	985.5
Projected Increase Associated with the Extreme Ozone Attainment Demonstration Plan <sup>(2)</sup> (tons/year)	1.1	11.0	--
SJVUAPCD Significance Threshold (tons/year)	10	--	10
Significant?	NO	NO	NO

Source: SJVUAPCD, Extreme Ozone Attainment Demonstration Plan, Chapter 3.0 – Emission Inventory

(1) Numbers in parentheses are emissions increases

(2) Assumes that overall increase in electricity associated with the control measures is one percent.

The inventory prepared for the 2004 Extreme Ozone Attainment Demonstration Plan 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 Extreme Ozone Attainment Demonstration Plan control measures would partially contribute to the emission changes identified in the emission inventories. The inventory also accounts for growth in population. It is 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, relative to the projected peak electricity demand in 2010. The estimated NO<sub>x</sub> emissions due to increased electrical demand associated with implementation of the Extreme Ozone Attainment Demonstration Plan are expected to be reduced between the 2002 and 2010 inventories. The estimated VOC, and CO emissions due to increased electrical demand associated with implementation of the Extreme Ozone Attainment Demonstration Plan are expected to increase, but the increases are less than the SJVUAPCD significance thresholds (see Table 3.2-6). Based on Table 3.2-6 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.

While the control measures may cause an increase in NO<sub>x</sub> emissions, overall the Extreme Ozone Attainment Demonstration Plan should achieve enough NO<sub>x</sub> reductions to attain ambient air quality standards and result in overall emission reductions (i.e., much larger NO<sub>x</sub> reductions than NO<sub>x</sub> increases from power plants). An incremental increase in electricity demand is not expected to create significant adverse air quality impacts. No significant adverse impacts to air quality are expected from control measures requiring electricity use.

The SJVUAPCD 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. Most of the electricity used in California is generated in-state but some electricity is imported. While these electricity generating facilities would not be subject to SJVUACPD 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 SJVUAPCD 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

(CEC, 200b). 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. Options for further NO<sub>x</sub> emission reductions could include addition of control equipment (selective and non-selective catalytic reduction), process changes to reduce emissions or require that new equipment meet more stringent emission limits. 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 NO<sub>x</sub> control. As a result ammonia slip emissions could increase, thus, contributing to PM<sub>10</sub> 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.

Control Measure E - Small Boilers, Process Heaters and Steam Generators, Control Measure G - Solid Fuel Fired Boilers, Steam Generators, and Process Heaters, Control Measure N - Water Heaters could reduce NO<sub>x</sub> by using SCR, and Control Measure S - Stationary Gas Turbines which may potentially result in increase ammonia emissions due to "ammonia slip" (release). 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.

A number of control measures could result in a decrease in VOC emissions from various facilities including: (1) Control Measure F - Wineries Fermentation; (2) Control Measure O - Steam Enhanced Oil Well Vents; (3) Control Measure P - Soil Decontamination; (4) Control Measure R - Polymeric Foam Manufacturing; (5) Control Measure U - Aviation Fuel Transfer; (6) Control Measure Requiring Further Study C - Sumps, Pits and Wastewater Processing Equipment; (7) Control Measure Requiring Further Study E - Adhesives; (8) Control Measure Requiring Further Study G - Cutback Asphalt Application; and (9) Control Measure Requiring Further Study K - Brandy Production. 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 NO<sub>x</sub> and CO emissions. While some control measures may cause a small increase in CO and NO<sub>x</sub> emissions, the Extreme Ozone Attainment Demonstration Plan will achieve enough NO<sub>x</sub> reductions overall to attain and maintain ambient air quality standards. The emission control devices require air permits to operate. 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.

Control Measure Requiring Further Study H – Restaurants, Under-fired charbroilers 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 would require the use of diesel particulate filters, add-on devices that are mounted on the exhaust pipe, e.g., Control Measure H – Stationary IC Engines, Control Measure Requiring Further Study A– Portable Equipment Registration, and Control Measure Requiring Further Study B – Asphalt Plant Dryers/Heaters. In the case of exhaust pollutants, Manufacturers of Emission Controls 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).

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

### **Secondary Emissions from Change in Use of VOCs**

**PROJECT-SPECIFIC IMPACTS:** Some of the proposed control measures are expected to alter the formulation of various products including coatings (Control Measure K – Automotive Coating and Control Measure M – Various Coating Rules), adhesives (Potential Control Measure Requiring Further Study E – Adhesives), and graphic arts supplies (Potential Control Measure Requiring Further Study F – Graphic Arts). To obtain further VOC emissions from paints and other coating products it is expected that coatings would be reformulated with water-based or exempt compound formulations. Concerns have been raised regarding a number of issues associated with the use of lower



VOC content limits for coating products including: (1) low VOC coatings tend to have a high solids content resulting in a thicker application and use of more low VOC coatings than conventional coatings; (2) the potential for illegal thinning producing non-compliant coatings; (3) the potential need for more priming to promote adhesion; (4) the potential need for more topcoats to increase durability; (5) the potential need for more touch-ups and repair work since low VOC coatings dry slowly and are susceptible to damage; (6) the potential need for more frequent recoating due to inferior durability when compared to conventional coatings; (7) substituting low VOC coatings with inferior durability with better performing high VOC in other categories (e.g., the use of industrial maintenance coatings in residential settings); and (8) the potential for low VOC coatings to have higher reactivity rates (thus producing more ozone) than conventional coatings.

The above issues have been studied by CARB, the SCAQMD, and the U.S. EPA as part of rule making activities. In all studies, the low VOC coatings were determined to be comparable to the conventional coatings. These issues are further discussed below.

**More Thickness:** 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.

Table 3.2-7 shows that the 1998 CARB Survey yielded 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 3.2-7

1998 CARB Survey

Coating Types	CARB SURVEY RESULTS	
	Average VOC Content (g/l) <sup>(1)</sup>	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 <sup>(2)</sup> (>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

(1) g/l = grams per liter

(2) PSU = primers, sealers, and undercoatings

Based upon the results of the CARB survey, it is concluded that compliant low-VOC coatings are not necessarily formulated with a higher solids content than conventional coatings (CARB, 2000). Further, there is no evidence that there is an inverse correlation between solids content and coverage area. Studies completed by the SCAQMD show similar results (SCAQMD, 2003)

**Illegal Thinning:** It has been asserted that thinning occurs in the field in excess of what may be allowed by 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.

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.

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 (CARB, 2000). The SCAQMD has completed similar studies concluding that illegal thinning was not a major problem (SCAQMD, 2003).

In summary, field investigations of actual painting sites in 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. As a result, claims of thinning resulting in significant adverse air quality impacts are unfounded.

**More Priming:** 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. Additionally, it 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, coating product data sheets were evaluated. 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, the product data sheets were analyzed 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 (CARB, 2000).

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 Topcoat:** 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 (CARB, 2000).

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 Up and Repair Work:** 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. Product data sheets were evaluated and recent studies conducted 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 (CARB, 2000).

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:** 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 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.

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:** 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 to 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. Second, coating rules can be developed to prohibit 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, 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. Thus, it is highly unlikely that coating applicators will violate future coatings rules by substituting higher-VOC coatings for lower-VOC coatings.

As discussed above, CARB 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 (CARB, 2000). 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.

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 less 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 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 industrial and maintenance 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 (CARB, 2000).

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-chlorobenzotrifluoride (PCBTF), VMS as well as other solvents have low photochemical reactivity and should be exempted from consideration as a VOC. 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 the Office of Environmental Health Hazard Assessment (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 (i.e., 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 synergistic effect of all issues be analyzed. CARB staff analysis determined that based on the NTS data (see below) and review of product data sheet, the low-VOC compliant coatings have comparable performance as conventional coatings. 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 (CARB 2000). 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.

**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 results of the NTS 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 coating reformulation have been identified so no mitigation measures are required.

### **Secondary Air Quality Impacts from Construction Activities**

While implementing the Extreme Ozone Attainment Demonstration Plan 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 Plan will require construction of new infrastructure including construction of controls at stationary sources (e.g., electrostatic precipitators and vapor recovery systems).

Construction activities are largely limited to the installation of control equipment, which would not involve extensive construction activities and would not be expected to result in significant emissions. Other construction activities could involve the installation of new fueling stations for the bus fleet rules. The control measures apply to a number of facilities within the Basin. Construction emissions from very large projects could exceed the VOC and NO<sub>x</sub> thresholds on an annual basis. However, the need for large construction projects is not expected to be required due to the Extreme Ozone Attainment Demonstration Plan. Construction emissions are temporary and would cease following the end of construction activities. Therefore, significant construction emissions are not expected.

**PROJECT-SPECIFIC MITIGATION:** Secondary air quality impacts from construction impacts are not significant 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.

Control Measure L – Concentrated Animal Feeding Operations would require control of VOC emissions from handling of livestock waste. The District is in the process of identifying controls on this source for new livestock operations in response to recent state legislation (SB700). VOC emissions are produced by the anaerobic digestion of the

manure by naturally occurring bacteria. Emissions occur in corrals and feedlots, in lagoons where manure is stored, and in areas where manure is spread or composted. Potential controls focus on preventing anaerobic conditions from occurring and by capturing the gases produced by the anaerobic processes. Some manure digestion systems are designed to produce methane (natural gas) and VOC emissions that are captured and burned off with a flare or used by an engine or gas turbine to produce electricity that can be used on the farm or fed back into the grid. Burning the gases will result in emissions related to the combustion process (primarily NO<sub>x</sub>) that will be subject to control under District regulations. Since the San Joaquin Valley has sufficient land to accommodate the disposal of manure, it is unlikely that manure generated in the San Joaquin Valley would be transported out of the District. It is more likely that manure would be treated on-site or transported to other facilities that have control equipment. The amount of emissions generated would depend on the type of combustion process used and controls placed on the engines, turbines, and flares in the case of anaerobic digesters and the amount of manure (and, thus, number of trucks) that would be transported if composting facilities are used. More detailed analysis will be completed when the rule is proposed; however, it is expected that the rule will be designed to control more emissions than it will generate, thus providing an overall emission reduction.

Control Measure J – Composting/Biosolids Operations, is expected to control emissions of VOC. The composting control methods available to control emissions from composting may 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. The compliance options are expected to include some form of enclosure and subsequent air pollution control. The primary impact (aside from construction) is emissions from energy to operate the control equipment. Emissions from these sources can be controlled through permit conditions and are expected to be insignificant compared to the expected benefits, including reductions in VOC emissions (CARB, 2002).

**PROJECT-SPECIFIC MITIGATION:** Secondary air quality impacts from miscellaneous sources are not significant so no mitigation measures are required.

#### **Secondary Impacts from Mobile Sources**

**PROJECT-SPECIFIC IMPACTS:** Several control measures would require the use of cleaner burning diesels or alternate fuels. These control measures include Control Measure C – Fleet Rule, School Buses, Control Measure H – Stationary IC Engines, and the District’s Heavy-Duty Engine Incentive Program.

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 rapeseed. 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 transesterification, 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. NO<sub>x</sub> emissions are similar to or slightly higher when compared to diesel. A few biodiesels and biodiesel blends will result in reduced NO<sub>x</sub> emissions and CARB has certified the use of certain biodiesels. Only CARB approved biodiesel would be approved for use as part of any new or modified rule. 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).

Biodiesel fuel also may not meet ASTM D-975 specifications for diesel fuel due to their water content. Most manufacturers of diesel engines specify use of an ASTM D-975 compliant fuel in their engine applications. Potential users of an emulsion-based diesel fuel should confirm the suitability of the fuel for use in their specific engine application and ensure that such use would not void any aspect of the engine warrantee.

**PROJECT-SPECIFIC MITIGATION:** Secondary air quality impacts from mobile sources are not significant so no mitigation measures are required.

#### **3.2.2.4.2 Transport of Air Pollutants**

**PROJECT-SPECIFIC IMPACTS:** In 2003, CARB amended state regulations on ozone transport mitigation. CARB retained, with minor revisions to eliminate outdated provisions, the requirement for upwind transport districts such as the San Joaquin Valley to apply best available retrofit control technology (BARCT). To ensure that upwind

districts minimize their impact on downwind districts, CARB also added two new requirements related to the adoption of all feasible measures and no net increase thresholds for new source review permitting programs. The San Joaquin Valley was already required to comply with these provisions due to other existing California Health and Safety Code requirements. The District already had the most stringent new source review thresholds and had implemented all feasible measures in lieu of meeting the annual five percent ozone precursors emissions reductions requirements.

As shown in Table 8-2 of the Extreme Ozone Attainment Demonstration Plan, a number of BARCT rules has been adopted by the District since 1991. The District adopted the majority of these rules before 1994 and continues to update them as new technology is demonstrated. To ensure that the District continues to include all feasible measures applicable to sources under its authority, the District reviewed adopted rules of other California Air Districts to determine if other measures should be incorporated. The California Air Pollution Control Officers Association (CAPCOA) has taken a proactive step to assist in this process by developing a list of the most stringent rules adopted by California Air Districts. The District participated in the process of developing the list and has reviewed its own adopted rules and proposed control measures in the Extreme Ozone Attainment Demonstration Plan to ensure it meets the “all feasible measure” requirement.

Decreasing VOC and NO<sub>x</sub> emissions within the SJVAB is expected to result in a decrease in ambient ozone concentrations and a decrease in the available ozone to transport into other adjacent air basins. The potential for increased ozone transport is expected to be reduced with the implementation of the Extreme Ozone Attainment Demonstration Plan as fewer VOC and NO<sub>x</sub> emissions would be generated and less ozone would be produced in the Basin. No significant impacts associated with transport are expected due to implementation of the proposed Plan.

**PROJECT-SPECIFIC MITIGATION:** Air quality impacts from associated with pollutant transport are not significant so no mitigation measures are required.

#### **3.2.2.4.3 “Weekend Effect”**

**PROJECT-SPECIFIC IMPACTS:** Implementation of the Extreme Ozone Attainment Demonstration Plan is expected to result in decreases in both NO<sub>x</sub> and VOC emissions, which are ozone precursors, and ultimately a decrease in ozone concentrations.

It has been well established that NO<sub>x</sub> is a precursor, along with reactive hydrocarbons, to ozone, and thus reducing NO<sub>x</sub> emissions generally lowers ozone formation. However, studies have shown that lowering NO<sub>x</sub> alone can, under some limiting conditions such as low hydrocarbon to NO<sub>x</sub> ratios under certain meteorological conditions, lead to localized zones of increase ozone. Nitric oxide can react with and consume ozone to produce nitrogen dioxide and oxygen. Since NO<sub>x</sub> emissions at the source are predominantly nitric oxide, ozone can be scavenged in the vicinity of a NO<sub>x</sub> source. If NO<sub>x</sub> controls reduce nitric oxide emissions from the source, this ozone scavenging effect may be

diminished. This phenomenon has been investigated as part of the “ozone weekend effect.”

The “ozone weekend effect” refers to the interesting observation that ozone measurements in some locations are typically higher on weekends compared to weekdays. This is somewhat surprising because smog-forming emissions mostly come from sources such as cars, trucks, factories, and fossil-fueled power plants that could be expected to produce lower total emissions on weekends compared to weekdays. (CARB, 2003)

In some locations, ozone concentrations are typically higher on weekends despite indications that smog-forming emissions of VOCs and NO<sub>x</sub> are almost certainly lower on weekends. The measured concentrations of VOCs and NO<sub>x</sub> in the ambient air usually decrease on weekends at most monitoring sites. Nonetheless, ozone is now routinely higher on weekends throughout the South Coast Air Basin (CARB 2003).

The ozone weekend effect presently occurs at most, if not all of the monitoring sites in the Los Angeles and San Francisco metropolitan areas, based on measurements during the ozone seasons of 1996 through 1998. However, the ozone weekend effect is absent or negligible at most sites in Sacramento and San Joaquin Valleys (CARB 2003). Based on data from 1996 through 1998, typical ozone weekend effects in four major areas of California are the following:

- South Coast Air Basin – 22 ppb or 32 percent higher than Friday ozone;
- San Francisco Bay Area Air Basin – 9 ppb or 25 percent higher than Friday ozone;
- Sacramento Metropolitan area – 5 ppb or 8 percent higher than Friday ozone (not statistically significant); and
- San Joaquin Valley Air Basin – 4 ppb or six percent higher than Friday ozone (not statistically significant) (CARB 2003).

Within each of these four regions, the ozone weekend effect tends to be smallest at those sites that measure the highest ozone concentrations.

CARB has been studying the weekend effect because it has become a regulatory issue because of this paradox has been offered by some as evidence that further reductions of NO<sub>x</sub> emissions would be counter-productive for reducing ambient ozone levels at this time. However, a strategy of concurrent reductions of the major precursors of ozone, VOCs and NO<sub>x</sub> has been used for more than 25 years to reduce ozone levels in California’s ambient air. Concurrent reductions of VOCs and NO<sub>x</sub> have been very successful at reducing the high ozone levels in southern California and other portions of the state. Concurrent reductions of VOCs and NO<sub>x</sub> have been effective at reducing

ozone levels on all days of the week, including weekends. Both weekend and weekdays show substantial improvement in ozone concentrations. On average however, ozone concentrations have declined slightly more slowly on weekends than on weekdays (CARB 2003).

Although CARB staff agrees that NO<sub>x</sub> reductions can cause ozone concentrations to increase temporarily via ozone quenching and VOC-limited chemistry, CARB staff contends that NO<sub>x</sub> reductions are not counter-productive for attaining ambient air quality standards (CARB 2003).

The NO<sub>x</sub>-reduction hypothesis is only one possible explanation of the ozone weekend effect. Other possible causes of the ozone weekend effect are being investigated. Contrary to the NO<sub>x</sub> reduction hypothesis, the alternative hypotheses do not imply that strategic reductions would be counterproductive for reducing ozone concentrations in the long term. In fact, ozone air quality has improved most when NO<sub>x</sub> air quality has also improved. These other hypotheses are being investigated and five have been considered plausible including NO<sub>x</sub> reductions, different timing of emissions including NO<sub>x</sub>, different amounts and impacts of pollutants that persist overnight aloft, different amounts of light absorbing particulate matter in the air, ozone quenching by nitric oxide emissions, or some combination of these five hypotheses (CARB 2003).

CARB has concluded that the available data are not sufficient to determine the actual causes responsible for the ozone weekend effect. The available data provide support for NO<sub>x</sub> reduction as a factor but much of the data are also consistent with the other plausible factors. Because the currently available data are not well-suited for testing the plausibility of several causes or for attributing the overlapping factors among the causes, it is speculative to conclude that NO<sub>x</sub> reduction is the cause of the ozone weekend effect.

Further the ozone weekend effect in the San Joaquin Valley Air Basin is smaller compared to the South Coast Air Basin, the San Francisco Bay Area Air Basin, and the Sacramento Valley Air Basin. The ozone weekend effect tends to be smallest at the locations that experience the highest average ozone concentration. These locations are usually downwind of major urban areas (CARB 2003).

Based on the above, the potential for increased ozone concentrations due to the decreased NO<sub>x</sub> emissions proposed as part of the Extreme Ozone Attainment Demonstration Plan is considered less than significant. Research appears to confirm that the largest ozone decreases are seen with the largest VOC and NO<sub>x</sub> emission decreases (CARB 2003).

**PROJECT-SPECIFIC MITIGATION:** Air quality impacts due to the “weekend effect” are not significant so no mitigation measures are required.

#### 3.2.2.4.4 Non-Criteria Pollutants

**PROJECT SPECIFIC IMPACTS:** A number of control measures that are proposed in the Extreme Ozone Attainment Demonstration Plan 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.

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 the requirements imposed by Proposition 65 include the requirements that manufacturer's have to provide public notices if any Proposition 65 listed-material (i.e., any hazardous chemical included on the Proposition 65 list of chemicals of concern) is used.

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 District's TAC rules. Exempt solvents are considered to be viable alternatives to aid coating manufacturers in reformulating existing coatings to meet the VOC content limits proposed. For example, acetone may be used as a replacement solvent in lacquers, floor coatings, and waterproofing sealers. Acetone has been used in lacquers and waterproofing sealers, but manufacturers may increase the acetone content in these coatings to comply with VOC limits. The potential impacts will need to be analyzed for each control measure during the rulemaking process.

Control measures that would reduce VOC emissions would also reduce TACs classified as VOCs. To the extent that control measures reduce VOC emissions, associated TAC emission reductions could occur as well.

The overall impacts associated with implementation of the Extreme Ozone Attainment Demonstration Plan 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.

#### 3.2.2.4.5 Future Ambient Air Quality/Attainment Demonstration

Air quality models are used to predict ozone concentrations in future years. These models simulate the formation, transport, and removal of ozone from the lower

atmosphere. The models are computer programs that estimate the contribution of ozone from emissions, winds, temperature, dispersion, removal, and chemical changes.

Several photochemical models are available to assess the emissions reductions needed to achieve the federal one-hour ozone standard. These include the Community Multiscale Air Quality (CMAQ), SARMAP Air Quality Model (SAQM), and the Comprehensive Air quality Model with Extensions (CAMx) model. The U.S. EPA has approved each of these models for use in SIPs. During the course of the SIP modeling effort, each one of these models were run and the output was compared to observations. The CAMx model was judged to perform slightly better than the others. For meteorological inputs to the air quality model, weather models called MM5 (Meso-scale Model 5) and Calmet were used. Other meteorological models were run, but this model resulted in the best overall performance for winds and temperatures.

In order to estimate the amount of emissions reductions needed to achieve ambient air quality standards, a modeling base case was developed. This is a historical episode that represents near worst-case weather conditions.

Of the CCOS episodes, where extensive air quality and meteorological data was available, the July/August 2000, episode was determined to be the most representative of the transport and formation of ozone in the Central California Region. During CCOS, numerous air quality and meteorological measurements were taken that would produce more confidence in photochemical modeling results. Weather causing poor dispersion and light transport of pollutants during the July-August 2000 episode was typical of high ozone events in Central California. High pressure dominated the region and the magnitude of that pressure was typical of high ozone events. This weather pattern caused light winds, strong inversions, and poor dispersion throughout the episode. The SJVUAPCD concluded that the July-August 2000 episode meteorology was typical of ozone episodes in the SJV. Therefore, the episode was deemed useful for evaluation of emission reductions.

Once the model has been validated by comparing predicted and observed concentrations, the model can be used to predict future air quality. Future year emissions (without additional control) are processed to provide input to the model. The first step in estimating reductions to achieve the federal one-hour ozone standards is to forecast emissions for the attainment year, which for this plan is 2010. The 2010 emissions estimate was run through the model. The model showed that the projected 2010 emissions did not attain the federal one-hour ozone standards. Because of fire emissions impacts in the model on the days later in the episode, July 30 at the beginning of the episode was chosen to do future year analyses. The model forecast that the highest concentrations in the San Joaquin Valley would be 128 ppb near Fresno and 136 ppb near Bakersfield.

Attainment demonstration refers to estimating the amount of ozone precursor emission reductions needed for the model to project attainment of the federal one-hour ozone



standards. After validation of the model, and some emissions adjustments for inventory improvements, the amount of reductions needed to attain the federal one-hour ozone standards was calculated.

Once a base 2010 emission scenario was established, reductions in emissions of ozone precursors were estimated across the modeling region from the 2010 emissions forecast. These cuts consist of reducing the amount of VOC and NO<sub>x</sub> emissions in the region by a percentage, running these emissions through the model, and recording and plotting the results. This process was repeated for many across-the-model-region emissions cuts for both VOC and NO<sub>x</sub>. Cuts were made to the NO<sub>x</sub> and VOC inventories at 10% intervals. The model responses to these emission cuts were then plotted, and combinations of VOC and NO<sub>x</sub> controls that achieve the standards were analyzed. The modeling results revealed that both VOC and NO<sub>x</sub> emissions reductions were needed in the Fresno and Bakersfield area using the July 30 episode day.

For this Extreme Ozone Attainment Demonstration Plan, any control measure commitments identified after September 2002 represents additional reductions that contribute to the overall total reductions needed for attainment. These measures include (1) District control measures and state and federal measures identified for the 2003 PM<sub>10</sub> Plan approved by U.S. EPA effective June 25, 2004, (2) District measures adopted after the inventory cutoff but before the PM<sub>10</sub> Plan and not reflected in the PM<sub>10</sub> Plan, and (3) any additional District, state, and federal measure commitments developed for this Extreme Ozone Attainment Demonstration Plan. These emissions reductions were added for both VOC and NO<sub>x</sub> and the resulting totals were used to compute the percentages by which the 2010 NO<sub>x</sub> and VOC emission inventories were reduced by the control measures. As shown in Table 3.2-7, adding the emission reductions from these three components gives a total VOC emission reduction of about 50.4 tons/day and a total NO<sub>x</sub> emission reduction of about 51.8 tons/day. These inventories represented about 86.3% of the VOC inventory used in the modeling and about 87.1% of the NO<sub>x</sub> inventory used in the modeling. Based on modeling results, the predicted ozone level was determined to be too high, thereby indicating nonattainment.

This predicted nonattainment led the District to identify additional emissions reductions, which when added to the totals reflected in Table 3.2-7, would be sufficient to demonstrate attainment. The District determined that 5 tons per day of VOC emissions reductions and 5 tons per day of NO<sub>x</sub> emissions reductions, when added to the totals already shown in Table 3.2-7 from specific District and State measures identified through this Extreme Ozone Attainment Demonstration Plan, would be sufficient to demonstrate attainment. Addition of 5 tons per day to each of the VOC and NO<sub>x</sub> categories produced total reductions of 55.4 tons per day of VOC and 56.8 tons per day of NO<sub>x</sub> (Table 3.2-7). These reductions result in a VOC emissions inventory that is 84.9 percent of the VOC inventory used in the modeling and a NO<sub>x</sub> emissions inventory that is about 85.9 percent of the NO<sub>x</sub> inventory used in the modeling. Based on the revised modeling results the predicted 2010 ozone level was determined to be in attainment with the federal one-hour ozone standards.

**TABLE 3.2-8  
SJVAB Federal 1-Hour Ozone Attainment Concept**

Category	2010 Summer Planning Inventory (tons/day)	
	VOC	NO <sub>x</sub>
2010 Baseline Inventory <sup>a</sup>	367.6	401.7
<b>District Rules-- Post-Inventory and Pre-PM10 Plan<sup>b</sup></b>	<b>0</b>	<b>0.1</b>
New State Commitments in 2010 from <b>PM10 Plan<sup>c</sup></b>	2.5	14.9
New District Commitments in 2010 from <b>PM10 Plan<sup>d</sup></b>	11.6	23.9
<b>Total New Commitments in 2010 from PM10 Plan</b>	<b>14.1</b>	<b>38.8</b>
New CARB Commitments in 2010 from Extreme OADP <sup>e</sup>	15.0	10.0
New District Commitments in 2010 from Extreme OADP <sup>f</sup>	21.3	2.9
<b>Total New Commitments in 2010 from Extreme OADP</b>	<b>36.3</b>	<b>12.9</b>
<b>Total Reductions through PM10 Plan and Extreme OADP</b>	<b>50.4</b>	<b>51.8</b>
<b>Reductions Needed from Long-Term Measures</b>	<b>5</b>	<b>5</b>
<b>Total Reductions</b>	<b>55.4</b>	<b>56.8</b>
<b>Total Reductions as % of 2010 Inventory</b>	<b>15.1%</b>	<b>14.1%</b>

<sup>a</sup>CCOS Summer Inventory, Version 2.11, January 2004; reflects control measures through September 2002.

<sup>b</sup> Represents District Rule 4313 for Lime Kilns, which is estimated to provide 0.1 tpd of 2010 NO<sub>x</sub> reductions.

<sup>c</sup> Based on estimated annual emissions reductions in Table 4-14 in 2003 PM10 Plan. Values have been adjusted to reflect summer emissions.

<sup>d</sup> Based on estimated annual emissions reductions in Tables 4-17 and 4-19 in the 2003 PM10 Plan, converted to summer totals thru the EIC codes affected by the control measure categories using summer and annual CCOS inventories. Residential wood combustion emissions excluded.

<sup>e</sup> New state measures above and beyond those in the 2003 PM10 Plan; see Table 4-3 in the Extreme OADP.

<sup>f</sup> New District measures above and beyond those in the 2003 PM10 Plan; emissions reductions from measures listed in Table 4-1 of the Extreme OADP that are already in the PM10 Plan were not included in this subtotal because they are already captured in the “District” line for the PM10 Plan and thus have already been subtracted.

In accordance with the federal Clean Air Act, these additional emissions reductions needed to demonstrate attainment are placed into the category of “Long-Term Measures” that will be identified in 2007. No specific control measures producing these reductions are identified at this time. The District needs to identify these measures no later than the spring of 2007. Because of other major SIP commitments that are scheduled to occur prior to this date (e.g., the 2006 PM10 Plan and the 2007 8-hour Ozone Attainment Demonstration Plan), specific control measures with reductions of this magnitude are expected to be identified.

Put another way, the emissions reductions achieved through the Amended 2002 and 2005 Rate of Progress Plan for San Joaquin Valley Ozone, when modeled out to 2010, are insufficient to attain the federal one-hour ozone standards in the SJVAB. Additional reductions are needed for attainment. Adding together the additional reductions from District and state measures in the 2003 PM10 Plan and the Extreme Ozone Attainment Demonstration Plan (including the “Long-Term Measures”) produces a total emission reduction that is sufficient to demonstrate attainment of the federal 1-hr ozone standards in the SJVAB in 2010 for the types of weather conditions observed during this episode.

In conclusion, the Extreme Ozone Attainment Demonstration Plan is expected to lead to sufficient VOC and NOx emission reductions to demonstrate attainment of the federal one-hour ambient air quality standard for ozone.

#### 3.2.2.4.6 Cumulative Air Quality Impacts

A variety of control measures have been proposed by the SJVUAPCD as part of the Extreme Ozone Attainment Demonstration Plan. Additional control measures have been proposed or implemented by CARB to further reduce VOC and NOx emissions in the district by 2010. Additional emission reductions, not included in the Extreme Ozone Attainment Demonstration Plan, are expected due to implementation of control measures from the San Joaquin Valley regional transportation planning agencies. These control measures involve modifications or new transportation projects to minimize vehicle trips and traffic congestion in a variety of different ways. The implementation of all of these control measures are evaluated in the cumulative air quality analysis as they are all related to attainment of the federal and state ambient air quality standards. These control measures seek to control emissions, even considering population growth and its related impacts.

#### **Criteria Pollutants**

Some secondary emissions may occur as a result of implementing one or more control measures in the Extreme Ozone Attainment Demonstration Plan. The overall emission reductions gained by the Extreme Ozone Attainment Demonstration Plan 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 SJVUAPCD to evaluate the specific

technology, identify secondary impacts, and identify feasible mitigation measures, as necessary. Rules implemented by the SJVUAPCD, CARB and other agencies, including transportation improvements from the various regional transportation planning agencies within the San Joaquin Valley, are expected to have a cumulative beneficial impact on air quality by lowering criteria pollutant emissions.

The control measures proposed by the SJVUAPCD as part of the Extreme Ozone Attainment Demonstration Plan are estimated to achieve a total of 21.3 tons per day of VOC and 2.9 tons per day of NO<sub>x</sub> (see Table 3.2-8) and have proposed rule adoption schedules between 2004 and 2007

Control measures to be implemented by CARB are expected to reduce VOC emissions by an additional 15 per day in the District by 2010, and to provide up to 10 tons per day of further NO<sub>x</sub> reductions beyond the prior commitment (see Table 3.2-8). CARB control measures 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.

Additional emission reductions, not included in the Extreme Ozone Attainment Demonstration Plan, are expected due to implementation of control measures from the San Joaquin Valley regional transportation planning agencies. These control measure involve modifications or new transportation projects to minimize vehicle trips and traffic congestion in a variety of different ways.

Therefore, the emission reductions gained by the control measures identified in the Extreme Ozone Attainment Demonstration Plan 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 Extreme Ozone Attainment Demonstration Plan is expected to result in sufficient emission reductions to attain the one-hour federal ozone standard by 2010. 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.

### **Toxic Pollutants**

Implementing the Extreme Ozone Attainment Demonstration Plan may contribute to new or additional non-criteria pollutant emissions. For example, increases in the use methylene chloride and perchloroethylene could occur in adhesives, graphic arts supplies and in various different coatings 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 SJVUACPD 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-1 During promulgation of new rules and rule amendments, the SJVUAPCD will 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.

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