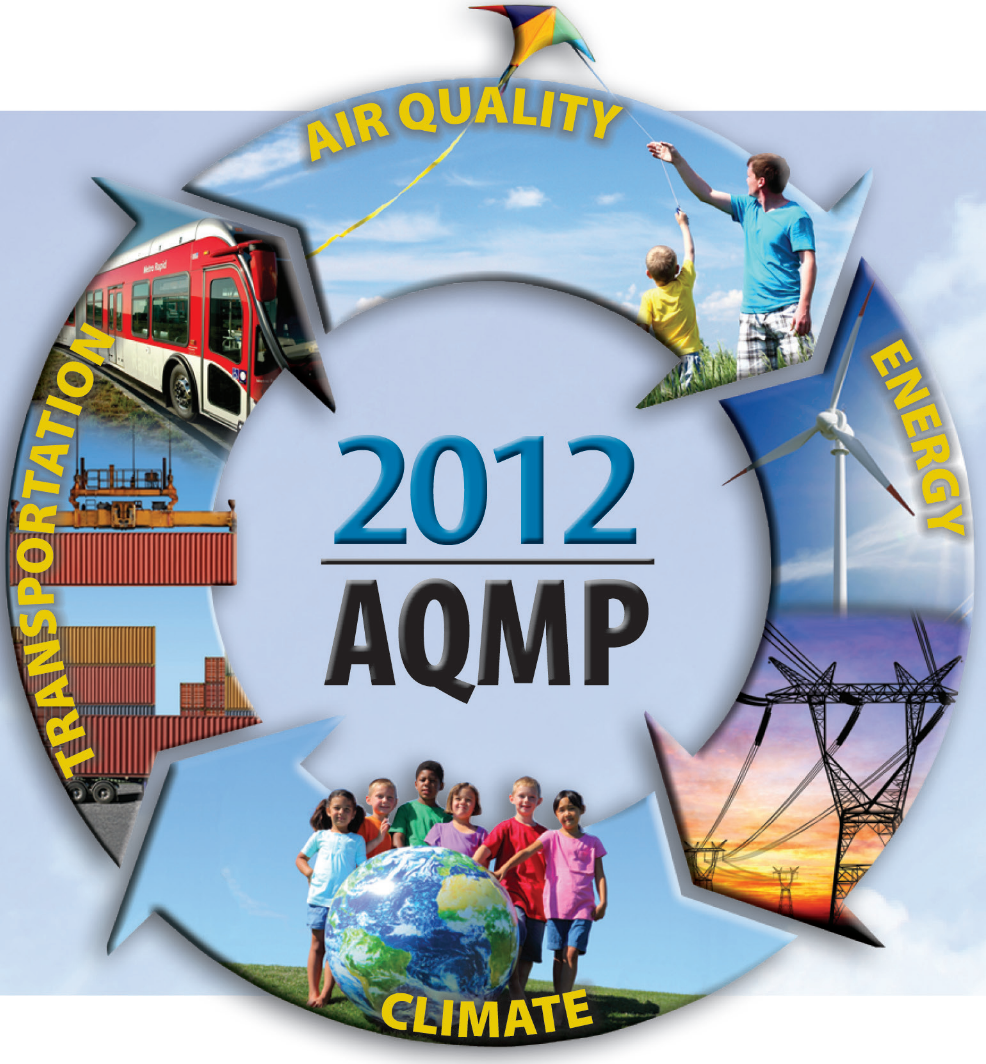
Appendix I

Air Quality Management Plan



Health Effects

February 2013

South Coast Air Quality Management District
Cleaning the air that we breathe...™

FINAL 2012 AQMP
APPENDIX I

HEALTH EFFECTS

FEBRUARY 2013

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INTRODUCTION

This document presents a summary of scientific findings on the health effects of ambient air pollutants. The California Health and Safety Code Section 40471(b) requires that the South Coast Air Quality Management District prepare a report on the health impacts of particulate matter in the South Coast Air Basin (SCAB) in conjunction with the preparation of the Air Quality Management Plan revisions. This document, which was prepared to satisfy that requirement, also includes the effects of the other major pollutants.

HEALTH EFFECTS OF AIR POLLUTION

Ambient air pollution is a major public health concern. Excess deaths and increases in illnesses associated with high air pollution levels have been documented in several episodes as early as 1930 in Meuse Valley, Belgium; 1948 in Donora, Pennsylvania; and 1952 in London. Although levels of pollutants that occurred during these acute episodes are now unlikely in the United States, ambient air pollution continues to be linked to increases in illness and other health effects (morbidity) and increases in death rates (mortality).

The adverse health effects associated with air pollution are diverse and include:

- Premature mortality
- Cardiovascular effects
- Increased health care utilization (hospitalization, physician and emergency room visits)
- Increased respiratory illness and other morbidity (symptoms, infections, and asthma exacerbation)
- Decreased lung function (breathing capacity)
- Lung inflammation
- Potential immunological changes

- Increased airway reactivity to a known pharmacological agent exposure - a method used in laboratories to evaluate the tendency of airways to have an increased possibility of developing an asthmatic response
- A decreased tolerance for exercise
- Adverse birth outcomes such as low birth weights

The evidence linking these effects to air pollutants is derived from population-based observational and field studies (epidemiological) as well as controlled laboratory studies involving human subjects and animals. There have been an increasing number of studies focusing on the mechanisms (that is, on learning how specific organs, cell types, and biomarkers are involved in the human body's response to air pollution) and specific pollutants responsible for individual effects. Yet the underlying biological pathways for these effects are not always clearly understood.

Although individuals inhale pollutants as a mixture under ambient conditions, the regulatory framework and the control measures developed are pollutant-specific for six major outdoor pollutants covered under Sections 108 and 109 of the Clean Air Act. This is appropriate, in that different pollutants usually differ in their sources, their times and places of occurrence, the kinds of health effects they may cause, and their overall levels of health risk. Different pollutants, from the same or different sources, oftentimes occur together. Evidence for more than additive effects has not been strong and, as a practical matter, health scientists, as well as regulatory officials, usually must deal with one pollutant at a time in adopting air quality standards. To meet the air quality standards, comprehensive plans are developed such as the Air Quality Management Plan (AQMP), and to minimize toxica exposure a local air toxics control plan is also prepared. These plans examine multiple pollutants, cumulative impacts, and transport issues related to attaining healthful air quality. A brief overview of the effects observed and attributed to various air pollutants is presented in this document.

This summary is drawn substantially from reviews presented previously (SCAQMD, 1996, 2003, 2007), and from reviews on the effects of air pollution by the American Thoracic Society (ATS, 1996), the U.S. EPA reviews for ozone (U.S. EPA, 2006), Carbon Monoxide (U.S. EPA, 2010), and Particulate Matter (U.S. EPA, 2004, 2009), from a published review of the health effects of air pollution (Brunekreef and Holgate, 2002), and from reviews prepared by the California Air Resources Board and the California EPA Office of the Environmental Health Hazard Assessment for

Particulate Matter (CARB, 2002), for Ozone (CARB, 2005) and for NO2 (CARB, 2007). Additional materials are from U.S. EPA's current and ongoing review of the ozone standard and health effects (U.S. EPA, 2012c, d). More detailed citations and discussions on air pollution health effects can be found in these references.[1]

Also included are tables showing summaries of the U.S. EPA conclusions regarding the causality of air pollution health effects. The .

TABLE I -1 below shows the five descriptors used by U.S. EPA.

TABLE I -1

Weight of Evidence Descriptions for Causal Determination

DETERMINATION	WEIGHT OF EVIDENCE
Causal Relationship	Evidence is sufficient to conclude that there is a causal relationship with relevant pollutant exposures. That is, the pollutant has been shown to result in health effects in studies in which chance, bias, and confounding could be ruled out with reasonable confidence. For example: a) controlled human exposure studies that demonstrate consistent effects; or b) observational studies that cannot be explained by plausible alternatives or are supported by other lines of evidence (e.g., animal studies or mode of action information). Evidence includes replicated and consistent high-quality studies by multiple investigators. Evidence is sufficient to conclude that there is a causal relationship with relevant pollutant exposures. That is, the pollutant has been shown to result in effects in studies in which chance, bias, and confounding could be ruled out with reasonable confidence. Controlled exposure studies (laboratory or small- to medium-scale field studies) provide the strongest evidence for causality, but the scope of inference may be limited. Generally, determination is based on multiple studies conducted by multiple research groups, and evidence that is considered sufficient to infer a causal relationship is usually obtained from the joint consideration of many lines of evidence that reinforce each other.

[1] Most of the studies referred to in this appendix are cited in the above sources. Only more recent specific references selected references to provide examples of the types of health effects will be cited in this summary.

TABLE I -2 (Concluded)

Weight of Evidence Descriptions for Causal Determination

DETERMINATION	WEIGHT OF EVIDENCE
Likely To Be A Causal Relationship	Evidence is sufficient to conclude that a causal relationship is likely to exist with relevant pollutant exposures, but important uncertainties remain. That is, the pollutant has been shown to result in health effects in studies in which chance and bias can be ruled out with reasonable confidence but potential issues remain. For example: a) observational studies show an association, but copollutant exposures are difficult to address and/or other lines of evidence (controlled human exposure, animal, or mode of action information) are limited or inconsistent; or b) animal toxicological evidence from multiple studies from different laboratories that demonstrate effects, but limited or no human data are available. Evidence generally includes replicated and high-quality studies by multiple investigators.
Suggestive Of A Causal Relationship	Evidence is suggestive of a causal relationship with relevant pollutant exposures, but is limited because chance, bias and confounding cannot be ruled out. For example, at least one high-quality epidemiologic study shows an association with a given health outcome but the results of other studies are inconsistent.
Inadequate To Infer A Causal Relationship	Evidence is inadequate to determine that a causal relationship exists with relevant pollutant exposures. The available studies are of insufficient quantity, quality, consistency or statistical power to permit a conclusion regarding the presence or absence of an effect.
Not Likely To Be A Causal Relationship	Evidence is suggestive of no causal relationship with relevant pollutant exposures. Several adequate studies, covering the full range of levels of exposure that human beings are known to encounter and considering susceptible populations, are mutually consistent in not showing an effect at any level of exposure.

Adapted from U.S. EPA, 2009

OZONE

Ozone is a highly reactive compound, and is a strong oxidizing agent. When ozone comes into contact with the respiratory tract, it can react with tissues and cause damage in the airways. Since it is a gas, it can penetrate into the gas exchange region of the deep lung.

The U.S. EPA primary standard for ozone, adopted in 2008, is 0.075 ppm averaged over eight hours. The California Air Resources Board (CARB) has established standards of 0.09 ppm averaged over one hour and at 0.070 ppm averaged over eight hours.

A number of population groups are potentially at increased risk for ozone exposure effects. In the ongoing review of ozone, the U.S. EPA has identified populations as having adequate evidence for increased risk from ozone exposures include individuals with asthma, younger and older age groups, individuals with reduced intake of certain nutrients such as Vitamins C and E, and outdoor workers. There is suggestive evidence for other potential factors, such as variations in genes related to oxidative metabolism or inflammation, gender, socioeconomic status, and obesity. However further evidence is needed.

The adverse effects reported with short-term ozone exposure are greater with increased activity because activity increases the breathing rate and the volume of air reaching the lungs, resulting in an increased amount of ozone reaching the lungs. Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher specific ventilation rate than adults (i.e. after normalization for body mass).

A number of adverse health effects associated with ambient ozone levels have been identified from laboratory and epidemiological studies (U.S. EPA, 1996; 2006, 2011; ATS, 1996). These include increased respiratory symptoms, damage to cells of the respiratory tract, decrease in lung function, increased susceptibility to respiratory infection, an increased risk of hospitalization, and increased risk of mortality.

Increases in ozone levels are associated with increased numbers of absences from school. The Children's Health Study, conducted by researchers at the University of Southern California, followed a cohort of children that live in 12 communities in Southern California with differing levels of air pollution for several years. A publication from this study reported that school absences in fourth graders for respiratory illnesses were positively associated with ambient ozone levels. An increase of 20 ppb ozone was associated with an 83% increase in illness-related absence rates (Gilliland, 2001).

The number of hospital admissions and emergency room visits for all respiratory causes (infections, respiratory failure, chronic bronchitis, etc.) including asthma shows a consistent increase as ambient ozone levels increase in a community. These excess hospital admissions and emergency room visits are observed when hourly ozone concentrations are as low as 0.06 to 0.10 ppm.

Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations are strongest during warmer months but overall persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).

Multicity studies of short-term ozone exposures (days) and mortality have also examined regional differences. Evidence was provided that there were generally higher ozone-mortality risk estimates in northeastern U.S. cities, with the southwest and urban mid-west cities showing lower or no associations (Smith, 2009; Bell, 2008). Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality, but not cardiovascular-related causes, when PM2.5 exposure was also included in the analysis.

In the ongoing U.S. EPA review, it was concluded that there is adequate evidence for asthmatics to be a potentially at risk population (U.S. EPA, 2012c). Several population-based studies suggest that asthmatics are at risk from ambient ozone levels, as evidenced by changes in lung function, increased hospitalizations and emergency room visits.

Laboratory studies have also compared the degree of lung function change seen in age and gender-matched healthy individuals versus asthmatics and those with chronic obstructive pulmonary disease. In studies of individuals with chronic obstructive pulmonary decease, the degree of change evidenced did not differ significantly. That finding, however, may not accurately reflect the true impact of exposure on these respiration-compromised individuals. Since the respiration-compromised group may have lower lung function to begin with, the same total change may represent a substantially greater relative adverse effect overall. Other studies have found that subjects with asthma are more sensitive to the short-term effects of ozone in terms of lung function and inflammatory response.

Another publication from the Children's Health Study focused on children and outdoor exercise. In Southern California communities with high ozone concentrations, the relative risk of developing asthma in children playing three or more sports was found to be over three times higher than in children playing no sports (McConnell, 2002). These findings indicate that new cases of asthma in children may be associated with performance of heavy exercise in communities with high levels of ozone. While it has long been known that air pollution can exacerbate symptoms in individuals with preexisting respiratory disease, this is among the first studies that indicate ozone exposure may be causally linked to asthma onset.

In addition, human and animal studies involving both short-term (few hours) and long-term (months to years) exposures indicate a wide range of effects induced or associated with ambient ozone exposure. These are summarized in Table I-2.

Some lung function responses (volume and airway resistance changes) observed after a single exposure to ozone exhibit attenuation or a reduction in magnitude with repeated exposures. Although it has been argued that the observed shift in response is evidence of a probable adaptation phenomenon, it appears that while functional changes may exhibit attenuation, biochemical and cellular changes which may be associated with episodic and chronic exposure effects may not exhibit similar adaptation. That is, internal damage to the respiratory system may continue with repeated ozone exposures, even if externally observable effects (chest symptoms and reduced lung function) disappear. Additional argument against adaptation is that after several days or weeks without ozone exposures, the responsiveness in terms of lung function as well as symptoms returns.

In a laboratory, exposure of human subjects to low levels of ozone causes reversible decrease in lung function as assessed by various measures such as respiratory volumes, airway resistance and reactivity, irritative cough and chest discomfort. Lung function changes have been observed with ozone exposure as low as 0.06 to 0.12 ppm for 6-8 hours under moderate exercising conditions. Similar lung volume changes have also been observed in adults and children under ambient exposure conditions (0.10 - 0.15 ppm 1-hour average). The responses reported are indicative of decreased breathing capacity and are reversible.

TABLE I -3

Adverse Health Effects of Ozone (O3) - Summary of Key Findings

OZONE CONCENTRATION AND EXPOSURE (ppm, hr)	HEALTH EFFECT
Ambient air containing 0.10 - 0.15 ppm daily 1-hr max over days to weeks; < 0.06 ppm (Max 8-hour average) < 0.069 ppm (Mean 8-hour average)	Decreased breathing capacity in children, adolescents, and adults exposed to O3 outdoors Positive associations of ambient O3 with respiratory hospital admissions and Emergency Department (ED) visits in the U.S., Europe, and Canada with supporting evidence from single-city studies. Generally, these studies had mean 8-h max O3 concentrations less than 0.06 ppm. Positive associations between short-term exposure to ambient O3 and respiratory symptoms (e.g., cough, wheeze, and shortness of breath) in children with asthma. Generally, these studies had mean 8-hr max O3 concentrations less than 0.069 ppm.
≥0.12 ppm (1-3hr) ≥0.06 ppm (6.6hr) (chamber exposures)	Decrements in lung function (reduced ability to take a deep breath), increased respiratory symptoms (cough, shortness of breath, pain upon deep inspiration), increased airway responsiveness and increased airway inflammation in exercising adults Effects are similar in individuals with preexisting disease except for a greater increase in airway responsiveness for asthmatic and allergic subjects Older subjects (>50 yrs old) have smaller and less reproducible changes in lung function Attenuation of response with repeated exposure
≥0.12 ppm with prolonged, repeated exposure (chamber exposures)	Changes in lung structure, function, elasticity, and biochemistry in laboratory animals that are indicative of airway irritation and inflammation with possible development of chronic lung disease Increased susceptibility to bacterial respiratory infections in laboratory animals

From: SCAQMD, 1996; U.S. EPA, 2007, U.S. EPA, 2012c, Kim 2011

The results of several studies where human volunteers were exposed to ozone for 6.6 hours at levels between 0.04 and 0.12 ppm were recently summarized (Brown, 2008).

As shown in the figure below, there is an increasing response on lung function with increasing exposure levels in moderately exercising subjects. A more recent study (Kim, 2010) exposed young healthy adults to 0.06 ppm ozone for 6.6 hours while engaging in intermittent moderate exercise. The subjects exhibited a reduction in lung function (FEV1) after exposure.

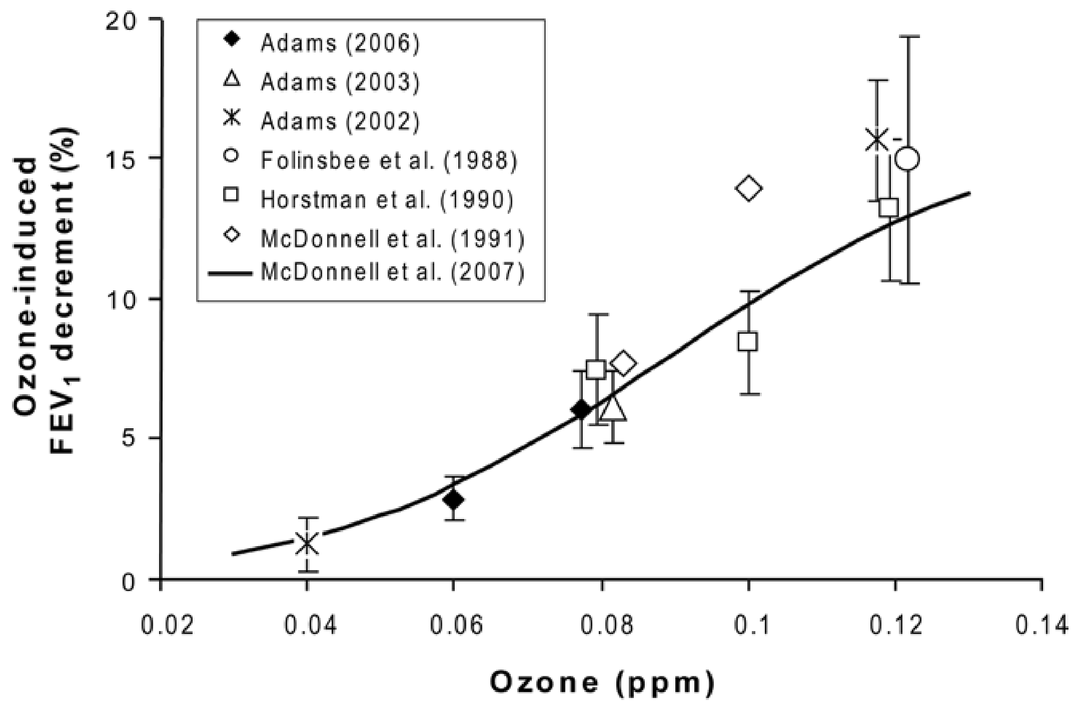


FIGURE I -1

Comparison of mean ozone-induced decrements in lung function following 6.6 hours of ozone exposure (from Brown, 2008)

In addition to controlled laboratory conditions, studies of individuals exercising outdoors, including children attending summer camp, have shown associations of reduced lung function with ozone exposure. There were wide ranges in responses among individuals. U.S. EPA's recent review indicates reductions of <1 to 4% in lung function when standardized to an increase of 0.03 ppm for an 8-hour maximum (U.S. EPA, 2012).

Results of epidemiology studies support the relationship between ozone exposure and respiratory effects. Several, but not all, studies have found associations of short-term ozone levels and hospital admissions and emergency department admissions for respiratory-related conditions (U.S. EPA, 2011).

In laboratory studies, cellular and biochemical changes associated with respiratory tract inflammation have also been consistently found in the airway lining after low-level exposure to ozone. These changes include an increase in specific cell types and in the concentration of biochemical mediators of inflammation and injury such as Interleukin-1, Tumor Necrosis Factor α, and fibronectin. Indications of lung injury and inflammatory changes have been observed in healthy adults exposed to ozone in the range of 0.06 to 0.10 ppm for up to 6.6 hours with intermittent moderate exercise.

There may be interactions between ozone and other ambient pollutants. The susceptibility to ozone observed under ambient conditions could be modified due to the combination of pollutants that coexist in the atmosphere or ozone might sensitize these subgroups to the effects of other pollutants.

Some animal studies show results that indicate possible chronic effects including functional and structural changes of the lung. These changes indicate that repeated inflammation associated with ozone exposure over a lifetime may result in cumulative damage to respiratory tissue such that individuals later in life may experience a reduced quality of life in terms of respiratory function and activity level achievable. An autopsy study involving Los Angeles County residents, although conducted many years ago when pollutant levels were higher than currently measured, provided supportive evidence of lung tissue damage (structural changes) attributable to air pollution.

A study of birth outcomes in Southern California found an increased risk for birth defects in the aortic and pulmonary arteries associated with ozone exposure in the second month of pregnancy (Ritz et al., 2002). This was the first study linking ambient air pollutants to birth defects in humans. Studies conducted since mostly focusing on cardiac and oral cleft defects have found mixed results, with some showing associations, but others did not.

In summary, adverse effects associated with ozone exposures have been well documented. Although the specific mechanisms of actions are not fully identified, there is a strong likelihood that oxidation of key enzymes and proteins and inflammatory responses play important roles.

It may be instructive to provide the overall U.S. EPA staff preliminary conclusions on the causality on ozone health effects for the health outcomes evaluated (U.S. EPA, 2011). These are provided in Tables I-3 and I-4. On the basis of the most recent evaluations of ozone health effects, U.S. EPA's Clean Air Scientific Advisory Committee has recommended that the National Ambient Air Quality Standard (NAAQS) for ozone be reduced and recommended a range in which 0.070 ppm would be the upper limit. This would be consistent with the California air quality standard.

TABLE I -4

Summary of Causal Determinations for Short-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Effects on Liver and Xenobiotic Metabolism	Inadequate to infer a causal relationship
Effects on Cutaneous and Ocular Tissues	Inadequate to infer a causal relationship
Mortality	Likely to be a causal relationship

From U.S. EPA, 2011

TABLE I - 5

Summary of Causal Determinations for Long-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Likely to be a causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Reproductive and Developmental Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Carcinogenicity and Genotoxicity	Inadequate to infer a causal relationship
Mortality	Suggestive of a causal relationship

From U.S. EPA, 2012c

PARTICULATE MATTER

Airborne particulates are a complex group of pollutants that vary in source, size and composition, depending on location and time. The components include nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and material from the earth's crust. Substances of biological origin, such as pollen and spores, may also be present.

The National Ambient Air Quality Standard for particulate matter was established in 1971, and set limits on the ambient level of Total Suspended Particulates (TSP). In 1987, the national particulate matter standards were revised to cover particles sized 10 µm (micrometers) aerodynamic diameter and smaller. These can be inhaled through the upper airways and deposited in the lower airways and gas exchange tissues in the lung. These particles are referred to as PM10. U.S. EPA initially promulgated ambient air quality standards for PM10 of 150 $\mu g/m^3$ averaged over a 24-hour period, and 50 $\mu g/m^3$ for an annual average. U.S. EPA has since rescinded the annual PM10 standard, but kept the 24-hour standard.

In more recent years additional focus has been placed on particles having an aerodynamic diameter of 2.5 µm or less (PM2.5). A greater fraction of particles in this size range can penetrate and deposit deep in the lungs. The U.S. EPA established standards for PM2.5 in 1997 and in 2006 lowered the air quality standards for PM2.5 to 35 $\mu g/m^3$ for a 24-hour average and reaffirmed 15 $\mu g/m^3$ for an annual average standard. There was considerable controversy and debate surrounding the review of particulate matter health effects and the consideration of ambient air quality standards (Kaiser, 1997; Vedal, 1997) when the U.S. EPA promulgated the initial PM2.5 standards in 1997. The California Air Resources Board adopted an air quality standard for PM2.5 in 2002 at 12 $\mu g/m^3$ annual average.

Since that time, numerous studies have been published, and some of the key studies were closely scrutinized and the data reanalyzed by additional investigators. The reanalyses confirmed the findings of significant result, and there are now substantial new data confirming and extending the range of the adverse health effects of PM2.5 exposures.

There are also differences in the composition and sources of particles in the different size ranges that may have implications for health effects. The particles larger than 2.5 µm (often referred to as the coarse fraction) are mostly produced by mechanical processes. These include automobile tire wear, industrial processes such as cutting and grinding, and resuspension of particles from the ground or road surfaces by wind and human activities.

In contrast, particles smaller than 2.5 μm are mostly derived from combustion sources, such as automobiles, trucks, and other vehicle exhaust, as well as from stationary combustion sources. The particles are either directly emitted or are formed in the atmosphere from gases that are emitted. Components from material in the earth's crust, such as dust, are also present, with the amount varying in different locations.

Attention to another range of very small particles has been increasing over the last few years. These are generally referred to as "ultrafine" particles, with diameters of 0.1 μm or less. These particles are mainly from fresh emissions of combustion sources, but are also formed in the atmosphere by condensation of vapors that are emitted or by chemical or photochemical reactions with other contaminants in the air.

Ultrafine particles have relatively short half lives (minutes to hours) and rapidly grow through condensation and coagulation processes into larger particles within the PM2.5 size range. These particles are garnering interest since a limited number of epidemiological and some laboratory studies, though not all, indicate that their toxicity may be higher on a mass basis than larger particles. There is also evidence that these small particles, or toxic components carried on their surface, can translocate from the lung to the blood and to other organs of the body.

There have been several reviews of the health effects of ambient particulate matter (ATS, 1996; Brunekreef, 2002; U.S. EPA, 2004; U.S. EPA, 2009; Brook, 2012). In addition, the California Air Resources Board (CARB) and the Office of Environmental Health and Hazard Assessment (OEHHA) have reviewed the adequacy of the California Air Quality Standards for Particulate Matter (Cal EPA, 2002).

The major types of effects associated with particulate matter include:

- Increased mortality
- Exacerbation of respiratory disease and of cardiovascular disease as evidenced by increases in:
    - Respiratory symptoms
    - Cardiovascular symptoms, non-fatal myocardial infarction

- Hospital admissions and emergency room visits
- Physician office visits
- School absences
- Adverse birth outcomes

- Effects on lung function
- Changes in lung morphology

The California Air Resources Board has also set air quality standards for particulate matter. The current federal and California standards are listed in Table I-5.

TABLE I - 6

Ambient Air Quality Standards for Particulate Matter

STANDARD	FEDERAL	CALIFORNIA
PM10 24-Hour average	150 $\mu g/m^3$	50 $\mu g/m^3$
PM10 Annual Average	--	20 $\mu g/m^3$
PM 2.5 24-Hour Average	35 $\mu g/m^3$	--
PM 2.5 Annual Average	15 $\mu g/m^3$	12 $\mu g/m^3$

Short-Term Exposure Effects

Epidemiological studies have provided evidence for most of the effects listed above. An association between increased daily or several-day-average concentrations of PM10 and excess mortality and morbidity is consistently reported from studies involving communities across the U.S. as well as in Europe, Asia, and South America. A review and analysis of epidemiological literature for acute adverse effects of particulate matter was published by the American Thoracic Society in 1996. Several adverse effects were listed as associated with daily PM10 exposures, as listed in Table I-6. It also appears that individuals who are elderly or have preexistent lung or heart disease are more susceptible than others to the adverse effects of PM10 (ATS, 1996).

Since then many more recent studies have confirmed that excess mortality and morbidity are associated with short-term particulate matter levels (Pope, 2006).

Estimates of mortality effects from studies of PM10 exposures range from 0.3 to 1.7% increase for a 10 μg/m^3 increase in PM10 levels. The National Morbidity, Mortality, and Air Pollution Study (NMMAPS), a study of 20 of the largest U.S. cities, determined a combined risk estimate of about a 0.5% increase in total mortality for a 10 μg/m^3 increase in PM10 (Samet, 2000a). This study also analyzed the effects of gaseous co-pollutants. The results indicated that the association of PM10 and mortality was not confounded by the presence of the gaseous pollutants. When the gaseous pollutants were included in the analyses, the significance of the PM10 estimates remained. The PM10 effects were reduced somewhat when O3 was also considered and tended to be variably decreased when NO_2, CO, and SO_2 were added to the analysis. These results argue that the effects are likely due to the particulate exposures; they cannot readily be explained by coexisting weather stresses or other pollutants.

TABLE I - 7

Combined Effect Estimates of Daily Mean Particulate Pollution (PM10)

	% CHANGE IN HEALTH INDICATOR PER EACH 10 μg/m^3 INCREASE IN PM10
Increase in Daily Mortality	
Total deaths	1.0
Respiratory deaths	3.4
Cardiovascular deaths	1.4
Increase in Hospital Usage (all respiratory diagnoses)	
Admissions	1.4
Emergency department visits	0.9
Exacerbation of Asthma	
Asthmatic attacks	3.0
Bronchodilator use	12.2
Emergency department visits*	3.4
Hospital admissions	1.9
Increase in Respiratory Symptom Reports	
Lower respiratory	3.0
Upper respiratory	0.7
Cough	2.5

Decrease in Lung Function	
Forced expiratory volume	0.15
Peak expiratory flow	0.08

* One study only

(Source: American Journal of Respiratory and Critical Care Medicine, Vol. 153, 113-50, 1996)

An expansion of the NMMAPS study to 90 U.S. Cities also reported association with PM10 levels and mortality (Samet 2000b; HEI, 2003). It was discovered that this study was one that used a software package with inappropriate default settings. The investigators have reanalyzed the data using corrected settings for the software (Dominici, 2002a, Dominici 2002b). When the estimates for the 90 cities in the study were recalculated, the estimate changed from 0.41% increase in mortality for a 10 $\mu g/m^3$ increase in PM10 to a 0.27% increase. There remained a strong positive association between acute exposure to PM10 and mortality. When an alternate model was used, the average estimate was 0.21% increase in mortality per 10ug/m3 increase in PM10 (HEI, 2003). Thus while the quantitative estimate was reduced, the major findings of the study did not change.

Studies of short-term exposures to PM2.5 have also found associations with increases in mortality. The NMMAPS study conducted a national analysis of PM2.5 mortality association for 1999-2000. The risk estimates were 0.29% for all-cause mortality and 0.38% for cardio-respiratory mortality (Dominici. 2007). In its recent review U.S. EPA determined that estimates for PM2.5 generally are in the range of 0.29 to 1.21% increase in total deaths per 10 $\mu g/m^3$ increase in 24-hour PM2.5 levels. The estimates for cardiovascular related mortality range from 0.03 to 1.03% per 10 $\mu g/m^3$, and for respiratory mortality estimates range from 1.01 to 2.2% per 10 $\mu g/m^3$ 24-hour PM2.5 (U.S. EPA, 2009). FIGURE I -2 shows a summary of recent studies of mortality and short-term PM2.5 exposures.

Several studies have attempted to assess the relative importance of particles smaller than 2.5 μm and those between 2.5 μm and 10 μm (PM10-2.5). While some studies report that PM2.5 levels are better predictors of mortality effects, others suggest that PM10-2.5 is also important. Most of the studies found higher mortality associated with PM2.5 levels than with PM10-2.5. For example, a study of six cities in the U.S. found that particulate matter less than 2.5 μm was associated with increased mortality, but that the larger particles were not. In the U.S. EPA review, (U.S. EPA, 2009) several studies were presented that that found associations of PM10-2.5 and mortality. Some of the studies showed differences by region of the U.S. In one study of 47 U.S. cities that had both PM2.5 and PM10 data available to calculate PM10-2.5 as a difference, overall, the study found a significant association between the computed PM10—2.5 and all cause, cardiovascular, and respiratory mortality. The study also reported difference by season and climate area.

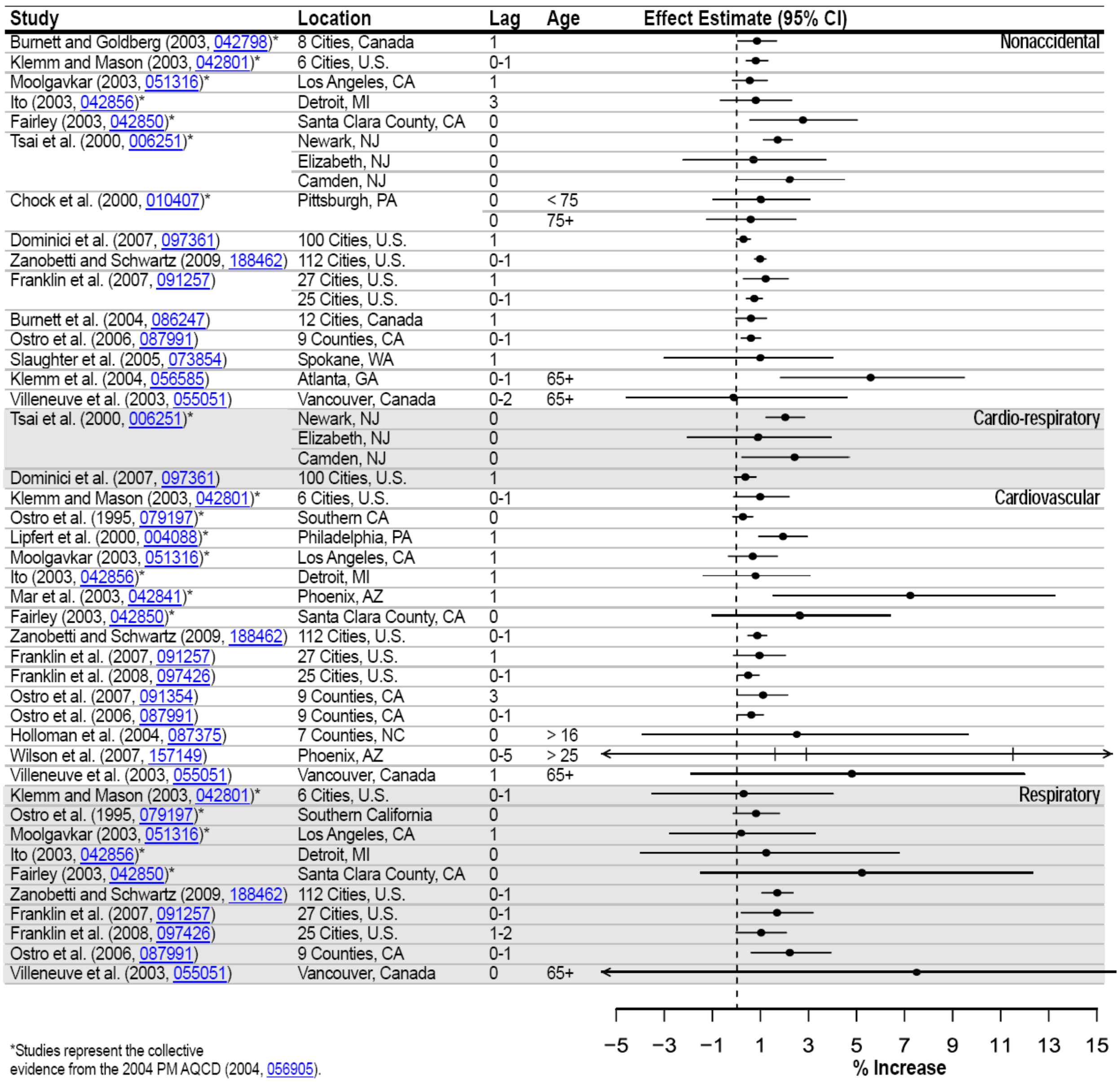


FIGURE I -2

Summary of Nonaccidental Mortality per 10 µg/m3 Increase in PM2.5 Short-term Exposures (from U.S. EPA 2009)

The relative importance of both PM2.5 and PM10-2.5 may vary in different regions depending on the relative concentrations and components, which can also vary by season. A major knowledge gap is the relative paucity of direct measurements of PM2.5-10. Most estimates are made by subtracting PM2.5 from PM10 measured at co-located samplers, a process that is subject to errors that are inherent in the subtracting of one relatively large number from another. More research is needed to better assess the relative effects of fine (PM2.5) and coarse (PM10-2.5) fractions of particulate matter on mortality. A graph from the U.S. EPA review is included below to demonstrate ranges of mortality findings.

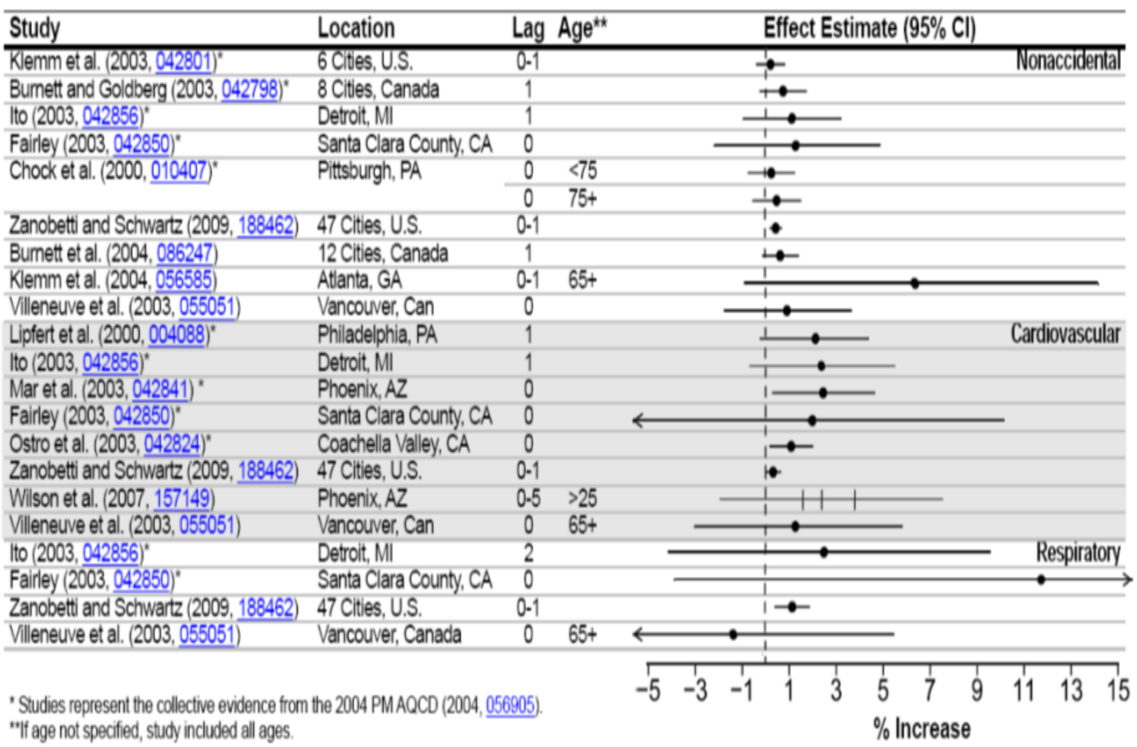


FIGURE I - 3

Summary of Percent Increase in Total (Nonaccidental) and Cause-Specific Mortality Per 10 µg/m3 Increase in PM10-2.5 (from U.S. EPA. 2009)

A number of studies have evaluated the association between particulate matter exposure and indices of morbidity such as hospital admissions, emergency room visits or physician office visits for respiratory and cardiovascular diseases. The effects estimates are generally higher than the effects for mortality. The effects are associated with measures of PM10 and PM2.5. Effects are also associated with PM10-2.5.

In the NMMAPS study, hospital admissions for those 65 years or older were assessed in 14 cities. Several models were compared to estimate associations of hospital admissions for specific disease categories and short-term PM10 levels. Hospital admissions showed an increase ranging from 0.68 – 1.47% for cardiovascular diseases, a range of 1.46 – 2.88% increase for chronic obstructive pulmonary disease, and a range of 1.31 – 2.86% increase for pneumonia per 10 $\mu g/m^3$ increase in PM10 (Samet, 2000). In the reanalysis of the study, (HEI 2003), it was found that when using different models the pollution coefficients were on average lower. However the authors note that most of the conclusions of associations with PM10 exposures and hospital admissions held.

Similarly, school absences, lost workdays and restricted activity days have also been used in some studies as indirect indicators of acute respiratory conditions. The results are suggestive of both immediate and delayed impact on these parameters following elevated particulate matter exposures. These observations are consistent with the hypothesis that increased susceptibility to infection follows particulate matter exposures, which is consistent with mechanistic studies that show PM exposures may suppress the immune system.

Some studies have reported that short-term particulate matter exposure is associated with changes in lung function (lung capacity and breathing volume); upper respiratory symptoms (hoarseness and sore throat); and lower respiratory symptoms (increased sputum, chest pain and wheeze). The severity of these effects is widely varied and is dependent on the population studied, such as adults or children with and without asthma. Sensitive individuals, such as those with asthma or pre-existing respiratory disease, may have increased or aggravated symptoms associated with short-term particulate matter exposures. Several studies have followed the number of medical visits associated with pollutant exposures. A range of increases from 1 to 4% for medical visits for respiratory illnesses was found corresponding to a 10 $\mu g/m^3$ change in PM10. A number of studies also looked at levels of PM2.5 or PM10-2.5. The findings suggest that both the fine and coarse fractions may have associations with some respiratory symptoms (U.S. EPA, 2009).

The biological mechanisms by which particulate matter can produce health effects are being investigated in laboratory studies. Inflammatory responses in the respiratory system in humans and animals exposed to concentrated ambient particles have been measured. These include effects such as increases in neutrophils in the lungs. Other changes reported include increased release of cytokines and interleukins, chemicals released as part of the inflammatory process. The effects of particulate matter may be mediated in part through the production of reactive oxygen species during the inflammatory process. Several reviews discuss mechanistic studies in more detail (Brunekreef, 2002; Brook, 2004;Brook, 2010).

Long-Term Exposure Effects

While most studies have evaluated the acute effects, some studies specifically focused on evaluating the effects of chronic exposure to PM10 and PM2.5. Studies have analyzed the mortality of adults living in different U.S. cities. After adjusting for important risk factors, taken as a whole these studies found a positive association of deaths and exposure to particulate matter. A similar association was observable in both total number of deaths and deaths due to specific causes. The largest effects were observed from cardiovascular causes and ischemic heart disease. A shortening of lifespan was also reported in these studies.

Since the initial promulgation by U.S. EPA of the National Ambient Air Quality Standards for PM2.5, controversy has remained over the association of mortality and exposures to PM2.5. Thus an expanded discussion of this issue is presented below.

Significant associations for PM2.5 for both total mortality and cardiorespiratory mortality were reported in a study following a national cohort recruited by the American Cancer Society for its Cancer Preventions Study II over several years. A re-analysis of the data from this study confirmed the initial finding (Krewski, 2000). In this study, mortality rates and PM2.5 levels were analyzed for 51 metropolitan areas of the U.S. Average levels from monitors in each area were used to estimate exposures. At these levels of aggregation, regional differences in the association of PM2.5 and mortality were noted, with higher associations in the northeast, and lower or non-significant associations in the west.

The Harvard Six Cities Study evaluated several size ranges of particulate matter and reported significant associations with PM15, PM2.5, sulfates, and non-sulfate particles, but not with coarse particles (PM15 – PM2.5). An extension of the Harvard Six Cities Cohort confirmed the association of mortality with PM2.5 levels (Laden, 2006). These studies provide evidence that the fine particles, as measured by PM2.5, may be more strongly associated with mortality effects from long-term particulate matter exposures than are coarse compounds. An update to this study covering a follow-up over the years 1974 to 2009 (Lepeule, 2012) was recently published. Findings indicated a linear relationship of PM2.5 levels and mortality

from all causes, cardiovascular causes, and from lung cancer. According to the authors, the PM2.5 levels decreased over time, but no evidence of a threshold for these effects was found.

A recent study conducted in Canada on long-term particulate exposures and mortality found a 15% increase in all-cause mortality and a 31% increase in ischemic heart disease mortality for a 10 µg.m^3 increase in PM2.5. The mean concentration among all study subjects was 8.7 µg/m^3 (Crouse, 2012)

A follow-up study of the American Cancer Society cohort confirmed and extended the findings in the initial study. The researchers estimated that, on average, a 10 µg/m3 increase in fine particulates was associated with approximately a 4% increase in total mortality, a 6% increase in cardiopulmonary mortality, and an 8% increase risk of lung cancer mortality (Pope, 2002). The magnitude of effects is larger in the long-term studies than in the short-term investigations. In an additional reanalysis and extension of the American Cancer Society cohort from 1982 to 2000 (Krewski, 2009), and including additional metropolitan areas for the most recent years, effects estimates on mortality were similar, though somewhat higher, than those reported previously. The extended analyses included an additional 11 years of cohort follow-up. The authors reported positive and significant association between a 10 µg/m^3 change in PM2.5 level and all cause, cardiopulmonary disease, and ischemic heart disease deaths. Mortality from ischemic heart disease was associated with the largest risk estimates.

Other national studies include an analysis of mortality and PM2.5 exposures in a Medicare population. Zeger and Associates (2008) assembled a Medicare cohort by including all Medicare enrollees residing in zip codes with centroids within six miles of a PM2.5 monitor. PM2.5 data was obtained from the monitoring stations, and mean annual levels were called for the zip codes within six miles of each monitor. The estimated associations between exposures to PM2.5 and mortality for the eastern and central portions of the U.S. were similar to those previously published in the Six Cities Study and the American Cancer Society cohorts. The authors reported that there were no significant associations between zip code levels of PM2.5 and mortality rates in the western region of the U.S. This lack of association was attributed largely to the higher PM2.5 levels in Los Angeles area counties compared to other western urban areas, but there were not higher mortality rates in these counties. The authors further reported that they found no associations of PM2.5 with mortality in persons aged 85 years or higher.

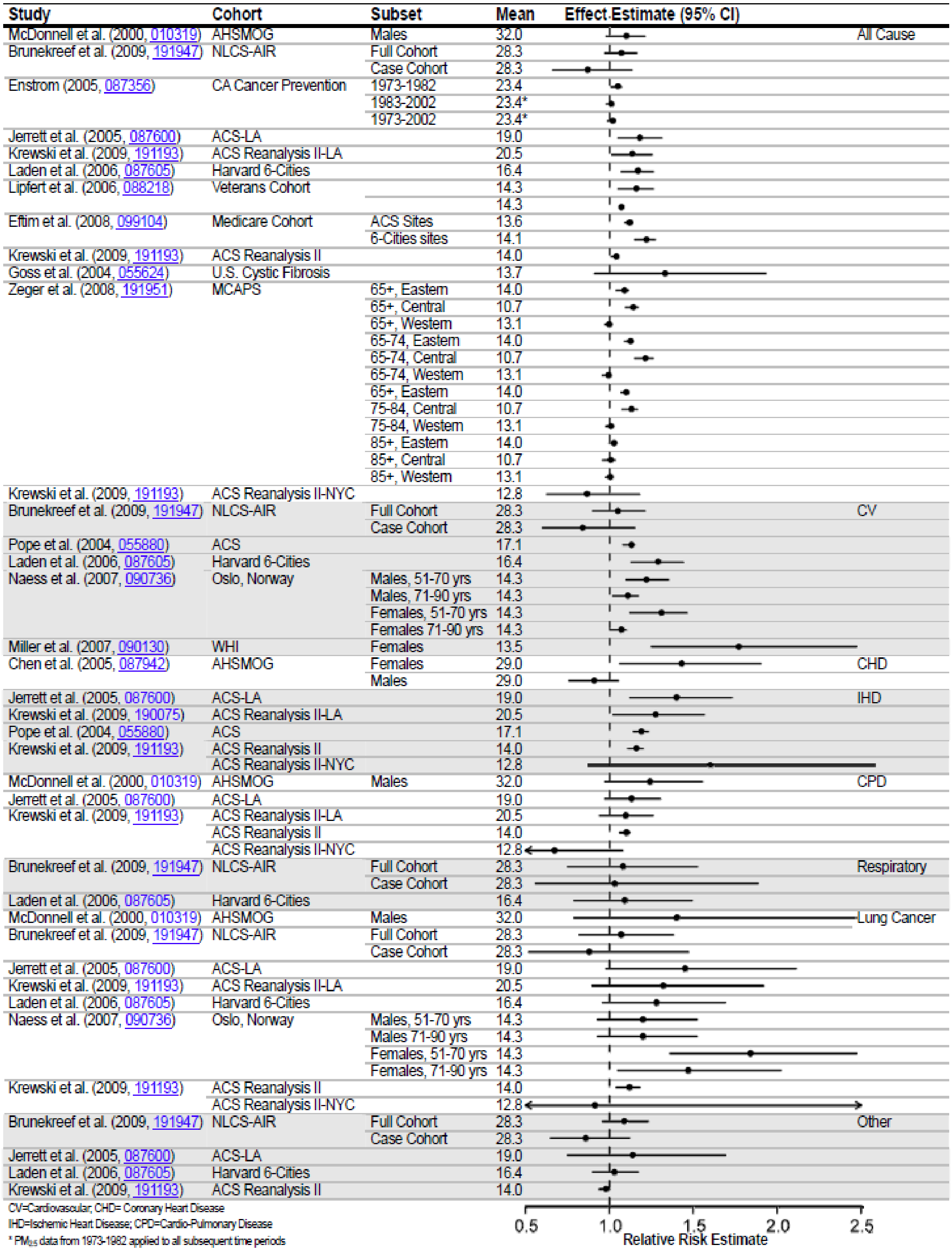


FIGURE I - 4

Mortality Risk Estimates, Long-Term Exposure to PM2.5 in Recent Cohort Studies
From U.S. EPA, 2009

Analyses of mortality and PM2.5 levels specific to California have also been reported. A cohort of elderly individuals (average age of 65 yr in 1973) recruited from 11 California counties was followed over several years (Enstrom, 2005). An association for exposure with all-cause deaths was reported from 1973–1982. However, no significant association was found in the later time period of 1983–2002. Pollutant levels were taken from ambient monitors and averaged over each county to estimate exposures.

Two recent reports have been released looking at air pollution and health effects in California cohorts. One study (Lipsett, 2011) followed school teachers recruited in 1995, and followed through 2005. Pollutant exposures at the subject residence were estimated using data from ambient monitors, and extrapolated using a distance weighted method. The authors reported significant association of PM2.5 levels and mortality from ischemic heart disease, but no associations were found with all-cause, cardiovascular, or respiratory disease.

The second study (Jerrett, 2011) followed individuals in California from the American Cancer Society II cohort recruited starting in 1982, with follow up to 2000. Pollutant levels at subject residences were estimated using several methods and models. All but one of the methods found no association of all-cause mortality with PM2.5 levels. All exposure estimation methods were reported to have found significant associations with ischemic heart disease mortality, however. The authors noted that mortality rates differ in urban areas compared to non-urban areas, and so included a variable for this in a land use regression model to estimate effects on mortality. When the authors applied the land use regression model including an urban indicator to estimate exposures, all-cause mortality, mortality from cardiovascular disease, and mortality from ischemic heart disease were all significantly associated with PM2.5 levels.

Some other studies have focused on particulate matter exposure and health effects in residents of Southern California. Two analyses of the American Cancer Society cohort, for example, focused specifically on the Los Angeles Metropolitan area using methods to estimate exposures on a finer geographical scale than previous studies that used geographic scales at the county or metropolitan area. Using data from monitoring stations in the Los Angeles area, one study applied interpolation methods (Jerrett, 2005) and another applied land use regression techniques (Krewski, 2009) to estimate exposures to the study individuals. Significant associations of PM2.5 with mortality from all causes and cardiopulmonary disease were reported, with the magnitude of risks being higher than those from the national studies of the American Cancer Society cohort. This provides evidence that using methods to provide more detailed exposure estimates can result in stronger associations of PM2.5 and mortality. It should be noted that various analyses were presented in these, as well as other, studies to estimate the influence on various individual level and ecologic variables that might also be related to health effects risks. Including such variable generally reduces the association of PM2.5 and mortality. It may be illustrative to describe some of the estimates from the various calculations as presented by the authors of the Los Angeles area cohort (Krewski, 2009). In the descriptions in Table I-7, HR refers to Hazard Ratio expressed for a 10 ug/m^3 change in PM2.5 exposure, followed by the 95% Confidence Interval. For example, if the Hazard Ratio is 2, the risk would be twice as high, and conversely if the Hazard Ration is 0.5, the risk would be one-half of that of the reference group. Several of the analyses results follow as excerpted from Krewski, 2009. Table I-7 includes PM2.5, plus various additional individual and ecological variables.

TABLE I - 8

Influence of Adding Confounding Variables (From Krewski, 2009)

VARIABLE INCLUDED	HAZARD RATIO
PM2.5 alone (stratified for age, sex, and race)	1.197 (95% CI, 1.082–1.325);
PM2.5 with 44 individual-level covariates	1.143 (95% CI, 1.033–1.266)
With 44 individual-level covariates and the ecologic covariate of unemployment	1.127 (95% CI, 1.015–1.252)
With 44 individual-level covariates and social factors extracted from the principal component analysis (which account for 81% of the total variance in the social variables)	1.142 (95% CI, 1.026–1.272).
With 44 individual-level covariates and all ecologic covariates that were individually associated with mortality in bivariate models with PM2.5 exposure	1.115 (95% CI, 1.003–1.239)
Parsimonious model that included 44 individual-level covariates and ecologic confounder variables that both reduced the pollution coefficient and had associations with mortality	1.126 (95% CI, 1.014–1.251)

Another study looked at measuring of atherosclerosis in Southern California residents Kunzli, 2005). An assessment of the carotid intima-media thickness (CIMT) was used as a measure of subclinical atherosclerosis. The subjects' residential areas were geocoded and a geospatial extrapolation of ambient monitoring data was used to assign annual mean concentrations of ambient PM2.5. The authors report results of an association between atherosclerosis and ambient air pollution as measured by PM2.5. The associations of PM2.5 and CIMT were strongest in women ≥ 60 years of age.

The U.S. EPA has recently proposed to lower the annual National Ambient Air Quality Standard for PM2.5 (U.S. EPA, 2012a). U.S. EPA also released a Regulatory Impact Analysis (U.S. EPA 2012b) which looked at the costs and benefits of alternate PM2.5 stand levels. As part of the analysis, U.S. EPA also looked at California specific studies regarding PM2.5 and mortality published in the scientific literature. The U.S. EPA analysis concluded "most of the cohort studies conducted in California report central effect estimates similar to the (nation-wide) all-cause mortality risk estimate we applied from Krewski et al. (2009) and Laden et al. (2006) albeit with wider confidence intervals. A couple cohort studies conducted in California indicate higher risks than the risk estimates we applied." Thus in U.S. EPA's judgment the California related studies provided estimates of mortality consistent with or higher than those from the national studies.

Other studies report evidence indicating that particulate matter exposure early in pregnancy may be associated with lowered birth weights (Bobak, 1999). Studies from the U.S., the Czech Republic and Mexico City have reported that neonatal and early postnatal exposure to particulate matter may lead to increased infant mortality. A more recent study in Southern California found increased risks for infant deaths associated with exposures to particulates and other pollutants (Ritz, 2006). These results suggest that fetuses and infants may be subgroups affected by particulate matter exposures.

In addition, some long-term effect studies have reported an increased risk of mortality from lung cancer associated with particulate matter exposures. A study involving California Seventh Day Adventists (very few of whom smoke) has reported an association of lung cancer mortality with PM10 levels. It is not clear from these studies whether the association relates to causation of disease, or whether individuals with cancer are more susceptible to other effects of particles leading to the observed mortality association. A study that followed a large number of individuals living in the largest U.S. cities found elevated lung cancer risk associated with long-term average PM2.5 levels (Pope, 2002).

Several studies have assessed the effects of long-term particulate matter exposure on respiratory symptoms and lung function changes. Associations have been found with symptoms of chronic bronchitis and decreased lung function. A study of school children in 12 communities in Southern California showed significant association of particulate matter with bronchitis or phlegm in children with asthma. These effects were also associated with NO_2 and acid vapor levels (McConnell, 1999).

A cohort of fourth graders from the Southern California communities was followed over a period of four years by the Children's Health Study. A lower rate of growth in lung function was found in children living in areas with higher levels of particulate pollution (Gauderman, 2000). Decreases in lung function growth were associated with PM10, PM2.5, PM10-2.5, acid vapor, and NO_2. There was no association with ozone levels. The investigators were not able to identify independent effects of the pollutants, but noted that motor vehicle emissions are a major source of the pollutants.

A follow-up study on a second cohort of children confirmed the findings that decreased lung function growth was associated with particulates, nitric oxides, and elemental carbon levels (Gauderman, 2002). Elemental carbon is often used as a measure for diesel particulate. Additionally, children who moved to areas with less air pollution were found to regain some of the lung function growth rate (Avol, 2001). By the time the fourth graders graduated from high school, a significant number showed lower lung function. The risk of lower lung function was about five times higher in children with the highest PM2.5 exposure when compared to the lowest exposure communities (Gauderman, 2004). These deficits are likely to persist since the children were at the end of their growth period.

Despite data gaps, the extensive body of epidemiological studies has both qualitative and quantitative consistency suggestive of causality. A considerable body of evidence from these studies suggests that ambient particulate matter, alone or in combination with other coexisting pollutants, is associated with significant increases in mortality and morbidity in a community.

In summary, the scientific literature indicates that an increased risk of mortality and morbidity is associated with particulate matter at ambient levels. The evidence for particulate matter effects is mostly derived from population studies with supportive evidence from clinical and animal studies. Although most of the effects are attributable to particulate matter, co-pollutant effects cannot be ruled out on the basis of existing studies. The difficulty of separating the effects may be due to the fact that particulate levels co-vary with other combustion source pollutants. That is, the particle measurements serve as an index of overall exposure to combustion-related pollution, and some component(s) of combustion pollution other than particles might be at least partly responsible for the observed health effects.

U.S. EPA staff has presented conclusions on the particulate matter causal determination of several health effects based on a recent review of the available scientific studies (U.S. EPA, 2009). These are depicted in the Tables I-8 and I-9.

TABLE I - 9

Summary of Causal Determination of PM10-2.5 by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Suggestive
Respiratory effects	Suggestive
Mortality	Suggestive
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Inadequate
Respiratory effects	Inadequate
Mortality	Inadequate
Reproductive and developmental	Inadequate

From U.S. EPA, 2009

TABLE I - 10

Summary of Causal Determination of PM2.5 by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Central nervous system	Inadequate information to assess
Mortality	Causal
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Mortality	Causal
Reproductive and developmental	Suggestive of a causal relationship
Cancer, Mutagenicity, Genotoxicity	Suggestive of a causal relationship

From U.S. EPA, 2009

In terms of estimating health burdens of air pollution exposure, CARB has conducted analyses in the past estimating exposures and quantitative health effects from exposures to particulate matter, as well as other pollutants. The most recent assessment focused on premature mortality and PM2.5 (CARB 2010). The analysis used the U.S. EPA's risk assessment methodology for calculating premature mortality, and used ambient air quality measurements averaged over a three-year period of 2006-2008. The analysis indicated that PM2.5 related premature deaths in California as 9,200 with an uncertainty range of 7,300 – 11,000. Estimates were also made for the California Air Basins. For the South Coast Air Basin, the estimate was 4,900 with an uncertainty range of 3,900 – 6,000. These estimates were calculated using the associations of cardiopulmonary mortality and PM2.5 from the second exposure period from Krewski (2009). The associations from the first exposure period from Krewski, 2009 as well as other cause of death estimates were also presented.

Another analysis of health impacts in the South Coast was conducted as part of the Draft Socioeconomic Report for the 2012 AQMP. The analysis estimates the anticipated costs and benefits of adopting the measures in the Final 2012 AQMP. Adopting these measures is projected to result in attainment of the national PM2.5 standards by 2014. The total average annual quantifiable benefits associated with implementing the Final 2012 AQMP were calculated and represent the currently quantifiable benefit of moving beyond today's regulations to the level needed to meet the federal PM2.5 standards. Table I-10 shows the number of avoided cases (or person-days) by health effect when the Basin attains the PM2.5 standard in 2014 and also in 2023 that result (SCAQMD 2012). The estimates pertain to the projected PM2.5 reductions only.

TABLE I - 11

Changes in Number of Health Effects for Future Years*
for Measures Contained in the Final 2012 AQMP

Health Outcome	**Number of Avoided Cases**	
	2014	**2023**
Mortality	668	275
Acute Bronchitis	597	186
Non-Fatal Heart Attacks	29 - 261	12 – 105
Lower & Upper Respiratory Symptoms	18,384	5,750
Emergency Room Visits	153	53
Hospital Admissions	151	62
Minor Restricted Activity Days	287,447	95,093
Work Loss Days	48,805	16,055
Asthma Attacks	26,910	3,628

*Changes reflect differences in base and control cases for a given year. Positive numbers are reductions in symptoms due to the Final 2012 AQMP.

**Person-days.

ULTRAFINE PARTICLES

As noted above, numerous studies have found association of particulate matter levels with adverse effects, including mortality, hospital admissions, and respiratory disease symptoms. The vast majority of these studies used particle mass of PM10 or PM2.5 as the measure of exposure. Some researchers have postulated, however, that ultrafine particles may be responsible for some of the observed associations of particulate matter and health outcomes (Oberdorster, et al, 1995; Seaton, et al, 1995). Ultrafine particles have aerodynamic diameter of less than 0.1 µm.

Several potential mechanisms have been brought forward to suggest that the ultrafine portion may be important in determining the toxicity of ambient particulates, some of which are discussed below.

For a given mass concentration, ultrafine particles have much higher numbers and surface area compared to larger particles. Particles can act as carriers for other adsorbed agents, such as trace metals and organic compounds; and the larger surface area may transport more of such toxic agents than larger particles.

Smaller particles can also be inhaled deep into the lungs. As much as 50% of 0.02 µm diameter particles are estimated to be deposited in the alveolar region of the lung. The relation between deposition and particle size is of complex nature. The ultrafine particles generally have higher fractional deposition in the alveolar region. However, for the smaller nucleation mode (particles less than 0.01 µm size) the deposition in the alveolar region declines, but increases in the extrathoracic region.

Exposures of laboratory animals to ultrafine particles have found cardiovascular and respiratory effects. Using an animal model of atherosclerotic disease, mice exposed to concentrated ultrafine particles near a roadway in Southern California showed larger early atherosclerotic lesions than mice exposed to concentrated PM2.5 or to filtered air (Araujo, 2008). In a mouse allergy model, exposures to concentrated ultrafine particles resulted in a greater response to antigen challenge to ovalbumin (Li, 2010), indicating that vehicular traffic exposure could exacerbate allergic inflammation in already-sensitized animals.

Controlled exposures of human volunteers to ultrafine particles either laboratory generated or as products of combustion, such as diesel exhaust containing particles, have found physiological changes related to vascular effects. Mills, 2011, for example found exposure to diesel exhaust particulate attenuated both acetylcholine and sodium-nitroprusside-induced vasorelaxation.

There are no long-term studies of human population exposure to ultrafine particles, as there is a lack of a monitoring network in the U.S. There have been several cross sectional epidemiological studies of ultrafine particles, mainly from Europe. Some of these studies found effects on hospital admissions, and emergency department visits, for respiratory and cardiovascular effects. Other studies, however, have not found such effects (U.S. EPA, 2009). Concentrations of ultrafine particles can vary geographically, and it is not clear how well central site monitors may capture actual exposures.

U.S. EPA staff has presented conclusions on causal determination of several health effects of ultrafine PM based on a recent review of the available scientific studies (U.S. EPA, 2009). These are depicted in Table I-11.

Additional discussion on the sources and health effects of ultrafine particles can be found in Chapter 9 of the 2012 AQMP.

TABLE I - 12

Summary of Causal Determination of Ultrafine PM by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Suggestive
Respiratory effects	Suggestive
Central nervous system	Inadequate information to assess
Mortality	Inadequate
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Inadequate
Respiratory effects	Inadequate
Mortality	Inadequate
Reproductive and developmental	Inadequate
Cancer, Mutagenicity, Genotoxicity	Inadequate

From U.S. EPA, 2009

CARBON MONOXIDE

The high affinity of carbon monoxide (CO) to bond with oxygen-carrying proteins (hemoglobin and myoglobin) results in reduced oxygen supply in the bloodstream of exposed individuals. The reduced oxygen supply is responsible for the toxic effects of CO which are typically manifested in the oxygen-sensitive organ systems. The effects have been studied in controlled laboratory environments involving exposure of humans and animals to CO, as well as in population-based studies of ambient CO exposure effects. People with deficient blood supply to the heart (ischemic heart disease) are known to be susceptible to the effects of CO. Protection of this group is the basis of the existing National Ambient Air Quality Standards for CO at 35 ppm for one hour and 9 ppm averaged over eight hours. The health effects of ambient CO have been recently reviewed (U.S. EPA, 2000, 2010).

Inhaled CO has no known direct toxic effect on lungs but rather exerts its effects by interfering with oxygen transport through the formation of carboxyhemoglobin (COHb, a chemical complex of CO and hemoglobin). Exposure to CO is often evaluated in terms of COHb levels in blood measured as percentage of total hemoglobin bound to CO. COHb levels in non-smokers range between 0.3 and 0.7% and 5 to 10% in smokers. COHb levels in excess of 1.5% in a significant proportion of urban non-smoking populations can be considered as evidence of widespread exposure to environmental CO.

Under controlled laboratory conditions, healthy subjects exposed to CO sufficient to result in 5% COHb levels exhibited reduced duration of maximal exercise performance and consumption of oxygen. Studies involving subjects with coronary artery disease who engaged in exercise during CO exposures have shown that COHb levels as low as 2.4% can lead to earlier onset of electrocardiograph changes indicative of deficiency of oxygen supply to the heart. Other effects include an earlier onset of chest pain, an increase in the duration of chest pain, and a decrease in oxygen consumption.

Findings of epidemiologic studies have observed associations between ambient CO concentration and emergency department visits and hospital emissions for ischemic heart disease and other cardiovascular diseases.

Animal studies associated with long-term exposure to CO resulting in COHb levels that are equivalent to those observed in smokers have shown indication of reduction in birth weight and impaired neurobehavior in the offspring of exposed animals.

Epidemiological studies conducted in Southern California have indicated an association with CO exposure during pregnancy to increases in pre-term births (Ritz, 2000). However, the results were not consistent in different areas studied. The increase in the pre-term births was also associated with PM10 levels. Another study found increased risks for cardiac-related birth defects with carbon monoxide exposure in the second month of pregnancy (Ritz, 2002). Toxicological studies in laboratory animals with higher than ambient levels of CO have also reported decrements in birth weight and prenatal growth.

U.S. EPA staff has presented conclusions on causal determination of the health effects of carbon monoxide based on a recent review of the available scientific studies (U.S. EPA, 2010). These are depicted in Table I-12.

TABLE I - 13

Causal Determination for Health Effects of Carbon Monoxide

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Likely to be a causal relationship
Central nervous system	Suggestive
Respiratory morbidity	Suggestive
Mortality	Suggestive
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Inadequate
Central nervous system	Suggestive
Birth outcomes and developmental effects	Suggestive
Respiratory morbidity	Inadequate
Mortality	Not likely to be a causal relationship

From U.S. EPA, 2010

NITROGEN DIOXIDE

The U.S. EPA has recently reviewed the health effects of nitrogen dioxide (U.S. EPA, 2008a). Evidence for low-level nitrogen dioxide (NO_2) exposure effects is derived from laboratory studies of asthmatics and from epidemiological studies. Additional supportive evidence is derived from animal studies.

Some epidemiological studies using the presence of an unvented gas stove as a surrogate for indoor NO_2 exposures suggest an increased incidence of respiratory infections or symptoms in children. However the evidence is mixed.

Recent studies related to outdoor exposure have found health effects associated with ambient NO_2 levels, including respiratory symptoms, respiratory illness, decreased lung function, increased emergency room visits for asthma, and cardiopulmonary mortality. However, since NO_2 exposure generally occurs in the presence of other pollutants, such as particulate matter, these studies are often unable to determine the specific role of NO_2 in causing effects.

The Children's Health Study in Southern California found associations of air pollution, including NO_2, PM10, and PM2.5, with respiratory symptoms in asthmatics (McConnell, 1999). Particles and NO_2 were correlated, and effects of individual pollutants could not be discerned. A subsequent analysis indicated a stronger role for NO_2 (McConnell, 2002).

Ambient levels of NO_2 were also associated with a decrease in lung function growth in a group of children followed for eight years. In addition to NO_2, the decreased growth was also associated with particulate matter and airborne acids. The study authors postulated this may be a result of a package of pollutants from traffic sources (Gauderman, 2004).

Results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (bronchial reactivity) or after inhaled allergens. Effects were observed with exposures from 0.1 to 0.3 ppm NO_2 for periods ranging from 30 minutes to three hours. A similar response is reported in some studies with healthy subjects at higher levels of exposure (1.5 - 2.0 ppm). Mixed results have been reported when people with chronic obstructive lung disease are exposed to low levels of NO_2.

Short-term controlled studies of animals exposed to NO_2 over a period of several hours indicate cellular changes associated with allergic and inflammatory response and interference with detoxification processes in the liver. In some animal studies

the severity of the lung structural damage observed after relatively high levels of short-term ozone exposure is observed to increase when animals are exposed to a combination of ozone and NO_2.

In animals, longer-term (3-6 months) repeated exposures at 0.25 ppm appear to decrease one of the essential cell-types (T-cells) of the immune system. Non-specific changes in cells involved in maintaining immune functions (cytotoxic T-cells and natural killer cells) have been observed in humans after repeated exposure (4-6 days) to >0.6 ppm of NO_2 (20 min. - 2 hours). All these changes collectively support the observation reported both in population and animal studies of increased susceptibility to infections, as a result of NO_2 exposure.

The U.S. EPA recently adopted a new short-term standard of 100 ppb (0.1 ppm) averaged over 1 hour. The standard was designed to protect against increases in airway reactivity in individuals with asthma observed in controlled exposure studies, as well as respiratory symptoms observed in epidemiological studies. The new standard also requires additional monitoring for NO_2 near roadways.

SULFUR DIOXIDE

Controlled laboratory studies involving human volunteers have clearly identified asthmatics as a very sensitive group to the effects of ambient sulfur dioxide ($SO_{2)}$ exposures. Healthy subjects have failed to demonstrate any short-term respiratory functional changes at exposure levels up to 1.0 ppm over 1-3 hours.

In exercising asthmatics, brief exposure (5-10 minutes) to SO_2 at levels between 0.2-0.6 ppm can result in significant alteration of lung function, such as increases in airway resistance and decreases in breathing capacity. In some, the exposure can result in severe symptoms necessitating the use of medication for relief. The response to SO_2 inhalation is observable within two minutes of exposure, increases further with continuing exposure up to five minutes then remains relatively steady as exposure continues. SO_2 exposure is generally not associated with any delayed reactions or repetitive asthmatic attacks.

In epidemiologic studies, associations of SO_2 levels with increases in respiratory symptoms, increases in emergency department visits and hospital admissions for respiratory-related causes have been reported. Coupled with the human clinical studies, these data suggest that SO_2 can trigger asthmatic episodes in individuals with pre-existing asthma.

The U.S. EPA has recently revised the SO_2 air quality standard. The previous 24-hour standard was rescinded and replaced with a new 1-hour standard at 75 ppb (0.075 ppm) to protect against acute asthma attacks in sensitive individuals.

Animal studies have shown that despite SO_2 being a respiratory irritant, it does not cause substantial acute or chronic toxicity in animals exposed at ambient concentrations. However, relatively high exposures (10 ppm of SO_2 for 72 hours) in mice can lead to tissue damage, fluid accumulation and sloughing of respiratory lining. Sensitization to allergies is observable in guinea pigs repeatedly exposed to high levels (72 ppm) of SO_2. This effect needs further evaluation in clinical and population studies to identify any chronic exposure impact on both asthmatic incidence and attacks in a population.

Some epidemiological studies indicate that the mortality and morbidity effects associated with the fine fraction of particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from fine particles have not been successful. Thus, it is not clear whether the two pollutants act synergistically, or whether being generated from similar combustion sources, they represent the same pollution index for the observed effects.

SULFATES

Based on a level determined necessary to protect the most sensitive individuals, the California Air Resources Board (CARB) in 1976 adopted a standard of 25 µg/m^3 (24-hour average) for sulfates. There is no federal air quality standard for sulfates.

In recent years, a vast majority of effects (mortality and morbidity) associated with fine particles (PM2.5) and sulfur dioxide have shown a similar association with ambient sulfate levels in some population studies. The efforts to fully separate the effects of sulfates from other coexisting pollutants have not been successful. This may be due to the fact that these pollutants covary under ambient conditions, having been emitted from common sources; and the effects observed may be due to the combination of pollutants, rather than a single pollutant.

A clinical study involving exposure of human subjects to sulfuric acid aerosol indicated that adolescent asthmatics may be a susceptible population subgroup with some changes in lung function observed with exposures below 100 µg/m^3. In general, however, laboratory exposures of human volunteers to sulfates at or near ambient levels have not found significant changes in lung function.

Results from animal studies involving exposures to sulfuric acid aerosol, ammonium bisulfate and ammonium sulfate indicate that acidic particles (former two) are more toxic than non-acidic particles (latter). In addition, the severity or magnitude of both mortality and morbidity effects is relatively higher in population studies of the eastern United States and Canada where sulfate concentrations are higher than for those observed in the western United States. Mixed results have been reported from studies which attempted to ascertain the role of acidity in determining the observed toxicity.

LEAD

The U.S. EPA has recently reviewed the health effects of ambient lead exposures in conjunction with a review of the NAAQS for lead (U.S. EPA 2006b; U.S. EPA 2007b). The following summary is taken from these reviews.

There are a number of potential public health effects at low level exposures. The health implications are generally indexed by blood lead levels, which are related to lead exposures both from inhalation as well as from ingestion. As identified by U.S. EPA, effects include impacts on population IQ, as well as heart disease and kidney disease. The array of health effects includes the following.

- Heme biosynthesis and related functions;
- Neurological development and function;
- Reproduction and physical development;
- Kidney function;
- Cardiovascular function
- Immune function

Children appear to be sensitive to the neurological toxicity of lead, with effects observed at blood lead concentration ranges of 5 – 10 µg/dL, or possibly lower. No clear threshold has yet been established for such effects.

According to the U.S. EPA review, the most important effects observed are neurotoxic effects in children and cardiovascular effects in adults. The effects in children include impacts on intellectual attainment and school performance.

U.S. EPA has recently revised the NAAQS for lead to a level of 0.15 µg/m^3 averaged over a rolling three-month period to protect against lead toxicity. Figures I-5 and I-6, taken from the U.S. EPA review, depict the health effects of lead in relation to blood levels. In the figure, the question marks indicate that there are no demonstrated threshold blood lead levels for health effects. The Centers for Disease Control (CDC) has recently revised their lead hazard information and replaced their level of concern for adverse effects of 10 µg/dL blood lead level with a childhood blood lead level reference value of 5 µg/dL to identify children and environments associated with lead-exposure hazards (CDC, 2012).

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Immune Effects
30 µg/dL		Increased urinary δ-aminolevulinic acid	
15 µg/dL	Behavioral disturbances (e.g., inattention, delinquency)	Erythrocyte protoporphyrin (EP) elevation	
	Altered electrophysiological responses		
10 µg/dL	Effects on neuromotor function	Inhibition of δ-aminolevulinic acid dehydratase (ALAD)	Effects on humoral (↑ serum IgE) and cell-mediated (↓ T-cell abundance) immunity
	CNS cognitive effects (e.g., IQ deficits)	Pyrimidine-5′-nuclotidase (Py5N) activity inhibition	
5 µg/dL	↓	↓	
	(???)	(???)	
0 µg/dL			

FIGURE I - 5

Summary of Lowest Observed Effect Levels for Key Lead-Induced Health Effects in Children (From U.S. EPA 2007b)

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Cardiovascular Effects	Renal Effects
30 µg/dL	Peripheral sensory nerve impairment	Erythrocyte protoporphyrin (EP) elevation in males		Impaired Renal Tubular Function
20 µg/dL	Cognitive impairment			
15 µg/dL	Postural sway	Erythrocyte protoporphyrin (EP) elevation in females Increased urinary δ-aminolevulinic acid		
10 µg/dL		Inhibition of δ-aminolevulinic acid dehydratase (ALAD)	Elevated blood pressure	
5 µg/dL			↓ (???)	Elevated serum creatine (↓ creatine clearance)
0 µg/dL				

FIGURE I - 6

Summary of Lowest Observed Effect Levels for Key Lead-Induced Health Effects in Adults (From U.S. EPA 2007b)

TOXIC AIR CONTAMINANTS

Toxic air contaminants are pollutants for which there generally are no ambient air quality standards. The Toxic Air Contaminant Identification and Control Act (AB1807, Tanner 1983) created California's program to reduce exposures to air toxics. The Air Toxics "Hot Spots" Information and Assessment Act (AB2588, Connelly, 1987) supplements the program by requiring statewide air toxics inventories, notification of people exposure to significant health risks, and facility plans to reduce these risks. Under California's Air Toxics Program, CARB staff and Office of Environmental Health Hazard Assessment (OEHHA) assess the health effects of substances that may pose a risk of adverse health effects. These effects are usually an increased risk for cancer, adverse birth outcomes and respiratory effects. After review by the state Scientific Review Panel, CARB holds a public hearing on whether to formally list substances that may pose a significant risk to public health as a Toxic Air Contaminant.

OEHHA also establishes potency factors for air toxics that are carcinogenic. The potency factors can be used to estimate the additional cancer risk from ambient levels of toxics. This estimate represents the chance of contracting cancer in an individual over a lifetime exposure to a given level of an air toxic and is usually expressed in terms of additional cancer cases per million people exposed.

For non-cancer health effects, OEHHA has developed acute and chronic Reference Exposure Levels (RELs). RELs are concentrations in the air below which adverse health effects are not likely to occur. Acute RELs refer to short-term exposures, generally of 1-hour duration. Chronic RELs refer to long-term exposures of several years. OEHHA has also established 8-hour RELs for several substances. The ratio of ambient concentration to the appropriate REL can be used to calculate a Hazard Index. A Hazard Index of less than one would not be expected to result in adverse effects. The measured levels from the most recent study were below the applicable Reference Exposure Levels.

The District conducted studies on the ambient concentrations and estimated the potential health risks from air toxics (SCAQMD, 2008). In the latest study, a two -year monitoring program was undertaken at 10 sites throughout the SCAB over the time period 2004-2006. Over 30 substances were measured, and annual average levels were calculated. The results showed that the overall risk for excess cancer from a 70-year lifetime exposure to the levels of air toxics calculated as the average level at the 10 sites was about 1,200 in a million. The largest contributor to this risk was diesel particulate matter, accounting for about 84% of the air toxics risk. A breakdown of the major contributors to the air toxics risk is shown in Figure I-7. The average levels measured were also compared to the non-cancer Reference Exposure Levels. The measurements were below the established RELs.

The California Air Resources Board listed Diesel Particulate Matter as a Toxic Air Contaminant in 1989. The International Agency for Research on Cancer, an arm of the World Health Organization, classified diesel exhaust as probably carcinogenic to humans in 1989. Recently IARC convened an international panel of scientists to review the published literature since the initial classification regarding the carcinogenicity of diesel combustion emissions. The panel concluded that diesel exhaust is a substance that causes lung cancer in humans (Benbrahim-Tallaa, 2012).

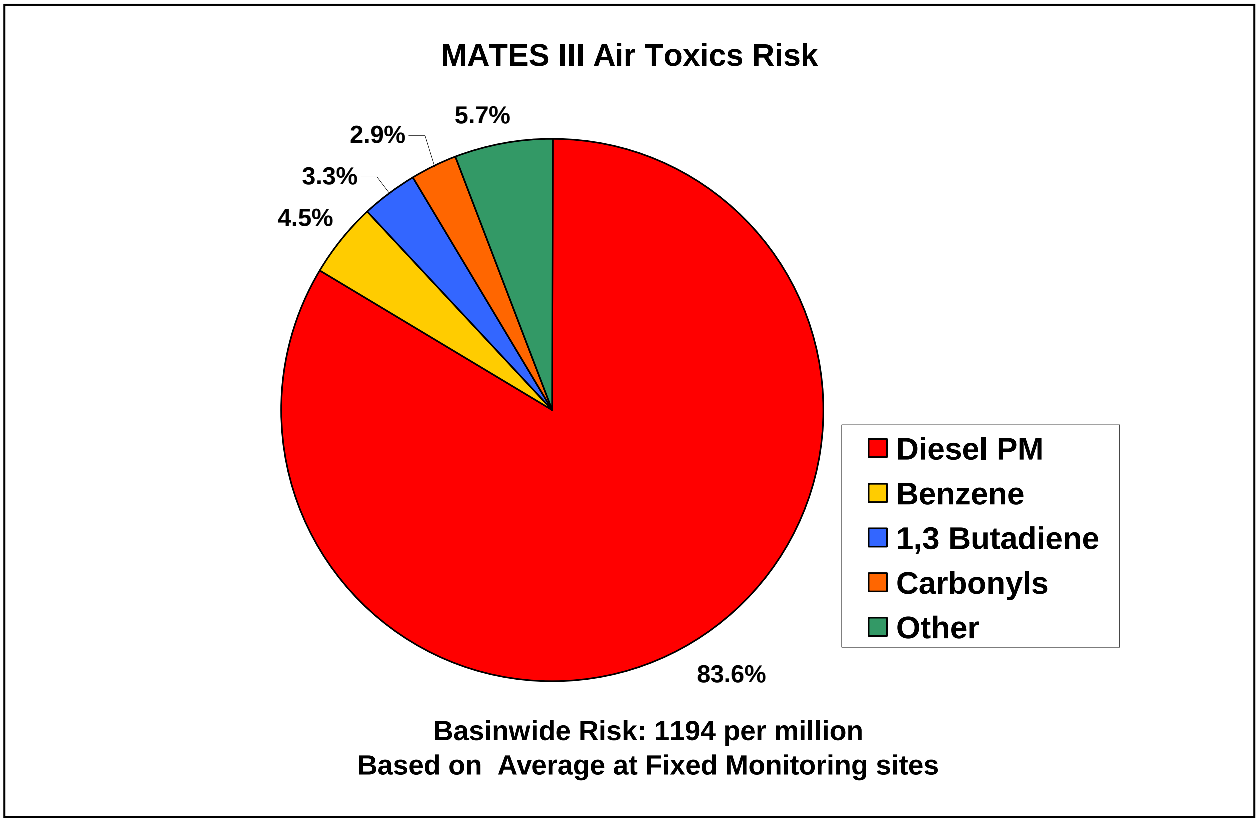


FIGURE I - 7

Major Pollutants Contributing to Air Toxics Cancer Risk in the South Coast Air Basin

The key air toxics contributing to risk from mobile and stationary sources are listed in Table I-13.

TABLE I - 14

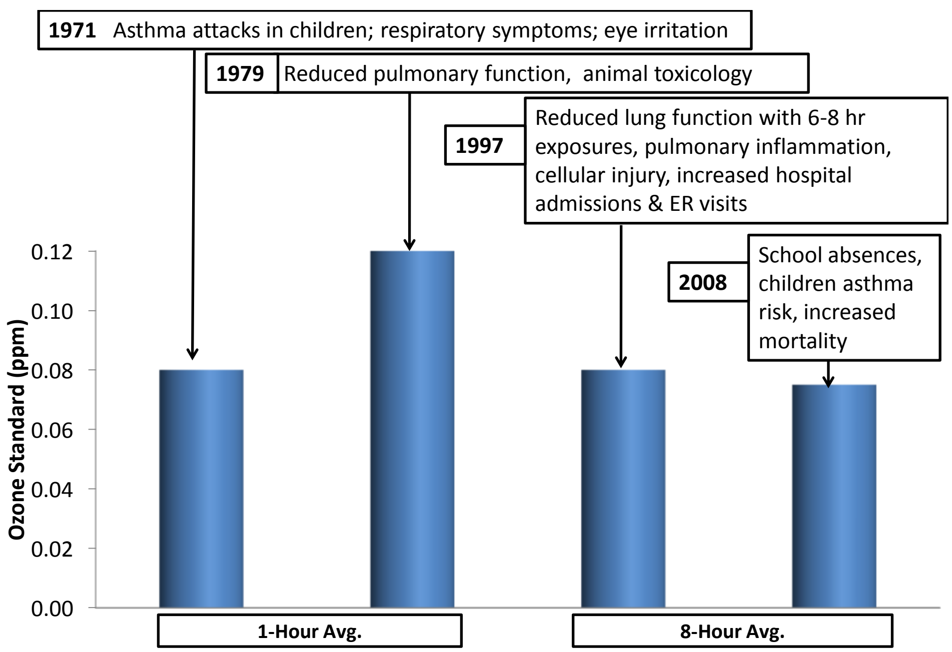
Key Toxic Air Contaminants in the SCAB

MOBILE SOURCES	STATIONARY SOURCES
Acetaldehyde	Hexavalent Chromium
Benzene	Methylene Chloride
1,3 Butadiene	Nickel
Diesel Particulate Matter	Perchloroethylene
Formaldehyde	Trichloroethylene

CONCLUSION

A large body of scientific evidence shows that the adverse impacts of air pollution in human and animal health are clear. A considerable number of population-based and laboratory studies have established a link between air pollution and increased morbidity and, in some instances, earlier mortality.

As the scientific methods for the study of air pollution health effects have progressed over the past decades, adverse effects have been shown to occur at lower levels of exposure. For some pollutants, no clear thresholds for effects have been demonstrated. The new findings have, in turn, led to the revision and lowering of National Ambient Air Quality Standards which, in the judgment of the Administrator of the U.S. EPA, are necessary to protect public health. Figures I-8 and I-9 are meant to convey some of the historical context to recent revisions to the NAAQS for ozone and for particulate matter.



Evolution of National Ozone Standards follows research generated knowledge

FIGURE I - 8

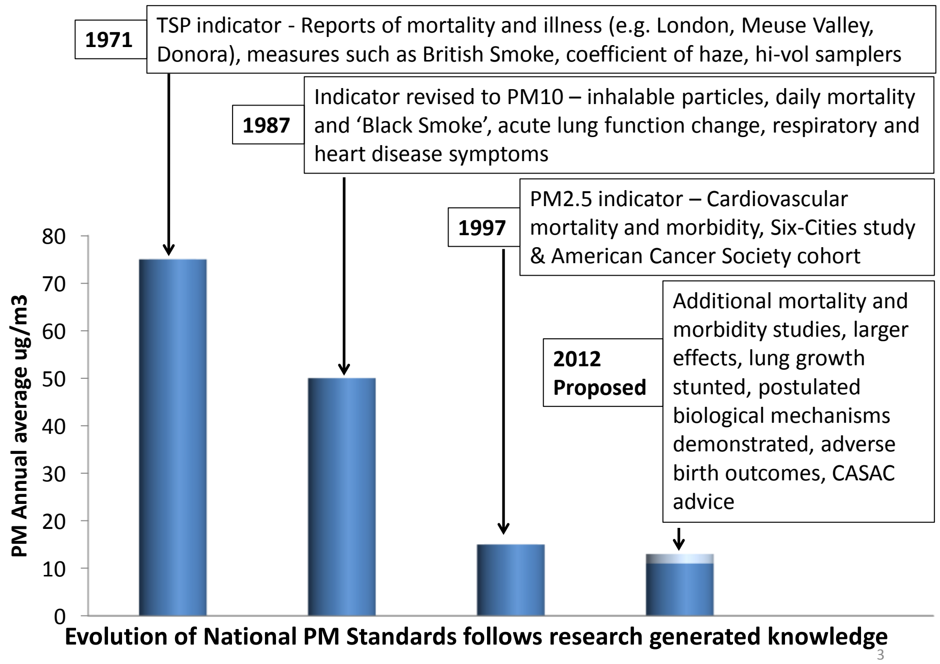

1971
TSP indicator - Reports of mortality and illness (e.g. London, Meuse Valley, Donora), measures such as British Smoke, coefficient of haze, hi-vol samplers
1987
Indicator revised to PM10 – inhalable particles, daily mortality and 'Black Smoke', acute lung function change, respiratory and heart disease symptoms
1997
PM2.5 indicator – Cardiovascular mortality and morbidity, Six-Cities study & American Cancer Society cohort
2012
Proposed
Additional mortality and morbidity studies, larger effects, lung growth stunted, postulated biological mechanisms demonstrated, adverse birth outcomes, CASAC advice
PM Annual average ug/m3
80
70
60
50
40
30
20
10
0
Evolution of National PM Standards follows research generated knowledge
3

FIGURE I - 9

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ATTACHMENT 1

ROSTER OF THE 2012 AQMP ADVISORY COUNCIL

South Coast AQMD Advisory Council
2012

NAME	**AFFILIATION**
Greg Adams	Los Angeles County Sanitation Districts
Todd Campbell	Clean Energy Fuels
David Czamanske	Sierra Club of Pasadena
Afif El-Hasan	American Lung Association
John Froines	UCLA School of Public Health
Ed Laird	Laird Coatings Corp
William LaMarr	Small Business Alliance
Julia Lester	ENVIRON
Rita Loof	RadTech
Robert McConnell	USC
J. Wayne Miller	CE-CERT Bourns College of Engineering
Emily Nelson	Consultant
Gary Polakovic	Make Over Earth
Walter Siembab	South Bay COG; Siembab Planning Associates
Sam Soret	Loma Linda University, School of Public Health
Mike Wang	WSPA

ATTACHMENT 2
CARB AND OEHHA COMMENTS

Appendix I-Health Effects was submitted to the following individuals for review and comment:

Linda Smith, Ph.D.
Chief, Health Exposure Assessment Branch
California Environmental Protection Agency
California Air Resources Board (CARB)

Melanie Marty, Ph.D.
Assistant Deputy Director
Scientific Affairs Division
Office of Environmental Health Hazard Assessment (OEHHA)

Copies of their comments follow.

CARB Comments on 2012 Appendix I-Health Effects

From: Smith, Linda@ARB [mailto:lsmith@arb.ca.gov]
Sent: Wednesday, September 26, 2012 1:40 PM
To: Jean Ospital
Cc: Herner, Jorn@ARB
Subject: RE: AQMD Advisory Council Update and Meeting on October 11, 2012

Jean,

Thank you for the opportunity to review and comment on Appendix I of the SC AQMP. Overall, it is a well-written document on the health effects of exposure to the major air pollutants, summarizing the most important literature in the field. Our comments, which are embedded in the document (attached), are brief. There are a few suggestions for improving clarity, and we noted a few minor errors in fact that should be corrected.

Please contact me if you have any questions, and thanks, again. I hope this email finds you well.

Regards,
Linda

* Linda Tombras Smith, Ph.D.
Chief, Health and Exposure Assessment Branch California Environmental Protection Agency Air Resources Board lsmith@arb.ca.gov
* *

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy cost, see our web site at http://www.arb.ca.gov

-----Original Message-----
From: Jean Ospital [mailto:JOspital@aqmd.gov]
Sent: Friday, September 21, 2012 8:34 AM
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Cc: Marty, Melanie@OEHHA; Smith, Linda@ARB; Elaine Chang; Philip Fine; Barbara Baird; William Wong; Marilyn Traynor; Christina Batteate
Subject: AQMD Advisory Council Update and Meeting on October 11, 2012

To: 2012 AQMD Advisory Council
RE: Update on Draft Appendix I Review

Greetings to all.

At the July 11, 2012 meeting of the Advisory Council the group requested that another meeting be held to review Appendix I and any revisions that might be made. We have scheduled a meeting of the Advisory Council for October 11, 2012. Details are below.

2012 AQMP Advisory Council meeting
October 11, 2012
10 am - noon
Room CC8
AQMD Offices
21865 Copley Drive,
Diamond Bar, CA

An interim updated draft has been posted to the AQMD website at http://www.aqmd.gov/aqmp/2012aqmp/RevisedDraft/AppI.pdf. Additions to the initial draft were made based on suggestions from the advisory group, and include a brief summary of lead health effects, an expansion of the conclusion section to reflect how health studies support revisions to the National Ambient Air Quality Standards, information on EPA's proposed revisions to the PM2.5 NAAQS, and the recent finding from the International Agency for Research on Cancer regarding the carcinogenicity of diesel exhaust.

We have also received one public comment to the AQMP that is relevant to the draft Appendix I, which I attach for your information. A member of the public also distributed a handout at a meeting of the AQMP Advisory Group relevant to the draft Appendix I, and the handout is also attached for your information. Prior to the October 11 meeting, we will be providing you another interim draft version of Appendix I, which will be prepared in conjunction with CARB. Additionally, we expect to have additional outside reviews of the draft Appendix by the end of this month. We will attach any additional comments relative to the draft Appendix as we receive them so that they will also be available to you prior to the October 11 meeting.
If any of you have additional comment on the draft Appendix I, please forward to me by the end of this month (Sept 30, 2012) if possible, but at the latest prior to the next meeting of the Advisory Council on October 11, 2012.

Revisions to the current draft made as a result of comments received by the end of September will be sent to you prior to the October 11 Advisory Council meeting for your review. Additionally, the revised draft will have all comments received as attachments.

Additional information regarding the Draft 2012 AQMP is available at http://www.aqmd.gov/aqmp/2012aqmp/index.htm.

Lastly, a reminder that the Advisory Council is subject to the California open meetings regulations. Please do not copy other Advisory Council members regarding any comments or correspondence. There will be opportunity for discussion at the meeting on October 11.

Thanks.

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REVIEW DRAFT
APPENDIX I

HEALTH EFFECTS

SEPTEMBER 2012

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Roster of the 2012 AQMP Advisory Council

ATTACHMENT 2
Comments received from Advisory Council review

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INTRODUCTION

This document presents a summary of scientific findings on the health effects of ambient air pollutants. The California Health and Safety Code Section 40471(b) requires that the South Coast Air Quality Management District prepare a report on the health impacts of particulate matter in the South Coast Air Basin (SCAB) in conjunction with the preparation of the Air Quality Management Plan revisions. This document, which was prepared to satisfy that requirement, also includes the effects of the other major pollutants.

HEALTH EFFECTS OF AIR POLLUTION

Ambient air pollution is a major public health concern. Excess deaths and increases in illnesses associated with high air pollution levels have been documented in several episodes as early as 1930 in Meuse Valley, Belgium; 1948 in Donora, Pennsylvania; and 1952 in London. Although levels of pollutants that occurred during these acute episodes are now unlikely in the United States, ambient air pollution continues to be linked to increases in illness (morbidity) and increases in death rates (mortality).

The adverse health effects associated with air pollution are diverse and include:

- Increased mortality
- Increased health care utilization (hospitalization, physician and emergency room visits)
- Increased respiratory illness (symptoms, infections, and asthma exacerbation)
- Decreased lung function (breathing capacity)
- Lung inflammation
- Potential immunological changes
- Increased airway reactivity to a known chemical exposure - a method used in laboratories to evaluate the tendency of airways to have an increased possibility of developing an asthmatic response
- A decreased tolerance for exercise.

The evidence linking these effects to air pollutants is derived from population-based observational and field studies (epidemiological) as well as controlled laboratory studies involving human subjects and animals. There have been an increasing number of studies focusing on the mechanisms (that is, on learning how specific organs, cell types, and biochemicals are involved in the human body's response to air pollution) and specific pollutants responsible for individual effects. Yet the underlying biological pathways for these effects are not always clearly understood.

Although individuals inhale pollutants as a mixture under ambient conditions, the regulatory framework and the control measures developed are mostly pollutant-specific. This is appropriate, in that different pollutants usually differ in their sources, their times and places of occurrence, the kinds of health effects they may cause, and their overall levels of health risk. Different pollutants, from the same or different sources, may sometimes act together to harm health more than they would acting separately. Nevertheless, as a practical matter, health scientists, as well as regulatory officials, usually must deal with one pollutant at a time in determining health effects and in adopting air quality standards. To meet the air quality standards, comprehensive plans are developed such as the Air Quality Management Plan (AQMP), and to minimize toxic exposure a local air toxics control plan is also prepared. These plans examine multiple pollutants, cumulative impacts, and transport issues related to attaining healthful air quality. A brief overview of the effects observed and attributed to various air pollutants is presented in this document.

This summary is drawn substantially from reviews presented previously (SCAQMD, 1996, 2003, 2007), and from reviews on the effects of air pollution by the American Thoracic Society (ATS, 1996), the U.S. EPA reviews for ozone (U.S. EPA, 2006), Carbon Monoxide (U.S. EPA, 2010), and Particulate Matter (U.S. EPA, 2004, 2009), from a published review of the health effects of air pollution (Brunekreef and Holgate, 2002), and from reviews prepared by the California EPA Office of the Environmental Health Hazard Assessment for Particulate Matter (Cal EPA, 2002) and for Ozone (Cal EPA, 2005). Additional materials are from EPA's current review of the ozone standard and health effects (EPA, 2011). More detailed citations and discussions on air pollution health effects can be found in these references.[1]

[1] Most of the studies referred to in this appendix are cited in the above sources. Only more recent specific references will be cited in this summary.

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:17:07 AM
Please give citations to substantiate the statement.

Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:19:03 AM
The author is referring to ARB's reviews of the state ambient air quality standards. The correct citation is ARB, 2002 and ARB, 2005.

OZONE

Ozone is a highly reactive compound, and is a strong oxidizing agent. When ozone comes into contact with the respiratory tract, it can react with tissues and cause damage in the airways. Since it is a gas, it can penetrate into the gas exchange region of the deep lung.

The EPA primary standard for ozone, adopted in 2008, is 0.075 ppm averaged over eight hours. The California Air Resources Board (CARB) has established standards of 0.09 ppm averaged over one hour and at 0.070 ppm averaged over eight hours.

The major subgroups of the population considered to be at increased risk from ozone exposure are outdoor exercising individuals, including children, and people with preexisting respiratory disease(s) such as asthma. The data base identifying the former group as being at increased risk to ozone exposure is much stronger and more quantitative than that for the latter group, probably because of a larger number of studies conducted with healthy individuals. The adverse effects reported with short-term ozone exposure are greater with increased activity because activity increases the breathing rate and the volume of air reaching the lungs, resulting in an increased amount of ozone reaching the lungs. Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher ventilation rate than adults.

A number of adverse health effects associated with ambient ozone levels have been identified from laboratory and epidemiological studies (EPA, 1996; 2006, 2011; ATS, 1996). These include increased respiratory symptoms, damage to cells of the respiratory tract, decrease in lung function, increased susceptibility to respiratory infection, and increased risk of hospitalization.

Increases in ozone levels are associated with elevated absences from school. The Children's Health Study, conducted by researchers at the University of Southern California, followed a cohort of children that live in 12 communities in Southern California with differing levels of air pollution for several years. A publication from this study reported that school absences in fourth graders for respiratory illnesses were associated with ambient ozone levels. An increase of 20 ppb ozone was associated with an 83% increase in illness-related absence rates (Gilliland, 2001).

The number of hospital admissions and emergency room visits for all respiratory causes (infections, respiratory failure, chronic bronchitis, etc.) including asthma

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shows a consistent increase as ambient ozone levels increase in a community. These excess hospital admissions and emergency room visits are observed when hourly ozone concentrations are as low as 0.06 to 0.10 ppm.

Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).

Multicity studies of short-term ozone exposures (days) and mortality have also examined regional differences. Evidence was provided that there were generally higher ozone-mortality risk estimates in northeastern U.S. cities, with the southwest and urban mid-west cities showing lower or no associations (Smith, 2009; Bell, 2008). Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality, but not cardiovascular-related causes, when PM2.5 exposure were also included in the analysis.

Several population-based studies suggest that asthmatics are more adversely affected by ambient ozone levels, as evidenced by increased hospitalizations and emergency room visits. Laboratory studies have attempted to compare the degree of lung function change seen in age and gender-matched healthy individuals versus asthmatics and those with chronic obstructive pulmonary disease. While the degree of change evidenced did not differ significantly, that finding may not accurately reflect the true impact of exposure on these respiration-compromised individuals. Since the respiration-compromised group may have lower lung function to begin with, the same degree of change may represent a substantially greater adverse effect overall.

Another publication from the Children's Health Study focused on children and outdoor exercise. In communities with high ozone concentrations, the relative risk of developing asthma in children playing three or more sports was found to be over three times higher than in children playing no sports (McConnell, 2002). These findings indicate that new cases of asthma in children are associated with heavy exercise in communities with high levels of ozone. While it has long been known that air pollution can exacerbate symptoms in individuals with respiratory disease, this is among the first studies that indicate ozone exposure may be causally linked to asthma onset.

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Author: Administrator Subject: Sticky Note Date: 9/14/2012 1:58:20 PM
This is a rather strong conclusion given that there is only one study that supports the statement.

In addition, human and animal studies involving both short-term (few hours) and long-term (months to years) exposures indicate a wide range of effects induced or associated with ambient ozone exposure. These are summarized in Table I-1.

TABLE I-1

Adverse Health Effects of Ozone (O3) - Summary of Key Studies

0_3 CONCENTRATION AND EXPOSURE HR., PPM	HEALTH EFFECT
Ambient air containing 0.10 - 0.15 daily 1-h max over days to weeks; ≥ 0.05 (8 hour average)	Decreased breathing capacity, in children, adolescents, and adults exposed to 0_3 outdoors Exacerbation of respiratory symptoms (e.g., cough, chest pain) in individuals with preexisting disease (e.g., asthma) with low ambient exposure, decreased temperature, and other environmental factors resulting in increased summertime hospital admissions and emergency department visits for respiratory causes
≥0.12 (1-3h) ≥0.06 (6.6h) (chamber exposures)	Decrements in lung function (reduced ability to take a deep breath), increased respiratory symptoms (cough, shortness of breath, pain upon deep inspiration), increased airway responsiveness and increased airway inflammation in exercising adults Effects are similar in individuals with preexisting disease except for a greater increase in airway responsiveness for asthmatic and allergic subjects Older subjects (>50 yrs old) have smaller and less reproducible changes in lung function Attenuation of response with repeated exposure
≥0.12 with prolonged, repeated exposure (chamber exposures)	Changes in lung structure, function, elasticity, and biochemistry in laboratory animals that are indicative of airway irritation and inflammation with possible development of chronic lung disease Increased susceptibility to bacterial respiratory infections in laboratory animals

From: SCAQMD, 1996; EPA, 2007

Some lung function responses (volume and airway resistance changes) observed after a single exposure to ozone exhibit attenuation or a reduction in magnitude with repeated exposures. Although it has been argued that the observed shift in response is evidence of a probable adaptation phenomenon, it appears that while functional changes may exhibit adaptation, biochemical and cellular changes which may be

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:19:55 AM

We are not aware of any studies that report reduced pulmonary function and symptoms in people exposed to 0.05 ppm ozone. Only a small percentage of studied subjects show these effects with exposure to 0.06 ppm (5% of fewer of the total number studied to date).

Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:20:39 AM

Respiratory symptoms have also been noted in healthy children and younger adults with this sort of exposure, although not in healthy older adults.

Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:20:23 AM

This is an incorrect usage of the work "adaptation". Adaptation implies a permanently altered biological process, which is not the case with ozone. The correct term here is "attenuation" because the altered biological response only persists so long as regular ozone exposures continue.

associated with episodic and chronic exposure effects may not exhibit similar adaptation. That is, internal damage to the respiratory system may continue with repeated ozone exposures, even if externally observable effects (chest symptoms and reduced lung function) disappear.

In a laboratory, exposure of human subjects to low levels of ozone causes reversible decrease in lung function as assessed by various measures such as respiratory volumes, airway resistance and reactivity, irritative cough and chest discomfort. Lung function changes have been observed with ozone exposure as low as 0.06 to 0.12 ppm for 6-8 hours under moderate exercising conditions. Similar lung volume changes have also been observed in adults and children under ambient exposure conditions (0.10 - 0.15 ppm). The responses reported are indicative of decreased breathing capacity and are reversible.

The results of several studies where human volunteers were exposed to ozone for 6.6 hours at levels between 0.04 and 0.12 ppm were recently summarized (Brown, 2008). As shown in the figure below, there is an increasing response on lung function with increasing exposure levels in moderately exercising subjects.

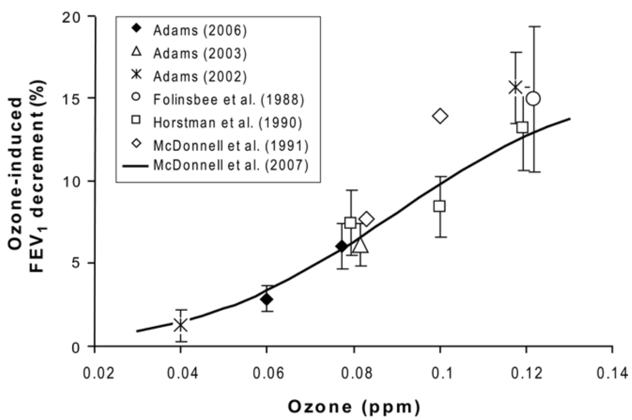

FIGURE I-1

Comparison of mean ozone-induced decrements in lung function following 6.6 hours of ozone exposure (from Brown, 2008)

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:20:49 AM

Please specify average time.

In addition to controlled laboratory conditions, studies of individuals exercising outdoors, including children attending summer camp, have shown associations of reduced lung function with ozone exposure. There were wide ranges in responses among individuals.

Results of epidemiology studies support the relationship between ozone exposure and respiratory effects. Several, but not all, studies have found associations of short-term ozone levels and hospital admissions and emergency department admissions for respiratory-related conditions (EPA, 2011).

In laboratory studies, cellular and biochemical changes associated with respiratory tract inflammation have also been consistently reported in the airway lining after low level exposure to ozone. These changes include an increase in specific cell types and in the concentration of biochemical mediators of inflammation and injury such as cytokines and fibronectin. Indications of lung injury and inflammatory changes have been observed in healthy adults exposed to ozone in the range of 0.06 to 0.10 ppm.

The susceptibility to ozone observed under ambient conditions could be due to the combination of pollutants that coexist in the atmosphere or ozone may actually sensitize these subgroups to the effects of other pollutants.

Some animal studies show results that indicate possible chronic effects including functional and structural changes of the lung. These changes indicate that repeated inflammation associated with ozone exposure over a lifetime may result in sufficient damage to respiratory tissue such that individuals later in life may experience a reduced quality of life in terms of respiratory function and activity level achievable. An autopsy study involving Los Angeles County residents provided supportive evidence of lung tissue damage (structural changes) attributable to air pollution.

A study of birth outcomes in southern California found an increased risk for birth defects in the aortic and pulmonary arteries associated with ozone exposure in the second month of pregnancy (Ritz et al., 2002). This is the first study linking ambient air pollutants to birth defects in humans. Studies conducted since mostly focusing on cardiac and oral cleft defects have found mixed results, with some showing associations, but others did not. Confirmation by further studies is needed.

In summary, adverse effects associated with ozone exposures have been well documented, although the specific causal mechanism is still somewhat unclear.

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:21:08 AM

Please specify the averaging time and whether or not the subjects were exercising, and if so, the ventilation rate. The total inhaled dose is the important factor, not just the ambient concentration.

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It may be instructive to provide the overall EPA staff preliminary conclusions on the causality on ozone health effects for the health outcomes evaluated (EPA, 2011). These are provided in the two tables below.

TABLE I-2

Summary of Causal Determinations for Short-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Effects on Liver and Xenobiotic Metabolism	Inadequate to infer a causal relationship
Effects on Cutaneous and Ocular Tissues	Inadequate to infer a causal relationship
Mortality	Likely to be a causal relationship

From EPA, 2011

TABLE I-3

Summary of Causal Determinations for Long-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Likely to be a causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Reproductive and Developmental Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Carcinogenicity and Genotoxicity	Inadequate to infer a causal relationship
Mortality	Suggestive of a causal relationship

From EPA, 2011

PARTICULATE MATTER

Airborne particulates are a complex group of pollutants that vary in source, size and composition, depending on location and time. The components include nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and material from the earth's crust. Substances of biological origin, such as pollen and spores, may also be present.

Until several years ago, the health effects of particulates were focused on those sized 10 µm (micrometers) aerodynamic diameter and smaller. These can be inhaled through the upper airways and deposited in the lower airways and gas exchange tissues in the lung. These particles are referred to as PM10. EPA initially promulgated ambient air quality standards for PM10 of 150 $\mu g/m^3$ averaged over a 24-hour period, and 50 $\mu g/m^3$ for an annual average. EPA has since rescinded the annual PM10 standard, but kept the 24-hour standard.

In recent years additional focus has been placed on particles having an aerodynamic diameter of 2.5 µm or less (PM2.5). A greater faction of particles in this size range can penetrate and deposit deep in the lungs. The EPA recently lowered the air quality standards for PM2.5 to 35 $\mu g/m^3$ for a 24-hour average and reaffirmed 15 $\mu g/m^3$ for an annual average standard. There was considerable controversy and debate surrounding the review of particulate matter health effects and the consideration of ambient air quality standards (Kaiser, 1997; Vedal, 1997) when the EPA promulgated the initial PM2.5 standards in 1997.

Since that time, numerous studies have been published, and some of the key studies were closely scrutinized and analyses repeated. The result is that there are now substantial data confirming the adverse health effects of PM2.5 exposures.

There are also differences in the composition and sources of particles in the different size ranges that may have implications for health effects. The particles larger than 2.5 µm (often referred to as the coarse fraction) are mostly produced by mechanical processes. These include automobile tire wear, industrial processes such as cutting and grinding, and resuspension of particles from the ground or road surfaces by wind and human activities.

In contrast, particles smaller than 2.5 µm are mostly derived from combustion sources, such as automobiles, trucks, and other vehicle exhaust, as well as from stationary combustion sources. The particles are either directly emitted or are formed

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Author: pwong Subject: Sticky Note Date: 9/26/2012 10:21:25 AM
While the California PM standards values are mentioned in table I-4, there is no discussion or mention in the text unlike ozone.

Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:18:05 AM
You might mention that a new annual average PM2.5 standard is expected by the end of the year. US EPA is considering a range of 12-13 ug/m3.

in the atmosphere from gases that are emitted. Components from material in the earth's crust, such as dust, are also present, with the amount varying in different locations.

Attention to another range of very small particles has been increasing over the last few years. These are generally referred to as "ultrafine" particles, with diameters of 0.1 µm or less. These particles are mainly from fresh emissions of combustion sources, but are also formed in the atmosphere from photochemical reactions. Ultrafine particles have relatively short half lives (minutes to hours) and rapidly grow through condensation and coagulation process into larger particles within the PM2.5 size range. These particles are garnering interest since laboratory studies indicate that their toxicity may be higher on a mass basis than larger particles, and there is evidence that these small particles can translocate from the lung to the blood and to other organs of the body.

There have been several reviews of the health effects of ambient particulate matter (ATS, 1996; Brunekreef, 2002; U.S. EPA, 2004; U.S. EPA, 2009). In addition, the California Air Resources Board (CARB) and the Office of Environmental Health and Hazard Assessment (OEHHA) have reviewed the adequacy of the California Air Quality Standards for Particulate Matter (Cal EPA, 2002).

The major types of effects associated with particulate matter include:

- Increased mortality
- Exacerbation of respiratory disease and of cardiovascular disease as evidenced by increases in:

  -Respiratory symptoms

  -Hospital admissions and emergency room visits

  -Physician office visits

  -School absences

  -Work loss days

- Effects on lung function
- Changes in lung morphology

The current federal and California standards are listed below:

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:21:48 AM

We don't think that the work loss days paper specifies the reason for work loss in terms of exacerbated chronic disease. This should be verified with the Ostro paper.

TABLE I-4

Ambient Air Quality Standards for Particulate Matter

STANDARD	FEDERAL	CALIFORNIA
PM10 24-Hour average	150 μg/m^3	50 μg/m^3
PM10 Annual Average	--	20 μg/m^3
PM 2.5 24-Hour Average	35 μg/m^3	--
PM 2.5 Annual Average	15 μg/m^3	12 μg/m^3

Short-Term Exposure Effects

Epidemiological studies have provided evidence for most of the effects listed above. An association between increased daily or several-day-average concentrations of PM10 and excess mortality and morbidity is consistently reported from studies involving communities across the U.S. as well as in Europe, Asia, and South America. A review and analysis of epidemiological literature for acute adverse effects of particulate matter was published by the American Thoracic Society in 1996. Several adverse effects were listed as associated with daily PM10 exposures, as listed in Table I-5.undertaken by Dockery and Pope to estimate these effects as percent increase in mortality associated with each incremental increase of PM10 by 10 μg/m^3. The estimates are presented in Table I-5. It also appears that individuals who are elderly or have preexistent lung or heart disease are more susceptible than others to the adverse effects of PM10 (ATS, 1996). Since then mMany more recent studies have confirmed that excess mortality and morbidity are associated with short term particulate matter levels (Pope, 2006).

Estimates of mortality effects from these studies of PM10 exposures range from 0.3 to 1.7% increase for a 10 μg/m^3 increase in PM10 levels. The National Morbidity, Mortality, and Air Pollution Study (NMMAPS), a study of 20 of the largest U.S. cities, determined a combined risk estimate of about a 0.5% increase in total mortality for a 10 μg/m^3 increase in PM10 (Samet, 2000a). This study also analyzed the effects of gaseous co-pollutants. The results indicated that the association of PM10 and mortality were not confounded by the presence of the gaseous pollutants. When the gaseous pollutants were included in the analyses, the significance of the PM10 estimates remained. The PM10 effects were reduced somewhat when O_3 was also considered and tended to be variably decreased when NO_2, CO, and SO_2 were

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:22:38 AM

The author should cite the reanalysis of the original NMMAPS studies that were sponsored by HEI. The statistical package used for the original analyses was found to not converge correctly. This led to incorrect RR and standard errors. The corrected papers are from 2003, and all reanalyzed papers that were affected by this statistical problem are in a volume published by HEI, and available on their website. In the case of NMMAPS, the RR dropped to about 0.25% with a 10 ug/m3 change in PM10.

added to the analysis. These results argue that the effects are likely due to the particulate exposures; they cannot readily be explained by coexisting weather stresses or other pollutants.

An expansion of the NMMAPS study to 90 U.S. Cities also reported association with PM10 levels and mortality (Samet 2000b). It was discovered that this study was one that used a flawed statistical software package. The investigators have reanalyzed the data using corrected settings for the software (Dominici, 2002a, Dominici 2002b). When the estimates for the 90 cities in the study were recalculated, the estimate changed from 0.41% increase in mortality for a 10 µg/m^3 increase in PM10 to a 0.27% increase. There remained a strong positive association between acute exposure to PM10 and mortality. Thus while the quantitative estimate was reduced, the major findings of the study did not change.

TABLE I-5

Combined Effect Estimates of Daily Mean Particulate Pollution (PM10)

	% CHANGE IN HEALTH INDICATOR PER EACH 10 µg/m^3 INCREASE IN PM10
Increase in Daily Mortality	
Total deaths	1.0
Respiratory deaths	3.4
Cardiovascular deaths	1.4
Increase in Hospital Usage (all respiratory diagnoses)	
Admissions	1.4
Emergency department visits	0.9
Exacerbation of Asthma	
Asthmatic attacks	3.0
Bronchodilator use	12.2
Emergency department visits*	3.4
Hospital admissions	1.9
Increase in Respiratory Symptom Reports	
Lower respiratory	3.0
Upper respiratory	0.7

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:22:44 AM
As stated in the a previous comment, please use the reanalysis from 2003.

Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:22:51 AM
The reference for this table is from 1996. A summary of more recent data would be helpful. EPA thoroughly evaluated the PM literature as part of the NAAQS review. On page 2-18 of the Integrated Science Assessment there is a summary of recent PM coarse literature. The ISA can be found at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546#Download

TABLE I-5 (concluded)

Combined Effect Estimates of Daily Mean Particulate Pollution

	% CHANGE IN HEALTH INDICATOR PER EACH 10 μg/m^3 INCREASE IN PM10
Cough	2.5
Decrease in Lung Function	
Forced expiratory volume	0.15
Peak expiratory flow	0.08

* One study only

(Source: American Journal of Respiratory and Critical Care Medicine, Vol. 153, 113-50, 1996)

Studies of PM2.5 also find associations with elevated mortality. The estimates for PM2.5 generally are in the range of 2.0 to 8.5% increase in total deaths per 25 μg/m^3 increase in 24-hour PM2.5 levels. The estimates for cardiovascular related mortality range from 3.0 to 7.0% per 25 μg/m^3 24-hour PM2.5, and for respiratory mortality estimates range from 2.0 to 7.0% per 25 μg/m^3 24-hour PM2.5.

Several studies have attempted to assess the relative importance of particles smaller than 2.5 μm and those between 2.5 μm and 10 μm (PM10-2.5). While some studies report that PM2.5 levels are better predictors of mortality effects, others suggest that PM10-2.5 is also important. Most of the studies found higher mortality associated with PM2.5 levels than with PM10-2.5. For example, a study of six cities in the U.S. found that particulate matter less than 2.5 μm was associated with increased mortality, but that the larger particles were not. Other studies in Mexico City and Santiago, Chile reported that PM10-2.5 was as important as PM2.5. Overall effects estimates for PM10-2.5 fall in the range of 0.5 to 6.0 % excess mortality per 25 μg/m^3 24-hour average.

The relative importance of both PM2.5 and PM10-2.5 may vary in different regions depending on the relative concentrations and components, which can also vary by season. More research is needed to better assess the relative effects of fine (PM2.5) and coarse (PM10-2.5) fractions of particulate matter on mortality.

A number of studies have evaluated the association between particulate matter exposure and indices of morbidity such as hospital admissions, emergency room

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Author: Administrator Subject: Sticky Note Date: 9/26/2012 10:23:11 AM

Please verify that 25 ug/m3 is correct. Most papers use 10 ug/m3.

visits or physician office visits for respiratory and cardiovascular diseases. The effects estimates are generally higher than the effects for mortality. The effects are associated with measures of PM10 and PM2.5. Effects are also associated with PM10-2.5. Thus, it appears that when a relatively small number of people experience severe effects, larger numbers experience milder effects, which may relate either to the coarse or to the fine fraction of airborne particulate matter.

In the NMMAPS study, hospital admissions for those 65 years or older were assessed in 14 cities. Hospital admissions for these individuals showed an increase of 6% for cardiovascular diseases and a 10% increase for respiratory disease admissions, per 50 μg/m^3 increase in PM10. The excess risk for cardiovascular disease ranges from 3-10% per 50 μg/m^3 PM10 and from 4-10% per 25 μg/m^3 PM2.5 or PM10-2.5.

Similarly, school absences, lost workdays and restricted activity days have also been used in some studies as indirect indicators of acute respiratory conditions. The results are suggestive of both immediate and delayed impact on these parameters following elevated particulate matter exposures. These observations are consistent with the hypothesis that increased susceptibility to infection follows particulate matter exposures.

Some studies have reported that short-term particulate matter exposure is associated with changes in lung function (lung capacity and breathing volume); upper respiratory symptoms (hoarseness and sore throat); and lower respiratory symptoms (increased sputum, chest pain and wheeze). The severity of these effects is widely varied and is dependent on the population studied, such as adults or children with and without asthma. Sensitive individuals, such as those with asthma or pre-existing respiratory disease, may have increased or aggravated symptoms associated with short-term particulate matter exposures. Several studies have followed the number of medical visits associated with pollutant exposures. A range of increases from 3% to 42% for medical visits for respiratory illnesses was found corresponding to a 50 μg/m^3 change in PM10. A limited number of studies also looked at levels of PM2.5 or PM10-2.5. The findings suggest that both the fine and coarse fractions may have associations with some respiratory symptoms.

The biological mechanisms by which particulate matter can produce health effects are being investigated in laboratory studies. Inflammatory responses in the respiratory system in humans and animals exposed to concentrated ambient particles have been measured. These include effects such as increases in neutrophils in the lungs. Other changes reported include increased release of cytokines and interleukins,

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The PM increments seem wide. Please verify.

chemicals released as part of the inflammatory process. The effects of particulate matter may be mediated in part through the production of reactive oxygen species during the inflammatory process. Recent reviews discuss mechanistic studies in more detail (Brunekreef, 2002; Brook, 2004).

Long-Term Exposure Effects

While most studies have evaluated the acute effects, some studies specifically focused on evaluating the effects of chronic exposure to PM10 and PM2.5. Studies have analyzed the mortality of adults living in different U.S. cities. After adjusting for important risk factors, taken as a whole these studies found a positive association of deaths and exposure to particulate matter. A similar association was observable in both total number of deaths and deaths due to specific causes. The largest effects were observed from cardiovascular causes and ischemic heart disease. A shortening of lifespan was also reported in these studies.

Since the initial promulgation by EPA of the National Ambient Air Quality Standards for PM2.5, controversy has remained over the association of mortality and exposures to PM2.5. Thus an expanded discussion of these studies is presented below.

Significant associations for PM2.5 for both total mortality and cardiorespiratory mortality were reported in a study following a national cohort recruited by the American Cancer Society for a Cancer Preventions Study over several years. A re-analysis of the data from this study confirmed the initial finding (Krewski, 2000). In this study, mortality rates and PM2.5 levels were analyzed for 51 metropolitan areas of the U.S. Average levels from monitors in each area were used to estimate exposures. At these levels of aggregation, regional differences in the association of PM2.5 and mortality were noted, with higher associations in the Northeast, and lower or non-significant associations in the West.

The Harvard Six Cities Study evaluated several size ranges of particulate matter and reported significant associations with PM15, PM2.5, sulfates, and non-sulfate particles, but not with coarse particles (PM15 – PM2.5). An extension of the Harvard Six Cities Cohort confirmed the association of mortality with PM2.5 levels (Laden, 2006). These studies provide evidence that the fine particles, as measured by PM2.5, may be more strongly associated with mortality effects from long-term particulate matter exposures than are coarse compounds. An update to this study covering a follow-up over the years 1974 to 2009 (Lepeule, 2012) was recently published. Findings indicated a linear relationship of PM2.5 levels and mortality

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from all causes, cardiovascular causes, and from lung cancer. According to the authors, the PM2.5 levels decreased over time, but no evidence of a threshold for these effects was found.

A follow-up study of the American Cancer Society cohort confirmed and extended the findings in the initial study. The researchers estimated that, on average, a 10 ug/m3 increase in fine particulates was associated with approximately a 4% increase in total mortality, a 6% increase in cardiopulmonary mortality, and an 8% increase risk of lung cancer mortality (Pope, 2002). The magnitude of effects is larger in the long-term studies than in the short-term investigations. In an additional re analysis and extension of the American Cancer Society cohort from 1982 to 2000 (Krewski, 2009), and including additional metropolitan areas for the most recent years, effects estimates on mortality were similar, though somewhat higher, than those reported previously.

Other national studies include an analysis of mortality and PM2.5 exposures in a Medicare population. Zeger and Associates (2008) assembled a Medicare cohort by including all Medicare enrollees residing in zip codes with centroids within 6 miles of a PM2.5 monitor. PM2.5 data was obtained from the monitoring stations, and mean annual levels were called for the zip codes within six miles of each monitor. The estimated associations between exposures to PM2.5 and mortality for the eastern and central portions of the U.S were similar to those previously published in the Six Cities Study and the American Cancer Society cohorts. The authors reported that there were no significant associations between zip code levels of PM2.5 and mortality rates in the western region of the U.S. This lack of association was attributed largely to the higher PM2.5 levels in Los Angeles area counties compared to other western urban areas, but there were not higher mortality rates in these counties. The authors further reported that they found no associations of PM2.5 with mortality in persons aged 85 years or higher.

Analyses of mortality and PM2.5 levels specific to California have also been reported. A cohort of elderly individuals (average age of 65 yr in 1973) recruited from 11 California counties was followed over several years (Enstrom, 2005). An association for exposure with all cause deaths was reported from 1973–1982. However, no significant association was found in the later time period of 1983–2002. Pollutant levels were taken from ambient monitors and averaged over each county to estimate exposures.

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Two analyses of the American Cancer Society cohort focused specifically on the Los Angeles Metropolitan area using methods to estimate exposures on a finer geographical scale than previous studies that used geographic scales at the county or metropolitan area. Using data from monitoring stations in the Los Angeles area, one study applied interpolation methods (Jerrett, 2005) and another applied land use regression techniques (Krewski, 2009) to estimate exposures to the study individuals. Significant associations of PM2.5 with mortality from all causes and cardiopulmonary disease were reported, with the magnitude of risks being up to three times higher than those from the national studies of the American Cancer Society cohort. This provides evidence that using methods to provide more detailed exposure estimates can result in stronger associations of PM2.5 and mortality.

Two recent reports have been released looking at air pollution and health effects in California. One study (Lipsett, 2011) followed school teachers recruited in 1995, and followed through 2005. Pollutant exposures at the subject residence were estimated using data from ambient monitors, and extrapolated using a distance weighted method. The authors reported significant association of PM2.5 levels and mortality from ischemic heart disease, but no associations were found with all cause, cardiovascular, or respiratory disease.

The second study (Jerrett, 2011) followed individuals in ~~the Los Angeles area~~ California from the American Cancer Society cohort recruited starting in 1982, with follow up to 2000. Pollutant levels at subject residences were estimated using several methods. All but one of the methods found no association of all-cause mortality with PM2.5 levels. All exposure estimation methods were reported to have found significant associations with ischemic heart disease mortality, however. The authors noted that mortality rates differ in urban areas compared to non-urban areas, and so included a variable for this in a land use regression model to estimate effects on mortality. When the authors applied the land use regression model including an urban indicator to estimate exposures, all-cause mortality, mortality from cardiovascular disease, and mortality from ischemic heart disease were all significantly associated with PM2.5 levels.

The U.S. EPA has recently proposed to lower the annual National Ambient Air Quality Standard for PM2.5 (U.S. EPA, 2012a). EPA also released a Regulatory Impact Analysis (U.S. EPA 2012b)which looked at the costs and benefits of alternate PM2.5 stand levels. As part of the analysis, EPA also looked at California specific studies regarding PM2.5 and mortality published in the scientific literature. The EPA

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When comparing the relative risks from the LA and national studies, we recommend that both the national and the LA studies be adjusted to account for ozone exposure. Adjustment for ozone reduced the RR from three to about 1.5 times the national studies, which still suggest that the RR is greater in LA.

analysis concluded "most of the cohort studies conducted in California report central effect estimates similar to the (nation-wide) all-cause mortality risk estimate we applied from Krewski et al. (2009) and Laden et al. (2006) albeit with wider confidence intervals. A couple cohort studies conducted in California indicate higher risks than the risk estimates we applied." Thus in EPAs judgment the California related studies provided estimates of mortality consistent with or higher than those from the national studies.

Other studies report evidence indicating that particulate matter exposure early in pregnancy may be associated with lowered birth weights (Bobak, 1999). Studies from the U.S., the Czech Republic and Mexico City have reported that neonatal and early postnatal exposure to particulate matter may lead to increased infant mortality. A more recent study in Southern California found increased risks for infant deaths associated with exposures to particulates and other pollutants (Ritz, 2006). These results suggest that infants may be a subgroup affected by particulate matter exposures.

In addition, some long-term effect studies have reported an increased risk of mortality from lung cancer associated with particulate matter exposures. A study involving California Seventh Day Adventists (very few of whom smoke) has reported an association of lung cancer mortality with PM10 levels. It is not clear from these studies whether the association relates to causation of disease, or whether individuals with cancer are more susceptible to other effects of particles leading to the observed mortality association. A study that followed a large number of individuals living in the largest U.S. cities found elevated lung cancer risk associated with long-term average PM2.5 levels (Pope, 2002).

Several studies have assessed the effects of long-term particulate matter exposure on respiratory symptoms and lung function changes. Associations have been found with symptoms of chronic bronchitis and decreased lung function. A study of school children in 12 communities in Southern California showed significant association of particulate matter with bronchitis or phlegm in children with asthma. These effects were also associated with NO_2 and acid vapor levels.

A cohort of fourth graders from the Southern California communities was followed over a period of four years by the Children's Health Study. A lower rate of growth in lung function was found in children living in areas with higher levels of particulate pollution (Gauderman, 2000). Decreases in lung function growth were associated with PM10, PM2.5, PM10-2.5, acid vapor, and NO_2. There was no association with

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ozone levels. The investigators were not able to identify independent effects of the pollutants, but noted that motor vehicle emissions are a major source of the pollutants.

A follow-up study on a second cohort of children confirmed the findings that decreased lung function growth was associated with particulates, nitric oxides, and elemental carbon levels (Gauderman, 2002). Elemental carbon is often used as a measure for diesel particulate. Additionally, children who moved to areas with less air pollution were found to regain some of the lung function growth rate (Avol, 2001). By the time the fourth graders graduated from high school, a significant number showed lower lung function. The risk of lower lung function was about five times higher in children with the highest PM2.5 exposure when compared to the lowest exposure communities (Gauderman, 2004). These deficits are likely to persist since the children were at the end of their growth period.

Despite data gaps, the extensive body of epidemiological studies has both qualitative and quantitative consistency suggestive of causality. A considerable body of evidence from these studies suggests that ambient particulate matter, alone or in combination with other coexisting pollutants, is associated with significant increases in mortality and morbidity in a community.

In summary, the scientific literature indicates that an increased risk of mortality and morbidity is associated with particulate matter at ambient levels. The evidence for particulate matter effects is mostly derived from population studies with supportive evidence from clinical and animal studies. Although most of the effects are attributable to particulate matter, co-pollutant effects cannot be ruled out on the basis of existing studies. The difficulty of separating the effects may be due to the fact that particulate levels co-vary with other combustion source pollutants. That is, the particle measurements serve as an index of overall exposure to combustion-related pollution, and some component(s) of combustion pollution other than particles might be at least partly responsible for the observed health effects.

EPA staff has presented conclusions on causal determination of several health effects based on a recent review of the available scientific studies (EPA, 2009). These are depicted in the Table below.

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TABLE I-6

Summary of Causal Determination of PM2.5 by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Central nervous system	Inadequate information to assess
Mortality	Causal
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Mortality	Causal
Reproductive and developmental	Suggestive of a causal relationship
Cancer, Mutagenicity, Genotoxicity	Suggestive of a causal relationship

From EPA, 2009

ULTRAFINE PARTICLES

As noted above, numerous studies have found association of particulate matter levels with adverse effects, including mortality, hospital admissions, and respiratory disease symptoms. The vast majority of these studies used particle mass of PM10 or PM2.5 as the measure of exposure. Some researchers have postulated, however, that ultrafine particles may be responsible for some of the observed associations of particulate matter and health outcomes (Oberdorster, et al, 1995; Seaton, et al, 1995). Ultrafine particles are generally classified of 0.1 μm and small diameter.

Several potential mechanisms have been brought forward to suggest that the ultrafine portion may be important in determining the toxicity of ambient particulates, some of which are discussed below.

For a given mass concentration, ultrafine particles have much higher numbers and surface area compared to larger particles. Particles can act as carriers for other adsorbed agents, such as trace metals and organic compounds; and the larger surface area may transport more of such toxic agents than larger particles.

Smaller particles can also be inhaled deep into the lungs. As much as 50% of 0.02 µm diameter particles are estimated to be deposited in the alveolar region of the lung. There is complex nature of the relation between deposition and particle size. The ultrafine particles generally have higher fractional deposition in the alveolar region. However, for the smaller nucleation mode (particles less than 0.01 µm size) the deposition in the alveolar region declines, but increases in the extrathoracic region.

Exposures of laboratory animals to ultrafine particles have found cardiovascular and respiratory effects. Mice exposed to concentrated near roadway ultrafine particles showed larger early atherosclerotic lesions than mice exposed to PM2.5 or filtered air (Arujo, 2008). In a mouse allergy model, exposures to concentrated ultrafine particles resulted in a greater response to antigen challenge to ovalbumin (Li, 2010), indicating that vehicular traffic exposure could exacerbate allergic inflammation in already-sensitized animals.

Controlled exposures of human volunteers to ultrafine particles either laboratory generated or as products of combustion, such as diesel exhaust containing particles, have found physiological changes related to vascular effects. Mills, 2011, for example found exposure to diesel exhaust particulate attenuated both acetylcholine and sodium-nitroprusside -induced vasorelaxation.

There are no long-term studies of human population exposure to ultrafine particle, as there is a lack of a monitoring network in the U.S. There have been several cross sectional epidemiological studies of ultrafine particles, mainly from Europe. Some of these studies found effects on hospital admissions, emergency department visits, for respiratory and cardiovascular effects. Other studies, however, have not found such effects (EPA, 2009). Concentrations of ultrafine particles can vary geographically, and it is not clear how well central site monitors may capture actual exposures.

EPA staff has presented conclusions on causal determination of several health effects of ultrafine PM based on a recent review of the available scientific studies (EPA, 2009). These are depicted in the table below.

Additional discussion on the sources and health effects of ultrafine particles can be found in Chapter 9 of the 2012 AQMP.

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It should be noted that this was an animal model of atherosclerotic disease.

TABLE I-7

Summary of Causal Determination of Ultrafine PM by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Suggestive
Respiratory effects	Suggestive
Central nervous system	Inadequate information to assess
Mortality	Inadequate
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Inadequate
Respiratory effects	Inadequate
Mortality	Inadequate
Reproductive and developmental	Inadequate
Cancer, Mutagenicity, Genotoxicity	Inadequate

From EPA, 2009

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CARBON MONOXIDE

The high affinity of carbon monoxide (CO) to bond with oxygen-carrying proteins (hemoglobin and myoglobin) results in reduced oxygen supply in the bloodstream of exposed individuals. The reduced oxygen supply is responsible for the toxic effects of CO which are typically manifested in the oxygen-sensitive organ systems. The effects have been studied in controlled laboratory environments involving exposure of humans and animals to CO, as well as in population-based studies of ambient CO exposure effects. People with deficient blood supply to the heart (ischemic heart disease) are known to be susceptible to the effects of CO. Protection of this group is the basis of the existing National Ambient Air Quality Standards for CO at 35 ppm for one hour and 9 ppm averaged over eight hours. The health effects of ambient CO have been recently reviewed (U.S. EPA, 2000, 2010).

Inhaled CO has no known direct toxic effect on lungs but rather exerts its effects by interfering with oxygen transport through the formation of carboxyhemoglobin (COHb, a chemical complex of CO and hemoglobin). Exposure to CO is often evaluated in terms of COHb levels in blood measured as percentage of total hemoglobin bound to CO. COHb levels in non-smokers range between 0.3 and 0.7% and 5 to 10% in smokers. COHb levels in excess of 1.5% in a significant proportion of urban non-smoking populations can be considered as evidence of widespread exposure to environmental CO.

Under controlled laboratory conditions, healthy subjects exposed to CO sufficient to result in 5% COHb levels exhibited reduced duration of maximal exercise performance and consumption of oxygen. Studies involving subjects with coronary artery disease who engaged in exercise during CO exposures have shown that COHb levels as low as 2.4% can lead to earlier onset of electrocardiograph changes indicative of deficiency of oxygen supply to the heart. Other effects include an earlier onset of chest pain, an increase in the duration of chest pain, and a decrease in oxygen consumption.

Findings of epidemiologic studies have observed associations between ambient CO concentration and emergency department visits and hospital emissions for ischemic heart disease and other cardiovascular diseases.

Animal studies associated with long-term exposure to CO resulting in COHb levels that are equivalent to those observed in smokers have shown indication of reduction in birth weight and impaired neurobehavior in the offspring of exposed animals.

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Epidemiological studies conducted in Southern California have indicated an association with CO exposure during pregnancy to increases in pre-term births. (Ritz, 2000). However, the results were not consistent in different areas studied. The increase in the pre-term births was also associated with PM10 levels. Another study found increased risks for cardiac related birth defects with carbon monoxide exposure in the second month of pregnancy (Ritz, 2002). Toxicological studies in laboratory animals with higher than ambient levels of CO have also reported decrements in birth weight and prenatal growth.

EPA staff has presented conclusions on causal determination of the health effects of carbon monoxide based on a recent review of the available scientific studies (EPA, 2010). These are depicted in the table below.

TABLE I-8

Causal Determination for Health Effects of Carbon Monoxide

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Likely to be a causal relationship
Central nervous system	Suggestive
Respiratory morbidity	Suggestive
Mortality	Suggestive
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Inadequate
Central nervous system	Suggestive
Birth outcomes and developmental effects	Suggestive
Respiratory morbidity	Inadequate
Mortality	Not likely to be a causal relationship

From EPA, 2010

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NITROGEN DIOXIDE

The U.S. EPA has recently reviewed the health effects of nitrogen dioxide (U.S. EPA, 2008a). Evidence for low-level nitrogen dioxide (NO_2) exposure effects is derived from laboratory studies of asthmatics and from epidemiological studies. Additional supportive evidence is derived from animal studies.

Epidemiological studies using the presence of an unvented gas stove as a surrogate for indoor NO_2 exposures suggest an increased incidence of respiratory infections or symptoms in children.

Recent studies related to outdoor exposure have found health effects associated with ambient NO_2 levels, including respiratory symptoms, respiratory illness, decreased lung function, increased emergency room visits for asthma, and cardiopulmonary mortality. However, since NO_2 exposure generally occurs in the presence of other pollutants, such as particulate matter, these studies are often unable to determine the specific role of NO_2 in causing effects.

The Children's Health Study in Southern California found associations of air pollution, including NO_2, PM10, and PM2.5, with respiratory symptoms in asthmatics (McConnell, 1999). Particles and NO_2 were correlated, and effects of individual pollutants could not be discerned. A subsequent analysis indicated a stronger role for NO2 (McConnell, 2002).

Ambient levels of NO_2 were also associated with a decrease in lung function growth in a group of children followed for eight years. In addition to NO_2, the decreased growth was also associated with particulate matter and airborne acids. The study authors postulated that these may be a measure of a package of pollutants from traffic sources. (Gauderman, 2004).

Results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (bronchial reactivity). Effects were observed with exposures from 0.1 to 0.3 ppm NO_2 for periods ranging from 30 minutes to 3 hours. A similar response is reported in some studies with healthy subjects at higher levels of exposure (1.5 - 2.0 ppm). Mixed results have been reported when people with chronic obstructive lung disease are exposed to low levels of NO_2.

Short-term controlled studies of animals exposed to NO_2 over a period of several hours indicate cellular changes associated with allergic and inflammatory response and interference with detoxification processes in the liver. In some animal studies

the severity of the lung structural damage observed after relatively high levels of short-term ozone exposure is observed to increase when animals are exposed to a combination of ozone and NO_2.

In animals, longer-term (3-6 months) repeated exposures at 0.25 ppm appear to decrease one of the essential cell-types (T-cells) of the immune system. Non-specific changes in cells involved in maintaining immune functions (cytotoxic T-cells and natural killer cells) have been observed in humans after repeated exposure (4-6 days) to >0.6 ppm of NO_2 (20 min. - 2 hours). All these changes collectively support the observation reported both in population and animal studies of increased susceptibility to infections, as a result of NO_2 exposure.

The U.S. EPA recently adopted a new short-term standard of 100 ppb (0.1 ppm) averaged over 1 hour. The standard was designed to protect against increases in airway reactivity in individuals with asthma observed in controlled exposure studies, as well as respiratory symptoms observed in epidemiological studies.

SULFUR DIOXIDE

Controlled laboratory studies involving human volunteers have clearly identified asthmatics as the most sensitive group to the effects of ambient sulfur dioxide ($SO_{2)}$ exposures. Healthy subjects have failed to demonstrate any short-term respiratory functional changes at exposure levels up to 1.0 ppm over 1-3 hours.

In exercising asthmatics, brief exposure (5-10 minutes) to SO_2 at levels between 0.2-0.6 ppm can result in significant alteration of lung function, such as increases in airway resistance and decreases in breathing capacity. In some, the exposure can result in severe symptoms necessitating the use of medication for relief. The response to SO_2 inhalation is observable within 2 minutes of exposure, increases further with continuing exposure up to 5 minutes then remains relatively steady as exposure continues. SO_2 exposure is generally not associated with any delayed reactions or repetitive asthmatic attacks.

In epidemiologic studies, associations of SO_2 levels with increases in respiratory symptoms, increases in emergency department visits and hospital admissions for respiratory-related causes have been reported.

The U.S. EPA has recently revised the SO_2 air quality standard. The previous 24-hour standard was rescinded and replaced with a new 1-hour standard at 75 ppb (0.075 ppm) to protect against high short-term exposures.

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Animal studies have shown that despite SO_2 being a respiratory irritant, it does not cause substantial acute or chronic toxicity in animals exposed at ambient concentrations. However, relatively high exposures (10 ppm of SO_2 for 72 hours) in mice can lead to tissue damage, fluid accumulation and sloughing of respiratory lining. Sensitization to allergies is observable in guinea pigs repeatedly exposed to high levels (72 ppm) of SO_2. This effect needs further evaluation in clinical and population studies to identify any chronic exposure impact on both asthmatic incidence and attacks in a population.

Some epidemiological studies indicate that the mortality and morbidity effects associated with the fine fraction of particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from fine particles have not been successful. Thus, it is not clear whether the two pollutants act synergistically, or whether being generated from similar combustion sources, they represent the same pollution index for the observed effects.

SULFATES

Based on a level determined necessary to protect the most sensitive individuals, the California Air Resources Board (CARB) in 1976 adopted a standard of 25 $\mu g/m^3$ (24-hour average) for sulfates. There is no federal air quality standard for sulfates.

In recent years, a vast majority of effects (mortality and morbidity) associated with fine particles (PM2.5) and sulfur dioxide have shown a similar association with ambient sulfate levels in some population studies. The efforts to fully separate the effects of sulfates from other coexisting pollutants have not been successful. This may be due to the fact that these pollutants covary under ambient conditions, having been emitted from common sources; and the effects observed may be due to the combination of pollutants, rather than a single pollutant.

A clinical study involving exposure of human subjects to sulfuric acid aerosol indicated that adolescent asthmatics may be a susceptible population subgroup with some changes in lung function observed with exposures below 100 $\mu g/m^3$. In general, however, laboratory exposures of human volunteers to sulfates at or near ambient levels have not found significant changes in lung function.

Results from animal studies involving exposures to sulfuric acid aerosol, ammonium bisulfate and ammonium sulfate indicate that acidic particles (former two) are more toxic than non-acidic particles (latter). In addition, the severity or magnitude of both mortality and morbidity effects is relatively higher in population studies of the eastern United States and Canada where sulfate concentrations are higher than for those observed in the western United States. Mixed results have been reported from studies which attempted to ascertain the role of acidity in determining the observed toxicity.

LEAD

The U.S. EPA has recently reviewed the health effects of ambient lead exposures in conjunction with a review of the NAAQS for lead. (U.S. EPA 2006b; U.S. EPA 2007b). The following summary is taken from these reviews.

There are a number of potential public health effects at low level exposures. The health implications are generally indexed by blood lead levels, which are related to lead exposures both from inhalation as well as from ingestion. As identified by EPA, effects includeimpacts on population IQ, as well as heart disease and kidney disease. The array of health effects includes the following.

- Heme biosynthesis and related functions;
- Neurological development and function;
- Reproduction and physical development;
- Kidney function;
- Cardiovascular function
- Immune function

Children appear to be sensitive to the neurological toxicity of lead, with effects observed at blood lead concentration ranges of 5 – 10 µg/dL, or possibly lower. No clear threshold has yet been established for such effects.

According to the EPA review, the most important effects observed are neurotoxic effects in children and cardiovascular effects in adults. The effects in children include impacts on intellectual attainment and school performance.

EPA has recently revised the NAAQS for lead to a level of 0.15 µg/m^3 averaged over a 3 month period to protect against lead toxicity. The following two charts, taken from the U.S. EPA review, depict the health effects of lead in relation to blood levels.

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Author: pwong Subject: Sticky Note Date: 9/26/2012 10:25:49 AM
The report (maybe intentionally) does not discuss any recent studies, similar to PM/ozone, regarding inhaled lead which may have been used for the updated NAAQS designation.
There is no mention or discussion on the California lead standard which is a 30 day average (1.5 ug/m3). It may helpful to mention that this is the concentration of lead in total suspended particles.

Author: pwong Subject: Sticky Note Date: 9/26/2012 10:25:10 AM
It may also be good to mention that the NAAQS is a “rolling” 3-month average

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Immune Effects
30 µg/dL		Increased urinary δ-aminolevulinic acid	
15 µg/dL	Behavioral disturbances (e.g., inattention, delinquency) Altered electrophysiological responses	Erythrocyte protoporphyrin (EP) elevation	
10 µg/dL	Effects on neuromotor function CNS cognitive effects (e.g., IQ deficits)	Inhibition of δ-aminolevulinic acid dehydratase (ALAD) Pyrimidine-5'-nuclotidase (Py5N) activity inhibition	Effects on humoral (↑ serum IgE) and cell-mediated (↓ T-cell abundance) immunity
5 µg/dL	↓	↓	
	(???)	(???)	
0 µg/dL			

FIGURE I-2

Summary of Lowest Observed Effect Levels for Key Lead- Induced Health Effects in Children (From U.S. EPA 2007b)

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Cardiovascular Effects	Renal Effects
30 µg/dL	Peripheral sensory nerve impairment	Erythrocyte protoporphyrin (EP) elevation in males		Impaired Renal Tubular Function
20 µg/dL	Cognitive impairment			
15 µg/dL	Postural sway	Erythrocyte protoporphyrin (EP) elevation in females Increased urinary δ-aminolevulinic acid		
10 µg/dL		Inhibition of δ-aminolevulinic acid dehydratase (ALAD)	Elevated blood pressure ↓	
5 µg/dL			(???)	Elevated serum creatine (↓ creatine clearance)
0 µg/dL				

FIGURE I-3

Summary of Lowest Observed Effect Levels for Key Lead- Induced Health Effects in Adults (From U.S. EPA 2007b)

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TOXIC AIR CONTAMINANTS

Toxic air contaminants are pollutants for which there generally are no ambient air quality standards. Under California's Air Toxics Program, CARB staff and Office of Environmental Health Hazard Assessment (OEHHA) assess the health effects of substances that may pose a risk of adverse health effects. These effects are usually an increased risk for cancer or adverse birth outcome. After review by the state Scientific Review Panel, CARB holds a public hearing on whether to formally list substances that may pose a significant risk to public health as a Toxic Air Contaminant.

ARB and OEHHA also establish potency factors for air toxics that are carcinogenic. The potency factors can be used to estimate the additional cancer risk from ambient levels of toxics. This estimate represents the chance of contracting cancer in an individual over a lifetime exposure to a given level of an air toxic and is usually expressed in terms of additional cancer cases per million people exposed.

The District conducted studies on the ambient concentrations and estimated the potential health risks from air toxics (SCAQMD, 2008). In the latest study, a two year monitoring program was undertaken at 10 sites throughout the SCAB over the time period 2004-2006. Over 30 substances were measured, and annual average levels were calculated. The results showed that the overall risk for excess cancer from a 70-year lifetime exposure to the levels of air toxics calculated as the average level at the 10 sites was about 1,200 in a million. The largest contributor to this risk was diesel ~~exhaust~~particulate matter, accounting for about 84% of the air toxics risk. A breakdown of the major contributors to the air toxics risk is shown in ~~FIGURE I-2~~FIGURE I-4.

While the California Air Resources Board listed Diesel Particulate Matter as a Toxic Air Contaminant in 1989, the International Agency for Research on Cancer, an arm of the World Health Organization, recently convened an international panel of scientists to review the published literature regarding the carcinogenicity of diesel combustion emissions. The panel concluded that Diesel Exhaust is a substance that causes cancer in humans (Benbrahim-Tallaa, 2012).

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Author: pwong Subject: Sticky Note Date: 9/26/2012 10:26:17 AM
The respiratory system appears to be a more frequent target than the reproductive system (http://www.oehha.ca.gov/air/allrels.html) and thus should be listed as well.

Author: pwong Subject: Sticky Note Date: 9/26/2012 10:26:24 AM
OEHHA calculates the potency factors.

Author: Administrator Subject: Sticky Note Date: 9/14/2012 5:28:36 PM
It was 1999, not 1989.

Author: pwong Subject: Sticky Note Date: 9/26/2012 10:26:44 AM
This gives the impression that IARC only recently began to review diesel. It might be better to discuss the original 1988 IARC designation and the recent update.

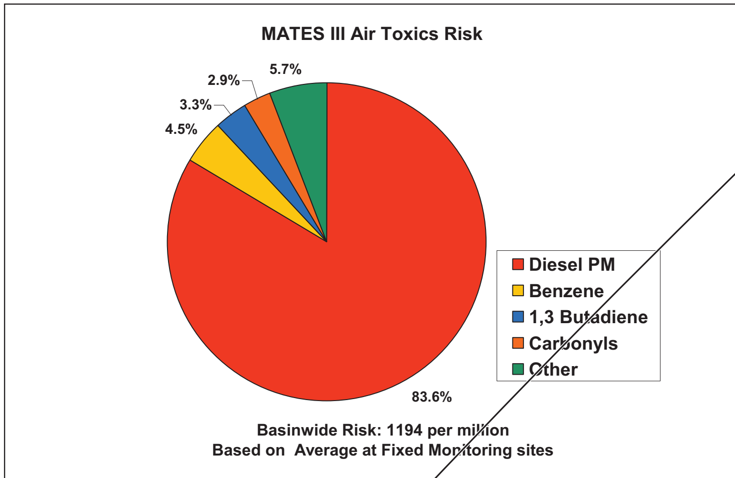

FIGURE I-42

Major Pollutants Contributing to Air Toxics Cancer Risk in the South Coast Air Basin

For non-cancer health effects, OEHHA has developed acute and chronic Reference Exposure Levels (RELs). RELs are concentrations in the air below which adverse health effects are not likely to occur. Acute RELs refer to short-term exposures, generally of one-hour duration. Chronic RELs refer to long-term exposures of several years. The ratio of ambient concentration to the appropriate REL can be used to calculate a Hazard Index. A Hazard Index of less than one would not be expected to result in adverse effects. The measured levels from the most recent study were below the applicable Reference Exposure Levels.

The key air toxics contributing to risk from mobile and stationary sources are listed in TABLE I-9.

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Author: pwong Subject: Sticky Note Date: 9/26/2012 10:26:54 AM

There is also an 8-hour REL.

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TABLE I-9

Key Toxic Air Contaminants in the SCAB

MOBILE SOURCES	STATIONARY SOURCES
Acetaldehyde	Hexavalent Chromium
Benzene	Methylene Chloride
1,3 Butadiene	Nickel
Diesel ~~Exhaust~~Particulate Matter	Perchloroethylene
Formaldehyde	Trichloroethylene

CONCLUSION

A large body of scientific evidence shows that the adverse impacts of air pollution in human and animal health are clear. A considerable number of population-based and laboratory studies have established a link between air pollution and increased morbidity and, in some instances, earlier mortality ~~and air pollution~~.

As the scientific methods for the study of air pollution health effects has progressed over the past decades, adverse effects have been shown to occur at lower levels of exposure. For some pollutants, no clear thresholds for effects have been demonstrated. The new findings have, in turn, led to the revision and lowering of National Ambient Air Quality Standards which, in the judgment of the Administrator of the U.S. EPA, are necessary to protect public health. The figures below are meant to convey some of the historical context to recent revisions to the NAAQS for ozone and for particulate matter.

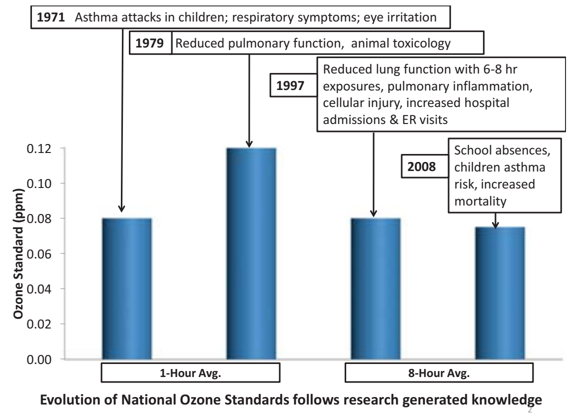

FIGURE I-4

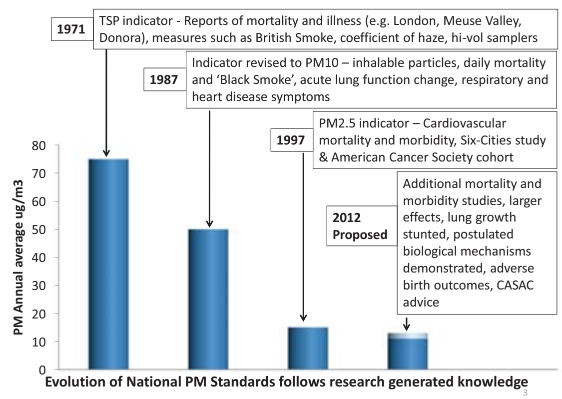

FIGURE I- 5

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OEHHA Comments on 2012 Appendix I-Health Effects

From: Marty, Melanie@OEHHA [mailto:Melanie.Marty@oehha.ca.gov]
Sent: Monday, October 01, 2012 4:25 PM
To: Jean Ospital
Subject: FW: Review of Draft 2012 AQMP Appendix I

Hi Jean – Bart and staff reviewed the report and have comments embedded in the pdf. They note that there are many more recent studies that are not cited. May be worth adding more, particularly where they note in the comments.

Hope this is helpful,

Melanie

Melanie Marty, Ph.D.
Assistant Deputy Director
Scientific Affairs Division
Office of Environmental Health Hazard Assessment
(916) 323-8808

From: Ostro, Bart@OEHHA
Sent: Monday, October 01, 2012 3:49 PM
To: Marty, Melanie@OEHHA
Subject: RE: Review of Draft 2012 AQMP Appendix I

Here it is. My general assessment is that for Pm and ozone many of the refs are old and a lot of new studies (2005 on) are not included...I'm not sure how much time Jean wants to put into this. We made some suggested refs along the way but there are dozens more that could be included in an a more current review. b

---

From: Marty, Melanie@OEHHA
Sent: Monday, October 01, 2012 12:29 PM
To: Ostro, Bart@OEHHA
Subject: FW: Review of Draft 2012 AQMP Appendix I

Hi Bart – Did you guys ever generate comments on the SCAQMD draft?

M.

Melanie Marty, Ph.D.
Assistant Deputy Director
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From: Jean Ospital [mailto:JOspital@aqmd.gov]
Sent: Tuesday, September 18, 2012 9:57 AM
To: Marty, Melanie@OEHHA
Cc: Elaine Chang; Philip Fine; Barbara Baird; William Wong
Subject: Review of Draft 2012 AQMP Appendix I

Melanie,

Thank you for your willingness to provide a review of the Draft Appendix I of the District's 2012 Air Quality Management Plan.

As background, the California Health and Safety Code Section 40471 calls for the District to prepare a report on the health impacts of particulate matter pollution in the South Coast Air Basin as part of the preparation of air quality management plans. Appendix I of the AQMP is a review of air pollution health effects, with the section dealing with particulate matter intended to fulfill this requirement. The current draft is available at the following link. http://www.aqmd.gov/aqmp/2012aqmp/draft/Appendices/AppxI.pdf. Additional materials related to the AQMP are available at http://www.aqmd.gov/aqmp/2012aqmp/index.htm.

As we discussed today, receiving the review before the end of this month would be most helpful for us.

Please give me a call if I can provide any additional information.

Best regards,

Jean

****

Jean Ospital
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REVIEW DRAFT
APPENDIX I

HEALTH EFFECTS

SEPTEMBER 2012

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ATTACHMENT 1
Roster of the 2012 AQMP Advisory Council

ATTACHMENT 2
Comments received from Advisory Council review

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INTRODUCTION

This document presents a summary of scientific findings on the health effects of ambient air pollutants. The California Health and Safety Code Section 40471(b) requires that the South Coast Air Quality Management District prepare a report on the health impacts of particulate matter in the South Coast Air Basin (SCAB) in conjunction with the preparation of the Air Quality Management Plan revisions. This document, which was prepared to satisfy that requirement, also includes the effects of the other major pollutants.

HEALTH EFFECTS OF AIR POLLUTION

Ambient air pollution is a major public health concern. Excess deaths and increases in illnesses associated with high air pollution levels have been documented in several episodes as early as 1930 in Meuse Valley, Belgium; 1948 in Donora, Pennsylvania; and 1952 in London. Although levels of pollutants that occurred during these acute episodes are now unlikely in the United States, ambient air pollution continues to be linked to increases in illness (morbidity) and increases in death rates (mortality).

The adverse health effects associated with air pollution are diverse and include:

- Increased mortality
- Increased health care utilization (hospitalization, physician and emergency room visits)
- Increased respiratory illness (symptoms, infections, and asthma exacerbation)
- Decreased lung function (breathing capacity)
- Lung inflammation
- Potential immunological changes
- Increased airway reactivity to a known chemical exposure - a method used in laboratories to evaluate the tendency of airways to have an increased possibility of developing an asthmatic response
- A decreased tolerance for exercise

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Author: sgreen Subject: Sticky Note Date: 9/26/2012 11:42:17 AM
Add:
Adverse birth outcomes such as low birth weight

The evidence linking these effects to air pollutants is derived from population-based observational and field studies (epidemiological) as well as controlled laboratory studies involving human subjects and animals. There have been an increasing number of studies focusing on the mechanisms (that is, on learning how specific organs, cell types, and biochemicals are involved in the human body's response to air pollution) and specific pollutants responsible for individual effects. Yet the underlying biological pathways for these effects are not always clearly understood.

Although individuals inhale pollutants as a mixture under ambient conditions, the regulatory framework and the control measures developed are mostly pollutant-specific. This is appropriate, in that different pollutants usually differ in their sources, their times and places of occurrence, the kinds of health effects they may cause, and their overall levels of health risk. Different pollutants, from the same or different sources, may sometimes act together to harm health more than they would acting separately. Nevertheless, as a practical matter, health scientists, as well as regulatory officials, usually must deal with one pollutant at a time in determining health effects and in adopting air quality standards. To meet the air quality standards, comprehensive plans are developed such as the Air Quality Management Plan (AQMP), and to minimize toxic exposure a local air toxics control plan is also prepared. These plans examine multiple pollutants, cumulative impacts, and transport issues related to attaining healthful air quality. A brief overview of the effects observed and attributed to various air pollutants is presented in this document.

This summary is drawn substantially from reviews presented previously (SCAQMD, 1996, 2003, 2007), and from reviews on the effects of air pollution by the American Thoracic Society (ATS, 1996), the U.S. EPA reviews for ozone (U.S. EPA, 2006), Carbon Monoxide (U.S. EPA, 2010), and Particulate Matter (U.S. EPA, 2004, 2009), from a published review of the health effects of air pollution (Brunekreef and Holgate, 2002), and from reviews prepared by the California EPA Office of the Environmental Health Hazard Assessment for Particulate Matter (Cal EPA, 2002) and for Ozone (Cal EPA, 2005). Additional materials are from EPA's current review of the ozone standard and health effects (EPA, 2011). More detailed citations and discussions on air pollution health effects can be found in these references.[1]

[1] Most of the studies referred to in this appendix are cited in the above sources. Only more recent specific references will be cited in this summary.

Page: 8

Author: sgreen Subject: Sticky Note Date: 9/26/2012 11:43:36 AM
Add something about the increased susceptibility of children and the elderly.

Author: sgreen Subject: Sticky Note Date: 9/26/2012 11:46:15 AM
and Nitrogen Dioxide (Cal EPA, 2007)

OZONE

Ozone is a highly reactive compound, and is a strong oxidizing agent. When ozone comes into contact with the respiratory tract, it can react with tissues and cause damage in the airways. Since it is a gas, it can penetrate into the gas exchange region of the deep lung.

The EPA primary standard for ozone, adopted in 2008, is 0.075 ppm averaged over eight hours. The California Air Resources Board (CARB) has established standards of 0.09 ppm averaged over one hour and at 0.070 ppm averaged over eight hours.

The major subgroups of the population considered to be at increased risk from ozone exposure are outdoor exercising individuals, including children, and people with preexisting respiratory disease(s) such as asthma. The data base identifying the former group as being at increased risk to ozone exposure is much stronger and more quantitative than that for the latter group, probably because of a larger number of studies conducted with healthy individuals. The adverse effects reported with short-term ozone exposure are greater with increased activity because activity increases the breathing rate and the volume of air reaching the lungs, resulting in an increased amount of ozone reaching the lungs. Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher ventilation rate than adults.

A number of adverse health effects associated with ambient ozone levels have been identified from laboratory and epidemiological studies (EPA, 1996; 2006, 2011; ATS, 1996). These include increased respiratory symptoms, damage to cells of the respiratory tract, decrease in lung function, increased susceptibility to respiratory infection, and increased risk of hospitalization.

Increases in ozone levels are associated with elevated absences from school. The Children's Health Study, conducted by researchers at the University of Southern California, followed a cohort of children that live in 12 communities in Southern California with differing levels of air pollution for several years. A publication from this study reported that school absences in fourth graders for respiratory illnesses were associated with ambient ozone levels. An increase of 20 ppb ozone was associated with an 83% increase in illness-related absence rates (Gilliland, 2001).

The number of hospital admissions and emergency room visits for all respiratory causes (infections, respiratory failure, chronic bronchitis, etc.) including asthma

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shows a consistent increase as ambient ozone levels increase in a community. These excess hospital admissions and emergency room visits are observed when hourly ozone concentrations are as low as 0.06 to 0.10 ppm.

Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).

Multicity studies of short-term ozone exposures (days) and mortality have also examined regional differences. Evidence was provided that there were generally higher ozone-mortality risk estimates in northeastern U.S. cities, with the southwest and urban mid-west cities showing lower or no associations (Smith, 2009; Bell, 2008). Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality, but not cardiovascular-related causes, when PM2.5 exposure were also included in the analysis.

Several population-based studies suggest that asthmatics are more adversely affected by ambient ozone levels, as evidenced by increased hospitalizations and emergency room visits. Laboratory studies have attempted to compare the degree of lung function change seen in age and gender-matched healthy individuals versus asthmatics and those with chronic obstructive pulmonary disease. While the degree of change evidenced did not differ significantly, that finding may not accurately reflect the true impact of exposure on these respiration-compromised individuals. Since the respiration-compromised group may have lower lung function to begin with, the same degree of change may represent a substantially greater adverse effect overall.

Another publication from the Children's Health Study focused on children and outdoor exercise. In communities with high ozone concentrations, the relative risk of developing asthma in children playing three or more sports was found to be over three times higher than in children playing no sports (McConnell, 2002). These findings indicate that new cases of asthma in children are associated with heavy exercise in communities with high levels of ozone. While it has long been known that air pollution can exacerbate symptoms in individuals with respiratory disease, this is among the first studies that indicate ozone exposure may be causally linked to asthma onset.

Page: 10

Author: BOstro Subject: Sticky Note Date: 10/1/2012 3:34:34 PM

You could include long-term exposures and resp mortality (Jerrett) and Mortality among those with pre-existing chronic disease (Zanobetti & Schwartz, 2011)

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In addition, human and animal studies involving both short-term (few hours) and long-term (months to years) exposures indicate a wide range of effects induced or associated with ambient ozone exposure. These are summarized in Table I-1.

TABLE I-1

Adverse Health Effects of Ozone (O3) - Summary of Key Studies

0_3 CONCENTRATION AND EXPOSURE HR., PPM	HEALTH EFFECT
Ambient air containing 0.10 - 0.15 daily 1-h max over days to weeks; ≥ 0.05 (8 hour average)	Decreased breathing capacity, in children, adolescents, and adults exposed to 0_3 outdoors Exacerbation of respiratory symptoms (e.g., cough, chest pain) in individuals with preexisting disease (e.g., asthma) with low ambient exposure, decreased temperature, and other environmental factors resulting in increased summertime hospital admissions and emergency department visits for respiratory causes
≥0.12 (1-3h) ≥0.06 (6.6h) (chamber exposures)	Decrements in lung function (reduced ability to take a deep breath), increased respiratory symptoms (cough, shortness of breath, pain upon deep inspiration), increased airway responsiveness and increased airway inflammation in exercising adults Effects are similar in individuals with preexisting disease except for a greater increase in airway responsiveness for asthmatic and allergic subjects Older subjects (>50 yrs old) have smaller and less reproducible changes in lung function Attenuation of response with repeated exposure
≥0.12 with prolonged, repeated exposure (chamber exposures)	Changes in lung structure, function, elasticity, and biochemistry in laboratory animals that are indicative of airway irritation and inflammation with possible development of chronic lung disease Increased susceptibility to bacterial respiratory infections in laboratory animals

From: SCAQMD, 1996; EPA, 2007

Some lung function responses (volume and airway resistance changes) observed after a single exposure to ozone exhibit attenuation or a reduction in magnitude with repeated exposures. Although it has been argued that the observed shift in response is evidence of a probable adaptation phenomenon, it appears that while functional changes may exhibit adaptation, biochemical and cellular changes which may be

associated with episodic and chronic exposure effects may not exhibit similar adaptation. That is, internal damage to the respiratory system may continue with repeated ozone exposures, even if externally observable effects (chest symptoms and reduced lung function) disappear.

In a laboratory, exposure of human subjects to low levels of ozone causes reversible decrease in lung function as assessed by various measures such as respiratory volumes, airway resistance and reactivity, irritative cough and chest discomfort. Lung function changes have been observed with ozone exposure as low as 0.06 to 0.12 ppm for 6-8 hours under moderate exercising conditions. Similar lung volume changes have also been observed in adults and children under ambient exposure conditions (0.10 - 0.15 ppm). The responses reported are indicative of decreased breathing capacity and are reversible.

The results of several studies where human volunteers were exposed to ozone for 6.6 hours at levels between 0.04 and 0.12 ppm were recently summarized (Brown, 2008). As shown in the figure below, there is an increasing response on lung function with increasing exposure levels in moderately exercising subjects.

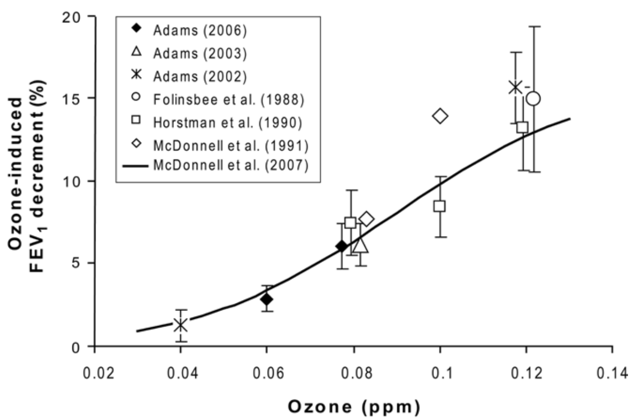

FIGURE I-1

Comparison of mean ozone-induced decrements in lung function following 6.6 hours of ozone exposure (from Brown, 2008)

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In addition to controlled laboratory conditions, studies of individuals exercising outdoors, including children attending summer camp, have shown associations of reduced lung function with ozone exposure. There were wide ranges in responses among individuals.

Results of epidemiology studies support the relationship between ozone exposure and respiratory effects. Several, but not all, studies have found associations of short-term ozone levels and hospital admissions and emergency department admissions for respiratory-related conditions (EPA, 2011).

In laboratory studies, cellular and biochemical changes associated with respiratory tract inflammation have also been consistently reported in the airway lining after low level exposure to ozone. These changes include an increase in specific cell types and in the concentration of biochemical mediators of inflammation and injury such as cytokines and fibronectin. Indications of lung injury and inflammatory changes have been observed in healthy adults exposed to ozone in the range of 0.06 to 0.10 ppm.

The susceptibility to ozone observed under ambient conditions could be due to the combination of pollutants that coexist in the atmosphere or ozone may actually sensitize these subgroups to the effects of other pollutants.

Some animal studies show results that indicate possible chronic effects including functional and structural changes of the lung. These changes indicate that repeated inflammation associated with ozone exposure over a lifetime may result in sufficient damage to respiratory tissue such that individuals later in life may experience a reduced quality of life in terms of respiratory function and activity level achievable. An autopsy study involving Los Angeles County residents provided supportive evidence of lung tissue damage (structural changes) attributable to air pollution.

A study of birth outcomes in southern California found an increased risk for birth defects in the aortic and pulmonary arteries associated with ozone exposure in the second month of pregnancy (Ritz et al., 2002). This is the first study linking ambient air pollutants to birth defects in humans. Studies conducted since mostly focusing on cardiac and oral cleft defects have found mixed results, with some showing associations, but others did not. Confirmation by further studies is needed.

In summary, adverse effects associated with ozone exposures have been well documented, although the specific causal mechanism is still somewhat unclear.

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It may be instructive to provide the overall EPA staff preliminary conclusions on the causality on ozone health effects for the health outcomes evaluated (EPA, 2011). These are provided in the two tables below.

TABLE I-2

Summary of Causal Determinations for Short-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Effects on Liver and Xenobiotic Metabolism	Inadequate to infer a causal relationship
Effects on Cutaneous and Ocular Tissues	Inadequate to infer a causal relationship
Mortality	Likely to be a causal relationship

From EPA, 2011

TABLE I-3

Summary of Causal Determinations for Long-Term Exposures to Ozone

HEALTH CATEGORY	CAUSAL DETERMINATION
Respiratory Effects	Likely to be a causal relationship
Cardiovascular Effects	Suggestive of a causal relationship
Reproductive and Developmental Effects	Suggestive of a causal relationship
Central Nervous System Effects	Suggestive of a causal relationship
Carcinogenicity and Genotoxicity	Inadequate to infer a causal relationship
Mortality	Suggestive of a causal relationship

From EPA, 2011

PARTICULATE MATTER

Airborne particulates are a complex group of pollutants that vary in source, size and composition, depending on location and time. The components include nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and material from the earth's crust. Substances of biological origin, such as pollen and spores, may also be present.

Until several years ago, the health effects of particulates were focused on those sized 10 µm (micrometers) aerodynamic diameter and smaller. These can be inhaled through the upper airways and deposited in the lower airways and gas exchange tissues in the lung. These particles are referred to as PM10. EPA initially promulgated ambient air quality standards for PM10 of 150 $\mu g/m^3$ averaged over a 24-hour period, and 50 $\mu g/m^3$ for an annual average. EPA has since rescinded the annual PM10 standard, but kept the 24-hour standard.

In recent years additional focus has been placed on particles having an aerodynamic diameter of 2.5 µm or less (PM2.5). A greater faction of particles in this size range can penetrate and deposit deep in the lungs. The EPA recently lowered the air quality standards for PM2.5 to 35 $\mu g/m^3$ for a 24-hour average and reaffirmed 15 $\mu g/m^3$ for an annual average standard. There was considerable controversy and debate surrounding the review of particulate matter health effects and the consideration of ambient air quality standards (Kaiser, 1997; Vedal, 1997) when the EPA promulgated the initial PM2.5 standards in 1997.

Since that time, numerous studies have been published, and some of the key studies were closely scrutinized and analyses repeated. The result is that there are now substantial data confirming the adverse health effects of PM2.5 exposures.

There are also differences in the composition and sources of particles in the different size ranges that may have implications for health effects. The particles larger than 2.5 µm (often referred to as the coarse fraction) are mostly produced by mechanical processes. These include automobile tire wear, industrial processes such as cutting and grinding, and resuspension of particles from the ground or road surfaces by wind and human activities.

In contrast, particles smaller than 2.5 µm are mostly derived from combustion sources, such as automobiles, trucks, and other vehicle exhaust, as well as from stationary combustion sources. The particles are either directly emitted or are formed

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The State of California annual average standard is 12 ug/m3

in the atmosphere from gases that are emitted. Components from material in the earth's crust, such as dust, are also present, with the amount varying in different locations.

Attention to another range of very small particles has been increasing over the last few years. These are generally referred to as "ultrafine" particles, with diameters of 0.1 µm or less. These particles are mainly from fresh emissions of combustion sources, but are also formed in the atmosphere from photochemical reactions. Ultrafine particles have relatively short half lives (minutes to hours) and rapidly grow through condensation and coagulation process into larger particles within the PM2.5 size range. These particles are garnering interest since laboratory studies indicate that their toxicity may be higher on a mass basis than larger particles, and there is evidence that these small particles can translocate from the lung to the blood and to other organs of the body.

There have been several reviews of the health effects of ambient particulate matter (ATS, 1996; Brunekreef, 2002; U.S. EPA, 2004; U.S. EPA, 2009). In addition, the California Air Resources Board (CARB) and the Office of Environmental Health and Hazard Assessment (OEHHA) have reviewed the adequacy of the California Air Quality Standards for Particulate Matter (Cal EPA, 2002).

The major types of effects associated with particulate matter include:

- Increased mortality
- Exacerbation of respiratory disease and of cardiovascular disease as evidenced by increases in:

    -Respiratory symptoms

    -Hospital admissions and emergency room visits

    -Physician office visits

    -School absences

    -Work loss days

- Effects on lung function
- Changes in lung morphology

The current federal and California standards are listed below:

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although some studies show lower effects of UF

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you could add nonfatal MI, infant lower resp illness, adverse birth outcomes.

TABLE I-4

Ambient Air Quality Standards for Particulate Matter

STANDARD	FEDERAL	CALIFORNIA
PM10 24-Hour average	150 µg/m^3	50 µg/m^3
PM10 Annual Average	--	20 µg/m^3
PM 2.5 24-Hour Average	35 µg/m^3	--
PM 2.5 Annual Average	15 µg/m^3	12 µg/m^3

Short-Term Exposure Effects

Epidemiological studies have provided evidence for most of the effects listed above. An association between increased daily or several-day-average concentrations of PM10 and excess mortality and morbidity is consistently reported from studies involving communities across the U.S. as well as in Europe, Asia, and South America. A review and analysis of epidemiological literature for acute adverse effects of particulate matter was published by the American Thoracic Society in 1996. Several adverse effects were listed as associated with daily PM10 exposures, as listed in Table I-5.undertaken by Dockery and Pope to estimate these effects as percent increase in mortality associated with each incremental increase of PM10 by 10 µg/m^3. The estimates are presented in Table I-5. It also appears that individuals who are elderly or have preexistent lung or heart disease are more susceptible than others to the adverse effects of PM10 (ATS, 1996). Since then mMany more recent studies have confirmed that excess mortality and morbidity are associated with short term particulate matter levels (Pope, 2006).

Estimates of mortality effects from these studies of PM10 exposures range from 0.3 to 1.7% increase for a 10 µg/m^3 increase in PM10 levels. The National Morbidity, Mortality, and Air Pollution Study (NMMAPS), a study of 20 of the largest U.S. cities, determined a combined risk estimate of about a 0.5% increase in total mortality for a 10 µg/m^3 increase in PM10 (Samet, 2000a). This study also analyzed the effects of gaseous co-pollutants. The results indicated that the association of PM10 and mortality were not confounded by the presence of the gaseous pollutants. When the gaseous pollutants were included in the analyses, the significance of the PM10 estimates remained. The PM10 effects were reduced somewhat when O_3 was also considered and tended to be variably decreased when NO_2, CO, and SO_2 were

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Unfortunately this 1996 is very dated. The 2010 Brook study and later Pope and Dockery review are more relevant. The brook focuses on PM2.5 long and short term studies and is an excellent review of the epi, tox, clinical studies as well as mechanisms.

added to the analysis. These results argue that the effects are likely due to the particulate exposures; they cannot readily be explained by coexisting weather stresses or other pollutants.

An expansion of the NMMAPS study to 90 U.S. Cities also reported association with PM10 levels and mortality (Samet 2000b). It was discovered that this study was one that used a flawed statistical software package. The investigators have reanalyzed the data using corrected settings for the software (Dominici, 2002a, Dominici 2002b). When the estimates for the 90 cities in the study were recalculated, the estimate changed from 0.41% increase in mortality for a 10 $\mu g/m^3$ increase in PM10 to a 0.27% increase. There remained a strong positive association between acute exposure to PM10 and mortality. Thus while the quantitative estimate was reduced, the major findings of the study did not change.

TABLE I-5

Combined Effect Estimates of Daily Mean Particulate Pollution (PM10)

	% CHANGE IN HEALTH INDICATOR PER EACH 10 $\mu g/m^3$ INCREASE IN PM10
Increase in Daily Mortality	
Total deaths	1.0
Respiratory deaths	3.4
Cardiovascular deaths	1.4
Increase in Hospital Usage (all respiratory diagnoses)	
Admissions	1.4
Emergency department visits	0.9
Exacerbation of Asthma	
Asthmatic attacks	3.0
Bronchodilator use	12.2
Emergency department visits*	3.4
Hospital admissions	1.9
Increase in Respiratory Symptom Reports	
Lower respiratory	3.0
Upper respiratory	0.7

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TABLE I-5 (concluded)

Combined Effect Estimates of Daily Mean Particulate Pollution

	% CHANGE IN HEALTH INDICATOR PER EACH 10 μg/m^3 INCREASE IN PM10
Cough	2.5
Decrease in Lung Function	
Forced expiratory volume	0.15
Peak expiratory flow	0.08

* One study only

(Source: American Journal of Respiratory and Critical Care Medicine, Vol. 153, 113-50, 1996)

Studies of PM2.5 also find associations with elevated mortality. The estimates for PM2.5 generally are in the range of 2.0 to 8.5% increase in total deaths per 25 μg/m^3 increase in 24-hour PM2.5 levels. The estimates for cardiovascular related mortality range from 3.0 to 7.0% per 25 μg/m^3 24-hour PM2.5, and for respiratory mortality estimates range from 2.0 to 7.0% per 25 μg/m^3 24-hour PM2.5.

Several studies have attempted to assess the relative importance of particles smaller than 2.5 μm and those between 2.5 μm and 10 μm (PM10-2.5). While some studies report that PM2.5 levels are better predictors of mortality effects, others suggest that PM10-2.5 is also important. Most of the studies found higher mortality associated with PM2.5 levels than with PM10-2.5. For example, a study of six cities in the U.S. found that particulate matter less than 2.5 μm was associated with increased mortality, but that the larger particles were not. Other studies in Mexico City and Santiago, Chile reported that PM10-2.5 was as important as PM2.5. Overall effects estimates for PM10-2.5 fall in the range of 0.5 to 6.0 % excess mortality per 25 μg/m^3 24-hour average.

The relative importance of both PM2.5 and PM10-2.5 may vary in different regions depending on the relative concentrations and components, which can also vary by season. More research is needed to better assess the relative effects of fine (PM2.5) and coarse (PM10-2.5) fractions of particulate matter on mortality.

A number of studies have evaluated the association between particulate matter exposure and indices of morbidity such as hospital admissions, emergency room

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visits or physician office visits for respiratory and cardiovascular diseases. The effects estimates are generally higher than the effects for mortality. The effects are associated with measures of PM10 and PM2.5. Effects are also associated with PM10-2.5. Thus, it appears that when a relatively small number of people experience severe effects, larger numbers experience milder effects, which may relate either to the coarse or to the fine fraction of airborne particulate matter.

In the NMMAPS study, hospital admissions for those 65 years or older were assessed in 14 cities. Hospital admissions for these individuals showed an increase of 6% for cardiovascular diseases and a 10% increase for respiratory disease admissions, per 50 $\mu g/m^3$ increase in PM10. The excess risk for cardiovascular disease ranges from 3-10% per 50 $\mu g/m^3$ PM10 and from 4-10% per 25 $\mu g/m^3$ PM2.5 or PM10-2.5.

Similarly, school absences, lost workdays and restricted activity days have also been used in some studies as indirect indicators of acute respiratory conditions. The results are suggestive of both immediate and delayed impact on these parameters following elevated particulate matter exposures. These observations are consistent with the hypothesis that increased susceptibility to infection follows particulate matter exposures.

Some studies have reported that short-term particulate matter exposure is associated with changes in lung function (lung capacity and breathing volume); upper respiratory symptoms (hoarseness and sore throat); and lower respiratory symptoms (increased sputum, chest pain and wheeze). The severity of these effects is widely varied and is dependent on the population studied, such as adults or children with and without asthma. Sensitive individuals, such as those with asthma or pre-existing respiratory disease, may have increased or aggravated symptoms associated with short-term particulate matter exposures. Several studies have followed the number of medical visits associated with pollutant exposures. A range of increases from 3% to 42% for medical visits for respiratory illnesses was found corresponding to a 50 $\mu g/m^3$ change in PM10. A limited number of studies also looked at levels of PM2.5 or PM10-2.5. The findings suggest that both the fine and coarse fractions may have associations with some respiratory symptoms.

The biological mechanisms by which particulate matter can produce health effects are being investigated in laboratory studies. Inflammatory responses in the respiratory system in humans and animals exposed to concentrated ambient particles have been measured. These include effects such as increases in neutrophils in the lungs. Other changes reported include increased release of cytokines and interleukins,

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chemicals released as part of the inflammatory process. The effects of particulate matter may be mediated in part through the production of reactive oxygen species during the inflammatory process. Recent reviews discuss mechanistic studies in more detail (Brunekreef, 2002; Brook, 2004).

Long-Term Exposure Effects

While most studies have evaluated the acute effects, some studies specifically focused on evaluating the effects of chronic exposure to PM10 and PM2.5. Studies have analyzed the mortality of adults living in different U.S. cities. After adjusting for important risk factors, taken as a whole these studies found a positive association of deaths and exposure to particulate matter. A similar association was observable in both total number of deaths and deaths due to specific causes. The largest effects were observed from cardiovascular causes and ischemic heart disease. A shortening of lifespan was also reported in these studies.

Since the initial promulgation by EPA of the National Ambient Air Quality Standards for PM2.5, controversy has remained over the association of mortality and exposures to PM2.5. Thus an expanded discussion of these studies is presented below.

Significant associations for PM2.5 for both total mortality and cardiorespiratory mortality were reported in a study following a national cohort recruited by the American Cancer Society for a Cancer Preventions Study over several years. A re-analysis of the data from this study confirmed the initial finding (Krewski, 2000). In this study, mortality rates and PM2.5 levels were analyzed for 51 metropolitan areas of the U.S. Average levels from monitors in each area were used to estimate exposures. At these levels of aggregation, regional differences in the association of PM2.5 and mortality were noted, with higher associations in the Northeast, and lower or non-significant associations in the West.

The Harvard Six Cities Study evaluated several size ranges of particulate matter and reported significant associations with PM15, PM2.5, sulfates, and non-sulfate particles, but not with coarse particles (PM15 – PM2.5). An extension of the Harvard Six Cities Cohort confirmed the association of mortality with PM2.5 levels (Laden, 2006). These studies provide evidence that the fine particles, as measured by PM2.5, may be more strongly associated with mortality effects from long-term particulate matter exposures than are coarse compounds. An update to this study covering a follow-up over the years 1974 to 2009 (Lepeule, 2012) was recently published. Findings indicated a linear relationship of PM2.5 levels and mortality

from all causes, cardiovascular causes, and from lung cancer. According to the authors, the PM2.5 levels decreased over time, but no evidence of a threshold for these effects was found.

A follow-up study of the American Cancer Society cohort confirmed and extended the findings in the initial study. The researchers estimated that, on average, a 10 ug/m3 increase in fine particulates was associated with approximately a 4% increase in total mortality, a 6% increase in cardiopulmonary mortality, and an 8% increase risk of lung cancer mortality (Pope, 2002). The magnitude of effects is larger in the long-term studies than in the short-term investigations. In an additional re analysis and extension of the American Cancer Society cohort from 1982 to 2000 (Krewski, 2009), and including additional metropolitan areas for the most recent years, effects estimates on mortality were similar, though somewhat higher, than those reported previously.

Other national studies include an analysis of mortality and PM2.5 exposures in a Medicare population. Zeger and Associates (2008) assembled a Medicare cohort by including all Medicare enrollees residing in zip codes with centroids within 6 miles of a PM2.5 monitor. PM2.5 data was obtained from the monitoring stations, and mean annual levels were called for the zip codes within six miles of each monitor. The estimated associations between exposures to PM2.5 and mortality for the eastern and central portions of the U.S were similar to those previously published in the Six Cities Study and the American Cancer Society cohorts. The authors reported that there were no significant associations between zip code levels of PM2.5 and mortality rates in the western region of the U.S. This lack of association was attributed largely to the higher PM2.5 levels in Los Angeles area counties compared to other western urban areas, but there were not higher mortality rates in these counties. The authors further reported that they found no associations of PM2.5 with mortality in persons aged 85 years or higher.

Analyses of mortality and PM2.5 levels specific to California have also been reported. A cohort of elderly individuals (average age of 65 yr in 1973) recruited from 11 California counties was followed over several years (Enstrom, 2005). An association for exposure with all cause deaths was reported from 1973–1982. However, no significant association was found in the later time period of 1983–2002. Pollutant levels were taken from ambient monitors and averaged over each county to estimate exposures.

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Author: sgreen Subject: Sticky Note Date: 9/26/2012 1:59:40 PM
Also can add a recent study conducted in Canada by Crouse et al. 2012 (EHP 120:965-970). Study found 15% increase in all-cause mortality and 31% increase in ischemic heart disease mortality for each 10ug/m3 increase in PM 2.5. Mean concentration among all study subjects was only 8.7 ug/m3.

Two analyses of the American Cancer Society cohort focused specifically on the Los Angeles Metropolitan area using methods to estimate exposures on a finer geographical scale than previous studies that used geographic scales at the county or metropolitan area. Using data from monitoring stations in the Los Angeles area, one study applied interpolation methods (Jerrett, 2005) and another applied land use regression techniques (Krewski, 2009) to estimate exposures to the study individuals. Significant associations of PM2.5 with mortality from all causes and cardiopulmonary disease were reported, with the magnitude of risks being up to three times higher than those from the national studies of the American Cancer Society cohort. This provides evidence that using methods to provide more detailed exposure estimates can result in stronger associations of PM2.5 and mortality.

~~Two~~ recent reports have been released looking at air pollution and health effects in California. One study (Lipsett, 2011) followed school teachers recruited in 1995, and followed through 2005. Pollutant exposures at the subject residence were estimated using data from ambient monitors, and extrapolated using a distance weighted method. The authors reported significant association of PM2.5 levels and mortality from ischemic heart disease, but no associations were found with all cause, cardiovascular, or respiratory disease.

The second study (Jerrett, 2011) followed individuals in ~~the Los Angeles area~~ California from the American Cancer Society cohort recruited starting in 1982, with follow up to 2000. Pollutant levels at subject residences were estimated using several methods. All but one of the methods found no association of all-cause mortality with PM2.5 levels. All exposure estimation methods were reported to have found significant associations with ischemic heart disease mortality, however. The authors noted that mortality rates differ in urban areas compared to non-urban areas, and so included a variable for this in a land use regression model to estimate effects on mortality. When the authors applied the land use regression model including an urban indicator to estimate exposures, all-cause mortality, mortality from cardiovascular disease, and mortality from ischemic heart disease were all significantly associated with PM2.5 levels.

The U.S. EPA has recently proposed to lower the annual National Ambient Air Quality Standard for PM2.5 (U.S. EPA, 2012a). EPA also released a Regulatory Impact Analysis (U.S. EPA 2012b)which looked at the costs and benefits of alternate PM2.5 stand levels. As part of the analysis, EPA also looked at California specific studies regarding PM2.5 and mortality published in the scientific literature. The EPA

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Four Also Ostro et al. (2010) using Teachers Cohort and Jerrett 2005 using ACS in LA.

analysis concluded "most of the cohort studies conducted in California report central effect estimates similar to the (nation-wide) all-cause mortality risk estimate we applied from Krewski et al. (2009) and Laden et al. (2006) albeit with wider confidence intervals. A couple cohort studies conducted in California indicate higher risks than the risk estimates we applied." Thus in EPAs judgment the California related studies provided estimates of mortality consistent with or higher than those from the national studies.

Other studies report evidence indicating that particulate matter exposure early in pregnancy may be associated with lowered birth weights (Bobak, 1999). Studies from the U.S., the Czech Republic and Mexico City have reported that neonatal and early postnatal exposure to particulate matter may lead to increased infant mortality. A more recent study in Southern California found increased risks for infant deaths associated with exposures to particulates and other pollutants (Ritz, 2006). These results suggest that infants may be a subgroup affected by particulate matter exposures.

In addition, some long-term effect studies have reported an increased risk of mortality from lung cancer associated with particulate matter exposures. A study involving California Seventh Day Adventists (very few of whom smoke) has reported an association of lung cancer mortality with PM10 levels. It is not clear from these studies whether the association relates to causation of disease, or whether individuals with cancer are more susceptible to other effects of particles leading to the observed mortality association. A study that followed a large number of individuals living in the largest U.S. cities found elevated lung cancer risk associated with long-term average PM2.5 levels (Pope, 2002).

Several studies have assessed the effects of long-term particulate matter exposure on respiratory symptoms and lung function changes. Associations have been found with symptoms of chronic bronchitis and decreased lung function. A study of school children in 12 communities in Southern California showed significant association of particulate matter with bronchitis or phlegm in children with asthma. These effects were also associated with NO_2 and acid vapor levels.

A cohort of fourth graders from the Southern California communities was followed over a period of four years by the Children's Health Study. A lower rate of growth in lung function was found in children living in areas with higher levels of particulate pollution (Gauderman, 2000). Decreases in lung function growth were associated with PM10, PM2.5, PM10-2.5, acid vapor, and NO_2. There was no association with

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ozone levels. The investigators were not able to identify independent effects of the pollutants, but noted that motor vehicle emissions are a major source of the pollutants.

A follow-up study on a second cohort of children confirmed the findings that decreased lung function growth was associated with particulates, nitric oxides, and elemental carbon levels (Gauderman, 2002). Elemental carbon is often used as a measure for diesel particulate. Additionally, children who moved to areas with less air pollution were found to regain some of the lung function growth rate (Avol, 2001). By the time the fourth graders graduated from high school, a significant number showed lower lung function. The risk of lower lung function was about five times higher in children with the highest PM2.5 exposure when compared to the lowest exposure communities (Gauderman, 2004). These deficits are likely to persist since the children were at the end of their growth period.

Despite data gaps, the extensive body of epidemiological studies has both qualitative and quantitative consistency suggestive of causality. A considerable body of evidence from these studies suggests that ambient particulate matter, alone or in combination with other coexisting pollutants, is associated with significant increases in mortality and morbidity in a community.

In summary, the scientific literature indicates that an increased risk of mortality and morbidity is associated with particulate matter at ambient levels. The evidence for particulate matter effects is mostly derived from population studies with supportive evidence from clinical and animal studies. Although most of the effects are attributable to particulate matter, co-pollutant effects cannot be ruled out on the basis of existing studies. The difficulty of separating the effects may be due to the fact that particulate levels co-vary with other combustion source pollutants. That is, the particle measurements serve as an index of overall exposure to combustion-related pollution, and some component(s) of combustion pollution other than particles might be at least partly responsible for the observed health effects.

EPA staff has presented conclusions on causal determination of several health effects based on a recent review of the available scientific studies (EPA, 2009). These are depicted in the Table below.

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TABLE I-6

Summary of Causal Determination of PM2.5 by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Central nervous system	Inadequate information to assess
Mortality	Causal
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Causal
Respiratory effects	Likely to be causal
Mortality	Causal
Reproductive and developmental	Suggestive of a causal relationship
Cancer, Mutagenicity, Genotoxicity	Suggestive of a causal relationship

From EPA, 2009

ULTRAFINE PARTICLES

As noted above, numerous studies have found association of particulate matter levels with adverse effects, including mortality, hospital admissions, and respiratory disease symptoms. The vast majority of these studies used particle mass of PM10 or PM2.5 as the measure of exposure. Some researchers have postulated, however, that ultrafine particles may be responsible for some of the observed associations of particulate matter and health outcomes (Oberdorster, et al, 1995; Seaton, et al, 1995). Ultrafine particles are generally classified of 0.1 μm and small diameter.

Several potential mechanisms have been brought forward to suggest that the ultrafine portion may be important in determining the toxicity of ambient particulates, some of which are discussed below.

For a given mass concentration, ultrafine particles have much higher numbers and surface area compared to larger particles. Particles can act as carriers for other adsorbed agents, such as trace metals and organic compounds; and the larger surface area may transport more of such toxic agents than larger particles.

Smaller particles can also be inhaled deep into the lungs. As much as 50% of 0.02 µm diameter particles are estimated to be deposited in the alveolar region of the lung. There is complex nature of the relation between deposition and particle size. The ultrafine particles generally have higher fractional deposition in the alveolar region. However, for the smaller nucleation mode (particles less than 0.01 µm size) the deposition in the alveolar region declines, but increases in the extrathoracic region.

Exposures of laboratory animals to ultrafine particles have found cardiovascular and respiratory effects. Mice exposed to concentrated near roadway ultrafine particles showed larger early atherosclerotic lesions than mice exposed to PM2.5 or filtered air (Arujo, 2008). In a mouse allergy model, exposures to concentrated ultrafine particles resulted in a greater response to antigen challenge to ovalbumin (Li, 2010), indicating that vehicular traffic exposure could exacerbate allergic inflammation in already-sensitized animals.

Controlled exposures of human volunteers to ultrafine particles either laboratory generated or as products of combustion, such as diesel exhaust containing particles, have found physiological changes related to vascular effects. Mills, 2011, for example found exposure to diesel exhaust particulate attenuated both acetylcholine and sodium-nitroprusside -induced vasorelaxation.

There are no long-term studies of human population exposure to ultrafine particle, as there is a lack of a monitoring network in the U.S. There have been several cross sectional epidemiological studies of ultrafine particles, mainly from Europe. Some of these studies found effects on hospital admissions, emergency department visits, for respiratory and cardiovascular effects. Other studies, however, have not found such effects (EPA, 2009). Concentrations of ultrafine particles can vary geographically, and it is not clear how well central site monitors may capture actual exposures.

EPA staff has presented conclusions on causal determination of several health effects of ultrafine PM based on a recent review of the available scientific studies (EPA, 2009). These are depicted in the table below.

Additional discussion on the sources and health effects of ultrafine particles can be found in Chapter 9 of the 2012 AQMP.

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TABLE I-7

Summary of Causal Determination of Ultrafine PM by Exposure Duration and Health Outcome

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Suggestive
Respiratory effects	Suggestive
Central nervous system	Inadequate information to assess
Mortality	Inadequate
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular effects	Inadequate
Respiratory effects	Inadequate
Mortality	Inadequate
Reproductive and developmental	Inadequate
Cancer, Mutagenicity, Genotoxicity	Inadequate

From EPA, 2009

CARBON MONOXIDE

The high affinity of carbon monoxide (CO) to bond with oxygen-carrying proteins (hemoglobin and myoglobin) results in reduced oxygen supply in the bloodstream of exposed individuals. The reduced oxygen supply is responsible for the toxic effects of CO which are typically manifested in the oxygen-sensitive organ systems. The effects have been studied in controlled laboratory environments involving exposure of humans and animals to CO, as well as in population-based studies of ambient CO exposure effects. People with deficient blood supply to the heart (ischemic heart disease) are known to be susceptible to the effects of CO. Protection of this group is the basis of the existing National Ambient Air Quality Standards for CO at 35 ppm for one hour and 9 ppm averaged over eight hours. The health effects of ambient CO have been recently reviewed (U.S. EPA, 2000, 2010).

Inhaled CO has no known direct toxic effect on lungs but rather exerts its effects by interfering with oxygen transport through the formation of carboxyhemoglobin (COHb, a chemical complex of CO and hemoglobin). Exposure to CO is often evaluated in terms of COHb levels in blood measured as percentage of total hemoglobin bound to CO. COHb levels in non-smokers range between 0.3 and 0.7% and 5 to 10% in smokers. COHb levels in excess of 1.5% in a significant proportion of urban non-smoking populations can be considered as evidence of widespread exposure to environmental CO.

Under controlled laboratory conditions, healthy subjects exposed to CO sufficient to result in 5% COHb levels exhibited reduced duration of maximal exercise performance and consumption of oxygen. Studies involving subjects with coronary artery disease who engaged in exercise during CO exposures have shown that COHb levels as low as 2.4% can lead to earlier onset of electrocardiograph changes indicative of deficiency of oxygen supply to the heart. Other effects include an earlier onset of chest pain, an increase in the duration of chest pain, and a decrease in oxygen consumption.

Findings of epidemiologic studies have observed associations between ambient CO concentration and emergency department visits and hospital emissions for ischemic heart disease and other cardiovascular diseases.

Animal studies associated with long-term exposure to CO resulting in COHb levels that are equivalent to those observed in smokers have shown indication of reduction in birth weight and impaired neurobehavior in the offspring of exposed animals.

Epidemiological studies conducted in Southern California have indicated an association with CO exposure during pregnancy to increases in pre-term births. (Ritz, 2000). However, the results were not consistent in different areas studied. The increase in the pre-term births was also associated with PM10 levels. Another study found increased risks for cardiac related birth defects with carbon monoxide exposure in the second month of pregnancy (Ritz, 2002). Toxicological studies in laboratory animals with higher than ambient levels of CO have also reported decrements in birth weight and prenatal growth.

EPA staff has presented conclusions on causal determination of the health effects of carbon monoxide based on a recent review of the available scientific studies (EPA, 2010). These are depicted in the table below.

TABLE I-8

Causal Determination for Health Effects of Carbon Monoxide

SHORT-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Likely to be a causal relationship
Central nervous system	Suggestive
Respiratory morbidity	Suggestive
Mortality	Suggestive
LONG-TERM EXPOSURES	
Health Outcome	**Causality Determination**
Cardiovascular morbidity	Inadequate
Central nervous system	Suggestive
Birth outcomes and developmental effects	Suggestive
Respiratory morbidity	Inadequate
Mortality	Not likely to be a causal relationship

From EPA, 2010

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NITROGEN DIOXIDE

The U.S. EPA has recently reviewed the health effects of nitrogen dioxide (U.S. EPA, 2008a). Evidence for low-level nitrogen dioxide (NO_2) exposure effects is derived from laboratory studies of asthmatics and from epidemiological studies. Additional supportive evidence is derived from animal studies.

Epidemiological studies using the presence of an unvented gas stove as a surrogate for indoor NO_2 exposures suggest an increased incidence of respiratory infections or symptoms in children.

Recent studies related to outdoor exposure have found health effects associated with ambient NO_2 levels, including respiratory symptoms, respiratory illness, decreased lung function, increased emergency room visits for asthma, and cardiopulmonary mortality. However, since NO_2 exposure generally occurs in the presence of other pollutants, such as particulate matter, these studies are often unable to determine the specific role of NO_2 in causing effects.

The Children's Health Study in Southern California found associations of air pollution, including NO_2, PM10, and PM2.5, with respiratory symptoms in asthmatics (McConnell, 1999). Particles and NO_2 were correlated, and effects of individual pollutants could not be discerned. A subsequent analysis indicated a stronger role for NO2 (McConnell, 2002).

Ambient levels of NO_2 were also associated with a decrease in lung function growth in a group of children followed for eight years. In addition to NO_2, the decreased growth was also associated with particulate matter and airborne acids. The study authors postulated that these may be a measure of a package of pollutants from traffic sources. (Gauderman, 2004).

Results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (bronchial reactivity). Effects were observed with exposures from 0.1 to 0.3 ppm NO_2 for periods ranging from 30 minutes to 3 hours. A similar response is reported in some studies with healthy subjects at higher levels of exposure (1.5 - 2.0 ppm). Mixed results have been reported when people with chronic obstructive lung disease are exposed to low levels of NO_2.

Short-term controlled studies of animals exposed to NO_2 over a period of several hours indicate cellular changes associated with allergic and inflammatory response and interference with detoxification processes in the liver. In some animal studies

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the severity of the lung structural damage observed after relatively high levels of short-term ozone exposure is observed to increase when animals are exposed to a combination of ozone and NO_2.

In animals, longer-term (3-6 months) repeated exposures at 0.25 ppm appear to decrease one of the essential cell-types (T-cells) of the immune system. Non-specific changes in cells involved in maintaining immune functions (cytotoxic T-cells and natural killer cells) have been observed in humans after repeated exposure (4-6 days) to >0.6 ppm of NO_2 (20 min. - 2 hours). All these changes collectively support the observation reported both in population and animal studies of increased susceptibility to infections, as a result of NO_2 exposure.

The U.S. EPA recently adopted a new short-term standard of 100 ppb (0.1 ppm) averaged over 1 hour. The standard was designed to protect against increases in airway reactivity in individuals with asthma observed in controlled exposure studies, as well as respiratory symptoms observed in epidemiological studies.

SULFUR DIOXIDE

Controlled laboratory studies involving human volunteers have clearly identified asthmatics as the most sensitive group to the effects of ambient sulfur dioxide ($SO_{2)}$ exposures. Healthy subjects have failed to demonstrate any short-term respiratory functional changes at exposure levels up to 1.0 ppm over 1-3 hours.

In exercising asthmatics, brief exposure (5-10 minutes) to SO_2 at levels between 0.2-0.6 ppm can result in significant alteration of lung function, such as increases in airway resistance and decreases in breathing capacity. In some, the exposure can result in severe symptoms necessitating the use of medication for relief. The response to SO_2 inhalation is observable within 2 minutes of exposure, increases further with continuing exposure up to 5 minutes then remains relatively steady as exposure continues. SO_2 exposure is generally not associated with any delayed reactions or repetitive asthmatic attacks.

In epidemiologic studies, associations of SO_2 levels with increases in respiratory symptoms, increases in emergency department visits and hospital admissions for respiratory-related causes have been reported.

The U.S. EPA has recently revised the SO_2 air quality standard. The previous 24-hour standard was rescinded and replaced with a new 1-hour standard at 75 ppb (0.075 ppm) to protect against high short-term exposures.

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Animal studies have shown that despite SO_2 being a respiratory irritant, it does not cause substantial acute or chronic toxicity in animals exposed at ambient concentrations. However, relatively high exposures (10 ppm of SO_2 for 72 hours) in mice can lead to tissue damage, fluid accumulation and sloughing of respiratory lining. Sensitization to allergies is observable in guinea pigs repeatedly exposed to high levels (72 ppm) of SO_2. This effect needs further evaluation in clinical and population studies to identify any chronic exposure impact on both asthmatic incidence and attacks in a population.

Some epidemiological studies indicate that the mortality and morbidity effects associated with the fine fraction of particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from fine particles have not been successful. Thus, it is not clear whether the two pollutants act synergistically, or whether being generated from similar combustion sources, they represent the same pollution index for the observed effects.

SULFATES

Based on a level determined necessary to protect the most sensitive individuals, the California Air Resources Board (CARB) in 1976 adopted a standard of 25 $\mu g/m^3$ (24-hour average) for sulfates. There is no federal air quality standard for sulfates.

In recent years, a vast majority of effects (mortality and morbidity) associated with fine particles (PM2.5) and sulfur dioxide have shown a similar association with ambient sulfate levels in some population studies. The efforts to fully separate the effects of sulfates from other coexisting pollutants have not been successful. This may be due to the fact that these pollutants covary under ambient conditions, having been emitted from common sources; and the effects observed may be due to the combination of pollutants, rather than a single pollutant.

A clinical study involving exposure of human subjects to sulfuric acid aerosol indicated that adolescent asthmatics may be a susceptible population subgroup with some changes in lung function observed with exposures below 100 $\mu g/m^3$. In general, however, laboratory exposures of human volunteers to sulfates at or near ambient levels have not found significant changes in lung function.

Results from animal studies involving exposures to sulfuric acid aerosol, ammonium bisulfate and ammonium sulfate indicate that acidic particles (former two) are more toxic than non-acidic particles (latter). In addition, the severity or magnitude of both mortality and morbidity effects is relatively higher in population studies of the eastern United States and Canada where sulfate concentrations are higher than for those observed in the western United States. Mixed results have been reported from studies which attempted to ascertain the role of acidity in determining the observed toxicity.

LEAD

The U.S. EPA has recently reviewed the health effects of ambient lead exposures in conjunction with a review of the NAAQS for lead. (U.S. EPA 2006b; U.S. EPA 2007b). The following summary is taken from these reviews.

There are a number of potential public health effects at low level exposures. The health implications are generally indexed by blood lead levels, which are related to lead exposures both from inhalation as well as from ingestion. As identified by EPA, effects includeimpacts on population IQ, as well as heart disease and kidney disease. The array of health effects includes the following.

- Heme biosynthesis and related functions;
- Neurological development and function;
- Reproduction and physical development;
- Kidney function;
- Cardiovascular function
- Immune function

Children appear to be sensitive to the neurological toxicity of lead, with effects observed at blood lead concentration ranges of 5 – 10 µg/dL, or possibly lower. No clear threshold has yet been established for such effects.

According to the EPA review, the most important effects observed are neurotoxic effects in children and cardiovascular effects in adults. The effects in children include impacts on intellectual attainment and school performance.

EPA has recently revised the NAAQS for lead to a level of 0.15 µg/m^3 averaged over a 3 month period to protect against lead toxicity. The following two charts, taken from the U.S. EPA review, depict the health effects of lead in relation to blood levels.

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Immune Effects
30 µg/dL		Increased urinary δ-aminolevulinic acid	
15 µg/dL	Behavioral disturbances (e.g., inattention, delinquency) Altered electrophysiological responses	Erythrocyte protoporphyrin (EP) elevation	
10 µg/dL	Effects on neuromotor function CNS cognitive effects (e.g., IQ deficits)	Inhibition of δ-aminolevulinic acid dehydratase (ALAD) Pyrimidine-5'-nuclotidase (Py5N) activity inhibition	Effects on humoral (↑ serum IgE) and cell-mediated (↓ T-cell abundance) immunity
5 µg/dL	↓	↓	
	(???)	(???)	
0 µg/dL			

FIGURE I-2

Summary of Lowest Observed Effect Levels for Key Lead- Induced Health Effects in Children (From U.S. EPA 2007b)

Lowest Observed Effect Blood Lead Level	Neurological Effects	Hematological Effects	Cardiovascular Effects	Renal Effects
30 µg/dL	Peripheral sensory nerve impairment	Erythrocyte protoporphyrin (EP) elevation in males		Impaired Renal Tubular Function
20 µg/dL	Cognitive impairment			
15 µg/dL	Postural sway	Erythrocyte protoporphyrin (EP) elevation in females Increased urinary δ-aminolevulinic acid		
10 µg/dL		Inhibition of δ-aminolevulinic acid dehydratase (ALAD)	Elevated blood pressure ↓	
5 µg/dL			(???)	Elevated serum creatine (↓ creatine clearance)
0 µg/dL				

FIGURE I-3

Summary of Lowest Observed Effect Levels for Key Lead- Induced Health Effects in Adults (From U.S. EPA 2007b)

TOXIC AIR CONTAMINANTS

Toxic air contaminants are pollutants for which there generally are no ambient air quality standards. Under California's Air Toxics Program, CARB staff and Office of Environmental Health Hazard Assessment (OEHHA) assess the health effects of substances that may pose a risk of adverse health effects. These effects are usually an increased risk for cancer or adverse birth outcome. After review by the state Scientific Review Panel, CARB holds a public hearing on whether to formally list substances that may pose a significant risk to public health as a Toxic Air Contaminant.

CARB and OEHHA also establish potency factors for air toxics that are carcinogenic. The potency factors can be used to estimate the additional cancer risk from ambient levels of toxics. This estimate represents the chance of contracting cancer in an individual over a lifetime exposure to a given level of an air toxic and is usually expressed in terms of additional cancer cases per million people exposed.

The District conducted studies on the ambient concentrations and estimated the potential health risks from air toxics (SCAQMD, 2008). In the latest study, a two year monitoring program was undertaken at 10 sites throughout the SCAB over the time period 2004-2006. Over 30 substances were measured, and annual average levels were calculated. The results showed that the overall risk for excess cancer from a 70-year lifetime exposure to the levels of air toxics calculated as the average level at the 10 sites was about 1,200 in a million. The largest contributor to this risk was diesel ~~exhaust~~particulate matter, accounting for about 84% of the air toxics risk. A breakdown of the major contributors to the air toxics risk is shown in ~~FIGURE I-2~~FIGURE I-4.

While the California Air Resources Board listed Diesel Particulate Matter as a Toxic Air Contaminant in 1989, the International Agency for Research on Cancer, an arm of the World Health Organization, recently convened an international panel of scientists to review the published literature regarding the carcinogenicity of diesel combustion emissions. The panel concluded that Diesel Exhaust is a substance that causes cancer in humans (Benbrahim-Tallaa, 2012).

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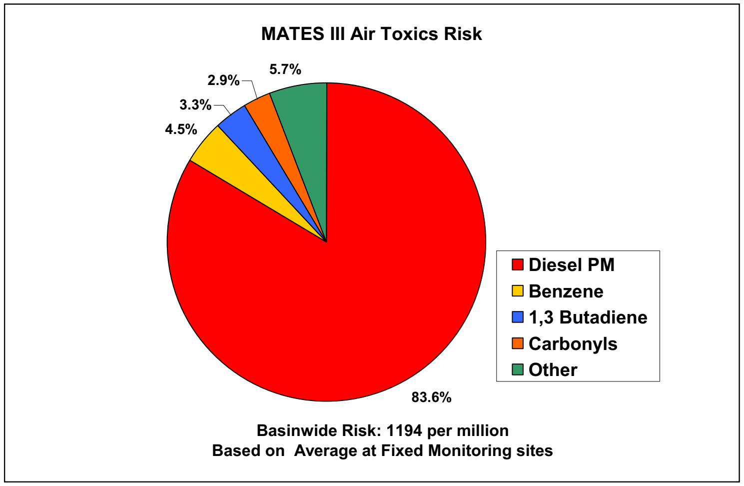

FIGURE I-42

Major Pollutants Contributing to Air Toxics Cancer Risk in the South Coast Air Basin

For non-cancer health effects, OEHHA has developed acute and chronic Reference Exposure Levels (RELs). RELs are concentrations in the air below which adverse health effects are not likely to occur. Acute RELs refer to short-term exposures, generally of one-hour duration. Chronic RELs refer to long-term exposures of several years. The ratio of ambient concentration to the appropriate REL can be used to calculate a Hazard Index. A Hazard Index of less than one would not be expected to result in adverse effects. The measured levels from the most recent study were below the applicable Reference Exposure Levels.

The key air toxics contributing to risk from mobile and stationary sources are listed in TABLE I-9.

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TABLE I-9

Key Toxic Air Contaminants in the SCAB

MOBILE SOURCES	STATIONARY SOURCES
Acetaldehyde	Hexavalent Chromium
Benzene	Methylene Chloride
1,3 Butadiene	Nickel
Diesel ~~Exhaust~~Particulate Matter	Perchloroethylene
Formaldehyde	Trichloroethylene

CONCLUSION

A large body of scientific evidence shows that the adverse impacts of air pollution in human and animal health are clear. A considerable number of population-based and laboratory studies have established a link between air pollution and increased morbidity and, in some instances, earlier mortality ~~and air pollution~~.

As the scientific methods for the study of air pollution health effects has progressed over the past decades, adverse effects have been shown to occur at lower levels of exposure. For some pollutants, no clear thresholds for effects have been demonstrated. The new findings have, in turn, led to the revision and lowering of National Ambient Air Quality Standards which, in the judgment of the Administrator of the U.S. EPA, are necessary to protect public health. The figures below are meant to convey some of the historical context to recent revisions to the NAAQS for ozone and for particulate matter.

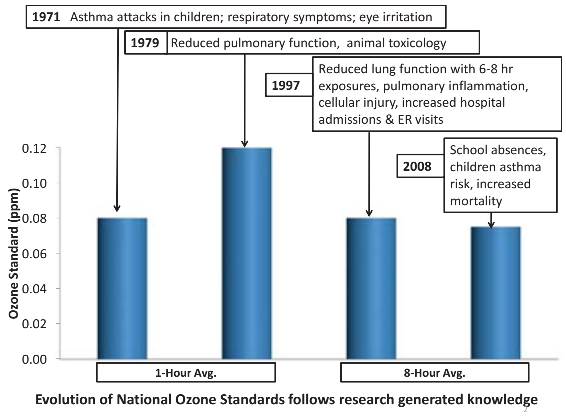

FIGURE I-4

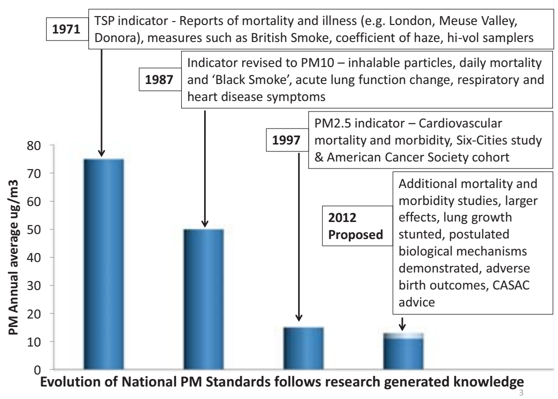

FIGURE I- 5

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ATTACHMENT 3

COMMENTS RECEIVED ON DRAFT APPENDIX I FROM SCAQMD ADVISORY COUNCIL

Section 40471 of the California Health and Safety Code calls for the periodic preparation of a report on the health impacts of particulate matter air pollution in the South Coast Air Basin as part of the Air Quality Management Plan (AQMP) revisions. The report is to be submitted to the Advisory Council for review and comment.

The correspondence requesting comments from the Advisory Council and a copy of their comments received through October 5, 2012, follow.

-----Original Message-----
From: Jean Ospital
Sent: Thursday, June 07, 2012 11:47 AM
To: Afif El-Hasan (Afif.h.el-hasan@kp.org); David Czamanske (dczamanske@hotmail.com); Ed Laird (elaird@coatingsresource.com); Emily Nelson (dremilynelson@gmail.com); makeoverearth.com, gary; Greg Adams (gadams@lacsd.org); J. Wayne Miller (wayne.miller@ucr.edu); John Froines (jfroines@ucla.edu); Lester, Julia; Mike Wang (mwang@wspa.org); radtech.org, rita; Robert McConnell (rmcconne@usc.edu); Sam Soret (ssoret@llu.edu); Todd Campbell (tcampbell@cleanenergyfuels.com); Walter Siembab (ws@siembab.com); William LaMarr (BillLaMarr@msn.com)
Cc: Elaine Chang; Barbara Baird; Michael Krause; Marilyn Traynor
Subject: Review of Health Effects - 2012 AQMP Draft Appendix I

Greetings to all,

I want to thank all of you for agreeing to participate on the AQMD's Advisory Council, and provide an update to our schedule.

As you know, Section 40471 of the California Health and Safety Code calls for the periodic preparation of a report on the health impacts of particulate matter air pollution in the South Coast Air Basin as part of the Air Quality Management Plan (AQMP) revisions. The report is to be submitted to the Advisory Council for review and comment.

We have prepared a draft of the report on PM2.5, which also includes other air pollutant health impacts, as a draft Appendix I to the 2012 AQMP. The draft Appendix I is attached for your review.

We have scheduled a meeting of the Advisory Council to provide comments to District staff. The details are below.

Date: Wednesday, July 11, 2012
Time: 2:00 p.m.-4:00 p.m.
Place: SCAQMD Conference Room CC-8

Please send any written comments you might have to me by July 11, 2012. Electronic format is preferred. All comments received will be attached to the Appendix when it is released in final form.

The Advisory Council is subject to the California open meetings regulations. Please do not copy other Advisory Council members regarding your comments. There will be opportunity for discussion at the meeting on July 11. The Advisory Council Roster is attached for your information.

Thanks again, and please let me know if I can provide any additional information.

Jean Ospital
Health Effects Officer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765
Phone: 909-396-2582
Fax: 909-396-3324
email: jospital@aqmd.gov

WATER RECLAMATION
SOLID WASTE MANAGEMENT

COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

1955 Workman Mill Road, Whittier, CA 90601-1400
Mailing Address: P.O. Box 4998, Whittier, CA 90607-4998
Telephone: (562) 699-7411, FAX: (562) 699-5422
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GRACE ROBINSON CHAN
Chief Engineer and General Manager

July 10, 2012
File No.: 31-380.10

Jean Ospital, Dr.P.H.
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, California 91765-4182

Dear Dr. Ospital:

Comments on Appendix I: Health Effects
Draft 2012 Air Quality Management Plan

Thank you for the opportunity to represent Los Angeles County Sanitation Districts and Supervisor Antonovich in submitting these brief comments on Appendix I of the 2012 Draft Air Quality Management Plan. As you well know, the AQMP presents varying degrees of significant impacts on all the residents of the air basin, and we recognize the staff's considerable efforts to address many of those in the AQMP as specifically as possible and applaud your efforts. We have the following comments on Appendix I and the health aspects draft 2012 AQMP.

1. Consider implementing the most beneficial control measures healthwise-speaking first. While there is the obligatory ranking of control measures with respect to cost effectiveness, another permutation on this might be showing the reduction in population exposure per control measure, if such a calculation can be made. Implementing the most beneficial measures healthwise first might also garner more popular support for the plan.

2. We raised a concern as to the focus of air toxics measures in the 2007 AQMP and are not certain we ever got a response and will take this opportunity to raise it again. On Page I-25 of the 2012 Appendix I, the basinwide cancer risk is reported to be 1200 in a million, largely the impact of Diesel particulate matter and other mobile source emissions. We also look again at Dr. Thomas Mack's 2004 work Cancers in the Urban Development[1], a detailed study "atlas" of three quarters of a million cancer types reported to the Cancer Surveillance Program at USC by mostly L.A. County doctors between 1972 and 1998. With the exception of high-risk tracts around the 405, 605,105, and 710 freeways and some areas between the two ports (we will return to this) the L.A. County rates for nose and throat, all types of lung and bronchus carcinomas, papillary

[1] Cancers in the Urban Environment *Patterns of Malignant Disease in Los Angeles County and Its Neighborhoods*; Thomas Mack, Dept. of Preventive Medicine, Keck School of Medicine, Norris Comprehensive Cancer Center, University of Southern California; Elsevier Academic Press, 2004.

DM# 2294914

Recycled Paper

carcinoma of the thyroid, squamous bladder carcinoma, diffuse mixed B-cell non-Hogkin lymphoma were similar to the national rate while prostrate carcinoma, brain malignancies, small cell carcinoma of the lung and bronchus, adenocarcinoma of the lung and bronchus were slightly lower than the national rate. In the last paragraph on Page 7 of the 645 page tome, in a section entitled *Environmental and Other Causes of Cancer* the author states,"...no local increase in cancer due to pollution has yet been clearly identified in the United States. Even such highly publicized sites of pollution as the Love Canal, Three Mile Island and those popularized in the movies *Erin Brockovich* and *A Civil Action* did not produce clear evidence of a cancer excess, although each of these examples of irresponsible industrial contamination represented a clear potential danger to local residents and may have produced other medical problems." In the very last sentence of that same book on Page 645, Dr. Mack also states, "As of this writing, no evidence of a malignancy caused by a strictly environmental carcinogen has yet been confirmed."

Several types of cancers unfortunately seem more prevalent around certain freeways and between the ports and these are worthy of more study. We believe the AQMP should focus on acute and chronic effects of non-carcinogenic air pollution as a priority, while the localized impacts around freeways and ports is further studied for their carcinogenic health effects.

3. We believe that some analysis of indoor air quality and the PM2.5 attainment plan is appropriate at this time. A significant portion of human exposure to PM2.5 occurs indoors where people spend ~85-90% of their time.[2]

We thank you for this opportunity to comment.

Very truly yours,

Grace Robinson Chan

Gregory M. Adams

Gregory M. Adams
Assistant Departmental Engineer
Air Quality Engineering
Technical Services Department

GMA:bb

cc: Debbie Mendelsohn

---

[2] Journal of the Air and Waste Management Association, March 2007, *Indoor/Outdoor Relationships, Trends, and Carbonaceous Content of Fine Particulate Matter in Retirement Homes of the Los Angeles Basin,* p.366.

From:	Afif Elhasan
To:	Jean Ospital
Cc:	Elaine Chang
Subject:	AQMP comments-Elhasan
Date:	Tuesday, July 10, 2012 5:59:42 AM
Attachments:	AQMP-Elhasan1.doc

I'll see you at the meeting tomorrow. Attached are some comments.

best regards-afif

Comments on the “Draft 2012 AQMP Appendix I-Health Effects”

From Afif El-Hasan, MD, Member-Environmental Justice Committee, AQMD

The 2012 AQMP Draft Report on Health Effects summarized the deleterious effects of a number of airborne pollutants. I would like to make the following comments:

Lower income populations tend to live in closer proximity to freeways, large volume transportation corridors or other sources of man-made air pollution. Other factors compounding the issue include reduced use of air conditioning (more open windows) and less use of auto transportation (more walking in polluted areas and using bikes/buses). This population also has less access to routine medical care, inhaled anti-inflammatory medication for chronic lung disease, and antibiotics for infection. These environmental and socioeconomic factors must be taken into account in future population studies on the effects of air pollution.

Obesity must be addressed in these studies. Decreased activity due to poor outside air quality, lung disease, asthma, and lack of access to healthier (more expensive) food are all contributors to obesity. In turn, obesity increases the prevalence of asthma, lung disease, cardiovascular disease and cancer. Physical activity then becomes further decreased which leads to further health issues. Fat cells can also store lipid soluble chemicals that are absorbed from the environment. This may possibly contribute to the body’s deterioration with chronic exposure to pollutants.

Pregnancy is another unique and serious issue. Pregnancy is associated with reduced lung function at a time when the mother’s lungs and cardiovascular system are supporting both the mother and the child. At the same time, the fetus is vulnerable to chemical exposure at a critical time in development. The human toll to the family of a baby with health problems and the cost to society of a premature infant or an infant with birth defects makes protection of the pregnant women a priority from a public health standpoint.

Studies have suggested a decrease in mental function associated with exposure to air pollution. This has been documented in adults with chronic exposure to high levels of air pollution, and in children born and raised in these areas. When establishing values for safe levels of pollution in the air, risks to cognitive function must be addressed. This is especially important for children who may attend schools or use parks that are in close proximity to freeways and other transportation corridors.

California Autobody Association

California Cleaners Association

California Film Extruders & Converters Association

California Furniture Manufacturers Association

California Independent Petroleum Association

Construction Industry Air Quality Coalition

Korean Drycleaners-Laundry Association of Southern California

Metal Finishing Association of Southern California

Printing Industries of California

Screenprinting & Graphic Imaging Association International

Southern California Rock Products Association

July 11, 2012

Jean Ospital, Dr. P.H.
Health Effects Officer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: Comments on Appendix I Draft 2012 Air Quality Management Plan

Dear Dr. Ospital:

I appreciate the opportunity to represent the Home Rule Advisory Group (HRAG) in submitting comments on the draft report on $PM_{2.5}$, and other air pollutant health impacts, as they are set forth in Appendix I of the 2012 Draft Air Quality Management Plan (AQMP). Speaking on behalf of the HRAG, we understand that the AQMP promises to have significant impacts on all who are participating in the process and applaud the time and effort required to produce a thorough and feasible plan.

Following are my comments:

In the draft, considerable effort has gone into explaining the adverse health effects associated with exposure to air pollutants and toxic air contaminants and linking it with increases in illness (morbidity) and increases in death rates (mortality). On Page I-25, for example, the report states that the cancer risk throughout the South Coast Air Basin (SCAB) is 1200 in a million and largely attributable to diesel exhaust from mobile sources, accounting for as much as 84% of the air toxics risk. This is confirmed by the chart (Figure 2) on Page I-26, showing "*Major pollutants contributing to Air Toxics Cancer Risks in the South Coast Air Basin,*" and Table 9, on Page I-26: "*Key Toxic Air Contaminants in the SCAB.*"

While stationary sources and mobile sources contribute to the overall cancer risk, clearly, the latter is the major contributor and should warrant the greatest and most immediate attention from a regulatory, as well as a health effects perspective. It has been discouraging, from our participation in the AQMP Advisory Group meetings, to learn that suggested strategies for reducing diesel exhaust from mobile sources seem to be more voluntary than prescriptive and don't appear to have the same degree of urgency as those for stationary sources.

We also noticed that a number of reviews, analyses and studies on the effects of air pollution, ozone, and particulate matter are cited throughout the report. Some of this research was done on a national and international level, and some was done in specific cities throughout the United States. One study which is specific to California, and involved a cohort of individuals from 11 California counties, was conducted by Dr. James E. Enstrom, and represents a contrarian perspective of the $PM_{2.5}$ and mortality relationship. Little coverage of the study, and the significance of the findings, is given in the report. Other relevant scientific data which can be found in research by Dr. Robert Phalen's book: "*The Particulate Air Pollution Controversy*" would be a useful and instructive addition to the final version of this report. One other body of research which has been completely overlooked or disregarded in this report is "*Cancers in the Urban Environment*," by Dr. Thomas M. Mack.

This research appears to be extremely relevant because it is focused on patterns of malignant disease in Los Angeles County and its neighborhoods. In his book, Dr, Mack discusses many cases involving nonrandom, geographic variations, thus indicating that factors other than chance determine the pattern of community incidence. Among the factors known to be responsible for individual malignancies are personal experiences other than occupational exposures. Some of these are habits, recreational preferences, past reproductive and medial events, and genetic inheritance.

In at least six instances in his book the geographic distribution of high risk of disease was clearly nonrandom, but did not conform to the pattern that would have been predicted by available knowledge. The malignancies in question included oropharyngeal carcinoma, small cell carcinoma and adenocarcinoma of the lung, papillary carcinoma of the thyroid, squamous carcinoma of the bladder, and diffuse mixed B-cell non-Hodgkin lymphoma. According to Dr. Mack, the true explanation for none of these patterns is currently known, although educated guesses provide tentative hypotheses that are currently still be evaluated. As a final statement in his book, Dr. Mack states that "*as of this writing, no evidence of a malignancy caused by a strictly environmental carcinogen has yet been confirmed.*"

In December 2006, when commenting on the 2007 AQMP, I raised a concern about the methodology used by a district consultant when attempting to quantify the health effects from improvements in levels of $PM_{2.5}$ and ozone and assigning economic values to those same health effects for that AQMP. Our comments were made out of concern for the environment, as well as for the health and welfare of the workforce, our families, and the general public. Another reason for expressing my concern and commenting on this aspect of the 2007 AQMP was over the alarming and ever increasing cost of compliance with the rules that are ultimately promulgated after every AQMP. Just as the cost of health care continues to rise, so does the cost of compliance.

We were encouraged to read on Page I-13 of the report that the district acknowledges that more research is needed to better assess the relative effects of fine ($PM_{2.5}$) and coarse ($PM_{10-2.5}$) fractions of particulate matter on mortality. It is common knowledge that the district and much if not all of the business community differs over the methodology used to measure the costs and benefits associated with certain emissions and/or risk reduction strategies. We hope that these differences can be quickly and amicably resolved.

As a way of emphasizing the importance of realistically measuring costs and benefits for control strategies, I would like to mention that at the time the 2007 AQMP was being drafted the unemployment rate in the Los Angeles County was 4.7%. The 2007 Budget Act signed by then Governor Schwarzenegger included the largest reserve of any budget act in the state's history. Today, while the state of our air quality continues to improve the state of our economy and the availability of jobs has worsened. If the goal of the AQMP is to improve air quality, reduce the adverse health impacts of particulate matter and exposure to toxic air contaminants, it is essential that the Plan represents the needs of all stakeholders. For the business community this means that control measures must be more than just feasible, they must be reasonable, acceptable to industry, and cost effective, as measured by a standard or standards which are suitable to business.

Finally, when reading the last sentence on Page I-3: "*Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality,* ***but not cardiovascular causes, when $PM_{2.5}$ exposure were also included in the analysis,***" we believe there is a conflict with a statement made on Page I-10, halfway down the page beginning with the sentence: "*The major types of effects associated with particulate matter include:*

- *Increased mortality*
- *Exacerbation of respiratory disease* ***and of cardiovascular disease*** *as evidenced by increases in:*
    - *Respiratory symptoms*
    - *Hospital admissions and emergency room visits*
    - *Physician office visits*
    - *School absences*
    - *Work loss days*
- *Effects on lung function*
- *Changes in lung morphology*

Legitimate scientific research - regardless of the point of view - should be part of the collaborative process between the district and relevant stakeholders, if we are to create a better consensus on how to improve air quality as required by existing law while simultaneously improving the region's economy.

In closing, I want to express my sincere appreciation for inviting me to serve on the AQMP Advisory Group and on the AQMD Advisory Council, and thank you for the opportunity to comment on this important Appendix to the 2012 AQMP.

Yours very truly,

Bill La Marr
Executive Director
California Small Business Alliance

From: Julia Lester [mailto:JLester@environcorp.com]
Sent: Wednesday, July 11, 2012 9:36 PM
To: Jean Ospital
Subject: Great meeting today!

Jean,

At our meeting today, I promised to send you two things tonight. Here you go:

- Latest MSAT list
    - Reference: http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/100109guidmem.pdf
    - From the document:
      "EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are *acrolein, benzene, 1,3-butidiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter*."
- EPA figure on progression of new standards
    - I'm still checking my citations for the presentation I remember. I will have to send it later.

I thought that the discussion at the meeting today was very thought provoking. As I mentioned, I thought that the draft Appendix I did a nice job describing and summarizing the latest pertinent health studies (by pollutant).

Regards,

Julia

ENVIRON

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From:	Rob McConnell
To:	Jean Ospital
Cc:	Marilyn Traynor
Subject:	FW: Review of Health Effects - 2012 AQMP Draft Appendix I
Date:	Monday, July 09, 2012 7:28:20 AM
Attachments:	2012 AQMP Appendix I Draft 06-05-2012.pdf

Dear Dr. Ospital,

I attach the AQMP health effects appendix with a few comments embedded in the text. In general, I think this is a good summary drawing on the key studies and reviews conducted as the foundation for regulatory decisions by EPA staff and CARB.

Although there is a review of toxicity of ultrafine particles, there is no mention of the strong emerging epidemiological evidence that near-roadway exposures cause asthma and ischemic heart disease. Ultrafine particles are a leading candidate for the causal component of the near-roadway mixture. I know you have administrative constraints based on the current regulatory framework and the evidence base, and the current lack of a standard covering UF particles. However, if ultrafine particles are to be reviewed, the near-roadway literature may deserve some mention. Dr. Nino Kunzli, a world expert on the health effects of air pollution, recently published an editorial (I believe it was in the European Respiratory Journal) calling for regulation of ultrafine PM fraction.

Hope this is useful. Will there be a full AQMP that we will be asked to review later or is the extent of our commitment/obligation in this regard?

As I indicated to you earlier, it's unlikely I'll be able to join you on the 11th, but I'd be happy to review any follow-up documents or comment on any discussion items that correspond to my area of expertise.

Sincerely,

Rob McConnell MD
Professor of Preventive Medicine.
Keck School of Medicine
University of Southern California

The major subgroups of the population considered to be at increased risk from ozone exposure are outdoor exercising individuals, including children, and people with preexisting respiratory disease(s) such as asthma. The data base identifying the former group as being at increased risk to ozone exposure is much stronger and more quantitative than that for the latter group, probably because of a larger number of studies conducted with healthy individuals. The adverse effects reported with short-term ozone exposure are greater with increased activity because activity increases the breathing rate and the volume of air reaching the lungs, resulting in an increased amount of ozone reaching the lungs. Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher ventilation rate than adults.

A number of adverse health effects associated with ambient ozone levels have been identified from laboratory and epidemiological studies (EPA, 1996; 2006, 2011; ATS, 1996). These include increased respiratory symptoms, damage to cells of the respiratory tract, decrease in lung function, increased susceptibility to respiratory infection, and increased risk of hospitalization.

Increases in ozone levels are associated with elevated absences from school. The Children's Health Study, conducted by researchers at the University of Southern California, followed a cohort of children that live in 12 communities in Southern California with differing levels of air pollution for several years. A publication from this study reported that school absences in fourth graders for respiratory illnesses were associated with ambient ozone levels. An increase of 20 ppb ozone was associated with an 83% increase in illness-related absence rates (Gilliland, 2001).

The number of hospital admissions and emergency room visits for all respiratory causes (infections, respiratory failure, chronic bronchitis, etc.) including asthma shows a consistent increase as ambient ozone levels increase in a community. These excess hospital admissions and emergency room visits are observed when hourly ozone concentrations are as low as 0.06 to 0.10 ppm.

Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).

Multicity studies of short-term ozone exposures (days) and mortality have also examined regional differences. Evidence was provided that there were generally higher ozone-mortality risk estimates in northeastern U.S. cities, with the southwest and urban mid-west cities showing lower or no associations (Smith, 2009; Bell, 2008). Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality, but not

Summary of Comments on 2012 AQMP Appendix I Draft 06-05-2012.pdf

Page: 11

Author: rmcconne Subject: Sticky Note Date: 7/10/2012 10:54:29 AM

Not mutually exclusive. I think the exercising asthmatic children are one of the more studied at risk groups. Exercise in non-asthma causing new onset depends largely on our study, which has gotten a lot of attention because design was strong.

For a given mass concentration, ultrafine particles have much higher numbers and surface area compared to larger particles. Particles can act as carriers for other adsorbed agents, such as trace metals and organic compounds; and the larger surface area may transport more of such toxic agents than larger particles.

Smaller particles can also be inhaled deep into the lungs. As much as 50% of 0.02 µm diameter particles are estimated to be deposited in the alveolar region of the lung. There is complex nature of the relation between deposition and particle size. The ultrafine particles generally have higher fractional deposition in the alveolar region. However, for the smaller nucleation mode (particles less than 0.01 µm size) the deposition in the alveolar region declines, but increases in the extrathoracic region.

Exposures of laboratory animals to ultrafine particles have found cardiovascular and respiratory effects. Mice exposed to concentrated near roadway ultrafine particles showed larger early atherosclerotic lesions than mice exposed to PM2.5 or filtered air (Aru[illegible] 2008). In a mouse allergy model, exposures to concentrated ultrafine particles resulted in a greater response to antigen challenge to ovalbumin (Li, 2010), indicating that vehicular traffic exposure could exacerbate allergic inflammation in already-sensitized animals.

Controlled exposures of human volunteers to ultrafine particles either laboratory generated or as products of combustion, such as diesel exhaust containing particles, have found physiological changes related to vascular effects. Mills, 2011, for example found exposure to diesel exhaust particulate attenuated both acetylcholine and sodium-nitroprusside -induced vasorelaxation.

There are no long-term studies of human population exposure to ultrafine particle, as there is a lack of a monitoring network in the U.S. There have been several cross sectional epidemiological studies of ultrafine particles, mainly from Europe. Some of these studies found effects on hospital admissions, emergency department visits, for respiratory and cardiovascular effects. Other studies, however, have not found such effects (EPA, 2009). Concentrations of ultrafine particles can vary geographically, and it is not clear how well central site monitors may capture actual exposures.

EPA staff has presented conclusions on causal determination of several health effects of ultrafine PM based on a recent review of the available scientific studies (EPA, 2009). These are depicted in the table below.

Page: 27

Author: rmcconne Subject: Sticky Note Date: 7/10/2012 10:54:29 AM
spelled Araujo

Author: rmcconne Subject: Sticky Note Date: 7/10/2012 10:54:29 AM
I think most have been time series studies rather than cross sectional, but you might check to be sure.

The Children's Health Study in Southern California found associations of air pollution, including NO_2, PM10, and PM2.5, with respiratory symptoms in asthmatics (McConnell, 1999). Particles and NO_2 were correlated, and effects of individual pollutants could not be discerned. A subsequent analysis indicated a stronger role for NO_2 (McConnell, 2002).

Ambient levels of NO_2 were also associated with a decrease in lung function growth in a group of children followed for eight years. In addition to NO_2, the decreased growth was also associated with particulate matter and airborne acids. The study authors postulated that these may be a measure of a package of pollutants from traffic sources. (Gauderman, 2004).

Results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (bronchial reactivity). Effects were observed with exposures from 0.1 to 0.3 ppm NO_2 for periods ranging from 30 minutes to 3 hours. A similar response is reported in some studies with healthy subjects at higher levels of exposure (1.5 - 2.0 ppm). Mixed results have been reported when people with chronic obstructive lung disease are exposed to low levels of NO_2.

Short-term controlled studies of animals exposed to NO_2 over a period of several hours indicate cellular changes associated with allergic and inflammatory response and interference with detoxification processes in the liver. In some animal studies the severity of the lung structural damage observed after relatively high levels of short-term ozone exposure is observed to increase when animals are exposed to a combination of ozone and NO_2.

In animals, longer-term (3-6 months) repeated exposures at 0.25 ppm appear to decrease one of the essential cell-types (T-cells) of the immune system. Non-specific changes in cells involved in maintaining immune functions (cytotoxic T-cells and natural killer cells) have been observed in humans after repeated exposure (4-6 days) to >0.6 ppm of NO_2 (20 min. - 2 hours). All these changes collectively support the observation reported both in population and animal studies of increased susceptibility to infections, as a result of NO_2 exposure.

The U.S. EPA recently adopted a new short-term standard of 100 ppb (0.1 ppm) averaged over 1 hour. The standard was designed to protect against increases in airway reactivity in individuals with asthma observed in controlled exposure studies, as well as respiratory symptoms observed in epidemiological studies.

SULFUR DIOXIDE

Controlled laboratory studies involving human volunteers have clearly identified asthmatics as the most sensitive group to the effects of ambient sulfur dioxide ($SO_{2)}$ exposures. Healthy subjects have failed to demonstrate any short-term respiratory functional changes at exposure levels up to 1.0 ppm over 1-3 hours.

Page: 31

Author: rmcconne Subject: Sticky Note Date: 7/10/2012 10:54:29 AM

You don't draw conclusion but implies something stronger than what I think the results actually support...

Jean Ospital

From: Wayne Miller [wayne@cert.ucr.edu]
Sent: Wednesday, July 11, 2012 11:06 AM
To: Jean Ospital
Cc: Marilyn Traynor
Subject: RE: Advisory Council meeting at 2:00 p.m. on July 11, 2012 @ SCAQMD in CC-8 re: Review of Health Effects-2012 AQMP Draft Appendix I
Attachments: June 2012 IARC.pdf

Jean .. Nice work and addition for the AQMP. My two suggestions focus on the PM section.

First, while PM is a criteria pollutant and part of NAAQS, the introduction should mention that it is legally a Toxic Air Contaminant California and
words along CARB's introductory language for diesel PM might be appropriate.

Background on Diesel Health Effects (http://www.arb.ca.gov/research/diesel/diesel-health.htm)

Diesel engines emit a complex mixture of air pollutants, composed of gaseous and solid material. The visible emissions in diesel exhaust are known as particulate matter or PM. In 1998, California identified diesel exhaust particulate matter (PM) as a toxic air contaminant based on its potential to cause cancer, premature death, and other health problems. Diesel engines also contribute to California's fine particulate matter (PM2.5) air quality problems. Those most vulnerable are children whose lungs are still developing and the elderly who may have other serious health problems. Based on year 2006-2008 emissions in California, diesel PM contributes each year to approximately 2,000 premature deaths, with an uncertainty range of 1,500 to 2,400.

Second, while their report came out after your report, it would be valuable to add the recent finding of IRAC: " as of June 12, 2012 " the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), today classified diesel engine exhaust as carcinogenic to humans (Group 1), based on sufficient evidence that exposure is associated with an increased risk for lung cancer." The press release is attached ..

Respectfully submitted, Wayne Miller,PhD

International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
N° 213

12 June 2012

IARC: DIESEL ENGINE EXHAUST CARCINOGENIC

Lyon, France, June 12, 2012 -- After a week-long meeting of international experts, the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), today classified diesel engine exhaust as **carcinogenic to humans (Group 1)**, based on sufficient evidence that exposure is associated with an increased risk for lung cancer.

Background
In 1988, IARC classified diesel exhaust as *probably carcinogenic to humans (Group 2A)*. An Advisory Group which reviews and recommends future priorities for the IARC Monographs Program had recommended diesel exhaust as a high priority for re-evaluation since 1998.

There has been mounting concern about the cancer-causing potential of diesel exhaust, particularly based on findings in epidemiological studies of workers exposed in various settings. This was re-emphasized by the publication in March 2012 of the results of a large US National Cancer Institute/National Institute for Occupational Safety and Health study of occupational exposure to such emissions in underground miners, which showed an increased risk of death from lung cancer in exposed workers (1).

Evaluation
The scientific evidence was reviewed thoroughly by the Working Group and overall it was concluded that there was *sufficient evidence* in humans for the carcinogenicity of diesel exhaust. The Working Group found that diesel exhaust is a cause of lung cancer (*sufficient evidence*) and also noted a positive association (*limited evidence*) with an increased risk of bladder cancer (Group 1).

The Working Group concluded that gasoline exhaust was possibly carcinogenic to humans (Group 2B), a finding unchanged from the previous evaluation in 1989.

Public health
Large populations are exposed to diesel exhaust in everyday life, whether through their occupation or through the ambient air. People are exposed not only to motor vehicle exhausts but also to exhausts from other diesel engines, including from other modes of transport (e.g. diesel trains and ships) and from power generators.

Given the Working Group's rigorous, independent assessment of the science, governments and other decision-makers have a valuable evidence-base on which to consider environmental standards for diesel exhaust emissions and to continue to work with the engine and fuel manufacturers towards those goals.

Increasing environmental concerns over the past two decades have resulted in regulatory action in North America, Europe and elsewhere with successively tighter emission standards for both diesel and gasoline engines. There is a strong interplay between standards and technology – standards drive technology and new technology enables more stringent standards. For diesel engines, this required changes in the fuel such as marked decreases in sulfur content, changes in engine design to burn diesel fuel more efficiently and reductions in emissions through exhaust control technology.

However, while the amount of particulates and chemicals are reduced with these changes, it is not yet clear how the quantitative and qualitative changes may translate into altered health effects; research into

IARC: Diesel engines exhaust carcinogenic

this question is needed. In addition, existing fuels and vehicles without these modifications will take many years to be replaced, particularly in less developed countries, where regulatory measures are currently also less stringent. It is notable that many parts of the developing world lack regulatory standards, and data on the occurrence and impact of diesel exhaust are limited.

Conclusions
Dr Christopher Portier, Chairman of the IARC working Group, stated that "The scientific evidence was compelling and the Working Group's conclusion was unanimous: diesel engine exhaust causes lung cancer in humans." Dr Portier continued: "Given the additional health impacts from diesel particulates, exposure to this mixture of chemicals should be reduced worldwide."(2)

Dr Kurt Straif, Head of the IARC Monographs Program, indicated that "The main studies that led to this conclusion were in highly exposed workers. However, we have learned from other carcinogens, such as radon, that initial studies showing a risk in heavily exposed occupational groups were followed by positive findings for the general population. Therefore actions to reduce exposures should encompass workers and the general population."

Dr Christopher Wild, Director, IARC, said that "while IARC's remit is to establish the evidence-base for regulatory decisions at national and international level, today's conclusion sends a strong signal that public health action is warranted. This emphasis is needed globally, including among the more vulnerable populations in developing countries where new technology and protective measures may otherwise take many years to be adopted."

Summary evaluation
The summary of the evaluation will appear in The Lancet Oncology as an online publication ahead of print on June 15, 2012.

(1) JNCI J Natl Cancer Inst (2012) doi:10.1093/jnci/djs034
http://jnci.oxfordjournals.org/content/early/2012/03/05/jnci.djs034.abstract; and
JNCI J Natl Cancer Inst (2012) doi: 10.1093/jnci/djs035
http://jnci.oxfordjournals.org/content/early/2012/03/05/jnci.djs035.abstract

(2) Dr Portier is Director of the National Center for Environmental Health and the Agency for Toxic Substances and Disease Registry at the Centers for Disease Control and Prevention (USA).

For more information, please contact
Dr Kurt Straif, **IARC Monographs Section**, at +33 472 738 507, or **straifk@iarc.fr**;
Dr Lamia Tallaa, **IARC Monographs Section**, at +33 472 738 385, or **tallaal@iarc.fr**;
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Fadela Chaib, WHO News Team, at +41 79 475 55 56, or **chaibf@who.int.**

Link to the **audio file** posted shortly after the media briefing:
http://terrance.who.int/mediacentre/audio/press_briefings/

About IARC
The International Agency for Research on Cancer (IARC) is part of the World Health Organization. Its mission is to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control. The Agency is involved in both epidemiological and laboratory research and disseminates scientific information through publications, meetings, courses, and fellowships.

IARC: Diesel engines exhaust carcinogenic

Annexes

Evaluation groups - Definitions

Group 1: *The agent is carcinogenic to humans.*
This category is used when there is *sufficient evidence of carcinogenicity* in humans. Exceptionally, an agent may be placed in this category when evidence of carcinogenicity in humans is less than *sufficient* but there is *sufficient evidence of carcinogenicity* in experimental animals and strong evidence in exposed humans that the agent acts through a relevant mechanism of carcinogenicity.

Group 2.
This category includes agents for which, at one extreme, the degree of evidence of carcinogenicity in humans is almost *sufficient*, as well as those for which, at the other extreme, there are no human data but for which there is evidence of carcinogenicity in experimental animals. Agents are assigned to either Group 2A (*probably carcinogenic to humans*) or Group 2B (*possibly carcinogenic to humans*) on the basis of epidemiological and experimental evidence of carcinogenicity and mechanistic and other relevant data. The terms *probably carcinogenic* and *possibly carcinogenic* have no quantitative significance and are used simply as descriptors of different levels of evidence of human carcinogenicity, with *probably carcinogenic* signifying a higher level of evidence than *possibly carcinogenic*.

- **Group 2A:** The agent is *probably carcinogenic to humans*.
  This category is used when there is *limited evidence of carcinogenicity* in humans and *sufficient evidence of carcinogenicity* in experimental animals. In some cases, an agent may be classified in this category when there is *inadequate evidence of carcinogenicity* in humans and *sufficient evidence of carcinogenicity* in experimental animals and strong evidence that the carcinogenesis is mediated by a mechanism that also operates in humans. Exceptionally, an agent may be classified in this category solely on the basis of *limited evidence of carcinogenicity* in humans. An agent may be assigned to this category if it clearly belongs, based on mechanistic considerations, to a class of agents for which one or more members have been classified in Group 1 or Group 2A.

- **Group 2B:** The agent is *possibly carcinogenic to humans*.
  This category is used for agents for which there is *limited evidence of carcinogenicity* in humans and less than *sufficient evidence of carcinogenicity* in experimental animals. It may also be used when there is *inadequate evidence of carcinogenicity* in humans but there is *sufficient evidence of carcinogenicity* in experimental animals. In some instances, an agent for which there is *inadequate evidence of carcinogenicity* in humans and less than *sufficient evidence of carcinogenicity* in experimental animals together with supporting evidence from mechanistic and other relevant data may be placed in this group. An agent may be classified in this category solely on the basis of strong evidence from mechanistic and other relevant data.

Group 3: The agent is *not classifiable as to its carcinogenicity to humans*.
This category is used most commonly for agents for which the evidence of carcinogenicity is *inadequate* in humans and *inadequate* or *limited* in experimental animals.
Exceptionally, agents for which the evidence of carcinogenicity is *inadequate* in humans but *sufficient* in experimental animals may be placed in this category when there is strong evidence that the mechanism of carcinogenicity in experimental animals does not operate in humans.
Agents that do not fall into any other group are also placed in this category.

An evaluation in Group 3 is not a determination of non-carcinogenicity or overall safety. It often means that further research is needed, especially when exposures are widespread or the cancer data are consistent with differing interpretations.

IARC, 150 Cours Albert Thomas, 69372 Lyon CEDEX 08, France - Tel: +33 (0)4 72 73 84 85 - Fax: +33 (0)4 72 73 85 75

IARC: Diesel engines exhaust carcinogenic

Group 4: The agent is *probably not carcinogenic to humans*.
This category is used for agents for which there is *evidence suggesting lack of carcinogenicity* in humans and in experimental animals. In some instances, agents for which there is *inadequate evidence of carcinogenicity* in humans but *evidence suggesting lack of carcinogenicity* in experimental animals, consistently and strongly supported by a broad range of mechanistic and other relevant data, may be classified in this group.

Evidence for studies in humans - Definition

As shown previously, the evidence relevant to carcinogenicity is evaluated using standard terms. For studies in humans, evidence is defined into one of the following categories:

Sufficient evidence of carcinogenicity: The Working Group considers that a causal relationship has been established between exposure to the agent and human cancer. That is, a positive relationship has been observed between the exposure and cancer in studies in which chance, bias and confounding could be ruled out with reasonable confidence. A statement that there is *sufficient evidence* is followed by a separate sentence that identifies the target organ(s) or tissue(s) where an increased risk of cancer was observed in humans. Identification of a specific target organ or tissue does not preclude the possibility that the agent may cause cancer at other sites.

Limited evidence of carcinogenicity: A positive association has been observed between exposure to the agent and cancer for which a causal interpretation is considered by the Working Group to be credible, but chance, bias or confounding could not be ruled out with reasonable confidence.

Inadequate evidence of carcinogenicity: The available studies are of insufficient quality, consistency or statistical power to permit a conclusion regarding the presence or absence of a causal association between exposure and cancer, or no data on cancer in humans are available.

Evidence suggesting lack of carcinogenicity: There are several adequate studies covering the full range of levels of exposure that humans are known to encounter, which are mutually consistent in not showing a positive association between exposure to the agent and any studied cancer at any observed level of exposure. The results from these studies alone or combined should have narrow confidence intervals with an upper limit close to the null value (e.g. a relative risk of 1.0). Bias and confounding should be ruled out with reasonable confidence, and the studies should have an adequate length of follow-up. A conclusion of *evidence suggesting lack of carcinogenicity* is inevitably limited to the cancer sites, conditions and levels of exposure, and length of observation covered by the available studies. In addition, the possibility of a very small risk at the levels of exposure studied can never be excluded.

In some instances, the above categories may be used to classify the degree of evidence related to carcinogenicity in specific organs or tissues.

From: Soret, Samuel (LLU) [mailto:ssoret@llu.edu]
Sent: Wednesday, July 11, 2012 9:12 PM
To: Jean Ospital
Subject: Appendix I: comments and articles

Jean:

Per our conversation during this afternoon's meeting, I am enclosing the mentioned articles:

1) Two studies provide new evidence that prenatal exposure to PAHs, at levels commonly encountered in New York City (and other urban areas), is associated with obesity in childhood (Rundle et al., 2012) and may adversely affect child behavior (anxiety, depression and attention problems; Perera et al., 2012).

Rundle et al. Association of Childhood Obesity With Maternal Exposure to Ambient Air Polycyclic Aromatic Hydrocarbons During Pregnancy. *Am J Epidemiol*. 2012 Jun 1;175(11):1163-72.

Perera et al. Prenatal Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Child Behavior at Age 6-7 Years. *Environ Health Perspect*. 2012 Jun;120(6):921-6.

2) According to a recent investigation by Loma Linda University scientists (Spencer-Hwang et al., 2011), for kidney transplant recipients, ambient ozone levels potentially are associated with higher risk of fatal CHD. For each 10-ppb increase in O3, risk of fatal coronary heart disease increased by 34% (95% confidence interval, 3%-76%) in models adjusted for sex, race, age, year of transplant, primary cause of kidney failure, months of pre-transplant dialysis, and PM10. Please note that the publication of this article was accompanied by an invited editorial (see attached pdf: "Laden editorial") on the same issue of the *American Journal of Kidney Diseases* by Francine Laden (Harvard School of Public Health) and Wolfgang Winkelmayer (Stanford University School of Medicine). While numerous studies exist on the effects of air pollution on health-related outcomes in the general population or certain subpopulations, this is the first study in patients with kidney disease. As pointed out by Laden, the overarching question is whether kidney transplant recipients (and possibly other organ recipients) should be considered a susceptible subpopulation in the context of the Clean Air Act. These patients experience states of increased inflammation and oxidative stress, which may make enhance their susceptibility to air pollution. In addition, transplant patients receive long-term immunosuppressive medication. Immunosuppression per se may increase subsequent health risks among these patients.

Spencer-Hwang et al. Ambient air pollutants and risk of fatal coronary heart disease among kidney transplant recipients. *Am J Kidney Dis*. 2011 Oct;58(4):608-16.

Best.

Sam

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From: Froines, John [jfroines@ucla.edu]
Sent: Monday, August 06, 2012 2:49 PM
To: Marilyn Traynor; Afif El-Hasan (Afif.h.el-hasan@bp.org); Afif El-Hasan (afifhaitham@yahoo.com); Bill LaMarr (BillLaMarr@msn.com); David Czamanske (dczamanske@hotmail.com); Ed Laird (elaird@coatingsresource.com); Emily Nelson (dremilynelson@gmail.com); makeoverearth.com, gary; Greg Adams (gadams@lacsd.org); Lester, Julia; wang, Michael; Mike Wang (mwang@wspa.org); radtech.org, rita; Rob McConnell (rmcconne@hsc.usc.edu); Rob McConnell (rmcconne@usc.edu); 'Soret, Samuel (LLU)'; Todd Campbell (tcampbell@cleanenergyfuels.com); Walter Siembab (ws@siembab.com); Wayne Miller (wayne.miller@ucr.edu); Wayne Miller (wayne@cert.ucr.edu)
Cc: Jean Ospital; Barbara Baird; Patti Anderson; Batteate, Christina
Subject: RE: The Advisory Council re: AQMP's Appendix I: comments and articles--Articles from Dr. Soret

To all: I have read the articles that were attached from Marilyn Traynor, and I feel it is important to comment on the PAH issue. There appears to be some belief that PAHs are the etiologic agents associated with increased health risk. However, the true etiologic agents are either epoxides, radical cations, or quinones, that is, products of metabolism or atmospheric chemistry. We have published research demonstrating that naphthalene and phenanthrene decreases as one goes east in the LA Basin whereas the levels of quinones increases as one travels from Santa Monica/Long Beach to Riverside.

The quinones are highly reactive and likely the key agents in the toxicity of PAHs. PAHs are surrogates, but there are important issues about the levels of PAHs in relation to PAH quinones. The research on PAHs is well meaning, but there needs to be a better understanding of the chemistry that results in toxicity. This is quite important. Our research at the Long Beach Railyard showed the highest PAHs, but the inflammatory markers were off the charts in San Bernadino. It makes a difference whether the key agents are properly understood. See Trevor Penning et al, Chemical Research in Toxicology, volume 12(1), 1999 and the myriad of papers that followed to the present. I hope this is of interest. The key in all this is that the primary etiologic agents from fossil fuels are prooxidant (ROS) pathways or binding with electrophilic agents. PAHs themselves require bioactivation or atmospheric chemistry to act toxicologically.

John Froines

From: Marilyn Traynor [mailto:MTraynor@aqmd.gov]
Sent: Thursday, August 02, 2012 10:22 AM
To: Afif El-Hasan (Afif.h.el-hasan@bp.org); Afif El-Hasan (afifhaitham@yahoo.com); Bill LaMarr (BillLaMarr@msn.com); David Czamanske (dczamanske@hotmail.com); Ed Laird (elaird@coatingsresource.com); Emily Nelson (dremilynelson@gmail.com); makeoverearth.com, gary; Greg Adams (gadams@lacsd.org); Froines, John; Lester, Julia; wang, Michael; Mike Wang (mwang@wspa.org); radtech.org, rita; Rob McConnell (rmcconne@hsc.usc.edu); Rob McConnell (rmcconne@usc.edu); 'Soret, Samuel (LLU)'; Todd Campbell (tcampbell@cleanenergyfuels.com); Walter Siembab (ws@siembab.com); Wayne Miller (wayne.miller@ucr.edu); Wayne Miller (wayne@cert.ucr.edu)
Cc: Jean Ospital; Barbara Baird; Patti Anderson
Subject: To: The Advisory Council re: AQMP's Appendix I: comments and articles--Articles from Dr. Soret

TO: The Advisory Council
RE: AQMP Appendix I-Health Effects

This message is sent by Marilyn Traynor on behalf of Jean Ospital, Health Effects Officer, SCAQMD

Attached are the studies that Dr. Soret discussed at the Advisory Council meeting on July 11, 2012.

Marilyn Traynor
Administrative Secretary
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mtraynor@aqmd.gov

From: Soret, Samuel (LLU) [mailto:ssoret@llu.edu]
Sent: Wednesday, July 11, 2012 9:12 PM
To: Jean Ospital
Subject: Appendix I: comments and articles

Jean:

Per our conversation during this afternoon's meeting, I am enclosing the mentioned articles:

1) Two studies provide new evidence that prenatal exposure to PAHs, at levels commonly encountered in New York City (and other urban areas), is associated with obesity in childhood (Rundle et al., 2012) and may adversely affect child behavior (anxiety, depression and attention problems; Perera et al., 2012).

Rundle et al. Association of Childhood Obesity With Maternal Exposure to Ambient Air Polycyclic Aromatic Hydrocarbons During Pregnancy. *Am J Epidemiol*. 2012 Jun 1;175(11):1163-72.

Perera et al. Prenatal Polycyclic Aromatic Hydrocarbon (PAH) Exposure and Child Behavior at Age 6-7 Years. *Environ Health Perspect*. 2012 Jun;120(6):921-6.

2) According to a recent investigation by Loma Linda University scientists (Spencer-Hwang et al., 2011), for kidney transplant recipients, ambient ozone levels potentially are associated with higher risk of fatal CHD. For each 10-ppb increase in O3, risk of fatal coronary heart disease increased by 34% (95% confidence interval, 3%-76%) in models adjusted for sex, race, age, year of transplant, primary cause of kidney failure, months of pre-transplant dialysis, and PM10. Please note that the publication of this article was accompanied by an invited editorial (see attached pdf: "Laden editorial") on the same issue of the *American Journal of Kidney Diseases* by Francine Laden (Harvard School of Public Health) and Wolfgang Winkelmayer (Stanford University School of Medicine). While numerous studies exist on the effects of air pollution on health-related outcomes in the general population or certain subpopulations, this is the first study in patients with kidney disease. As pointed out by Laden, the overarching question is whether kidney transplant recipients (and possibly other organ recipients) should be considered a susceptible subpopulation in the context of the Clean Air Act. These patients experience states of increased inflammation and oxidative stress, which may make enhance their susceptibility to air pollution. In addition, transplant patients receive long-term immunosuppressive medication. Immunosuppression per se may increase subsequent health risks among these patients.

Spencer-Hwang et al. Ambient air pollutants and risk of fatal coronary heart disease among kidney transplant recipients. *Am J Kidney Dis*. 2011 Oct;58(4):608-16.

Best.

Sam

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From: Emily Nelson
To: Jean Ospital
Cc: John J. Benoit
Subject: AQMP Appendix I comments
Date: Friday, August 31, 2012 12:33:28 PM

Hello Jean,

Thank you for the opportunity to participate in the SCAQMD Advisory Council with focus on health effects of PM10. I believe your summary of Health Effects of Air Pollution included as Appendix I of the Draft 2012 AQMP is a thorough and comprehensive update on the latest published scientific research.

The discussion at our Advisory Council meeting on July 11, 2012 was excellent. After a review of the Draft published in July, I am confident that you included our substantive comments within the scope of purpose for Appendix I. As new and ongoing research in conducted, it clarifies the mechanisms of the health effects and drives the regulatory standard review process.

It is exciting progress to have the Multiple Air Toxics Exposure Study IV include a year of ultrafine particulate monitoring at ten stations as well as near sources. For personal reasons, it would be rewarding to have the MATES from 1987 included in your references!

I look forward to reviewing your Draft Final in early September.

Sincerely,
Emily Nelson, D.Env.

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Marilyn Traynor

From: Marilyn Traynor
Sent: Wednesday, October 03, 2012 1:48 PM
To: Marilyn Traynor
Subject: FW: synthesis paper
Attachments: EHP-117-167.pdf

From: Froines, John [mailto:jfroines@ucla.edu]
Sent: Monday, September 17, 2012 9:10 AM
To: Jean Ospital
Cc: Batteate, Christina
Subject: FW: synthesis paper

Jean: Please use the attached as my contribution to the AQMP. One paper reflects Particle Center work up to 2009 and the second paper represents work to the present and it is in press. The two papers reflect the overview of the Particle Center efforts and are comphrehensive in nature. These papers are the most advanced documents on the topic of airborne particulate matter including ultrafines. Note that the papers represent my thinking as I am an author on both and was very actively involved in their preparation. You will see references to our work in the papers. The authors in the second paper (most recent) include two distinguished epidemiologists, Jonathan Samet and Ralph Delfino. As you know Ralph is a member of our Center and his work has been funded by AQMD. These papers represent the most advanced work in the field. You should use the papers as my comments since I am an author and they reflect my knowledge base.

Rob McConnell should review the epidemiology that is directly pertinent to issues in California including work by Burt Brunekreef on the mortality issues. I am not an epidemiologist and Rob would be the more appropriate person, since he can discuss the work of Jerrett, Enstrom, and Brunekreef. In addition AQMD is currently funding Dr. Art Cho on mechanistic issues relating to particles and vapors in relation to inflammation. This funded proposal reflects our mechanistic considerations.

The two EHP papers should be read and considered carefully as they represent the state of the art. The 2012 paper is in press and should not be quoted until I give the go ahead. Get back to me with questions.
John

NOTE: The first paper referenced above follows. The second paper is in press and is not included at this time. The reference follows:

[Breysse PN, Delfino RJ, Dominici F, Elder ACP, Frampton MW, Froines JR, Geyh AS, Godleski JJ, Gold DR, Hopke PK, Koutrakis P, Li N, Oberdörster G, Pinkerton KE, Samet JM, Utell MJ, Wexler AS. U.S. EPA Particulate Matter Research Centers: Summary of Research Results for 2005–2011. Air Quality, Atmosphere and Health. In Press (2012).]

A link will be provided to this document once it is published.

Particulate Matter (PM) Research Centers (1999–2005) and the Role of Interdisciplinary Center-Based Research

Elinor W. Fanning,[1] John R. Froines,[1] Mark J. Utell,[2] Morton Lippmann,[3] Gunter Oberdörster[2], Mark Frampton,[2] John Godleski,[4] and Tim V. Larson[5]

[1]Center for Environmental and Occupational Health, School of Public Health, University of California at Los Angeles, Los Angeles, California, USA; [2]University of Rochester Medical Center, Rochester, New York, USA; [3]New York University School of Medicine, New York, New York, USA; [4]Department of Environmental Health, Harvard University School of Public Health, Boston, Massachusetts, USA; [5]Department of Civil and Environmental Engineering, University of Washington, Seattle, Washington, USA

Objective: The U.S. Environmental Protection Agency funded five academic centers in 1999 to address the uncertainties in exposure, toxicity, and health effects of airborne particulate matter (PM) identified in the "Research Priorities for Airborne Particulate Matter" of the National Research Council (NRC). The centers were structured to promote interdisciplinary approaches to address research priorities of the NRC. In this report, we present selected accomplishments from the first 6 years of the PM Centers, with a focus on the advantages afforded by the interdisciplinary, center-based research approach. The review highlights advances in the area of ultrafine particles and traffic-related health effects as well as cardiovascular and respiratory effects, mechanisms, susceptibility, and PM exposure and characterization issues.

Data sources and synthesis: The collective publications of the centers served as the data source. To provide a concise synthesis of overall findings, authors representing each of the five centers identified a limited number of topic areas that serve to illustrate the key accomplishments of the PM Centers program, and a consensus statement was developed.

Conclusions: The PM Centers program has effectively applied interdisciplinary research approaches to advance PM science.

Key words: acute effects, biological mechanisms, chronic effects, criteria pollutants, dosimetry, exposure assessment, morbidity, mortality, particulate matter. *Environ Health Perspect* 117:167–174 (2009). doi:10.1289/ehp.11543 available via *http://dx.doi.org/* [Online 15 September 2008]

The U.S. Environmental Protection Agency (EPA) funded five academic centers in 1999 to address the uncertainties in exposure, toxicity and health effects of airborne particulate matter (PM) identified in the "Research Priorities for Airborne Particulate Matter" of the National Research Council (NRC 1998). Centers were established at Harvard University (Boston, MA), New York University (New York, NY), University of Rochester (Rochester, NY), University of Washington (Seattle, WA), University of California (Irvine, CA), University of California (Los Angeles, CA), and University of Southern California (Los Angeles, CA). All centers were structured to promote interdisciplinary approaches to address the research priorities of the NRC. A midterm report of PM Center findings was published previously (Lippmann et al. 2003). This report highlights selected accomplishments from the first 6 years of the PM Centers, with a focus on the advantages of interdisciplinary, center-based research. A more detailed summary of research findings and bibliography may be found in supplemental material available from the U.S. EPA PM Centers website (U.S. EPA 2008).

PM Exposure Research Highlights

Characterization of ambient PM. The PM Centers worked to characterize ambient PM and the substantial variation of concentration and composition with source, region, seasonal and diurnal patterns, and size fraction. Examples of these findings follow. In the eastern United States, $PM_{2.5}$ (PM with aerodynamic diameter < 2.5 µm) composition varies seasonally, with relatively more sulfate from long-range transport in the winter, and nitrate in the summer. Substantial spatial variability in PM components and copollutants was observed (Maciejczyk and Chen 2005). In the Pacific Northwest, organic carbon (OC) derived from wood burning is a major contributor to fine particle mass (Larson et al. 2006). PM_{10} (PM < 10 µm in aerodynamic diameter) collected in Southern California derives largely from road dust and soil and contains significant quantities of metals, whereas $PM_{2.5}$ from the same locations contains primarily nitrates, OC, and elemental carbon (EC). Ultrafine PM (UFP; PM < 0.1 µm in aerodynamic diameter) is especially high in OC (Sardar et al. 2005). Semivolatile components of PM have received increased attention in recent investigations, especially with regard to combustion-derived UFP in which a significant fraction of emissions by mass can consist of semivolatile material that has condensed onto a nonvolatile, primarily carbon core (Kuhn et al. 2005a; Robinson et al. 2007). Atmospheric processes generate UFP in regions of the Los Angeles, California, air basin that receive advected pollutant air masses (Fine et al. 2004; Singh et al. 2006). The role of atmospheric chemistry in formation of UFP is important: photooxidation of diesel emissions rapidly generates organic PM (Ntziachristos et al. 2007).

Source apportionment. Research on sources emphasized mobile sources/traffic during the first 6 years of the PM Centers (see below). A workshop was held by the PM Centers to compare different methods for source apportionment of PM. The outcomes of different analytical methods found good agreement across different investigators and methods in apportioning sources of $PM_{2.5}$ mass in two U.S. cities: Phoenix, Arizona, and Washington, D.C. (Hopke et al. 2006; Thurston et al. 2005). Center research also included identification of tracer compounds for use in identifying sources of ambient particles (Fine et al. 2004).

Personal exposure. A significant body of data on personal exposure resulted from field studies of the PM Centers, including longitudinal studies conducted in different airsheds, populations, and housing. Extensive intrapersonal and interpersonal variability in the ratio of personal to ambient exposure measures was observed in some studies (Liu et al. 2003), but taken collectively the data establish that ambient air concentrations at central site monitors can yield valid estimates of average personal exposure for population-based epidemiologic studies (Sarnat et al. 2000, 2002). The location of central site monitors, extent of PM penetration into indoor environments, personal activities, and the influence of

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Progress reports and citations to additional PM Center publications are available on the U.S. Environmental Protection Agency (U.S. EPA) Web site at http://es.epa.gov/ncer/science/pm/centers.html

The authors applaud the efforts of all PM Center researchers and the U.S. EPA for continued support of this critical research area. U.S. EPA program officers S. Katz and G. Robarge were invaluable in coordinating the preparation of this manuscript.

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The authors declare they have no competing financial interests.

Received 4 April 2008; accepted 15 September 2008.

indoor PM sources can affect personal/ambient exposure ratios (Larson et al. 2004; Sarnat et al. 2006). The effects of these factors differ with PM size and composition; for example, freeway-derived UFP in the 70- to 100-nm range penetrated indoors to a greater extent than 10- to 20-nm PM (Zhu et al. 2005). The relationship of ambient criteria pollutant concentrations to ambient and personal $PM_{2.5}$ was explored. Ambient criteria pollutant levels were better predictors of personal $PM_{2.5}$ than they were of personal exposure to the gaseous species themselves, suggesting that the criteria pollutants may be useful as surrogates of $PM_{2.5}$ exposure, but are unlikely to act as confounders in epidemiologic studies (Sarnat et al. 2005). In a study of ambient UFP, hourly and 24-hr number concentrations were not significantly associated with concentrations of gaseous copollutants (Sardar et al. 2004).

PM Health Effects and Mechanisms of Injury Highlights

During the effort of the U.S. EPA to establish a national ambient air quality standard for fine particles, considerable questions about the biological plausibility of epidemiologic findings on hospitalization and mortality from cardiopulmonary effects arose. As a result the NRC committee recommended research into the mechanisms of injury that underlie PM health effects, especially daily mortality. Developments in defining toxicologic mechanisms and intermediate clinical conditions that may explain the observed cardiovascular mortality are one of the highest impact areas of the scientific contributions of the PM Centers, in particular by addressing PM size-specific research, for example, ultrafine, fine, and coarse PM.

PM effects on the cardiovascular system. The PM Centers convened a workshop to discuss potential mechanisms of PM-associated cardiovascular effects and to identify fruitful research approaches [Frampton et al. 2009 (in press; Utell et al. 2002] (Figure 1). During the first 6 years, center investigators have contributed to several review papers on cardiovascular responses to inhaled UFP and $PM_{2.5}$ (Brook et al. 2004; Delfino et al. 2005; Godleski 2006; Mar et al. 2006; Pope and Dockery 2006). New statistical methodology was developed and applied to strengthen the interpretation of acute mortality studies (Coull et al. 2001; Janes et al. 2005; Schwartz and Coull 2003; Zanobetti et al. 2000, 2001; Zeka and Schwartz 2004). Epidemiologic studies that focused on specific cardiovascular outcomes, such as myocardial infarction (Peters et al. 2001, 2004; Zanobetti and Schwartz 2005) or cause-specific mortality (Franklin et al. 2007; Miller et al. 2007; Pope et al. 2002; Zeka et al. 2005) produced hypotheses for testing in laboratory animal research and human clinical studies. Toxicologists have contributed by identifying cellular and biomolecular mechanisms involved in the cardiovascular effects that result from acute and long-term exposures to ambient PM (Araujo et al. 2008; Corey et al. 2006; Lippmann et al. 2005a, 2006; Sun et al. 2005). Most recently, toxicologic studies (Ghelfi et al. 2008) have shown that increases in reactive oxygen species (ROS) in the heart associated with inhalation of concentrated ambient particles (CAPs) may be abrogated by blocking neural receptors in the lung (Figure 2).

Investigations in the PM Centers and elsewhere supported the hypothesis that inflammatory responses contribute to cardiovascular toxicity. Possible mechanisms were proposed. Pulmonary inflammation could release ROS, cytokines, and chemokines from the lung to the systemic circulation (Frampton et al. 2006b). Vascular inflammatory markers were associated with $PM_{2.5}$ exposure in a subchronic mouse study (Sun et al. 2005). Gong et al. (2007), which demonstrated that both diesel extract and oxidized lipid components synergistically affect the expression profile of several gene modules related to vascular inflammatory processes. Evidence for an increase in C-reactive protein and a shift to a procoagulatory state of the blood was seen in coronary artery disease patients exposed to various size fractions of PM (Rückerl et al. 2006). Temporal and other parameters differed with the specific air pollution mixture in this study, which limited interpretation. Pope et al. (2004) concluded that fine particulate air pollution is a risk for cause-specific cardiovascular disease mortality via inflammation, accelerated atherosclerosis, and altered autonomic function. Zeka et al. (2006) reached similar conclusions. Their epidemiologic study supports the hypothesis that particles can induce cardiovascular disease through inflammatory pathways and suggests greater toxicity of traffic-related particles.

Autonomic function effects manifested as alterations in heart rate and heart rate variability (HRV) have been associated with $PM_{2.5}$ exposure. Decreased HRV was associated with

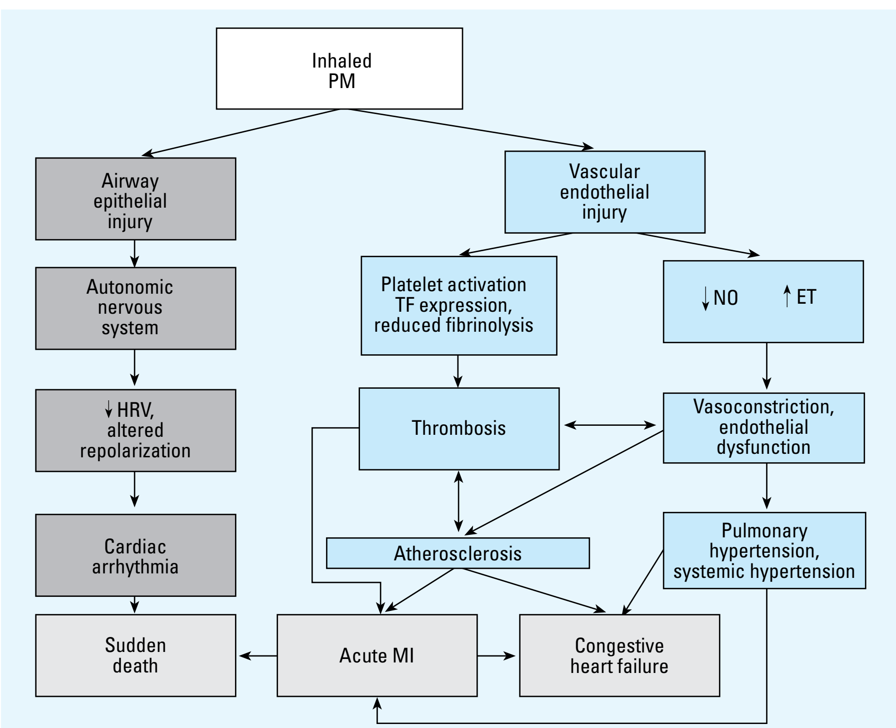

Figure 1. Mechanistic pathways for PM cardiovascular effects. Abbreviations: ET, endothelin; MI, myocardial infarction; NO, nitric oxide; TF, tissue factor. Modified from Frampton et al. 2009 (in press) with permission from Wolters Kluwer.

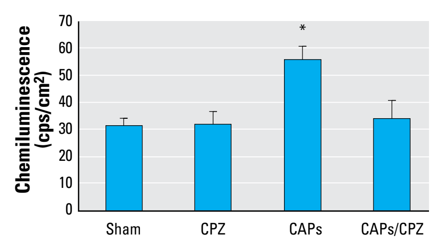

Figure 2. Capsazepine (CPZ) aerosolization prevents oxidative stress and damage in the heart of rats exposed to CAPs. Adult Sprague-Dawley rats received aerosols containing either 500 μM CPZ or saline for 20 min immediately prior to exposure to CAPs. Values represent the mean of eight independent determinations ± SEM. Reproduced from Ghelfi et al. (2008) with permission from Society of Toxicology.
*$p < 0.05$.

$PM_{2.5}$ exposure in panel studies of elderly subjects (Adar et al. 2007; Henneberger et al. 2005; Schwartz et al. 2005a). No associations with altered heart rate or HRV were seen in Seattle during the winter woodburning season (Mar et al. 2005b; Sullivan et al. 2005). A population-based study that drew on an established cohort (the Normative Aging Study) confirmed the association between decreased HRV and $PM_{2.5}$ seen in other studies; history of ischemic heart disease, hypertension, and diabetes modified the effects of $PM_{2.5}$ (Park et al. 2005). Cardiac arrhythmias and vascular changes such as endothelial cell responses and alterations in blood pressure are other important clinical signs of cardiovascular toxicity that have been identified in both humans and animals exposed to PM (Frampton et al. 2006b; Gong et al. 2004; Nadziejko et al. 2002).

Atherosclerosis is emerging as an important toxic end point of $PM_{2.5}$ exposure. Atherosclerosis findings may be related to reports of myocardial infarction associated with $PM_{2.5}$ in epidemiologic studies (Peters et al. 2004; Zanobetti and Schwartz 2005). The Peters study relates traffic exposures and myocardial infarction. Atherosclerotic lesions in a susceptible mouse model were enhanced by $PM_{2.5}$ exposure in a number of reports (Araujo et al. 2008; Chen and Hwang 2005; Chen and Nadziejko 2005; Lippmann et al. 2005b; Sun et al. 2005). Araujo et al. (2008) compared the proatherogenic effects of ambient UFP with $PM_{2.5}$ in apolipoprotein E–deficient mice. UFP-exposed mice exhibited significantly larger atherosclerotic lesions than mice exposed to $PM_{2.5}$ or filtered air (Figure 3).

Respiratory effects of PM exposure. PM Centers research has added to a wide body of literature investigating toxicologic mechanisms and effects of PM in the respiratory system. Overall, the issue of respiratory effects and PM exposure has been reviewed recently with reference to work produced by the PM Centers as well as others (Boothe and Shendell 2008; Salam et al. 2008). Salam focuses on asthma, whereas the Boothe and Shendell paper addresses some other end points in addition to respiratory effects. Results from clinical and panel studies in asthmatic and elderly subjects, as well as experimental studies in animals and *in vitro* cellular systems with relevance to respiratory tissues were reported. The discovery that UFP deposition is increased in asthmatic subjects during exercise has important implications for defining populations at greater risk of PM-related effects (Chalupa et al. 2004; Daigle et al. 2003). Adjuvant effects of ambient PM in promoting allergic airways responses occurred in a sensitized mouse model (Kleinman et al. 2005). Acute exposures to ambient PM in Seattle were associated with increased inflammation in asthmatic subjects, as measured by exhaled nitric oxide (Jansen et al. 2005; Koenig et al. 2005; Mar et al. 2005a). Respiratory effects in children were also a focus. Increased risk of infant hospitalization for bronchiolitis was significantly associated with subchronic and chronic exposures to PM in Los Angeles (Karr et al. 2007), where exposures in the month prior to hospitalization (subchronic) and mean lifetime exposure (chronic) referenced to the case diagnosis date were assessed on the basis of data derived from the California Air Resources Board. Epidemiologic studies that linked the PM Centers and the Children's Health Study (CHS) contributed findings that identify infants and children as important populations of concern for respiratory effects of PM (Gauderman et al. 2004, 2005, 2007; Molitor et al. 2007; Trenga et al. 2006). These studies demonstrate that exposure to $PM_{2.5}$ and other air pollutants were associated with reduced lung function growth in children and provided evidence for compromised lung function. The CHS/PM Center studies identified traffic as a risk factor (Gauderman et al. 2004, 2005, 2007; McConnell et al. 2006).

Identification of new target tissues. UFP of carbon-13 were detected in the olfactory bulbs of rats after inhalation exposure (Oberdörster et al. 2004), suggesting that the central nervous system is a potentially important toxicologic target of $PM_{2.5}$ (Figure 4). In support of this significant result, studies of mice chronically exposed to ambient $PM_{2.5}$ documented loss of brain neurons (Veronesi et al. 2005) and changes in gene expression in the brain consistent with inflammatory effects (Gunnison and Chen 2005). In another study, proinflammatory cytokines were increased in brains of mice exposed to concentrated $PM_{2.5}$ compared with those of control animals (Campbell et al. 2005).

Chemical mechanisms of PM toxicity. To better identify the most toxic PM components and sources, the PM Centers have pursued experimental linkages between toxicologic properties and specific physical/chemical characteristics of particles including size, surface area, and PM components such as transition metals, endotoxin, and organics including reactive organic compounds. Multiple chemical and biological mechanisms by which PM can induce toxic effects in a variety of target cell types have been proposed (Frampton 2006; Yang et al. 2008). Oxidative stress, a common effect of toxicant exposure, is a change in the redox environment of the cell (Schafer and Buettner 2001) through changes in the ratios of concentrations of oxidized to reduced cellular antioxidants. Oxidative stress occurs by increasing intracellular ROS or by depleting glutathione (GSH). GSH is the predominant antioxidant in cells and plays important roles in protecting against oxidative and electrophile stress (Rahman and MacNee 2000). A number of PM Center studies during the first 6 years contributed to what is now a strong evidentiary basis for oxidative damage as a general toxicologic mechanism of PM injury (Delfino et al. 2005; Ghelfi et al. 2008; González-Flecha 2004; Gurgueira et al. 2002; Li et al. 2003a, 2003b; Rhoden et al. 2004, 2005; Tao et al. 2003; Xia et al. 2006). There is widespread agreement throughout the PM Centers that oxidative stress may be a mechanism of major importance for cardiorespiratory effects.

Studies of reactive chemical components of ambient PM samples reported that particles possess intrinsic chemical reactivity

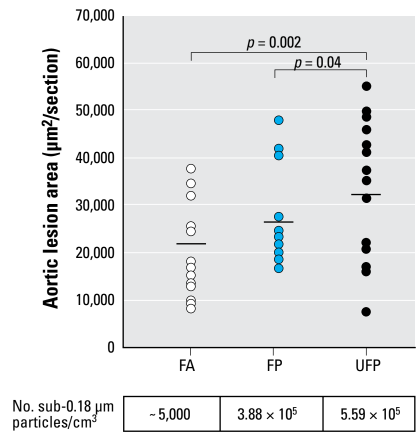

Figure 3. UFP is the most proatherogenic fraction. Atherosclerotic lesions were quantitatively analyzed in serial aortic root sections and stained with oil red O. Lesional area was scored as square micrometers per section and averaged ≥ 25 sections per animal. Group averages are indicated by straight horizontal bars. One mouse exposed to filtered air (FA) was an obvious outlier in its group and was removed from the atherosclerotic lesion analysis. However, its inclusion did not modify the overall significance. Mice exposed to FA are represented by white circles (n = 14), fine particles (FP) by blue circles (n = 16), and UFPs by black circles (n = 15). Reproduced from Araujo et al. (2008) with permission from Wolters Kluwer.

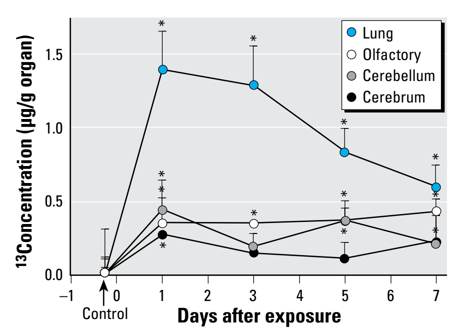

Figure 4. Time course of ^{13}C tissue concentrations in lung, olfactory bulb, cerebrum, and cerebellum of rats after a 6-hr inhalation exposure to ultrafine (36 nm count median diameter) elemental ^{13}C particles (n = 3 rats per time point). Adapted from Oberdörster et al. (2004) with permission from Taylor and Francis.
*$p < 0.05$ (ANOVA).

that may play an important role in toxicity (Cho et al. 2005; Venkatachari et al. 2005). Covalent modification of biological molecules by reactive electrophilic compounds, particularly organics, and ROS production are two key chemical mechanisms by which PM can disrupt intracellular biochemistry, ultimately altering gene expression and subcellular organelle function in target cells. Center investigators demonstrated covalent binding of a cellular enzyme by electrophilic agents, including organic compounds, present in ambient PM (Rodriguez et al. 2005; Samet et al. 1999) and reported that PM can directly inhibit the activity of enzymes involved in oxidative stress response in a cell-free assay (Hatzis et al. 2006). There is accumulating evidence that transition metals such as copper, vanadium, chromium, nickel, cobalt, and iron, as well as aromatic and polar organic substances, play a role in ROS production. An important role of metals may be alteration of signal transduction pathways involving oxidative stress (Samet et al. 2003). Assays that can screen for both oxidative and covalent binding properties of PM are of interest for comparing the toxicologic potential of PM from different sources, locations of interest, season, and other parameters of interest (Borm et al. 2007).

Life shortening associated with exposure to PM. In analyses at the Harvard Center in which daily deaths in 10 European cities were investigated by examining all-cause, respiratory, and cardiovascular deaths for all ages and stratifying by age groups, it was found that the effect of air pollution is not limited to advancing mortality by a few weeks, but that effects persist for over a month after exposure. The short-term mortality effect size estimate for PM_{10} doubles when longer-term effects for all mortality and cardiovascular mortality are considered and becomes five times higher for respiratory mortality (Zanobetti et al. 2003). Reduction of ambient air pollution levels was associated with reduced total, cardiovascular, and lung cancer mortality in the Harvard Six Cities Cohort (Laden et al. 2006). Long-term exposure was associated with excess lung cancer in cohort studies of Pope et al. (2002), Laden et al. (2006), and Pope and Dockery (2006).

Susceptibility factors and populations of concern for PM-induced health effects. When the PM Centers research was initiated, epidemiologic studies had indicated that the elderly and people with cardiovascular or chronic lung disease were at greater risk for morbidity and mortality associated with acute PM exposure. The PM Centers explored the basis for this susceptibility and also produced research findings that expand the spectrum of populations of concern. Support for the epidemiologic observations that elderly and chronic obstructive pulmonary disease patients have higher rates of hospitalization and mortality associated with acute PM exposure has come from human clinical studies showing that elderly people experience greater effects of PM on HRV and blood parameters (Park et al. 2005; Pope and Dockery 2006; Schwartz et al. 2005a, 2005b). Further support for the elderly as a population of concern comes from studies of geriatric laboratory animals (Elder et al. 2004a, 2004b).

A study of PM-related daily mortality found greater effects in diabetic subjects (Zeka et al. 2006). The increase in mortality in diabetics may be related to increased susceptibility to the cardiovascular effects of PM exposure, as indicated by greater rate of hospitalization for heart disease (Zanobetti and Schwartz 2002), sensitivity to changes in HRV (Park et al. 2005), and altered vasomotor function (O'Neill et al. 2005) in diabetic subjects. It is possible that these patients may be more susceptible to inflammatory effects of PM, which in turn affect vascular tissues (O'Neill et al. 2007). In contrast, recent results from the Women's Health Initiative suggest that diabetics in this cohort were not at increased risk (Miller et al. 2007). More work on this subject is needed, and controlled human exposures in diabetic studies have been initiated by the PM Centers (Frampton et al. 2006a). Schwartz et al. (2005b) reported an association between presence or absence of the allele for glutathione-*S*-transferase M1 and the high frequency component of HRV. Genetic susceptibility is an area in which the PM Centers are currently increasing research focus.

Advances in Critical Interdisciplinary Research Areas

Interdisciplinary research has been a hallmark of the PM Centers since their inception. Two subject areas that were exemplary in terms of bringing together multiple investigative perspectives were investigations of UFP and mobile sources.

Ultrafine particles: unique in composition and toxicity. Center-based research allowed a major effort to characterize size distributions, chemical speciation, and the effect of atmospheric processes of UFP to be integrated with toxicologic research (Donaldson and Stone 2003). UFP in urban airsheds are largely derived from fresh combustion sources, although secondary formation of UFP from atmospheric photochemical processes is also an important source (Sioutas et al. 2005). UFP freshly generated by combustion are short-lived and subsequently grow to form aggregates. UFP dominate particle number concentration in ambient PM samples while contributing little to PM mass concentrations. In part because of a complex fractal structure (Friedlander and Xiong 2000), UFP possess much greater surface area per unit mass than larger ambient particles. The large surface area, in turn, allows greater per-mass concentrations of adsorbed or condensed toxic air pollutants (oxidant gases, organic compounds, transition metals) to collect on UFP (Sioutas et al. 2005). Studies on ambient and model particles have concluded that the large specific surface area of UFP may be a key component in their toxicology (Oberdörster 2001).

The PM Centers produced an integrated body of exposure and toxicologic studies on ambient and model UFP as well as studies of controlled human exposures. Dosimetry work showed that UFP will have significant accumulation in the lung (Kreyling et al. 2006). In addition, UFP of varying composition can cross cellular membranes by diffusion (Geiser et al. 2005) and gain access to vulnerable targets within cells. The potential for translocation from the site of lung deposition into systemic circulation, although rates have been low with test particles (Kreyling et al. 2002), could have major mechanistic implications (Elder and Oberdörster 2006). Electron microscopy indicated subcellular penetration and mitochondrial damage by UFP in *in vivo* studies and, to a lesser extent, by fine particles (Li et al. 2003b). Disruption of mitochondrial functions may play an important role in PM-mediated health effects (Xia et al. 2007).

In a study of size-segregated concentrated ambient PM samples, the ability of PM to catalyze ROS generation, an initial step in the induction of oxidative stress, was greatest in the UFP fraction (Cho et al. 2005). Li et al. (2003a) summarized contrasting features of coarse, fine, and ultrafine particles from Southern California, including relevant chemical and biological parameters. The toxicologic findings correlated with PM OC and polycyclic aromatic hydrocarbon (PAH) composition, suggesting a role of organic agents in generating redox activity (Table 1).

The PM Centers conducted controlled human exposure studies with UFP. Results from these studies were limited, because of small group sizes and because these exposures are necessarily brief and conducted at low concentrations compared with the background PM exposures that may be experienced by urban study subjects. In the first set of studies, short-term exposures were conducted with 10–50 $\mu g/m^3$ carbon UFP generated in the laboratory. Alterations in blood cell adhesion molecules and in a marker of vascular perfusion suggest that UFP exposure may produce subtle changes in pulmonary vasoconstriction (Frampton 2007; Pietropaoli et al. 2004). A small but statistically significant reduction in arterial oxygen saturation and some evidence for reduced HRV were found, although the small study size limited interpretation (Gong et al. 2008). An expanded focus on UFP in epidemiologic studies is needed but has been limited to date by the challenges of assessing exposure to UFP.

Traffic: mobile sources are highly relevant to the public health impacts of PM. The center-based research context was particularly useful in advancing the science on mobile sources of PM, the focus of an extensive international research effort. Numerous investigations of the physical and chemical attributes of PM collected alongside freeways and in roadway tunnels were performed. The results have yielded data on size distribution, number and mass concentrations, chemical speciation, emissions factors, volatility, penetration indoors, and the impact of atmospheric processes on roadway PM (Biswas et al. 2007; Fine et al. 2004; Geller et al. 2006; Kuhn et al. 2005b, 2005c; Phuleria et al. 2007; Sardar et al. 2005; Zhu et al. 2005). Detailed spatial profiles of UFP concentration at varying distances from freeways were generated (Zhu et al. 2002a, 2002b). Concentrations of UFP drop exponentially with distance from the center of the freeway, reaching upwind levels at approximately 300 meters. The size distribution of UFP also changed markedly with distance reflective of coagulation and other atmospheric particle processes. Winter particle number concentrations are greater than summer, indicating formation of UFP from vapor condensation. Exposure to motor vehicle exhaust emissions during commuting may constitute a substantial fraction of daily personal PM exposure, especially to UFP (Sioutas et al. 2005; Zhu et al. 2007).

Toxicologic studies of traffic-derived aerosols studied by PM Centers included *in vitro* findings that implicate PM collected in freeway microenvironments in the production of reactive chemical species, stimulation of proinflammatory effects, and altered gene expression in cellular test systems. UFP fraction, carbonaceous content, and an organic tracer for vehicles were linked with toxicologic activity of PM in a variety of assays (Cho et al. 2005; Li et al. 2003a, 2003b). Several studies of laboratory animals exposed to PM on or near busy roadways have identified cardiovascular and allergic airways effects (Elder et al. 2004b, 2007; Kleinman et al. 2005). Evidence that traffic-derived air pollution affects humans has expanded significantly during the first 6 years of PM Centers funding, implicating mobile source in respiratory effects in children (Gauderman et al. 2004, 2005, 2007; McConnell et al. 2006), cardiovascular effects (Riediker et al. 2004) including myocardial infarction (Peters et al. 2004; Tonne et al. 2007), and low birth weight (Wilhelm and Ritz 2003). Toxicologic studies are needed to follow up the epidemiologic findings of effects on the fetus. In a reanalysis of data from the Harvard Six Cities study of daily mortality and PM, source apportionment approaches identified the mobile source factor as most strongly associated with increased daily mortality (Laden et al. 2000).

Policy Implications of PM Centers Research

Research findings from the PM Centers have had a significant influence on science policy, most directly in terms of the science that underlies the National Ambient Air Quality Standards (NAAQS) for PM. The findings of morbidity and mortality that form the scientific basis for the short-term and annual PM NAAQS were strengthened through epidemiologic and statistical research. Mechanistic investigations and studies of preclinical markers established biological plausibility for observed relationships between ambient air PM and observed acute mortality. In personal exposure studies, validation of the use of central site ambient concentrations provided crucial support to the interpretation of epidemiologic results.

The PM NAAQS are based on mass concentration. The state of the science suggests that no single parameter, whether mass, size fraction, surface area, or a particular chemical component, is responsible for all the diverse mechanisms and toxicologic end points that have been associated with PM, and a more sophisticated approach to standards will be needed. Based on findings from the PM Centers and others, the potential efficacy of number and component based standards should be assessed. As more data become available to link specific PM emissions sources, chemical composition, and physical characteristics with quantitative measures of toxicity, the question of source-specific control strategies to maximize public health protection also needs to be considered.

The increasing level of evidence that UFP are toxic but may not be controlled well by existing regulatory approaches raises other policy issues including mitigation of the risk of health effects associated with housing, schools, parks, and other heavily populated public facilities located near heavily traveled roadways, busy seaports, and other combustion sources that are the major urban sources of exposure to UFP. There are potential environmental justice concerns associated with transportation-derived combustion, as it is often areas of lower socioeconomic status that are most affected by proximity to these sources.

Looking Forward: Research Priorities and Current Directions

As the PM Centers program moved forward into the second phase, the original guiding research priorities were reevaluated, and new priorities have emerged. Several areas of investigation identified during the development of the 1997 PM NAAQS are still of critical relevance today, but the scientific questions being asked have been refined. Some research topics being pursued in the current round of PM Centers are described below.

Particle source characterization and PM components as factors in PM toxicity. The PM Centers current research agenda includes detailed studies of the physical and chemical attributes of ambient PM associated with specific sources. The current science indicates that multiple mechanisms of injury, in backgrounds modified by host susceptibility factors, can be activated by a variety of PM components and characteristics. To address the complexity associated with assessing the health effects associated with specific PM components, the current PM Centers research agenda compares toxicologic properties of PM by source type in addition to compositional attributes. Mobile sources continue to be a priority focus, and there is a need to better understand the fate of fossil fuel combustion emissions from a variety of mobile and stationary sources, including airports, seaports, and other sources as well as roadways. Building upon the productive body of work on mobile source PM in the first 6 years of PM Center work, the current PM Centers include human panel and clinical studies and toxicologic studies in laboratory animals and *in vitro* systems that test hypotheses about the effects of mobile source PM exposures. Source apportionment efforts are ongoing as well, to build on previous work that found mobile sources are dominant contributors to urban UFP loads. *In vitro* studies will pay particular attention to UFP, organic compounds, and transition metals. UFP formed from nucleation of ambient air vapors are a new focus, as they may be especially toxic.

Dosimetry and toxicokinetics. Research at the PM Centers is addressing particle deposition, uptake, distribution, and fate, including

Table 1. Contrasting features of coarse, fine, and ultrafine particles.

Parameters	Coarse PM_{10}	Fine PM_{10}	Ultrafine PM_{10}
Size (μm)	2.5–10	2.5–0.15	< 0.15
OC content	+	++	+++
EC content	+	++	+++
Metals (% of total elements)	+++	++	+
PAH content	+	+	+++
Redox activity (DTT assay)	+	++	+++
HO-1 induction	+	++	+++
GSH depletion	+	+++	+++
Mitochondrial damage	None	Some	Extensive

Data from Li et al. (2003a).

the effects of developmental stage on disposition of PM. Cell culture systems with gene expression and proteomics methods are being used for studies of metabolic and genetic responses that will be useful for toxicokinetics. Studies of the dosimetry and toxicokinetics associated with UFP are especially important, given previous PM Centers findings that these particles distribute into systemic circulation and secondary target organs such as the CNS, and can enter cells and subcellular organelles.

Mechanisms. All the current PM Centers have a strong focus on continuing to develop understanding of the toxic mechanisms that underlie clinically and epidemiologically defined adverse health effects of PM. Mechanisms being pursued include reactive chemical species that cause cellular oxidative stress responses. In the first 6 years, studies of oxidative damage associated with PM were performed using diverse chemical species, cell culture experiments, and laboratory animal studies. Evolving from that work, the current PM Centers studies are looking at markers of oxidative stress processes in humans and a range of clinical and preclinical biomarkers. The list of gene products that can be used as indicators of PM exposure or toxicity in various cell types has expanded. Mechanistic hypotheses are being tested in panel and other epidemiologic studies.

Susceptibility. Susceptibility is a major theme, drawing on the work from the earlier center and noncenter investigators showing that individuals with pulmonary and cardiac health conditions, elderly, children, diabetics, and others may be more susceptible to the adverse effects of PM exposure than the general population. The PM Centers are looking at early life exposures to PM in animal models, performing panel studies of elderly subjects or subjects with compromised health status, using a large established cohort to identify how risk factors for PM-related health outcomes may be modified by individual factors such as medication use, diet, and genotype. Compromised animal models are a key theme of current research into susceptibility. PM exposure studies on ApoE$^{-/-}$ mice (an atherosclerosis-prone model), hypertensive rats, and diabetic rats are all planned or underway.

Conclusions

In 1998, a committee of the NRC published the first of a four-volume report titled "Research Priorities for Airborne Particulate Matter" that identified the 10 highest-priority targets for PM research (NRC 1998). Within the research portfolio of the PM Centers, the priority areas have been addressed. A subsequent NRC report (2001) emphasized that these research priorities require multidisciplinary approaches. Recognizing that progress in understanding the health effects consequent to air pollution exposure requires talents from highly divergent fields, we believe that the PM Centers effectively promote interdisciplinary cross-fertilization. The next 5 years of this program will bring the experience and results of the first centers to fruition in new, focused studies that we hope will be instrumental in addressing the difficult scientific and public health policy problems that arise from ubiquitous particulate air pollution.

Correction

In the title of the manuscript originally published online, the date range in the title was incorrect. It has been corrected here.

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ATTACHMENT 4

EXTERNAL REVIEWERS' COMMENTS

Appendix I-Health Effects was submitted to the following individuals for review and comment:

Dr. Jonathan M. Samet, M.D., M.S
University of Southern California
Department of Preventive Medicine
USC Institute for Global Health

Dr. Michael Kleinman, Ph.D., M.S.
University of California, Irvine
Department of Medicine/Occupational and Environmental Medicine

Copies of their comments follow.

Keck School of Medicine of USC

Department of Preventive Medicine
Jonathan M. Samet, MD, MS
Professor and Flora L. Thornton Chair
Director, USC Institute of Global Health

September 25, 2012

Jean Ospital, MPH, PhD
Health Effects Officer
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Dear Jean,

As you requested, I attach comments concerning the Health Effects Appendix of the District's draft Air Quality Management Plan. Please do not hesitate to contact me if you have questions with regard to these comments.

Yours sincerely,

Jonathan M. Samet, MD, MS
Professor and Flora L. Thornton Chair
Department of Preventive Medicine
Director, USC Institute for Global Health

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Review: Health Effects Appendix
South Coast Air Quality Management District
Jonathan M. Samet, MD, MS

General Comments:

This relatively brief document provides an overview of the health effects of various air pollutants, giving emphasis to pollution by airborne particulate matter. The document also covers other "criteria pollutants" as well as ultrafine particulate matter and toxic air contaminants. This range of topics is appropriate to the development of an Air Quality Management Plan.

As presented, the document represents a summary, and an apparent updating of an earlier report. It is necessarily selective in its coverage and relies to an extent on the review documents prepared by the US Environmental Protection Agency for the "criteria" pollutants. I have the following general comments:

- Preparation of reviews of the health effects of air pollution is a daunting task, given the extensive data available and its continuing and rapid accrual. The South Coast Air Quality Management District is not well positioned to prepare a comprehensive and up-to-date review. Consequently, there are deficiencies of this review related to its scope and timeliness. The basis for the document's development is provided in the last paragraph on page I-2. While the statement is clear, the methods are not fully transparent. In particular, several older reviews are mentioned, along with more recent documents from the US Environmental Protection Agency and several prepared by the California EPA. I suggest that more careful attention be given to describing the basis for this review and to consideration of its methodology. For example, given the complexity and scope of the literature, the developers of the review might rely solely on summary documents or to also summarize documents and research published based on studies in California. In the present version, I could not readily identify why particular studies were included.

- I understand that the South Coast Air Quality Management District is required to provide a review in support of its air quality management plan. As stated, the California Health and Safety Code Section 40471(b) requires the preparation of report on "the health impacts of particulate matter in the South Coast Air Basin (SCAB) in conjunction with the preparation of the Air Quality Management Plan revisions." This document does not directly address the health impacts, if some quantification of burden is implicit in the requirement. The identification of health effects and selected of examples of risks from the literature represents a starting point in estimating the health impact. As noted in my next comment, the review might have establishing the relevance of the broad body of evidence to the South Coast Air Quality Management District as one objective.

- There is an extensive literature on airborne particulate matter and health, as well as on the risks of various other air pollutants. One question that might be reasonably addressed in this report is the generalizability of findings from this broad literature to California. Here, a careful review of studies in California might be of benefit. Additionally, considerations might be given to the mixture of pollutants in the South Coast Air Basin to support conclusions about the generalizability of findings.

- The document needs further editing in part to improve clarity and in part to bring in some of the most recent and relevant references. Additionally, if the most recent US EPA documents are to be used as the basis of the report, some updating is needed.

Specific comments:

See attached.

INTRODUCTION

This document presents a summary of scientific findings on the health effects of ambient air pollutants. The California Health and Safety Code Section 40471(b) requires that the South Coast Air Quality Management District prepare a report on the health impacts of particulate matter in the South Coast Air Basin (SCAB) in conjunction with the preparation of the Air Quality Management Plan revisions. This document, which was prepared to satisfy that requirement, also includes the effects of the other major pollutants.

HEALTH EFFECTS OF AIR POLLUTION

Ambient air pollution is a major public health concern. Excess deaths and increases in illnesses associated with high air pollution levels have been documented in several episodes as early as 1930 in Meuse Valley, Belgium; 1948 in Donora, Pennsylvania; and 1952 in London. Although levels of pollutants that occurred during these acute episodes are now unlikely in the United States, ambient air pollution continues to be linked to increases in illness (morbidity) and increases in death rates (mortality).

The adverse health effects associated with air pollution are diverse and include:

- Increased mortality
- Increased health care utilization (hospitalization, physician and emergency room visits)
- Increased respiratory illness (symptoms, infections, and asthma exacerbation)
- Decreased lung function (breathing capacity)
- Lung inflammation
- Potential immunological changes
- Increased airway reactivity to a known chemical exposure - a method used in laboratories to evaluate the tendency of airways to have an increased possibility of developing an asthmatic response
- A decreased tolerance for exercise.

The evidence linking these effects to air pollutants is derived from population-based observational and field studies (epidemiological) as well as controlled laboratory studies involving human subjects and animals. There have been an increasing number of studies focusing on the mechanisms (that is, on learning how specific organs, cell types, and biochemicals are involved in the human body's response to air pollution) and specific pollutants responsible for individual effects. Yet the underlying biological pathways for these effects are not always clearly understood.

Although individuals inhale pollutants as a mixture under ambient conditions, the regulatory framework and the control measures developed are ~~mostly~~ pollutant-specific. This is appropriate, in that different pollutants usually differ in their sources, their times and places of occurrence, the kinds of health effects they may cause, and their overall levels of health risk. Different pollutants, from the same or different sources, may sometimes act together to harm health more than they would acting separately. Nevertheless, as a practical matter, health scientists, as well as regulatory officials, usually must deal with one pollutant at a time in determining health effects and in adopting air quality standards. To meet the air quality standards, comprehensive plans are developed such as the Air Quality Management Plan (AQMP), and to minimize toxic exposure a local air toxics control plan is also prepared. These plans examine multiple pollutants, cumulative impacts, and transport issues related to attaining healthful air quality. A brief overview of the effects observed and attributed to various air pollutants is presented in this document.

This summary is drawn substantially from reviews presented previously (SCAQMD, 1996, 2003, 2007), and from reviews on the effects of air pollution by the American Thoracic Society (ATS, 1996), the U.S. EPA reviews for ozone (U.S. EPA, 2006), Carbon Monoxide (U.S. EPA, 2010), and Particulate Matter (U.S. EPA, 2004, 2009), from a published review of the health effects of air pollution (Brunekreef and Holgate, 2002), and from reviews prepared by the California EPA Office of the Environmental Health Hazard Assessment for Particulate Matter (Cal EPA, 2002) and for Ozone (Cal EPA, 2005). Additional materials are from EPA's current review of the ozone standard and health effects (EPA, 2011). More detailed citations and discussions on air pollution health effects can be found in these references.[1]

[1] Most of the studies referred to in this appendix are cited in the above sources. Only more recent specific references will be cited in this summary.

OZONE

Ozone is a highly reactive compound, and is a strong oxidizing agent. When ozone comes into contact with the respiratory tract, it can react with tissues and cause damage in the airways. Since it is a gas, it can penetrate into the gas exchange region of the deep lung.

The EPA primary standard for ozone, adopted in 2008, is 0.075 ppm averaged over eight hours. The California Air Resources Board (CARB) has established standards of 0.09 ppm averaged over one hour and at 0.070 ppm averaged over eight hours.

The major subgroups of the population considered to be at increased risk from ozone exposure are outdoor exercising individuals, including children, and people with preexisting respiratory disease(s) such as asthma. The data base identifying the former group as being at increased risk to ozone exposure is much stronger and more quantitative than that for the latter group, probably because of a larger number of studies conducted with healthy individuals. The adverse effects reported with short-term ozone exposure are greater with increased activity because activity increases the breathing rate and the volume of air reaching the lungs, resulting in an increased amount of ozone reaching the lungs. Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher ventilation rate than adults.

A number of adverse health effects associated with ambient ozone levels have been identified from laboratory and epidemiological studies (EPA, 1996; 2006, 2011; ATS, 1996). These include increased respiratory symptoms, damage to cells of the respiratory tract, decrease in lung function, increased susceptibility to respiratory infection, and increased risk of hospitalization.

Increases in ozone levels are associated with elevated absences from school. The Children's Health Study, conducted by researchers at the University of Southern California, followed a cohort of children that live in 12 communities in Southern California with differing levels of air pollution for several years. A publication from this study reported that school absences in fourth graders for respiratory illnesses were associated with ambient ozone levels. An increase of 20 ppb ozone was associated with an 83% increase in illness-related absence rates (Gilliland, 2001).

The number of hospital admissions and emergency room visits for all respiratory causes (infections, respiratory failure, chronic bronchitis, etc.) including asthma

shows a consistent increase as ambient ozone levels increase in a community. These excess hospital admissions and emergency room visits are observed when hourly ozone concentrations are as low as 0.06 to 0.10 ppm.

Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).

Multicity studies of short-term ozone exposures (days) and mortality have also examined regional differences. Evidence was provided that there were generally higher ozone-mortality risk estimates in northeastern U.S. cities, with the southwest and urban mid-west cities showing lower or no associations (Smith, 2009; Bell, 2008). Another long-term study of a national cohort found that long-term exposures to ozone were associated with respiratory-related causes of mortality, but not cardiovascular-related causes, when PM2.5 exposure were also included in the analysis.

at risk?

Several population-based studies suggest that asthmatics are more adversely affected by ambient ozone levels, as evidenced by increased hospitalizations and emergency room visits. Laboratory studies have attempted to compare the degree of lung function change seen in age and gender-matched healthy individuals versus asthmatics and those with chronic obstructive pulmonary disease. While the degree of change evidenced did not differ significantly, that finding may not accurately reflect the true impact of exposure on these respiration-compromised individuals. Since the respiration-compromised group may have lower lung function to begin with, the same degree of change may represent a substantially greater adverse effect overall. → There are two issues; 1) Is asthma adversely affected by ozone? and 2) Is the lung function response to ozone different in asthmatics and non-asthmatics

Another publication from the Children's Health Study focused on children and outdoor exercise. In communities with high ozone concentrations, the relative risk of developing asthma in children playing three or more sports was found to be over three times higher than in children playing no sports (McConnell, 2002). These findings indicate that new cases of asthma in children are associated with heavy exercise in communities with high levels of ozone. While it has long been known that air pollution can exacerbate symptoms in individuals with respiratory disease, this is among the first studies that indicate ozone exposure may be causally linked to asthma onset.

associated with episodic and chronic exposure effects may not exhibit similar adaptation. That is, internal damage to the respiratory system may continue with repeated ozone exposures, even if externally observable effects (chest symptoms and reduced lung function) disappear.

In a laboratory, exposure of human subjects to low levels of ozone causes reversible decrease in lung function as assessed by various measures such as respiratory volumes, airway resistance and reactivity, irritative cough and chest discomfort. Lung function changes have been observed with ozone exposure as low as 0.06 to 0.12 ppm for 6-8 hours under moderate exercising conditions. Similar lung volume changes have also been observed in adults and children under ambient exposure conditions (0.10 - 0.15 ppm). The responses reported are indicative of decreased breathing capacity and are reversible. update with kim study?

The results of several studies where human volunteers were exposed to ozone for 6.6 hours at levels between 0.04 and 0.12 ppm were recently summarized (Brown, 2008). As shown in the figure below, there is an increasing response on lung function with increasing exposure levels in moderately exercising subjects.

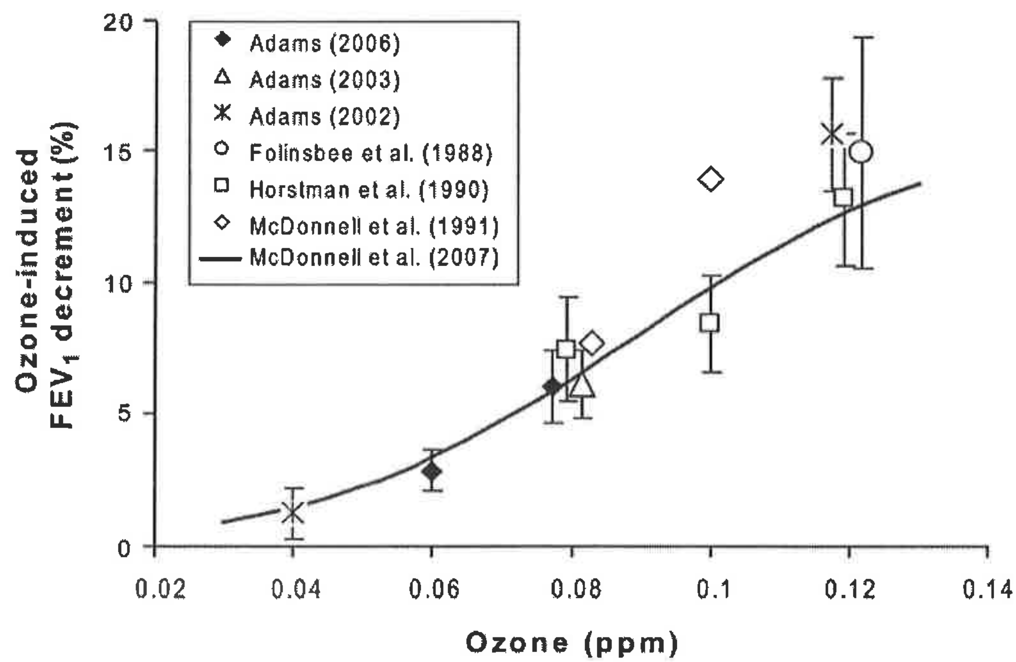

FIGURE I-1

Comparison of mean ozone-induced decrements in lung function following 6.6 hours of ozone exposure (from Brown, 2008)

In addition to controlled laboratory conditions, studies of individuals exercising outdoors, including children attending summer camp, have shown associations of reduced lung function with ozone exposure. There were wide ranges in responses among individuals.

Results of epidemiology studies support the relationship between ozone exposure and respiratory effects. Several, but not all, studies have found associations of short-term ozone levels and hospital admissions and emergency department admissions for respiratory-related conditions (EPA, 2011).

In laboratory studies, cellular and biochemical changes associated with respiratory tract inflammation have also been consistently ~~reported~~ in the airway lining after low level exposure to ozone. These changes include an increase in specific cell types and in the concentration of biochemical mediators of inflammation and injury such as cytokines and fibronectin. Indications of lung injury and inflammatory changes have been observed in healthy adults exposed to ozone in the range of 0.06 to 0.10 ppm.

The susceptibility to ozone observed under ambient conditions could be due to the combination of pollutants that coexist in the atmosphere or ozone may actually sensitize these subgroups to the effects of other pollutants.

Some animal studies show results that indicate possible chronic effects including functional and structural changes of the lung. These changes indicate that repeated inflammation associated with ozone exposure over a lifetime may result in sufficient damage to respiratory tissue such that individuals later in life may experience a reduced quality of life in terms of respiratory function and activity level achievable. An autopsy study involving Los Angeles County residents provided supportive evidence of lung tissue damage (structural changes) attributable to air pollution.

Sherwin? probably should mention that this refers to quite old exposures.

A study of birth outcomes in southern California found an increased risk for birth defects in the aortic and pulmonary arteries associated with ozone exposure in the second month of pregnancy (Ritz et al., 2002). This ~~is~~ the first study linking ambient air pollutants to birth defects in humans. Studies conducted since mostly focusing on cardiac and oral cleft defects have found mixed results, with some showing associations, but others did not. ~~Confirmation by further studies is needed.~~

In summary, adverse effects associated with ozone exposures have been well documented, although the specific causal mechanism is still somewhat unclear.

Need to acknowledge the mechanistic work.

PARTICULATE MATTER

Airborne particulates are a complex group of pollutants that vary in source, size and composition, depending on location and time. The components include nitrates, sulfates, elemental carbon, organic carbon compounds, acid aerosols, trace metals, and material from the earth's crust. Substances of biological origin, such as pollen and spores, may also be present.

Until several years ago, the health effects of particulates were focused on those sized 10 μm (micrometers) aerodynamic diameter and smaller. These can be inhaled through the upper airways and deposited in the lower airways and gas exchange tissues in the lung. These particles are referred to as PM10. EPA initially promulgated ambient air quality standards for PM10 of 150 $\mu g/m^3$ averaged over a 24-hour period, and 50 $\mu g/m^3$ for an annual average. EPA has since rescinded the annual PM10 standard, but kept the 24-hour standard.

In recent years additional focus has been placed on particles having an aerodynamic diameter of 2.5 μm or less (PM2.5). A greater faction of particles in this size range can penetrate and deposit deep in the lungs. The EPA recently lowered the air quality standards for PM2.5 to 35 $\mu g/m^3$ for a 24-hour average and reaffirmed 15 $\mu g/m^3$ for an annual average standard. There was considerable controversy and debate surrounding the review of particulate matter health effects and the consideration of ambient air quality standards (Kaiser, 1997; Vedal, 1997) when the EPA promulgated the initial PM2.5 standards in 1997.

Since that time, numerous studies have been published, and some of the key studies were closely scrutinized and analyses repeated. The result is that there are now substantial data confirming the adverse health effects of PM2.5 exposures.

There are also differences in the composition and sources of particles in the different size ranges that may have implications for health effects. The particles larger than 2.5 μm (often referred to as the coarse fraction) are mostly produced by mechanical processes. These include automobile tire wear, industrial processes such as cutting and grinding, and resuspension of particles from the ground or road surfaces by wind and human activities.

In contrast, particles smaller than 2.5 μm are mostly derived from combustion sources, such as automobiles, trucks, and other vehicle exhaust, as well as from stationary combustion sources. The particles are either directly emitted or are formed

in the atmosphere from gases that are emitted. Components from material in the earth's crust, such as dust, are also present, with the amount varying in different locations.

Attention to another range of very small particles has been increasing over the last few years. These are generally referred to as "ultrafine" particles, with diameters of 0.1 μm or less. These particles are mainly from fresh emissions of combustion sources, but are also formed in the atmosphere from photochemical reactions. Ultrafine particles have relatively short half lives (minutes to hours) and rapidly grow through condensation and coagulation process into larger particles within the PM2.5 size range. These particles are garnering interest since laboratory studies indicate that their toxicity may be higher on a mass basis than larger particles, and there is evidence that these small particles can translocate from the lung to the blood and to other organs of the body.

There have been several reviews of the health effects of ambient particulate matter (ATS, 1996; Brunekreef, 2002; U.S. EPA, 2004; U.S. EPA, 2009). In addition, the California Air Resources Board (CARB) and the Office of Environmental Health and Hazard Assessment (OEHHA) have reviewed the adequacy of the California Air Quality Standards for Particulate Matter (Cal EPA, 2002).

The major types of effects associated with particulate matter include:

Not mentioned on page I-1

- Increased mortality
- Exacerbation of respiratory disease and of cardiovascular disease as evidenced by increases in:

  -Respiratory symptoms

  -Hospital admissions and emergency room visits

  -Physician office visits

  -School absences

  -Work loss days

- Effects on lung function
- Changes in lung morphology

The current federal and California standards are listed below:

TABLE I-4

Ambient Air Quality Standards for Particulate Matter

STANDARD	FEDERAL	CALIFORNIA
PM10 24-Hour average	150 $\mu g/m^3$	50 $\mu g/m^3$
PM10 Annual Average	--	20 $\mu g/m^3$
PM 2.5 24-Hour Average	35 $\mu g/m^3$	--
PM 2.5 Annual Average	15 $\mu g/m^3$	12 $\mu g/m^3$

Short-Term Exposure Effects

Epidemiological studies have provided evidence for most of the effects listed above. An association between increased daily or several-day-average concentrations of PM10 and excess mortality and morbidity is consistently reported from studies involving communities across the U.S. as well as in Europe, Asia, and South America. A review and analysis of epidemiological literature for acute adverse effects was undertaken by Dockery and Pope to estimate these effects as percent increase in mortality associated with each incremental increase of PM10 by 10 $\mu g/m^3$. The estimates are presented in Table I-5. It appears that individuals who are elderly or have preexistent lung or heart disease are more susceptible than others to the adverse effects of PM10.

Newer reports available.

Many recent studies have confirmed that excess mortality and morbidity are associated with particulate matter levels. Estimates of mortality effects from these studies range from 0.3 to 1.7% increase for a 10 $\mu g/m^3$ increase in PM10 levels. The National Morbidity, Mortality, and Air Pollution Study (NMMAPS), a study of 20 of the largest U.S. cities, determined a combined risk estimate of about a 0.5% increase in total mortality for a 10 $\mu g/m^3$ increase in PM10 (Samet, 2000a). This study also analyzed the effects of gaseous co-pollutants. The results indicated that the association of PM10 and mortality were not confounded by the presence of the gaseous pollutants. When the gaseous pollutants were included in the analyses, the significance of the PM10 estimates remained. The PM10 effects were reduced somewhat when O_3 was also considered and tended to be variably decreased when NO_2, CO, and SO_2 were added to the analysis. These results argue that the effects are likely due to the particulate exposures; they cannot readily be explained by coexisting weather stresses or other pollutants.

An expansion of the NMMAPS study to 90 U.S. Cities also reported association with PM10 levels and mortality (Samet 2000b). It was discovered that this study was one that used a flawed statistical software package. The investigators have reanalyzed the data using corrected settings for the software (Dominici, 2002a, Dominici 2002b). When the estimates for the 90 cities in the study were recalculated, the estimate changed from 0.41% increase in mortality for a 10 μg/m^3 increase in PM10 to a 0.27% increase. There remained a strong positive association between acute exposure to PM10 and mortality. Thus while the quantitative estimate was reduced, the major findings of the study did not change.

TABLE I-5

Combined Effect Estimates of Daily Mean Particulate Pollution

	% CHANGE IN HEALTH INDICATOR PER EACH 10 μg/m^3 INCREASE IN PM10
Increase in Daily Mortality	
Total deaths	1.0
Respiratory deaths	3.4
Cardiovascular deaths	1.4
Increase in Hospital Usage (all respiratory diagnoses)	
Admissions	1.4
Emergency department visits	0.9
Exacerbation of Asthma	
Asthmatic attacks	3.0
Bronchodilator use	12.2
Emergency department visits*	3.4
Hospital admissions	1.9
Increase in Respiratory Symptom Reports	
Lower respiratory	3.0
Upper respiratory	0.7
Cough	2.5
Decrease in Lung Function	
Forced expiratory volume	0.15

severe effects, larger numbers experience milder effects, which may relate either to the coarse or to the fine fraction of airborne particulate matter.

In the NMMAPS study, hospital admissions for those 65 years or older were assessed in 14 cities. Hospital admissions for these individuals showed an increase of 6% for cardiovascular diseases and a 10% increase for respiratory disease admissions, per 50 $\mu g/m^3$ increase in PM10. The excess risk for cardiovascular disease ranges from 3-10% per 50 $\mu g/m^3$ PM10 and from 4-10% per 25 $\mu g/m^3$ PM2.5 or PM10-2.5.

Similarly, school absences, lost workdays and restricted activity days have also been used in some studies as indirect indicators of acute respiratory conditions. The results are suggestive of both immediate and delayed impact on these parameters following elevated particulate matter exposures. These observations are consistent with the hypothesis that increased susceptibility to infection follows particulate matter exposures.

Some studies have reported that short-term particulate matter exposure is associated with changes in lung function (lung capacity and breathing volume); upper respiratory symptoms (hoarseness and sore throat); and lower respiratory symptoms (increased sputum, chest pain and wheeze). The severity of these effects is widely varied and is dependent on the population studied, such as adults or children with and without asthma. Sensitive individuals, such as those with asthma or pre-existing respiratory disease, may have increased or aggravated symptoms associated with short-term particulate matter exposures. Several studies have followed the number of medical visits associated with pollutant exposures. A range of increases from 3% to 42% for medical visits for respiratory illnesses was found corresponding to a 50 $\mu g/m^3$ change in PM10. A limited number of studies also looked at levels of PM2.5 or PM10-2.5. The findings suggest that both the fine and coarse fractions may have associations with some respiratory symptoms.

The biological mechanisms by which particulate matter can produce health effects are being investigated in laboratory studies. Inflammatory responses in the respiratory system in humans and animals exposed to concentrated ambient particles have been measured. These include effects such as increases in neutrophils in the lungs. Other changes reported include increased release of cytokines and interleukins, chemicals released as part of the inflammatory process. The effects of particulate matter may be mediated in part through the production of reactive oxygen species during the inflammatory process. Recent reviews discuss mechanistic studies in more detail (Brunekreef, 2002; Brook, 2004). No longer recent!

Long-Term Exposure Effects

While most studies have evaluated the acute effects, some studies specifically focused on evaluating the effects of chronic exposure to PM10 and PM2.5. Studies have analyzed the mortality of adults living in different U.S. cities. After adjusting for important risk factors, taken as a whole these studies found a positive association of deaths and exposure to particulate matter. A similar association was observable in both total number of deaths and deaths due to specific causes. The largest effects were observed from cardiovascular causes and ischemic heart disease. A shortening of lifespan was also reported in these studies.

Since the initial promulgation by EPA of the National Ambient Air Quality Standards for PM2.5, controversy has remained over the association of mortality and exposures to PM2.5. Thus an expanded discussion of these studies is presented below.

Significant associations for PM2.5 for both total mortality and cardiorespiratory mortality were reported in a study following a national cohort recruited by the American Cancer Society for a Cancer Preventions Study over several years. A re-analysis of the data from this study confirmed the initial finding (Krewski, 2000). In this study, mortality rates and PM2.5 levels were analyzed for 51 metropolitan areas of the U.S. Average levels from monitors in each area were used to estimate exposures. At these levels of aggregation, regional differences in the association of PM2.5 and mortality were noted, with higher associations in the Northeast, and lower or non-significant associations in the West.

The Harvard Six Cities Study evaluated several size ranges of particulate matter and reported significant associations with PM15, PM2.5, sulfates, and non-sulfate particles, but not with coarse particles (PM15 – PM2.5). An extension of the Harvard Six Cities Cohort confirmed the association of mortality with PM2.5 levels (Laden, 2006). These studies provide evidence that the fine particles, as measured by PM2.5, may be more strongly associated with mortality effects from long-term particulate matter exposures than are coarse compounds. An update to this study covering a follow-up over the years 1974 to 2009 (Lepeule, 2012) was recently published. Findings indicated a linear relationship of PM2.5 levels and mortality from all causes, cardiovascular causes, and from lung cancer. According to the authors, the PM2.5 levels decreased over time, but no evidence of a threshold for these effects was found.

methods (Jerrett, 2005) and another applied land use regression techniques (Krewski, 2009) to estimate exposures to the study individuals. Significant associations of PM2.5 with mortality from all causes and cardiopulmonary disease were reported, with the magnitude of risks being up to three times higher than those from the national studies of the American Cancer Society cohort. This provides evidence that using methods to provide more detailed exposure estimates can result in stronger associations of PM2.5 and mortality.

Two recent reports have been released looking at air pollution and health effects in California. One study (Lipsett, 2011) followed school teachers recruited in 1995, and followed through 2005. Pollutant exposures at the subject residence were estimated using data from ambient monitors, and extrapolated using a distance weighted method. The authors reported significant association of PM2.5 levels and mortality from ischemic heart disease, but no associations were found with all cause, cardiovascular, or respiratory disease.

The second study (Jerrett, 2011) followed individuals in the Los Angeles area from the American Cancer Society cohort recruited starting in 1982, with follow up to 2000. Pollutant levels at subject residences were estimated using several methods. All but one of the methods found no association of all-cause mortality with PM2.5 levels. All exposure estimation methods were reported to have found significant associations with ischemic heart disease mortality, however. The authors noted that mortality rates differ in urban areas compared to non-urban areas, and so included a variable for this in a land use regression model to estimate effects on mortality. When the authors applied the land use regression model including an urban indicator to estimate exposures, all-cause mortality, mortality from cardiovascular disease, and mortality from ischemic heart disease were all significantly associated with PM2.5 levels.

Other studies report evidence indicating that particulate matter exposure early in pregnancy may be associated with lowered birth weights (Bobak, 1999). Studies from the U.S., the Czech Republic and Mexico City have reported that neonatal and early postnatal exposure to particulate matter may lead to increased infant mortality. A more recent study in Southern California found increased risks for infant deaths associated with exposures to particulates and other pollutants (Ritz, 2006). These results suggest that infants may be a subgroup affected by particulate matter exposures.

ULTRAFINE PARTICLES

As noted above, numerous studies have found association of particulate matter levels with adverse effects, including mortality, hospital admissions, and respiratory disease symptoms. The vast majority of these studies used particle mass of PM10 or PM2.5 as the measure of exposure. Some researchers have postulated, however, that ultrafine particles may be responsible for some of the observed associations of particulate matter and health outcomes (Oberdorster, et al, 1995; Seaton, et al, 1995). Ultrafine particles are ~~generally classified~~ of ~~0.1 µm and~~ small diameter.

Several potential mechanisms have been brought forward to suggest that the ultrafine portion may be important in determining the toxicity of ambient particulates, some of which are discussed below.

For a given mass concentration, ultrafine particles have much higher numbers and surface area compared to larger particles. Particles can act as carriers for other adsorbed agents, such as trace metals and organic compounds; and the larger surface area may transport more of such toxic agents than larger particles.

Smaller particles can also be inhaled deep into the lungs. As much as 50% of 0.02 µm diameter particles are estimated to be deposited in the alveolar region of the lung. There is complex nature of the relation between deposition and particle size. The ultrafine particles generally have higher fractional deposition in the alveolar region. However, for the smaller nucleation mode (particles less than 0.01 µm size) the deposition in the alveolar region declines, but increases in the extrathoracic region.

Exposures of laboratory animals to ultrafine particles have found cardiovascular and respiratory effects. Mice exposed to concentrated near roadway ultrafine particles showed larger early atherosclerotic lesions than mice exposed to PM2.5 or filtered air (Arujo, 2008). In a mouse allergy model, exposures to concentrated ultrafine particles resulted in a greater response to antigen challenge to ovalbumin (Li, 2010), indicating that vehicular traffic exposure could exacerbate allergic inflammation in already-sensitized animals.

Controlled exposures of human volunteers to ultrafine particles either laboratory generated or as products of combustion, such as diesel exhaust containing particles, have found physiological changes related to vascular effects. Mills, 2011, for example found exposure to diesel exhaust particulate attenuated both acetylcholine and sodium-nitroprusside -induced vasorelaxation.

NITROGEN DIOXIDE

The U.S. EPA has recently reviewed the health effects of nitrogen dioxide (U.S. EPA, 2008a). Evidence for low-level nitrogen dioxide (NO_2) exposure effects is derived from laboratory studies of asthmatics and from epidemiological studies. Additional supportive evidence is derived from animal studies.

Epidemiological studies using the presence of an unvented gas stove as a surrogate for indoor NO_2 exposures suggest an increased incidence of respiratory infections or symptoms in children.

Recent studies related to outdoor exposure have found health effects associated with ambient NO_2 levels, including respiratory symptoms, respiratory illness, decreased lung function, increased emergency room visits for asthma, and cardiopulmonary mortality. However, since NO_2 exposure generally occurs in the presence of other pollutants, such as particulate matter, these studies are often unable to determine the specific role of NO_2 in causing effects.

The Children's Health Study in Southern California found associations of air pollution, including NO_2, PM10, and PM2.5, with respiratory symptoms in asthmatics (McConnell, 1999). Particles and NO_2 were correlated, and effects of individual pollutants could not be discerned. A subsequent analysis indicated a stronger role for NO2 (McConnell, 2002).

Ambient levels of NO_2 were also associated with a decrease in lung function growth in a group of children followed for eight years. In addition to NO_2, the decreased growth was also associated with particulate matter and airborne acids. The study authors postulated that these may be a measure of a package of pollutants from traffic sources. (Gauderman, 2004).

Results from controlled exposure studies of asthmatics demonstrate an increase in the tendency of airways to contract in response to a chemical stimulus (bronchial reactivity). Effects were observed with exposures from 0.1 to 0.3 ppm NO_2 for periods ranging from 30 minutes to 3 hours. A similar response is reported in some studies with healthy subjects at higher levels of exposure (1.5 - 2.0 ppm). Mixed results have been reported when people with chronic obstructive lung disease are exposed to low levels of NO_2.

Short-term controlled studies of animals exposed to NO_2 over a period of several hours indicate cellular changes associated with allergic and inflammatory response and interference with detoxification processes in the liver. In some animal studies

the severity of the lung structural damage observed after relatively high levels of short-term ozone exposure is observed to increase when animals are exposed to a combination of ozone and NO_2.

In animals, longer-term (3-6 months) repeated exposures at 0.25 ppm appear to decrease one of the essential cell-types (T-cells) of the immune system. Non-specific changes in cells involved in maintaining immune functions (cytotoxic T-cells and natural killer cells) have been observed in humans after repeated exposure (4-6 days) to >0.6 ppm of NO_2 (20 min. - 2 hours). All these changes collectively support the observation reported both in population and animal studies of increased susceptibility to infections, as a result of NO_2 exposure.

The U.S. EPA recently adopted a new short-term standard of 100 ppb (0.1 ppm) averaged over 1 hour. The standard was designed to protect against increases in airway reactivity in individuals with asthma observed in controlled exposure studies, as well as respiratory symptoms observed in epidemiological studies.

SULFUR DIOXIDE

Not proven to be "most" sensitive

a very

Controlled laboratory studies involving human volunteers have clearly identified asthmatics as ~~the most~~ sensitive group to the effects of ambient sulfur dioxide (SO_2) exposures. Healthy subjects have failed to demonstrate any short-term respiratory functional changes at exposure levels up to 1.0 ppm over 1-3 hours.

In exercising asthmatics, brief exposure (5-10 minutes) to SO_2 at levels between 0.2-0.6 ppm can result in significant alteration of lung function, such as increases in airway resistance and decreases in breathing capacity. In some, the exposure can result in severe symptoms necessitating the use of medication for relief. The response to SO_2 inhalation is observable within 2 minutes of exposure, increases further with continuing exposure up to 5 minutes then remains relatively steady as exposure continues. SO_2 exposure is generally not associated with any delayed reactions or repetitive asthmatic attacks.

In epidemiologic studies, associations of SO_2 levels with increases in respiratory symptoms, increases in emergency department visits and hospital admissions for respiratory-related causes have been reported.

The U.S. EPA has recently revised the SO_2 air quality standard. The previous 24-hour standard was rescinded and replaced with a new 1-hour standard at 75 ppb (0.075 ppm) to protect against high short-term exposures.

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Dear Dr. Ospital:

I have completed my review of Appendix I. The comments follow.

General Comments:
The health literature in the Appendix provides valid support for the CA air quality standards. I do agree with Dr. McConnell who suggested in his comments the utility of expanding the section on epidemiological evidence showing that near roadway exposures are associated with asthma and ischemic heart disease.

With regard to air toxics it might be useful to recognize that emissions from modern diesel engines and retrofitted older diesels are quantitatively and perhaps qualitatively different from that of the older unmodified diesels which are still part of the fleet but of diminishing numbers. There is a gap in our knowledge at this time as to whether health impacts are indeed reduced (as one would expect) and better information on how long it would take to phase out unmodified diesels would be useful for future projections.

I noted a comment from Bill La Marr (California Small Business Assoc) regarding a possible conflict on I-3 and I-10. Note that I-3 deals with cardiovascular mortality studies whereas I-10 speaks to exacerbation of cardiovascular disease (i.e. morbidity) not mortality, so there is no conflict.

I also read Dr. Enstrom's comments. I considered the contention that there is "NO relationship in California between PM and total mortality". First, total mortality might not be the most useful metric to use since the most sensitive individuals include those with respiratory and cardiovascular disease. I think that Dr. Jarrett's paper using land use regression to provide improved exposure metrics demonstrate significant health effects.

I have several specific comments which are tabulated below. I also have some additional editorial suggestions that I will send by mail rather than transcribe them here.

Pg	Comment
I-2 Para 2	Although individuals inhale pollutants as a mixture under ambient conditions, the regulatory framework and the control measures developed are mostly pollutant-specific. This is appropriate, in that different pollutants usually differ in their sources, their times and places of occurrence, the kinds of health effects they may cause, and their overall levels of health risk. Different pollutants, from the same or different sources, may sometimes act together to harm health more than they would acting separately. Nevertheless, evidence for more than additive effects have not been strong and, as a practical matter, health scientists, as well as regulatory officials, usually ~~must~~ deal with one pollutant at a time in ~~determining health effects and in~~ adopting air quality standards. To meet the air quality standards, comprehensive plans are developed such as the Air Quality Management Plan (AQMP), and to minimize toxic exposure a local air toxics control plan is also prepared. These plans examine multiple pollutants, cumulative impacts, and transport issues related to attaining healthful air quality. A brief overview of the effects observed and attributed to various air pollutants is presented in this document.
I-3 Para3	Children may be a particularly vulnerable population to air pollution effects because they spend more time outdoors, are generally more active, and have a higher specific ventilation rate than adults (i.e. after normalization for body mass).
I-3 Para 5	Increases in ozone levels are associated with ~~elevated~~ increased numbers of absences from school.
I-4 Para 2	Numerous recent studies have found positive associations between increases in ozone levels and excess risk of mortality. These associations are strongest during warmer months but overall persist even when other variables including season and levels of particulate matter are accounted for. This indicates that ozone mortality effects may be independent of other pollutants (Bell, 2004).
I-4 Para 4	Since the respiration-compromised group may have lower lung function to begin with, the same total ~~degree of~~ change may represent a substantially greater relative adverse effect overall.
I-4 Para 5	Another publication from the Children's Health Study focused on children and outdoor exercise. In California communities with high ozone concentrations, the relative risk of developing asthma in children

	playing three or more sports was found to be over three times higher than in children playing no sports (McConnell, 2002). These findings indicate that new cases of asthma in children are associated with their performance of heavy exercise in communities with high levels of ozone. While it has long been known that air pollution can exacerbate or trigger symptoms in individuals with preexisting respiratory disease, this is among the first studies that indicate ozone exposure may be causally linked to asthma onset.
I-5 Table I-1 Row1, Col 2	exposure~~, decreased temperature,~~ and other environmental factors resulting in increased summertime hospital admissions and emergency department visits for respiratory causes (NOTE: while cold air can trigger asthma, this is confusing in the face of increased effects during warmer weather) Exacerbation of respiratory symptoms (e.g., cough, chest pain) in individuals with preexisting disease (e.g., asthma) with low ambient
I-5 Table I-1 Row 2, Col2	NOTE: include reference to the latest Kim paper that shows effects at 0.06ppm Kim, C. S., N. E. Alexis, et al. (2011). "Lung function and inflammatory responses in healthy young adults exposed to 0.06 ppm ozone for 6.6 hours." American Journal of Respiratory and Critical Care Medicine **183**(9): 1215-1221. RATIONALE: Exposure to ozone causes a decrease in spirometric lung function and an increase in airway inflammation in healthy young adults at concentrations as low as 0.08 ppm, close to the National Ambient Air Quality Standard for ground level ozone. OBJECTIVES: To test whether airway effects occur below the current ozone standard and if they are more pronounced in potentially susceptible individuals, such as those deficient in the antioxidant gene glutathione S-transferase mu 1 (GSTM1). METHODS: Pulmonary function and subjective symptoms were measured in 59 healthy young adults (19-35 yr) immediately before and after exposure to 0.0 (clean air, CA) and 0.06 ppm ozone for 6.6 hours in a chamber while undergoing intermittent moderate exercise. The polymorphonuclear neutrophil (PMN) influx was measured in 24 subjects 16 to 18 hours postexposure. MEASUREMENTS AND MAIN RESULTS: Subjects experienced a significantly greater (P = 0.008) change in FEV(1) (+/- SE) immediately after exposure to 0.06 ppm ozone compared with CA (-1.71 +/- 0.50% vs. -0.002 +/- 0.46%). The decrement in FVC was also greater (P = 0.02) after ozone versus CA (-2.32 +/- 0.41% vs. -1.13 +/- 0.34%). Similarly, changes in %PMN were greater after ozone (54.0 +/- 4.6%) than CA (38.3 +/- 3.7%) exposure (P < 0.001). Symptom scores were not different between ozone versus CA. There were no significant differences in changes in FEV(1), FVC, and %PMN between subjects with GSTM1-positive and GSTM1-null genotypes. CONCLUSIONS: Exposure of healthy young adults to 0.06 ppm ozone for 6.6 hours causes a significant decrement of FEV(1) and an increase in neutrophilic inflammation in the airways. GSTM1 genotype alone appears to have no significant role in modifying the effects.
I-6 Fig I-1	Add data point from Kim (2011) O3 vs CA (-1.71 +/- 0.50% vs. -0.002 +/- 0.46%)
I-7 Para 1	One could note in Figure I-1 that, not surprisingly, the results of studies

	conducted using subjects residing in California (Adams, et. al.) are consistent with measurements made with residents of other states (e.g. Kim et al., 2011) In addition to controlled laboratory conditions, studies of individuals exercising outdoors, including children attending summer camp, have shown associations of reduced lung function with ozone exposure. There were wide ranges in responses among individuals.
I-7 Para 2	In laboratory studies, cellular and biochemical changes associated with respiratory tract inflammation have also been consistently reported in the airway lining after low level exposure to ozone. These changes include an increase in specific cell types and in the concentration of biochemical mediators of inflammation and injury such as ~~cytokines~~ Interleukin-1, Tumor Necrosis Factor α and fibronectin.
I-7 Para 4	There may be interactions between ozone and other ambient pollutants. The susceptibility to ozone observed under ambient conditions could be modified due to the combination of pollutants that coexist in the atmosphere, or ozone ~~may actually~~might sensitize these subgroups to the effects of other pollutants.
I-7 Para 5	Some animal studies show results that indicate possible chronic effects including functional and structural changes of the lung. These changes indicate that repeated inflammation associated with ozone exposure over a lifetime may result in ~~sufficient~~ cumulative damage to respiratory tissue such that individuals later in life may experience a reduced quality of life in terms of respiratory function and activity level achievable.
I-7 Para 7	In summary, adverse effects associated with ozone exposures have been well documented. ~~,~~ A~~a~~lthough the specific ~~causal~~ mechanisms of action are not fully identified ~~is still somewhat unclear~~there is a strong likelihood that oxidation of key enzymes and proteins and inflammatory responses play important roles.
I-8 Para 1	NOTE: It might be useful to add the following: On the basis of the most recent evaluations of ozone health effects the CASAC has recommended to the USEPA Administrator that the NAAQS be reduced and recommended a range in which 0.070 ppm would be the upper limit, i.e. moving the national standard to be consistant with the CA standard.
I-9 P 3-4	In recent years additional focus has been placed on particles having an aerodynamic diameter of 2.5 μm or less (PM2.5). A greater fraction of particles in this size range can penetrate and deposit deep in the lungs. The EPA recently lowered the air quality standards for PM2.5 to 35 $\mu g/m^3$ for a 24-hour average and reaffirmed 15 $\mu g/m^3$ for an annual average standard. There was considerable controversy and debate surrounding the review

	of particulate matter health effects and the consideration of ambient air quality standards (Kaiser, 1997; Vedal, 1997) when the EPA promulgated the initial PM2.5 standards in 1997. Since that time, numerous studies have been published, and some of the key studies were closely scrutinized and ~~analyses repeated~~the data were reanalyzed by additional investigators. The re~~sult is that there are now substantial data~~analyses ~~confirming~~ confirmed the significant findings of adverse health effects of PM2.5 exposures and some additional studies demonstrated adverse effects at ambient concentrations at or below the current NAAQS.
I-10 P 1	in the atmosphere ~~from gases~~by condensation of vapors that are emitted or by chemical or photochemical reactions with other contaminants in the air.
I-10 P 2	These particles are garnering interest since a limited number of epidemiological and several laboratory studies indicate that their toxicity may be higher on a mass basis than larger particles, and there is evidence that these small particles, or toxic components carried on their surface, can translocate from the lung to the blood and to other organs of the body.
I-10 P 4	The major ~~types of~~ effects associated with particulate matter ~~include:~~are shown in Table I-4. California did not set a separate 24-hr average PM2.5 standard; the 35 µg/m3 NAAQS applies.
I-11 Table I-4	COMMENT: Insert NAAqS for 24 hr PM2.5 in brackets? Indicate in a footnote if the forms of the standard are not the same.
I-11 P2 L7	Was the mortality CV, Resp, total, all of the above??
I-11 P2	There are statistical associations between PM10 and several of the gaseous co-pollutants and therefore the association of PM10 and healtheffects were reduced somewhat when O_3 was also considered and tended to be variably decreased when NO_2, CO, and SO_2 were added to the analysis. However, in many studies there are significant independent associations of PM and health effects ~~These results argue~~thus supporting the contention that the effects are likely due to the particulate exposures; they cannot readily be explained by coexisting weather stresses or other pollutants.
I-13	COMMENT: It gets confusing when the basis changes from 10 µg/m3 to 25 µg/m3 or other metrics. There should be a reference for the Mexico City and Chile studies.
I-13 P3	The relative importance of both PM2.5 and PM10-2.5 may vary in different regions depending on the relative concentrations and components, which can also vary by season. A major knowledge gap is the relative paucity of direct measurements of PM2.5-10. Most estimates are made by subtracting PM2.5 from PM10 measured at co-located samplers, a process that is subject to large errors that are

	inherent in the subtracting of one relatively large number from another. More research is needed to better assess the relative effects of fine (PM2.5)
I-14 P3	These observations are consistent with the hypothesis that increased susceptibility to infection follows particulate matter exposures, which is consistent with mechanistic studies that show that PM exposures suppress the innate immune system.
I-14 P 4	The findings suggest that both the fine and coarse fractions may have associations with some respiratory symptoms, consistent with mechanistic studies that both coarse and fime PM suppress innate immune functions.
I-15 P4	COMMENT: This might also be a reflection that mortality in general is lower in the western states – perhaps analogous to the "healthy worker" effect seen in occupational studies. However effects are seen more clearly when analyses are focused on susceptible groups and when more personal metrics of exposure are used as shown by Jerrit et al.
I-16 P4	COMMENT: Pollutant levels dropped dramatically from 83-02. The impact of pollution on mortality would have dropped as well. When looking at a changing independent variable it may be more appropriate to look at the changes in mortality vs the changes in pollution over the entire period rather than arbitrary slices.
I-18 P1 L4	…couple OF cohort…
I-18 P2	…fetuses and infants may be subgroups…
I-21 P2 L4	Araujo,2008
I-26 P6 L3	…have been reported. Coupled with the human clinical studies, these data suggest that SO2 can trigger asthmatic episodes in individuals with pre-existing asthma.
I-26 P7	…to protect against ~~high short term exposure~~accute asthma attacks in sensitive individuals.

Sincerely,

Michael T. Kleinman

ATTACHMENT 5

PUBLIC COMMENTS

Appendix I-Health Effects was released for public review and comment in July and September 2012.

Copies of public comments on Appendix I Health Effects follow.

Criticism of Draft 2012 South Coast Air Quality Management District Air Quality Management Plan Appendix I Health Effects

and

Request for California Health and Safety Code Section 40471 (b) Hearing on Health Impacts of Particulate Matter Air Pollution in South Coast Air Basin

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August 30, 2012

Summary of Attached Pages:

1) Enstrom Criticism of Draft 2012 AQMD AQMP Appendix I Health Effects makes the primary points that a) overwhelming epidemiologic evidence indicates particulate matter is not killing Californians; b) since 2001 AQMD has not prepared reports on "the health impacts of particulate matter in the South Coast Air Basin" in accord with California Health and Safety Code (CHSC) Section 40471 (b); c) the AQMD Advisory Council failed to properly peer review AQMP Appendix I Health Effects; and d) AQMD must hold a Governing Board Hearing on AQMP Appendix I Health Effects before the 2012 AQMP is finalized.

2) Enstrom Op-Ed for The Desert Sun on particulate matter in the Coachella Valley, which was scheduled to be published on April 4, 2012 but which has never been published, makes a strong case that a) particulate matter is not currently harming Coachella Valley residents and b) there will be no health risk from particulate matter after the Sentinal Power Plant is operational.

3) Figure 21 from 2000 Health Effects Institute Reanalysis Report by Krewski, Jerrett, et al., shows clear and large variation in PM2.5 mortality risk across the US, with low risk in California

4) Enstrom Table 1 summary of the epidemiologic evidence shows NO relationship between PM2.5 and total mortality in California.

5) Enstrom Table 2 summary of the epidemiologic evidence shows NO relationship between PM10 and total mortality in California; also, US EPA summary of PM NAAQS indicates revocation of the annual PM10 standard in 2006 due to lack of long-term health effects.

6) NCHS US map shows 2009 age-adjusted total death rate by state, with California third lowest; also, California county data shows that the death rate in the South Coast Air Basin is lower than the death rate in every state except Hawaii.

Criticism of Draft 2012 South Coast Air Quality Management District Air Quality Management Plan Appendix I Health Effects

The Southern California Air Quality Management District (AQMD) has released its Draft 2012 Air Quality Management Plan (AQMP) (http://www.aqmd.gov/aqmp/2012aqmp/index.htm). This plan proposes aggressive and costly emission control measures, such as, increased use of zero emission vehicles and severe restrictions on wood-burning fireplaces, in order to reduce air pollution in the South Coast Air Basin (SCAB). This air basin includes about 17 million residents in Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino Counties. The primary goal of the AQMP is to bring the SCAB into compliance with the US Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) for criteria pollutants, such as, particulate matter (PM2.5 and PM10) and ozone. These standards are based on the nationwide health effects of these pollutants (http://www.epa.gov/air/criteria.html).

However, the AQMP needs to address the health effects of air pollution in the SCAB. In particular, California Health and Safety Code (CHSC) Section 40471 (b) specifically states "On or before December 31, 2001, and every three years thereafter, as part of the preparation of the air quality management plan revisions, the south coast district board, in conjunction with a public health organization or agency, shall prepare a report on the health impacts of particulate matter air pollution in the South Coast Air Basin. The south coast district board shall submit its report to the advisory council appointed pursuant to Section 40428 for review and comment. The advisory council shall undertake peer review concerning the report prior to its finalization and public release. The south coast district board shall hold public hearings concerning the report and the peer review, and shall append to the report any additional material or information that results from the peer review and public hearings." (http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=40001-41000&file=40460-40471).

As best I can determine, AQMD never prepared a "report on the health impacts of particulate matter air pollution in the South Coast Air Basin" at the end of 2001, 2004, 2007, or 2010. The only "health impacts" reports that I can find are Appendix I "Health Effects" of the 2003 AQMP, 2007 AQMP, and Draft 2012 AQMP. However these reports do not specifically address "the health impacts of particulate matter air pollution in the South Coast Air Basin." Indeed, the 2003 AQMP Appendix I states "The purpose of this appendix is to provide an overview of air pollution health effects, rather than to provide estimates of health risk from current ambient levels of pollutants in specific areas of the SCAB." (http://www.aqmd.gov/aqmp/docs/2003AQMP_AppI.pdf).

Failure to comply with CHSC Section 40471 (b) is a serious matter because the local health effects of PM provide the primary public health justification for the entire AQMP. Overwhelming epidemiologic evidence now indicates that there is NO relationship in California between PM and total mortality (also known as "premature deaths"), as I explained in the June 4, 2012 Orange County Register (http://www.ocregister.com/articles/air-357230-california-pollution.html).

This null relationship in California has been known since 2000, but the specific null evidence is only partially presented in the Draft 2012 AQMP and was entirely omitted from the earlier AQMPs. For instance, each AQMP Appendix I cites the 2000 Health Effects Institute Special Report "Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality," a major report relied upon by EPA and AQMD. However, only the nationwide PM2.5 mortality risk results in this report are cited in the AQMP, whereas Figures 5 and 21 show substantial geographic variation in PM2.5 mortality risk across the US, with Los Angeles ranking fifth lowest among 49 cities (http://www.scientificintegrityinstitute.org/HEIFigure5093010.pdf).

In total, ten separate analyses of five major California cohorts have found no relationship between PM2.5 and total mortality. Indeed, detailed analyses of two of these cohorts, funded by AQMD and completed in 2011, have found no relationship between any criteria pollutant and total mortality in California (www.scientificintegrityinstitute.org/Enstrom081512.pdf). Keep in mind, total mortality is the primary health impact that justifies the NAAQS. However, these national standards are not based on health effects or mortality in California or the SCAB. In 2009 the SCAB had an age-adjusted total death rate lower than the death rate in every state in the continental US (http://www.scientificintegrityinstitute.org/NCHSRR070811.pdf).

The 16 members of the 2012 AQMD Advisory Council were asked on June 7, 2012 to review and comment on Appendix I, particularly regarding the "health impacts of particulate matter air pollution in the South Coast Air Basin," and to attend a July 11, 2012 meeting at AQMD regarding Appendix I. Only 7 members submitted any written comments. The three members with the most relevant scientific expertise on PM did not address the "health impacts of particulate matter air pollution in the South Coast Air Basin". UCLA Professor John R. Froines did not submit any written comments; USC Professor Rob S. McConnell did not submit any comments on PM health effects; and LLU Professor Samuel Soret failed to reveal the null PM findings from AHSMOG in the December 2011 LLU Dr. P.H. dissertation of Lie Hong Chen (http://books.google.com/books/about/Coronary_Heart_Disease_Mortality_and_Lon.html?id=pA8ltwAACAAJ).

Dr. Soret served on the committee for Dr. Chen's highly relevant dissertation, CORONARY HEART DISEASE MORTALITY AND LONG-TERM EXPOSURE TO AMBIENT PARTICULATE AIR POLLUTANTS IN ELDERLY NONSMOKING CALIFORNIA RESIDENTS. The Abstract states "The purpose of this study is to assess the effect of long-term concentrations of ambient PM on risks of all causes . . . . The health effects of long-term ambient air pollution have been studied with up to 30 years of follow-up in the AHSMOG cohort, a cohort of 6,338 nonsmoking white California adults."

Before the Draft 2012 AQMP is finalized and approved, AQMD must hold a public hearing on the health impacts of air pollution in the SCAB, in accordance with CHSC Section 40471 (b). If the hearing confirms the overwhelmingly null evidence cited above, then the AQMP should not propose emission control measures necessary to comply with NAAQS that are not appropriate for California or the SCAB. Instead, AQMD should request a waiver from compliance with the NAAQS using the special waiver status granted to California in Section 209 of the Clean Air Act (http://www.epa.gov/otaq/cafr.htm).

From: "Folmer, James" <jfolmer@palmspri.gannett.com>
To: "James E. Enstrom" <jenstrom@ucla.edu>
Date: Tue, 3 Apr 2012 09:44:35 -0700
Subject: RE: Proposed Op-Ed on Particulate Matter Health Effects in CV

Dr. Engstrom, here's the edited version. I did minimal editing, just a few tweaks to match AP style. I replaced $\mu g/m^3$ with "micrograms per cubic meter." Please let me know if that's acceptable.

Also, I took your website references out of the body of the column and put them in a breakout (below) to make it more readable.

It will be in Wednesday's edition. Thanks for the contribution.

The Desert Sun has recently published a special report and an editorial on the Sentinel power plant that is under construction by Competitive Power Ventures. Substantial concern has been expressed about the impact of the particulate matter (PM) pollution that will be generated by the plant. I would like to provide my perspective on the PM levels associated with the plant and the health effects associated with PM. PM consists of "inhalable course particles" (PM10) and "fine particles" (PM2.5).

Based on the April 15, 2010, California Energy Commission air quality assessment for the Sentinel plant, Table 13 indicates that the maximum annual background PM10 level in the Coachella Valley will be increased from 54.9 microgram per cubic meter to 55.33 during plant operation. This represents a "worse case (maximum)" increase of only 0.8 percent. Based on the South Coast Air Quality Management District (AQMD) Final 2007 Air Quality Management Plan, the maximum annual average PM10 level in the Coachella Valley (Salton Sea Air Basin) is only 45.7 micrograms per cubic meter.

All these levels are quite similar to the U.S. EPA's 1987-2006 annual standard for PM10 of 50 micrograms per cubic meter. However, this standard was revoked in 2006 due to "inadequate" evidence of long-term health effects of PM10, as summarized in the 2004 and 2009 EPA Integrated Science Assessment for Particulate Matter.
The Desert Sun claim that "the Sentinel plant would increase the (PM10) level to 277 percent above the state standard" is highly misleading because it is based on the California Energy Commission's Table 13 comparison of 55.33 micrograms per cubic meter with the California annual standard for PM10 of 20. But this state standard was established by the California Air Resources Board in 2002 and does not reflect the extensive null evidence on PM10 health effects that has been published since 2002.

In January 2007, the Air Resources Board and AQMD approved $1,034,358 in funding, half from each agency, for two major epidemiologic studies on the relationship between PM (PM10 and PM2.5) and death in California. The study based on the American Cancer Society cohort was conducted by UC Berkeley professor Michael Jerrett and 13 other investigators.

The study based on the California Teachers Study cohort was conducted by Michael Lipsett of the California Department of Public Health and nine other investigators. A primary purpose of these studies was to produce new California evidence "to assist with the review of ambient air quality standards."

The results of these two studies were published in 2011 and they both found no relationship between PM and total mortality in California. The Jerrett Study found that total mortality during 1982-2000 among about 75,000 California adults was not related to either PM10 or PM2.5 in eight of nine models tested. The Lipsett Study found that total mortality during 2000-2005 among about 75,000 female

California teachers was not related to either PM10 or PM2.5.
The studies found some unexplained evidence of increased cardiovascular disease risk and decreased cancer risk, but there was no overall increased risk of death. These null results agree with the overwhelmingly null results for California that have been published since 2000, which include my 2005 results.

Thus, based on all the evidence described above, there is no health risk associated with PM in the Coachella Valley or in California as a whole and there will be no health risk from PM after the Sentinal power plant is operational. However, since AQMD and others have a different perspective and since The Desert Sun stated that "Robust debate on this issue is needed," I propose that an open forum be organized so that AQMD Executive Officer Barry Wallerstein and I can debate our different views on the health effects of PM in the Coachella Valley. Hopefully, our debate will help resolve the PM health effects issue.

James E. Enstrom is on the research faculty at the UCLA School of Public Health and has been conducting epidemiologic research there since 1973. Email him at jenstrom@ucla.edu

LEARN MORE ABOUT PARTICULATE MATTER
Read the California Energy Commission air quality assessment for the Sentinel plant at mydesert.com/opinion

Websites cited by James E. Engstrom:
www.epa.gov/pm/
www.aqmd.gov/aqmp/07aqmp/aqmp/Chapter_2.pdf
www.epa.gov/ttn/naaqs/standards/pm/s_pm_history.html
cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546
www.arb.ca.gov/board/books/2007/012507/07-1-4pres.pdf
wmbriggs.com/blog/?p=4587
ajrccm.atsjournals.org/content/184/7/828.short
www.scientificintegrityinstitute.org/Enstrom081111.pdf

From: "Folmer, James" <jfolmer@palmspri.gannett.com>
To: "James E. Enstrom" <jenstrom@ucla.edu>
Date: Wed, 28 Mar 2012 13:11:05 -0700
Subject: RE: April 5 DSun Op-Ed on PM Health Effects & Enstrom Photo

Photo is fine. I'll try to remember to send you the edited version. Feel free to pester me on Tuesday, but we can never promise exactly when a column will run depending on what's happening in the news.

Thanks.

2000 Krewski Jerrett HEI Report Figure 21
1982-1989 CPS II $PM_{2.5}$ Mortality Risk <1.0 in CA

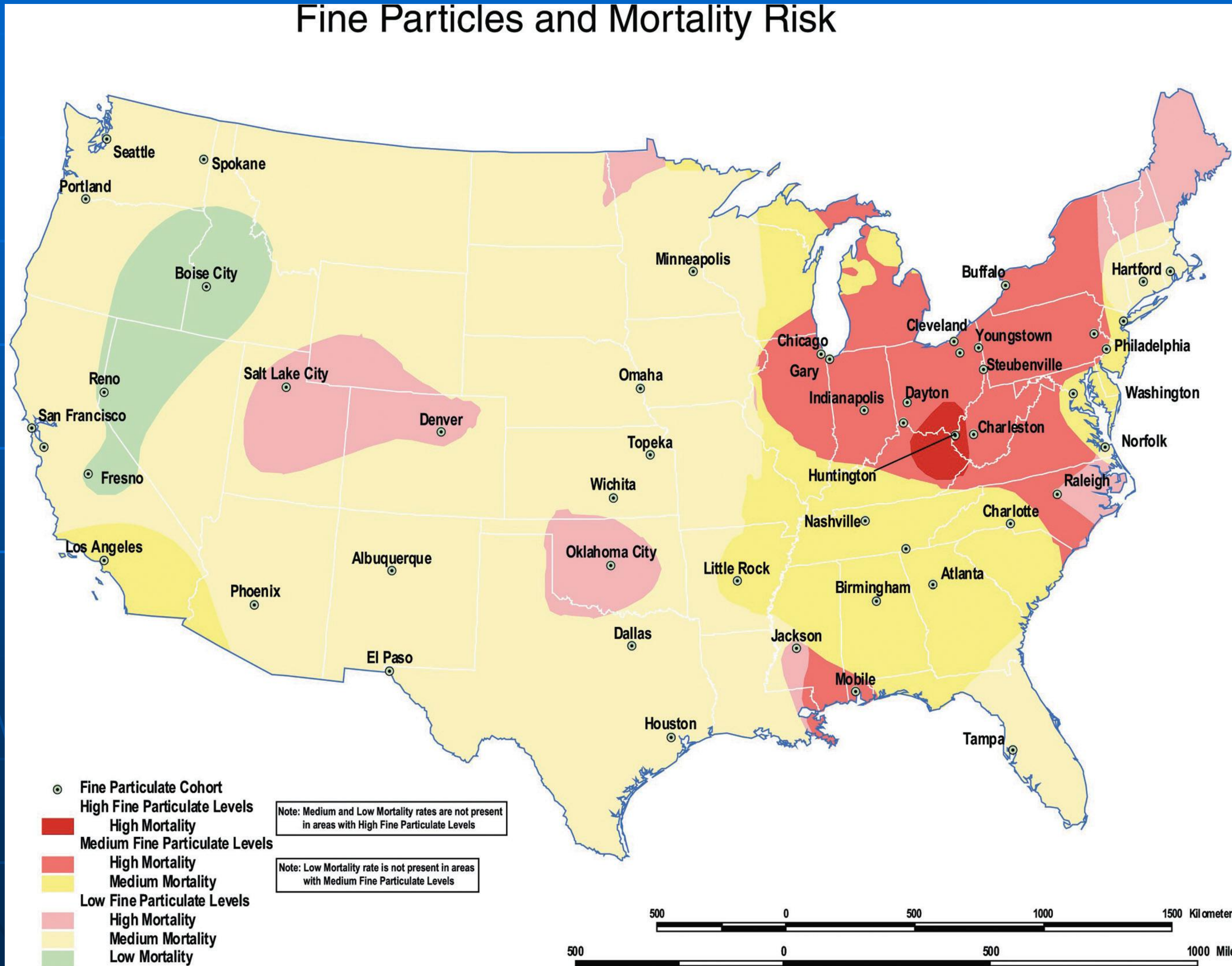


Table 1. Major Epidemiologic Studies of PM2.5 and Total Mortality in California
(http://scientificintegrityinstitute.org/Enstrom081512.pdf)
Relative risk of death from all causes (RR and 95% CI) for increase of 10 μg/m³ in PM2.5

McDonnell 2000 (N~3,800 [1,347 M + 2,422 F]; SC&SD&SF AB Adventists in 9 airsheds, used to estimate PM2.5)	CA AHSMOG Cohort	RR ~ 1.03 (0.95 – 1.12)	1977-1992
Krewski 2000 (2010) (N=40,408 [18,000 M + 22,408 F]; 4 MSAs; 1979-1983 PM2.5; 44 covariates)	CA CPS II Cohort	RR = 0.872 (0.805-0.944)	1982-1989
Jerrett 2005 (N=22,905; 267 zip code areas in LA basin only; 1999-2000 PM2.5; 44 cov + max confounders)	LA Basin CPS II Cohort	RR = 1.11 (0.99 - 1.25)	1982-2000
Enstrom 2005 (N=35,783 [15,573 M + 20,210 F]; 11 counties; 1979-1983 PM2.5; 25 county internal comparison)	CA CPS I Cohort	RR = 1.039 (1.010-1.069) RR = 0.997 (0.978-1.016)	1973-1982 1983-2002
Zeger 2008 (3.1 M [1.5 M M + 1.6 M F]; Medicare enrollees in CA+OR+WA [CA = 73%]; 2000-2005 PM2.5)	MCAPS Cohort "West"	RR = 0.989 (0.970-1.008)	2000-2005
Jerrett 2010 (N=77,767 [34,367 M + 43,400 F]; 54 counties; 2000 PM2.5; KRG ZIP; 20 ind cov+7 eco var; Slide 12)	CA CPS II Cohort	RR ~ 0.994 (0.965-1.025)	1982-2000
Krewski 2010 (N=40,408; 4 MSAs; 1979-1983 PM2.5; 44 cov) (N=50,930; 7 MSAs; 1999-2000 PM2.5; 44 cov)	CA CPS II Cohort	 RR = 0.960 (0.920-1.002) RR = 0.968 (0.916-1.022)	 1982-2000 1982-2000
Jerrett 2011 (N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; KRG ZIP Model; 20 ind cov+7 eco var; Table 28)	CA CPS II Cohort	RR = 0.994 (0.965-1.024)	1982-2000
Jerrett 2011 (N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; Nine Model Ave; 20 ic+7 ev; Fig 22 & Tab 27-32)	CA CPS II Cohort	RR = 1.002 (0.992-1.012)	1982-2000
Lipsett 2011 (N=73,489 [73,489 F]; 2000-2005 PM2.5)	CA Teachers Cohort	RR = 1.01 (0.95 – 1.09)	2000-2005
Ostro 2011 (N=43,220 [43,220 F]; 2002-2007 PM2.5)	CA Teachers Cohort	RR = 1.06 (0.96 – 1.16)	2002-2007

Table 2. <u>Major Epidemiologic Studies of PM10 and Total Mortality in California</u>

<u>Relative risk of death from all causes (RR and 95% CI) for increase of 10 μg/m³ in PM10</u>

McDonnell 2000	CA AHSMOG Cohort (N~3,800 [1,347 M + 2,422 F]; SC&SD&SF AB Adventists with PM10 from CARB monitors) [deaths from all natural causes ICD9=001-799]	RR ~ 1.01 (0.96 – 1.07)	1977-1992
Chen 2010	CA AHSMOG Cohort (N=4,830 [1,750 M + 3,080 F]; SC&SD&SF AB Adventists with PM10 from CARB monitors) [deaths from all natural causes ICD9= 001-799]	RR = 1.01 (0.98 – 1.04)	1977-2006
Jerrett 2011	CA CPS II Cohort (N=76,135 [33,625 M + 42,510 F]; 54 counties; 1988-2002 PM10; 20 ind cov+7 eco var; Table 37)	RR = 1.001 (0.987-1.017)	1982-2000
Lipsett 2011	CA Teachers Cohort (N=61,181 [61,181 F]; 1996-2005 PM10)	RR = 1.00 (0.97 – 1.04)	2000-2005

FOLLOWING THE SCIENCE: How National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM) Have Changed Over Time (http://www.epa.gov/pm/agriculture.html)

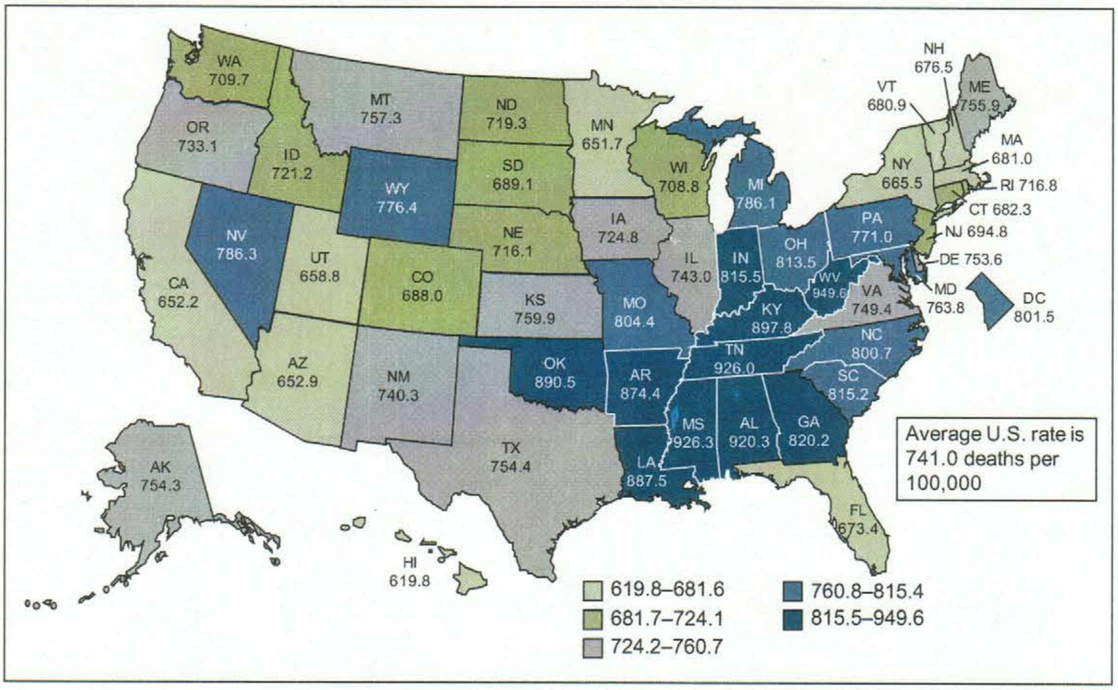
- EPA has regulated particle pollution since 1971. Our standards have evolved over time, as science has taught us more about how exposure to particles affects health and welfare.
- The 1971 standards, for example, set levels for all particles in the air, known as "total suspended particulate." This covered all sizes of airborne particles, including dirt and other larger particles.
- In 1987, EPA changed the standards to focus on those particles 10 micrometers in diameter and smaller, because particles larger than that don't generally get past the nose into the respiratory system. The Agency set both daily and annual PM10 standards at that time.
- In 1997, based on an expanding body of scientific evidence linking fine particles (PM2.5) to serious health effects, EPA added both daily and annual standards for fine particles.
- The Agency revised those standards in 2006, tightening the daily standard. That same year, **EPA revoked the annual standard for PM10, because there was insufficient evidence linking long-term exposure to inhalable coarse particle pollution to health problems.** EPA retained the daily PM10 standard – at 150 micrograms per cubic meter, the same level since 1987.

Do death rates vary by state?

States experience different risks of mortality. Hawaii has the lowest age-adjusted death rate (619.8 deaths per 100,000 population) of all the states, 16.4 percent lower than the average rate for the United States (741.0). West Virginia had the highest state age-adjusted death rate in 2009, 28.2 percent higher than the average U.S. rate.

In general, states in the Southeast region have higher rates than those in other regions of the country. Louisiana, for example, is typical of the region and has an age-adjusted death rate of 887.5 deaths per 100,000 population (3). States in other regions of the country, such as Illinois in the Midwest (743.0 deaths per 100,000 population) and Oregon in the West (733.1 deaths per 100,000 population), have rates that are more comparable with the average U.S. rate (3) (Figure 4).

Figure 4. Age-adjusted death rates, by state and the District of Columbia: United States, preliminary 2009



SOURCE: CDC/NCHS, National Vital Statistics System, Mortality.

Ratio of 2009 Age-Adjusted Total Death Rates (deaths/100,000)

California / U.S.	652.2 / 741.1 = 0.88 = 88%
'South Coast Air Basin' (4 Counties) / U.S.	650.8 / 741.1 = 0.88 = 88%
Los Angeles County / U.S.	637.3 / 741.1 = 0.86 = 86%
Orange County / U.S.	570.9 / 741.1 = 0.77 = 77%

Misrepresentation and Exaggeration of Health Impacts in South Coast Air Quality Management District Revised Draft 2012 Air Quality Management Plan Appendix I Health Effects

and

Request for California Health and Safety Code Section 40471 (b) Hearing on Health Impacts of Particulate Matter Air Pollution in South Coast Air Basin

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September 20, 2012

1) In spite of my repeated submissions to AQMD since 2008 of overwhelming evidence of no mortality impacts, including the evidence in my August 30, 2012 Criticism of the Draft 2012 AQMP (http://scientificintegrityinstitute.org/AQMP083012.pdf), the September 7, 2012 Revised Draft AQMP Appendix I Health Effects continues to seriously misrepresent and exaggerate the mortality impacts of criteria pollutants, like particulate matter, in the South Coast Air Basin (http://www.aqmd.gov/aqmp/2012aqmp/RevisedDraft/AppI.pdf).

2) Since 2000, overwhelming epidemiologic evidence that fine particulate matter is not killing Californians has been published by 26 accomplished doctoral level scientists (Ph.D. or M.D.), including myself. Since 2008, extensive written and/or verbal comments by 16 doctoral level critics, including myself, have been submitted to US EPA, CARB, and/or AQMD and these comments strongly criticize the way the California-specific evidence has been characterized by the three regulatory agencies. The names of the scientists and critics are listed on the next page.

3) The 2012 AQMP (http://www.aqmd.gov/aqmp/2012aqmp/index.htm) does not comply with California Health and Safety Code (CHSC) Section 40471 (b): "On or before December 31, 2001, and every three years thereafter, as part of the preparation of the air quality management plan revisions, the south coast district board, in conjunction with a public health organization or agency, shall prepare a report on the health impacts of particulate matter air pollution in the South Coast Air Basin. The south coast district board shall submit its report to the advisory council appointed pursuant to Section 40428 for review and comment. The advisory council shall undertake peer review concerning the report prior to its finalization and public release. The south coast district board shall hold public hearings concerning the report and the peer review, and shall append to the report any additional material or information that results from the peer review and public hearings." (http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=40001-41000&file=40460-40471).

4) Before the 2012 AQMP is finalized and approved, the AQMD Governing Board must hold a public hearing on "the report and the peer review" regarding "the health impacts of particulate matter air pollution in the South Coast Air Basin," as required by CHSC Section 40471 (b).

Twenty-Six Doctoral Level Scientists Who Have Published Epidemiologic Findings Since 2000 That Show NO Relationship Between PM2.5 and Total Mortality in California

David E. Abbey, Ph.D., Loma Linda University (2000)
Michal Abrahamowicz, Ph.D., McGill University (2000)
Leslie Bernstein, Ph.D., City of Hope National Medical Center (2011)
Richard T. Burnett, Ph.D., Health Canada, Canada (2000, 2011)
Ellen T. Chang, Sc.D., Cancer Prevention Institute of California (2011)
George Christakos, Ph.D., San Diego State University (2011)
Francesca Dominici, Ph.D., Harvard University (2008)
James E. Enstrom, Ph.D., University of California, Los Angeles (2005, 2006, 2010)
Mark S. Goldberg, Ph.D., University of Quebec (2000)
Katherine D. Henderson, Ph.D., Cancer Prevention Institute of California (2011)
Edward Hughes, Ph.D., Edward Hughes Consulting, Canada (2011)
Michael Jerrett, Ph.D., University of California Berkeley (2010, 2011)
Daniel Krewski, Ph.D., University of Ottawa, Canada (2000, 2010, 2011)
Michael J. Lipsett, M.D., California Department of Public Health (2011)
Aidan McDermott, Ph.D., Johns Hopkins University (2008)
William F. McDonnell, Ph.D., US Environmental Protection Agency (2000)
Bart D. Ostro, Ph.D., California Office of Environmental Health Hazard Assessment (2011)
C. Arden Pope III, Ph.D., Brigham Young University (2011)
Peggy J. Reynolds, Ph.D., Cancer Prevention Institute of California (2011)
Jonathan M. Samet, M.D., University of Southern California (2008)
Yuanli Shi, M.D., University of Ottawa, Canada (2011)
Jack Siemiatyck, Ph.D., University of Quebec (2000)
Michael J. Thun, M.D., American Cancer Society (2011)
George D. Thurston, Ph.D., New York University (2011)
Warren H. White, Ph.D., Washington University (2000)
Scott L. Zeger, Ph.D., Johns Hopkins University (2008)

Sixteen Doctoral Level Critics Who Have Criticized Since 2008 the Relationship Between PM2.5 and Total Mortality in California as Characterized by US EPA, CARB, and AQMD

William M. Briggs, Ph.D., Statistician, New York City & Cornell University
John D. Dunn, M.D., J.D., Physician & Attorney, Darnall Army Medical Center, Texas
James E. Enstrom, Ph.D., Epidemiologist, University of California, Los Angeles
Anthony Fucaloro, Ph.D., Chemist, Claremont McKenna College, California
Gordon J. Fulks, Ph.D., Astrophysicist, Oregon
Michael E. Ginevan, Ph.D., Statistician, M.E. Ginevan & Associates, Maryland
Thomas W. Hesterberg, Ph.D., Toxicologist, Navistar, Illinois
Frederick W. Lipfert, Ph.D., Environmental Scientist, New York
Geoffrey C. Kabat, Ph.D., Epidemiologist, Einstein College of Medicine, New York
Matthew A. Malkan, Ph.D., Astrophysicist, University of California, Los Angeles
Roger O. McClellan, D.V.M., Toxicologist, New Mexico
Henry I. Miller, M.D., Physician, Hoover Institution, Stanford University
Suresh H. Moolgavkar, M.D., Ph.D., Epidemiologist, University of Washington
D. Warner North, Ph.D., Risk Analyst, NorthWorks & Stanford University
Robert F. Phalen, Ph.D., Toxicologist, University of California, Irvine
S. Stanley Young, Ph.D., Statistician, National Institute of Statistical Sciences

Request for a Comprehensive hearing on the Health Impacts of Particulate Matter in the South Coast Basin area in compliance with Section 40471 (b) of the CA Health and Safety Code.

John Dale Dunn MD JD
Emergency Physician Brownwood TX
Policy advisor Heartland Institute, Chicago
Policy advisor, American Council on Science and Health, New York City.
Civilian Contract Faculty, Emergency Medicine, Carl R Darnall Army Medical Center, Fort Hood, TX

Members of the South Coast Air Quality Management District Board of Directors:

The recently released draft for Air Quality Management by the Southern California Air Quality Management District (AQMD) proposes very significant regulatory changes for more than 15 million residents of the area, however the South Coast AQMD proposes these changes without benefit of the prescribed triennial Air quality management plan revisions announcements. In conjunction with an effort to elicit public comments. Draft 2012 is, like so many drafts before, the product of a black box project at the South Coast AQMD, the precautionary principle and acceptance of science that has been effectively challenged in public in the past 4 years.

That is not according to Federal or State Clean Air Act law or the intent of environmental compliance provisions.

The Air Quality Management Plan (AQMP) (http://www.aqmd.gov/aqmp/2012aqmp/index.htm) proposes aggressive and draconian provisions that would have major impacts on the residents of the South Coast Basin Area.

I have included previous submissions to CARB on air regulations that were the product of the 2008-2010 activities and proposals and public comments made by prominent experts opposed to the new CARB air pollution measures. The South Coast Air Management Plan process should include close review and evaluations of those public comments that criticize and conflict with the studies relied on by the District planners.

The economic impact of the Management plan will kill or harm business, industry, transportation, and agricultural activity for now good reason, since air pollution is not killing anyone in South Coast. The proposed AQM Plan will cause hardship and shorten lives for the residents of the area in addition to depressing the economy with the well-known effect that can be expected, higher unemployment, stress and hardship, resulting in shortened life expectancies and misery—all for AQMD chasing a phantom menace—small particle pollution, that by evidence of the studies, causes no harm or deaths.

AQMP also should follow the law, that specifically states at Section 40471 of the Health and Safety Code "On or before December 31, 2001, and every three years thereafter, as part of the preparation of the air quality management plan revisions, the south coast district board, in conjunction with a public health organization or agency, shall prepare a report on the health impacts of particulate matter air pollution in the South Coast Air Basin. The south coast district board shall submit its report to the advisory council appointed pursuant to Section 40428 for review and comment. The advisory council shall undertake peer review concerning the report prior to its finalization and public release. The south coast district board shall hold public hearings concerning the report and the peer review, and shall append to the report any additional material or information that results from the peer review and public hearings." (http://www.leginfo.ca.gov/cgi- bin/displaycode?section=hsc&group=40001-41000&file=40460-40471).

The district has failed to comply. Therefore they should correct their failure and stand down from pursuing the Plan proposed until the review and hearing process is complete.

For 4 years 2008-2012, the California Air Resources Board (CARB) has attempted to push through air pollution/small particle control regulations that the CARB claimed were based on evidence of human health effects that included deaths from small particles.

Here are the links, which include my previous submissions protesting the inadequacy of the human health effects science relied on by CARB.

Public Comments by experts on the 2008 CARB "Tran" Report

October 24, 2008 CARB Public Comments on Fine PM and Premature Deaths in CA submitted by July 11, 2008
(http://www.arb.ca.gov/research/health/pm-mort/pm-mort_supp.pdf)
(http://www.scientificintegrityinstitute.org/CARBPMComments102408.pdf)

July 11, 2008 CARB PM2.5 Premature Mortality Teleconference Transcript 071108
(http://www.scientificintegrityinstitute.org/CARB071108.pdf)

February 26, 2010 CARB Symposium on PM2.5 & Deaths in CA

February 26, 2010 CARB Symposium on PM2.5 & Deaths Home Page Link
(http://www.arb.ca.gov/research/health/pm-mort/pm-mort-ws_02-26-10.htm)

February 26, 2010 CARB Symposium on PM2.5 & Deaths Agenda & Panel
(http://www.arb.ca.gov/research/health/pm-mort/pm_symposium_agenda.pdf)

February 26, 2010 CARB Symposium on PM2.5 & Deaths Webcast
(http://www.cal-span.org/cgi-bin/archive.php?owner=CARB&date=2010-02-26)

February 26, 2010 CARB Symposium on PM2.5 & Deaths Transcript
(http://www.arb.ca.gov/research/health/pm-mort/symposium_transcript_2-26-10.pdf)

Criticism of June 9, 2011 Draft and October 28, 2011 Final Jerrett Report on PM2.5 Deaths in CA

October 28, 2011Compilation of All Criticism since June 9, 2011 of Jerrett Report on CA PM2.5 Deaths
(http://www.scientificintegrityinstitute.org/JerrettCriticism102811.pdf)

Careful review of the submissions above by previous commenters would justify a stand down from the proposed AQMP outlined by the South Coast MD. Research shows that current ambient air pollution in California is not harmful and doesn't justify aggressive new AQMPlans.

Reputable scientists repeatedly raised important issues and Michael Jarrett's joke of a research project based on his selection of the "conurbation" model data, confirms that the CARB claims of thousands of lives saved by air regs is a house of cards built by CARB on small particle research data dredges to find poorly defined "premature deaths" supposed associated with poorly defined small particle pollution. Such uncertainties certainly cannot justify the extreme elements of the South Coast AMP.

The CARB never was able to properly dispel the objections raised in 2008-2010, and in February of 2010 lost the major face to face debate in a knockout when Dr. Michael Jarrett's project came a cropper and Dr. Jarrett admitted he couldn't find any current air pollution health effects.

Then Dr. Jarrett went back to his computer tricks and decided to redo his research with modeling that is risible, then 9 models showed no effect but one of his ten models finally gave him the results that allowed him to do what CARB asked—support their position that small particles are killers.

Dr. Jarrett's co-authors, an impressive array of fellow travelers in the small particle hunting research community, never excused or explained the decision to rely on the "conurbation" model as more reliable than the 9 models that showed no effect. Although conurbation sounds exotic, it is the game played by researchers called torturing the data, and in this case Dr. Jarrett found a way to dice and chop the geography of California to find populations that had the "associations" of air pollution and deaths he was looking for.

That is called the outcome based research fallacy and is fueled by the fact that Jarrett and his coauthors knew who funded their research, an agency that had a stake in promoting the public perception that small particles are killers.

South Coast Air Management District should comply with California Health and Safety Code Section 40471 (b) and schedule a Hearing for a full vetting of the small particle research issues before implementing the proposed AQMP and then act reasonably and discard the Plan.

There are no impact studies for the past decade, and the AQMD has no reports on health impacts on record for 2001 through 2010 when there should have been at least 3 reports filed, and at one point an AQMD report said, ignoring its responsibility in reporting, “The purpose of this appendix is to provide an overview of air pollution health effects, rather than to provide estimates of health risk from current ambient levels of pollutants in specific areas of the SCAB.” (http://www.aqmd.gov/aqmp/docs/2003AQMP_AppI.pdf).

The health effects studies are the foundation for any management plan and have been discarded in favor of aggressive regulatory proposals based on the precautionary principle or good intentions, but not on the science demanded in the Clean Air Act and its corresponding California Statutes. The research presented to the CARB and the public comments provided make a strong case for no effect from current ambient air pollution. No death effect, no measurable health effect from the criteria air pollutants.

Please consider the comments from 2008 on the proposed CARB Tran report, the submissions made for the debate in February of 2010, and the comments by experts on the final version of the Jerrett study that asserted the “conurbation” model justified the CARB pursuit of new and aggressive small particle regulations.

Many studies have found no PM 2.5 health effect and yet the CARB and the South Coast Management district continue to press forward to the detriment of the California economy. California cohorts have found no relationship between PM2.5 and total mortality. Indeed, detailed analyses of two of these cohorts funded by AQMD and completed in 2011, have found no relationship between any criteria pollutant and total mortality in California (www.scientificintegrityinstitute.org/Enstrom081512.pdf).

The CARB and US EPA human health effects research on small particles and other criteria pollutants have been depended on the questionable methodology of data dredging for “premature deaths. The problem is defining premature deaths, and the studies in fact do not count premature deaths as in a medical investigation, but the noise of variation in death rates. That is an opportunity for irresponsible data torturing to find air pollution and daily variation in death rates to call “premature deaths” that are not. The premature deaths projected by researchers, the USEPA and CARB to thousands in the state or nation are projections of deaths that area more than the daily average, not premature deaths of individuals who have been assessed for confounders and found to die short of life expectancy.

The research is unreliable, and misleading, and projections of hundreds of thousands of lives saved is deceitful nonsense. There are no deaths from small particles, the research is deceptive desk top death certificate data dredging that harvests the noise from day to day death rate variations and calls it signal, then projects the “correlations” the population to make impressive scare numbers of “premature deaths.”

These data dredged mortalities are the primary health impact used to justify the NAAQS. So the number is the product of data torturing and deception but even if the AQMD accepts the unreliable counting and methodology, the national standards are not based on health effects or mortality in California or the SCAB. In 2009 the SCAB had an age-adjusted total death rate lower than the death rate in every state in the continental US.
(http://www.scientificintegrityinstitute.org/NCHSRR070811.pdf).

The AQMD is obligated to evaluate the reliability of the research and another consideration is the already mentioned Krewski map that shows no California air pollution effects. That alone should give California policy makers pause before initiating another aggressive regulatory regime.

A good faith effort to review the human health effects science should convince the SC AMD policy makers to reconsider the proposed aggressive Management Plan.

Cordially,

John Dale Dunn MD JD

Misrepresentation and Exaggeration of Health Impacts in South Coast Air Quality Management District Revised Draft 2012 AQMP Appendix I Health Effects Version 2

and

Request for California Health and Safety Code Section 40471 (b) Hearing on Health Impacts of Particulate Matter Air Pollution in South Coast Air Basin

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October 11, 2012

1) In spite of my extensive and repeated criticism of the scientific and public health basis for the 2012 AQMD Air Quality Management Plan (AQMP), including my September 28, 2012 American Statistical Association JSM Proceedings Paper "Particulate Matter is Not Killing Californians" (http://www.scientificintegrityinstitute.org/ASA092812.pdf), the October 9, 2012 Revised Draft AQMP Appendix I Health Effects Version 2 continues to seriously misrepresent and exaggerate the health impacts of particulate matter in the South Coast Air Basin (SCAB) (http://www.aqmd.gov/aqmp/2012aqmp/RevisedDraft/AppI-v2.pdf).

2) Since 2000, overwhelming epidemiologic evidence that fine particulate matter is not killing Californians has been published by 26 accomplished doctoral level scientists (Ph.D. or M.D.), including myself. Since 2008, extensive written and/or verbal comments by 16 doctoral level critics, including myself, have been submitted to US EPA, CARB, and/or AQMD and these comments strongly criticize the way the California-specific evidence has been characterized by the three regulatory agencies. This evidence has not been properly recognized or used by AQMD in its assessment of the health impacts of particulate matter in the SCAB since 2000.

3) Since 2001 the Appendix I Health Effects for the AQMP has never complied with various clearly written provisions of California Health and Safety Code (CHSC) Section 40471 (b) (http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=40001-41000&file=40460-40471). In particular, Appendix I does not focus on "the health impacts of particulate matter air pollution in the South Coast Air Basin;" Appendix I has not been prepared "in conjunction with a public health organization or agency;" the AQMD Advisory Council did not "undertake peer review concerning the report," using a standard definition of peer review; the AQMD Governing Board has not complied with the requirement to "hold public hearings concerning the report and the peer review."

4) Before the 2012 AQMP is finalized and approved, the AQMD must be required to comply with all provisions of CHSC Section 40471 (b). In particular, the AQMD Governing Board must hold at least one public hearing that focuses on "the report and the peer review" regarding "the health impacts of particulate matter air pollution in the South Coast Air Basin."

Wed, 8/1/2012, 2:00 PM - 3:50 PM
http://www.amstat.org/meetings/jsm/2012/onlineprogram/ActivityDetails.cfm?SessionID=207510

Are Fine Particulates Killing Californians? — Invited Papers

Section on Risk Analysis , Section on Survey Research Methods , Section on Statistics and the Environment , Section for Statistical Programmers and Analysts , Section on Statistics in Epidemiology

Organizer(s): Michael E Ginevan, M.E. Ginevan & Associates

Chair(s): Michael E Ginevan, M.E. Ginevan & Associates

2:05 PM Particulate Matter is Not Killing Californians — **James E. Enstrom, University of California at Los Angeles**

2:25 PM A Closer Look at Air Pollution-Mortality Relationships for California Members of the American Cancer Society Cohort — **Frederick W. Lipfert, Environmental Consultant** ; S. Stanley Young, National Institute of Statistical Sciences

2:45 PM Assessing Variable Importance in an Environmental Observational Study — **S. Stanley Young, National Institute of Statistical Sciences** ; Jesse Q. Xia, National Institute of Statistical Sciences

3:05 PM Improving the Scientific Advice Provided by the Clean Air Scientific Advisory PM Subcommittee — **Robert F. Phalen, University of California at Irvine**

3:25 PM **Discussant:** Michael E Ginevan, M.E. Ginevan & Associates

3:45 PM **Floor Discussion**

01 Particulate Matter is Not Killing Californians

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Keywords: epidemiology ; particulate matter ; mortality ; causality ; statistics ; California
Abstract: There is now overwhelming epidemiologic evidence that particulate matter (PM), both fine particulate matter (PM2.5) and course particulate matter (PM10), is not related to total mortality in California. I will examine all the long-term PM epidemiologic cohort studies in California, and discuss the ways the findings from these studies have be used and/or ignored. I will discuss the limitations of these studies: lack of access to key databases; the ecological fallacy; failure to consider other pollutants; failure to satisfy causality criteria; and failure to consider other competing health risks. Also, ethical issues underlying much of PM2.5 epidemiology will be discussed. I will make a strong case that PM2.5 is not killing Californians and that there is not a scientific or public health basis for the many of the existing and proposed regulations designed to reduce PM levels in California. Finally, I will make the case that PM health effects and regulations must be put into perspective with other factors that influence health in California, given the low age-adjusted total death rate in this state.

Particulate Matter is Not Killing Californians

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September 28, 2012

Abstract

There is now overwhelming epidemiologic evidence that particulate matter (PM), both fine particulate matter (PM2.5) and course particulate matter (PM10), is not related to total mortality in California. I will examine all the long-term PM epidemiologic cohort studies in California, and discuss the ways the findings from these studies have be used and/or ignored. I will discuss the limitations of these studies: lack of access to key databases; the ecological fallacy; failure to consider other pollutants; failure to satisfy causality criteria; and failure to consider other competing health risks. Also, ethical issues underlying much of PM2.5 epidemiology will be discussed. I will make a strong case that PM2.5 is not killing Californians and that there is not a scientific or public health basis for the many of the existing and proposed regulations designed to reduce PM levels in California. Finally, I will make the case that PM health effects and regulations must be put into perspective with other factors that influence health in California, given the low age-adjusted total death rate in this state.

Key Words: epidemiology, particulate matter, mortality, causality, statistics, California

1. Background

1.1 Relationship of PM2.5 Epidemiology to EPA, CARB, and AQMD

This paper focuses on particulate matter (PM) epidemiology in California. PM consists of fine particulates (PM2.5), defined to have particle size <2.5 μm in diameter, and course particulates (PM10), defined to have a particle size <10 μm in diameter. PM2.5 is generated mainly by combustion processes, such as, forest fires, agricultural dust, industrial combustion, and diesel engines. PM2.5 epidemiology played a major role in the US Environmental Protection Agency (EPA) establishment of the 1997 National Ambient Air Quality Standard (NAAQS) for PM2.5 (http://www.epa.gov/air/criteria.html). EPA has recently proposed to lower the annual NAAQS for PM2.5 from the current level of 15 μg/m^3 to 12-13 μg/m^3

(http://www.epa.gov/pm/actions.html). The PM2.5 regulations established since 1997 have had multi-billion dollar economic impacts in the United States and California and have been highly contested (http://science.house.gov/press-release/harris-and-broun-question-administration%E2%80%99s-environmental-cost-benefit-analyses).

PM2.5 epidemiology has also been used by the California Air Resources Board (CARB) to establish the draconian Truck and Bus Regulation to reduce PM emissions from diesel vehicles in California (http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm). During the past five years, I have challenged the scientific and public health justifications for these regulations (http://www.arb.ca.gov/lists/gmbond2011/2-enstrom_letter_to_coal_cornez_re_suspend_carb_diesel_regs_121311.pdf).

PM2.5 epidemiology is also being used by the Southern California Air Quality Management District (AQMD) in the development of the 2012 Air Quality Management Plan (AQMP) (http://www.aqmd.gov/aqmp/2012aqmp/index.htm). The AQMP proposes aggressive and costly emission control measures in order to reduce existing PM and ozone levels in the South Coast Air Basin (SCAB). This air basin includes about 17 million residents in Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino Counties. The primary goal of the AQMP is to bring the SCAB into compliance with the NAAQS for criteria pollutants, primarily, PM2.5 and ozone.

An elevated relative risk (RR > 1.00) in an epidemiologic cohort study, i.e., increase in total (all cause) mortality risk for a 10 $\mu g/m^3$ increase in PM2.5 level, is interpreted by EPA, CARB, and AQMD as evidence that PM2.5 "causes" "premature deaths." Because EPA assigns a lifetime monetary value of about $7-9 million to each "premature death," the health benefits of preventing these deaths exceed the compliance costs of the regulations that are designed to reduce PM2.5 levels and PM2.5-related "premature deaths." Without PM2.5-related "premature deaths" the PM2.5 regulations are not justified on a cost-benefit basis.

During the past two decades there has been extensive criticism of PM2.5 epidemiology and its use for regulation of PM by EPA, CARB, and AQMD. Five major reasons for doubting a "causal" relationship between PM2.5 and "premature deaths" are: 1) the relative risk of death due to PM2.5 is small (RR ~ 1.10), varies by time and place, and shows no consistent dose-response relationship; 2) confounding variables, including other pollutants, often reduce the PM2.5 effect to zero (RR ~ 1.00); 3) the ecological fallacy applies to all PM2.5 epidemiology because PM2.5 measurements made at selected monitoring stations are imputed to individuals living near these stations; 4) the chemical composition of PM2.5 varies greatly across the US; and 5) the major PM2.5 epidemiologic findings that have been used to establish regulations are based on secret data maintained by the American Cancer Society and Harvard University (Krewski 2000), that is not accessible for independent reanalysis.

1.2 Major Lectures on PM2.5 and Mortality in California by Enstrom

The above epidemiologic issues are too complex to fully address in this paper. Additional relevant information can be found in the following major lectures that I have given since 2010, often in conjunction with other experts on this subject:

February 26, 2010 CARB Symposium "Estimating Premature Deaths from Long-term Exposure to PM2.5, with Enstrom talk "Critique of CARB Diesel Science, 1998-2010" (http://www.arb.ca.gov/research/health/pm-mort/pm-mort-ws_02-26-10.htm) (http://www.arb.ca.gov/research/health/pm-mort/enstrom.pdf)

November 28, 2011 UCLA Institute of the Environment Enstrom Seminar "Does Fine Particulate Matter Kill Californians? An Epidemiologic and Regulatory Controversy" (http://www.environment.ucla.edu/calendar/showevent.asp?eventid=667) and (http://www.arb.ca.gov/lists/gmbond2011/3-ioes_seminar_does_particulate_matter_kill_californians_enstrom_112811.pdf)

April 24, 2012 Dose-Response 2012 Conference Enstrom Lecture "Pseudoscientific Aspects of Fine Particulate Matter Epidemiology, 1993-2012" (http://dose-response.org/conference/2012/pdf/Enstrom_Dose_Response_Fine_Particulate.pdf)

August 1, 2012 American Statistical Association Joint Statistical Meeting Session "Are Fine Particulates Killing Californians?" with title talk by Enstrom (http://www.amstat.org/meetings/jsm/2012/onlineprogram/ActivityDetails.cfm?SessionID=207510) and (http://www.scientificintegrityinstitute.org/ASA080112.pdf)

2. PM2.5 and Total Mortality in California

2.1 California-specific Epidemiologic Results Summarized

Table 1 summarizes ten separate analyses of five major California cohorts that have found no relationship between PM2.5 and total mortality. References to these analyses are cited in the table and listed at the end of this paper and additional details are provided at this link (http://www.scientificintegrityinstitute.org/Enstrom081512.pdf). Included in Table 1 is an analysis limited to the Los Angeles area (Jerrett 2005). Table 2 summarizes five separate analyses of three of the major California cohorts. These analyses have found no relationship between PM10 and total mortality. There are no statewide cohort analyses that show a positive relationship between PM (PM2.5 and PM10) and total mortality in California. Indeed, three of these analyses (Jerrett 2011, Lipsett 2011, Ostro 2011), funded by CARB and AQMD, found no relationship between any criteria pollutant and total mortality in California.

The first published evidence of no PM2.5 mortality risk in California is contained in the July 2000 Health Effects Institute (HEI) Reanalysis Report (Krewski 2000). Figure 21, a U.S. map of "Fine Particulates and Mortality Risk," indicates no excess mortality risk in California. Figure 5 provides further evidence of the geographic variation in PM2.5 mortality risk, with Fresno (city #3) ranking second lowest in risk among 49 cities and Los Angeles (city #39) ranking fifth lowest in risk (http://www.scientificintegrityinstitute.org/HEIFigure5093010.pdf). Figure 1 below reproduces Figure 21 and Figure 5 with a city number assigned to each data point. The null California PM2.5 mortality risk findings in Figure 21 were confirmed in the August 31, 2010 letter from Krewski to HEI (Krewski 2010).

2.2 Misrepresentation of PM2.5 and Mortality in California by CARB

My December 15, 2005 *Inhalation Toxicology* paper, "Fine Particulate Air Pollution and Total Mortality Among Elderly Californians, 1973–2002" (Enstrom 2005), found no relationship between PM2.5 and mortality in California during 1983-2002. This is the first, largest, and most detailed peer reviewed journal publication that focuses on the relationship between PM2.5 and total mortality in California. Enstrom 2005 appeared just after the November 2005 *Epidemiology* paper "Spatial Analysis of Air Pollution and Mortality in Los Angeles" (Jerrett 2005), which found an unusually large relative risk between PM2.5 and mortality in the Los Angeles basin during 1982-2000. The finding is in direct contrast to the low absolute PM2.5 mortality risk for Los Angeles found in Figure 21. These conflicting findings need to be resolved with further analysis.

Enstrom 2005 was submitted to CARB health effects scientist Linda Smith on January 9, 2006 (http://www.arb.ca.gov/planning/gmerp/dec1plan/gmerp_comments/enstrom.pdf). The March 23, 2006 CARB meeting PPT presentation "Stronger Relationship Between Particulate Matter (PM) and Premature Death" gave extensive details on Jerrett 2005 and cited several other positive national studies, including Krewski 2000, Pope 2002, and Laden 2006 (http://www.arb.ca.gov/research/health/healthup/march06.pdf). However, it made no mention of Enstrom 2005, which was published one month after Jerrett 2005 and one month before a major Harvard Six Cities Study analysis (Laden 2006) appeared online. On August 21, 2006 CARB scientists Richard Bode, Linda Smith, and Hien T. Tran conducted a "Public Workshop on Updating the Methodology for Estimating Premature Death Associated with PM2.5 Exposures" and gave a PPT presentation (http://www.arb.ca.gov/research/health/pm-mort/ws-slides.pdf). The PPT presentation for this Workshop specifically shows Jerrett 2005 and Laden 2006, but not Enstrom 2005, as "New studies emerged since 2002." These PPT presentations show a pattern of omission of null findings like Enstrom 2005.

Additional misrepresentation of PM2.5 mortality risk in California was contained in the Draft and Final versions of the 2008 CARB Staff Report by Hien T. Tran "Methodology for Estimating Premature Deaths Associated with Long-term Exposure to Fine Airborne Particulate Matter in California." The October 24, 2008 Final Report states that PM2.5 contributes to 18,000 annual premature deaths in California, with 3,500 of these deaths due to diesel PM. These estimates of premature deaths provided the primary public health justification for new on-road diesel vehicle regulations approved and implemented by CARB. However, the premature death claims in this report are now entirely contradicted by the null findings presented in Table 1. My December 10, 2008 CARB comments exposed major flaws in this report (http://www.arb.ca.gov/lists/truckbus08/897-carb_enstrom_comments_on_statewide_truck_regulations_121008.pdf). The CARB misrepresentations of PM2.5 mortality risk in California continue up to the present, as explained in my talks and submissions cited above.

2.3 Failure to Properly Review Particulate Matter Health Impacts by AQMD

As an essential part of its currently ongoing preparation of the 2012 AQMP, the AQMD is required to address the health effects of air pollution in the SCAB. Indeed, California Health and Safety Code (CHSC) Section 40471 (b) specifically states "On or before December 31, 2001, and every three years thereafter, as part of the preparation of the air quality management plan revisions, the south coast district board, in conjunction with a public health organization or agency, shall prepare a report on the health impacts of particulate matter air pollution in the South Coast Air Basin. The south coast district board shall submit its report to the advisory council appointed pursuant to Section 40428 for review and comment. The advisory council shall undertake peer review concerning the report prior to its finalization and public release. The south coast district board shall hold public hearings concerning the report and the peer review, and shall append to the report any additional material or information that results from the peer review and public hearings." (http://www.leginfo.ca.gov/cgibin/displaycode?section=hsc&group=40001-41000&file=40460-40471).

However, based on available information, AQMD has never prepared a "report on the health impacts of particulate matter air pollution in the South Coast Air Basin" at the end of 2001, 2004, 2007, or 2010. The only "health impacts" reports are Appendix I "Health Effects" of the 2003 AQMP, 2007 AQMP, and Draft 2012 AQMP. However these reports do not specifically address PM health impacts in the SCAB. Indeed, the 2003 AQMP Appendix I states "The purpose of this appendix is to provide an overview of air pollution health effects, rather than to provide estimates of health risk from current ambient levels of pollutants in specific areas of the SCAB." (http://www.aqmd.gov/aqmp/docs/2003AQMP_AppI.pdf).

Failure to comply with CHSC Section 40471 (b) is a serious matter because the local health effects of PM provide the primary public health justification for the entire AQMP. As shown in Tables 1 and 2, there is now overwhelming epidemiologic evidence that there is NO relationship in California between PM and total mortality (also known as "premature deaths"). However, the 2003 AQMP Appendix I (https://aqmd.gov/aqmp/docs/2003AQMP_AppI.pdf, page I-14), 2007 AQMP Appendix I (https://aqmd.gov/aqmp/07aqmp/aqmp/Appendix_I.pdf, page I-14), 2012 Draft AQMP Appendix I (http://www.aqmd.gov/aqmp/2012aqmp/draft/Appendices/AppxI.pdf, page I-18), and 2012 Revised Draft AQMP Appendix I (http://www.aqmd.gov/aqmp/2012aqmp/RevisedDraft/AppI.pdf, page I-19) all make incorrect statements regarding the evidence in California and the SCAB.

All four Health Effects appendices have been authored by AQMD Health Effects Officer Jean Ospital (http://www.aqmd.gov/bios/ms_ospital_jean.html). These documents come to exactly the same conclusion regarding PM mortality risk: "Despite data gaps, the extensive body of epidemiological studies has both qualitative and quantitative consistency suggestive of causality. A considerable body of evidence from these studies suggests that ambient particulate matter, alone or in combination with other coexisting pollutants, is associated with significant increases in mortality and morbidity in a community. In summary, the scientific literature indicates that an increased risk of mortality and morbidity is associated with particulate matter at ambient levels. The evidence for particulate matter effects is mostly derived from population studies with supportive evidence from clinical and animal studies."

The null PM2.5 - mortality relationship in California has been known since 2000, but the specific null evidence is only partially presented in the Draft 2012 AQMP and was entirely omitted from the earlier AQMPs. For instance, each AQMP Appendix I cites Krewski 2000. However, only the nationwide PM2.5 mortality risk results in this report are cited, not the California-specific results in Figure 21. The 2007 AQMP Appendix review cites Jerrett 2005, Laden 2006, and the Pope 2006 review, which contains two references to Enstrom 2005, but Enstrom 2005 itself is not mentioned. Enstrom 2005 is mentioned briefly in the Draft 2012 Appendix I, but not assigned any major significance.

The overwhelmingly null evidence in Figures 1 and 2 is not fully or properly described in either the Draft or Revised Draft 2012 Appendix I. I pointed out major deficiencies in my April 21, 2011 CARB comments (http://www.arb.ca.gov/lists/sip2011/3-carb_enstrom_comments_on_sip_for_pm2.5_042711.pdf). Since August 2008 I have also had repeated direction communications with Ospital, including an April 4, 2012 email message requesting that null evidence be included in the 2012 AQMP Appendix I (http://www.scientificintegrityinstitute.org/Ospital040412.pdf).

The health impacts of PM in the SCAB are still not addressed in the September 7, 2012 Revised 2012 Draft AQMP Appendix I (http://www.aqmd.gov/aqmp/2012aqmp/RevisedDraft/AppI.pdf). Furthermore, this version makes an incorrect assessment of the California-specific evidence by uncritically relying on the June 2012 US EPA Regulatory Impact Analysis (RIA) (US EPA 2012). The RIA looked at California-specific studies regarding PM2.5 and mortality published in the scientific literature. Appendix I states "The EPA analysis concluded 'most of the cohort studies conducted in California report central effect estimates similar to the (nation-wide) all-cause mortality risk estimate we applied from Krewski et al. (2009) and Laden et al. (2006) albeit with wider confidence intervals. A couple cohort studies conducted in California indicate higher risks than the risk estimates we applied.' Thus in EPAs judgment the California related studies provided estimates of mortality consistent with or higher than those from the national studies."

However, there are clear errors in virtually every California-specific RR in EPA RIA Table 5.B-10. The McDonnell 2000 ratio, RR (males) =1.09 (0.98–1.24), should be RR (both sexes) ~ 1.00 (0.95–1.05), based on inclusion of an approximated RR for females. The partially adjusted Jerrett 2005 ratio, RR = 1.15 (1.03–1.29), should be the fully adjusted value, RR = 1.11 (0.99–1.25). The Enstrom 2005 ratio for 1973-1982, RR = 1.04 (1.01–1.07), should be the ratio for the entire follow-up period (1973-2002), RR = 1.01 (0.99–1.03). The Krewski 2009 ratio, RR = 1.42 (1.26–1.27), is obviously invalid and should be replaced by the Krewski 2010 ratio, RR = 0.968 (0.916–1.022), which is the ratio for all California subjects in Krewski 2009. The implausibly high Ostro 2010 ratio, RR = 1.84 (1.66–2.05), is invalid and has been replaced by the new Ostro 2011 ratio, RR = 1.06 (0.96–1.16). The corrected ratios are all consistent with RR = 1.00 and DO NOT support the EPA RIA claim that California-specific results are consistent with national results. Ospital uncritically accepted the EPA RIA and did not mention a single one of the EPA errors cited above.

The July 11, 2012 AQMP Advisory Council meeting did not result in proper peer review of Draft 2012 Appendix I. The three Advisory Council members with the most expertise on PM mortality studies and PM health effects epidemiology are John R. Froines, Ph.D., Samuel Soret, Ph.D., and Rob S. McConnell, M.D. They have not done peer review of Appendix I regarding "the health impacts of particulate matter air pollution in the South Coast Air Basin," as specified in CHSC Section 40471 (b). Also, there is evidence that they are not objective peer reviewers regarding PM health effects.

UCLA Professor John R. Froines has engaged in inappropriate activism regarding PM science based on the information contained in the following documents:
1) June 30, 2009 letter and attachments from Norman R. Brown to UCLA officials (http://www.calcontrk.org/CARBdocs/Delta_UCLA_Letter_063009.pdf),
2) February 20, 2011 Bakersfield Californian column by Lois Henry

(http://www.bakersfieldcalifornian.com/columnists/lois-henry/x1902890284/Politics-air-rules-make-for-a-smelly-situation), and 3) April 15, 2012 Bakersfield Californian column by Lois Henry (http://www.bakersfieldcalifornian.com/health/x1322083219/The-ex-radical-who-heads-air-boards-key-panel).

Loma Linda University (LLU) Professor Samuel Soret has not responded to my August 23, 2012 and September 14, 2012 email messages regarding his peer review of the AQMP Appendix I (http://www.scientificintegrityinstitute.org/Soret091412.pdf). His July 11, 2012 email message to AQMD did not mention the highly relevant December 2010 paper that he co-authored and apparently submitted to *Epidemiology* "The Mortality & Long-Term Exposure to AP in Elderly CA Adventists" (Chen 2010). Also, he has not properly described the overwhelmingly null relationship between PM and total mortality in the 35-year LLU Adventist Health Study of Air Pollution (AHSMOG) project (http://www.llu.edu/public-health/health/ahsmog.page).

USC Professor Rob S. McConnell has not responded to my August 25, 2012 and September 17, 2012 email messages regarding his incomplete July 9, 2012 peer review of AQMP Appendix I, which did not discuss PM in the SCAB (http://www.scientificintegrityinstitute.org/McConnell091712.pdf).

I submitted comments to AQMD regarding AQMP Appendix I on August 30, 2012 (http://www.scientificintegrityinstitute.org/AQMP083012.pdf) and on September 20, 2012 (http://www.scientificintegrityinstitute.org/AQMP092012.pdf).
These comments emphasize the need for AQMD to comply with all provisions of CHSC Section 40471 (b) before finalizing the 2012 AQMP. It is particularly important that the AQMD Governing Board conduct a hearing on the health impacts of PM in the SCAB. This hearing will allow scientists with diverse views to directly present evidence to the Board Members. This hearing could have a profound impact on the emission control measures that are approved in the 2012 AQMP.

Conclusions

There is now overwhelming epidemiologic evidence that PM (PM2.5 and PM10) is not killing Californians. This evidence must be fully examined and recognized by EPA, CARB, and AQMD before there are any further regulations to reduce PM levels in California, particularly in the SCAB. In addition, there needs to be a full reassessment of the current PM regulations to be sure that they are based on the actual health effects evidence in California. AQMD should not be required to comply with NAAQS that are not appropriate for California or the SCAB. Instead, AQMD should request a waiver from compliance with the NAAQS using the special waiver status granted to California in Section 209 of the Clean Air Act (http://www.epa.gov/otaq/cafr.htm). Finally, PM health effects and regulations must be put into perspective with other factors that influence health in California. Keep in mind the findings in Figure 2, which show that, based on the 2009 age-adjusted total death rate by state, California had the third lowest rate. Furthermore, the SCAB had a total death rate that was lower than the rate for every state except Hawaii (http://www.scientificintegrityinstitute.org/NCHSRR070811.pdf).

Table 1. Epidemiologic Cohort Studies of PM2.5 and Total Mortality in California (http://www.scientificintegrityinstitute.org/Enstrom081512.pdf)
Relative risk of death from all causes (RR and 95% CI) associated with increase of 10 µg/m³ in PM2.5

Krewski 2000 & 2010	CA CPS II Cohort	RR = 0.872 (0.805-0.944)	1982-1989
(N=40,408 [18,000 M + 22,408 F]; 4 MSAs; 1979-1983 PM2.5; 44 covariates)			
McDonnell 2000	CA AHSMOG Cohort	RR ~ 1.00 (0.95 – 1.05)	1977-1992
(N~3,800 [1,347 M + 2,422 F]; SC&SD&SF AB; M RR=1.09(0.98-1.21) & F RR~0.98(0.92-1.03))			
Jerrett 2005	CPS II Cohort in Los Angeles Basin		
(N=22,905; 267 zip code areas; 1999-2000 PM2.5; 44 cov + max confounders)		RR = 1.11 (0.99 - 1.25)	1982-2000
Enstrom 2005	CA CPS I Cohort	RR = 1.039 (1.010-1.069)	1973-1982
(N=35,783 [15,573 M + 20,210 F]; 11 counties; 1979-1983 PM2.5; 25 county internal comparison)		RR = 0.997 (0.978-1.016)	1983-2002
Enstrom 2006	CA CPS I Cohort	RR = 1.061 (1.017-1.106)	1973-1982
(N=35,783 [15,573 M + 20,210 F]; 11 counties; 1979-1983 & 1999-2001 PM2.5)		RR = 0.995 (0.968-1.024)	1983-2002
Zeger 2008	MCAPS Cohort "West"	RR = 0.989 (0.970-1.008)	2000-2005
(3.1 M [1.5 M M + 1.6 M F]; Medicare enrollees in CA+OR+WA (CA=73%); 2000-2005 PM2.5)			
Jerrett 2010	CA CPS II Cohort	RR ~ 0.994 (0.965-1.025)	1982-2000
(N=77,767 [34,367 M + 43,400 F]; 54 counties; 2000 PM2.5; KRG ZIP; 20 ind cov+7 eco var; Slide 12)			
Krewski 2010	CA CPS II Cohort		
(N=40,408; 4 MSAs; 1979-1983 PM2.5; 44 cov)		RR = 0.960 (0.920-1.002)	1982-2000
(N=50,930; 7 MSAs; 1999-2000 PM2.5; 44 cov)		RR = 0.968 (0.916-1.022)	1982-2000
Jerrett 2011	CA CPS II Cohort	RR = 0.994 (0.965-1.024)	1982-2000
(N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; KRG ZIP Model; 20 ind cov+7 eco var; Table 28)			
Jerrett 2011	CA CPS II Cohort	RR = 1.002 (0.992-1.012)	1982-2000
(N=73,609 [32,509 M + 41,100 F]; 54 counties; 2000 PM2.5; Nine Model Ave; 20 ic+7 ev; Fig 22 & Tab 27-32)			
Lipsett 2011	CA Teachers Cohort	RR = 1.01 (0.95 – 1.09)	2000-2005
(N=73,489 [73,489 F]; 2000-2005 PM2.5)			
Ostro 2011	CA Teachers Cohort	RR = 1.06 (0.96 – 1.16)	2002-2007
(N=43,220 [43,220 F]; 2002-2007 PM2.5)			
replaced Ostro 2010	Incorrect 2010 Result:	RR = 1.84 (1.66 – 2.05)	2002-2007

Krewski D (2010). August 31, 2010 letter from Krewski to Health Effects Institute and CARB with California-specific PM2.5 mortality results from Table 33 in Krewski 2009 (http://www.arb.ca.gov/research/health/pm-mort/HEI_Correspondence.pdf)

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Pope CA III, Dockery DW. (2006). Health Effects of Fine Particulate Air Pollution: Lines that Connect. *JAWMA*, Critical Review. 56(6):709-742 (http://www.scientificintegrityinstitute.org/PopeDockery2006.pdf) and (http://www.scientificintegrityinstitute.org/PopePPT2006.pdf)

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http://infotruck.blogspot.com/2009/10/driven-away-usa-ports-clean-air-program.html

***2009-10-11 Los Angeles* CAL,USA**

Driven Away * USA - Ports' clean air program shuts down some truckers.

Randy Thomas Trucking is preparing to close his business, he's unable to purchase new trucks to comply with port regulations taking effect in January

Reprinted from October 12, 2009 Los Angeles Business Journal article by FRANCISCO VARA-ORTA
http://labusinessjournal.com/accounts/login/?next=/news/2009/oct/12/driven-away/
http://los-angeles-business-journal.vlex.com/vid/driven-ports-clean-air-shuts-truckers-69119761

Randy Thomas ***has spent the last four decades proudly running his South Los Angeles trucking firm, which services the ports of Los Angeles and Long Beach... As the ports ballooned to become the largest trade complex in the country, Thomas' business grew from one truck he drove to a thriving little firm with 15 drivers. He put his three children through college – the first generation in his family to go. He was starting to look forward to retiring. He planned to leave his business to his family... Instead, the 60-year-old owner of Randy Thomas Trucking is preparing to close his business about Christmas. The reason: He's unable to purchase new trucks to comply with port regulations taking effect in January... In all, about 900 trucking companies shuttle cargo containers in and out of the two ports. Hundreds of them, like Thomas' company, are in danger of slipping out of existence in the next few months. Following them are thousands of truckers who own their own rigs and contract with small companies like*** **Thomas'*****... The recession-driven downturn in trade has pushed them to the precipice, but many believe what's shoving them over the edge is the Clean Trucks Program, which falls hardest on small operators... The program seeks to eliminate old polluting trucks from the ports. The program in October 2008 banned trucks made before 1989. But on Jan. 1, a more stringent ban extends to all trucks made before 1994 and those that have an engine made before 2004... It's unclear how many trucks will be sidelined as a result, but the number is a big one. The ports earlier estimated that as many as 12,000 trucks would fall into that criteria, but last week the L.A. port estimated 4,000 to 6,000 trucks would be banned Jan. 1... A new diesel truck costs about $100,000, while retrofitting a truck with a new engine costs about $10,000 to $15,000. Many small trucking firms, already scraping by on low margins, paying off existing trucks and whacked by the downturn in business at the ports, say it's not worth it to load up on debt to stay in the industry...*** (End of Road: Randy Thomas will cut the ignition on his trucking firm in December)

posted by truckbus @ 6:40 AM

Comments on Peer Review of South Coast Air Quality Management District Revised Draft 2012 AQMP Appendix I Health Effects Version 2

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October 11, 2012

Peer Review is an indispensable component of reliable science. Indeed the Rules governing the SCAQMD Air Quality Reports recognize that science without proper Peer Review is second-rate at best, and not a valid basis for important policy decisions.

However, in preparing its required 2012 Report on the Health Effects of particulate matter (PM) air pollution in the Southern Coast Air Basin, SCAQMD reveals a fundamental misunderstanding of the nature of a Peer Review. Every branch of science relies on *impartial* critiques of all its results, before they can be accepted. Scientific Peer Review is therefore the *opposite* of "Self-Review". It must be done by scientific peers who are clearly *independent* of the authors of all the work under consideration. In fact it is essential that some, or most, of the reviewers (or 'Referees' as they are typically called) be selected specifically for their rivalry, disagreements, or competition with the authors. This is necessary because in the marketplace of scientific ideas there is always more than one point of view, a fact which is very dangerous to forget. The essence of scientific Peer Review is a thorough search for all possible problems or limitations with the research being reviewed. It is precisely the job of a Peer Reviewer to attempt to pick apart every aspect of the work, which will result in its revision and improvement. Reliable science is completely dependent on this correction mechanism. A scientific research report can only be accepted after it has weathered all available criticisms.

Unfortunately, all of the "Reviews" that have been obtained for Appendix I, particularly on the long-term Health Effects of PM2.5, are either "Self-Reviews"--by authors and co-authors of the studies used by Appendix I (more accurately called 'editing')--or "Friends Reviews" (ie, by close colleagues and collaborators, known to share the same views as those authors). Self-Reviews may be of some use to 'clean up' a report, so long as it is clearly understood that they are *in no way a substitute* for actual Peer Review. Fortunately there is no shortage of fully qualified Peer Reviewers who are unambiguously independent of the views advanced in Appendix I. Proper scientific Peer Review, and the rules in 40471(b) which mandate it, now require input from this large, hitherto excluded, group of health scientists.

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10-10-12

Supplemental submission on the AQMP

Members of the Board of South Coast Air Management District,

I write to supplement my previous submission showing that there is no reliable evidence that human health effects in California and specifically in the South Coast District justify the proposed Management Plan.

I must reemphasize that I also believe that the South Coast District is not in compliance with the CA statutes that require a review of human health effects science on a regular basis and particularly when a new Management Plan is promulgated.

It is my understanding that before the Draft 2012 AQMP is finalized and approved, AQMD must hold a public hearing on the health impacts of air pollution in the SCAB, in accordance with CHSC Section 40471 (b).

If the hearing is held, in compliance with statute, I am convinced that the policy makers and board will find overwhelming the lack of evidence to justify any proposed plan, particularly the aggressive plan as proposed by AQMD staff.

The AQMP should not propose emission control measures necessary to comply with NAAQS that are not appropriate for California or the SCAB. Instead, AQMD should request a waiver from compliance with the NAAQS using the special waiver status granted to California in Section 209 of the Clean Air Act (http://www.epa.gov/otaq/cafr.htm).

To reiterate, and reemphasize, in January of 2007, the Air Resources Board and AQMD approved funding for two studies on the human health effects relationship to particle air pollution and the studies by Lipsett, and by Jarrett and others showed no human health effect, no association or relationship between PM and total mortality in California. The Jerrett Study found that total mortality during 1982-2000 among about 75,000 California adults was not related to either PM10 or PM2.5 in eight of nine models tested. He tortured the data to get one model to show an association, the model he called the conurbation model, which was nothing more than slicing the geographical pieces to find a small increase in deaths associated with Air Pollution. I have made fun of such nonsense and data dredging in my first submission. The Lipsett Study found that total mortality during 2000-2005 among about 75,000 female

California teachers was not related to either PM10 or PM2.5. The studies found some unexplained evidence of increased cardiovascular disease risk and decreased cancer risk, but there was no overall increased risk of death but in these studies there is no effort made to avoid the problem of noise in the small ranges of association. However that is the problem with epidemiology funded by government—the researchers know there will be no funds in the future for a study that fails to find what the government entity wants to justify a new regulatory regime.

These null results by Lipsett and Jarrett agree with the overwhelmingly null results for California that have been published since 2000, which include the study by Enstrom on 50,000 Californians. They also are coherent with the Krewski map mentioned before that shows a null California association of deaths and small particle pollution.

Thus, based on all the evidence described in my first submission and in this supplemental submission, I assert there is no health risk associated with PM in the South Coast regions, including the Coachella Valley. There is no evidence of death association in California as a whole and there will be no health risk from PM that would justify concern about the Sentinal power plant.

I urge that the AQMD Board and Staff review carefully review the evidence and consider the negative economic effects from draconian air management regulatory proposals. It is time to focus on the welfare of the public and the California economy is critical to people's well-being.

No human health effects research would justify more damage to the economy of the South Coast region or California as a whole.

Cordially,

From: Andrea Hricko [mailto:ahricko@usc.edu]
Sent: Sunday, October 28, 2012 4:16 PM
To: Jean Ospital
Cc: 'Balmes, John'; 'Ed Avol'; Rob McConnell; 'Froines, John'
Subject: HSPH News retrospective on Six Cities Study Controversy

Dear Jean: If the record for the AQMP is still open, pls consider this article as my comments. Thank you…. Andrea Hricko

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From: naaqs-bounces@lists101.his.com [mailto:naaqs-bounces@lists101.his.com] **On Behalf Of** Deborah Shprentz
Sent: Sunday, October 28, 2012 3:21 PM
To: NAAQS
Subject: [Naaqs] HSPH News retrospective on Six Cities Study Controversy

News at HSPH
Prevailing Winds

A decades-long fight to bring clean air standards in line with environmental health science offers lessons for today.

Doug Dockery

On a raw January day in Washington, DC, Douglas Dockery climbed Capitol Hill on his way to testify to Congress about the Harvard School of Public Health study he'd been running. He would have preferred to be anywhere else. It jarred Dockery—today, chair of the Department of Environmental Health—to confront people wearing white lab coats, holding signs that read, "Harvard, release the data!" Employed by an industry-backed group called Citizens for a Sound Economy, the protesters pressed on passersby fliers claiming that Harvard was hiding "secret" data. Their message was aimed directly at Dockery.
The year was 1997, and Dockery had arrived in Washington to tell Congress that because it had promised study participants confidentiality, Harvard couldn't share the raw data from its federally funded Six Cities study. The landmark research—one of the single most influential public health studies ever conducted—examined over 14 to 16 years the health effects of air pollution on more than 8,000 adults and 14,000 children in six U.S. cities. During that time, HSPH scientists published more than 100 peer-reviewed papers detailing their findings.

The blockbuster paper came in 1993, when Dockery's team described what he now calls amazing results. Residents of Steubenville, Ohio—the city with the dirtiest air—were 26 percent more likely to die prematurely than were citizens of Portage, Wisconsin, the city with the cleanest air. The primary culprit: fine particulates, up to hundreds of times narrower than a human hair, which were associated with increased incidence of lung cancer and cardiopulmonary disease. "The effects of air pollution were about two years' reduction in life expectancy," Dockery says. "It was much, much higher than we had expected." To Dockery and his colleagues, the results were conclusive evidence that soot produced by fossil fuel combustion kills.

That evidence was also enough for the U.S. Environmental Protection Agency (EPA), which in 1997 used the science, along with many other studies, as the foundation for the first-ever Clean Air Act regulations on particulate matter smaller than 2.5 microns in diameter. The EPA claimed the new PM2.5 rules would prevent 15,000 premature deaths annually and produce other huge benefits, among them preventing 250,000 incidences of aggravated asthma, 60,000 cases of bronchitis, and 9,000 hospital admissions every year.

But meeting the new standards would be far from simple or cheap. Manufacturing, power, steel, auto and other industries spent untold millions trying to disprove the science, discredit the EPA, and defeat the new regulations. The New York Times dubbed the clash "the environmental fight of the decade." It embroiled the Six Cities study in a years-long controversy—one that holds lessons for public health professionals working on issues critical in this year's election cycle, from new Clean Air Act rules and oil drilling to natural gas fracking and the ubiquitous pesticides and chemicals in our food, homes, and bodies.

A Deadly Cloud

Why Six Cities Matters Today

The clash between industry, politics, and science over the Six Cities study remains relevant today. Consider just a small sampling of contemporary public health controversies:

Global Warming:

A U.S. federal appeals court in June agreed with the EPA that auto and power plant emissions endanger the public health. Opponents had filed more than 60 lawsuits to block the EPA from regulating greenhouse gas emissions. As Matthew Wald of *The New York Times* wrote, "The judges unanimously dismissed arguments from industry that the science of global warming was not well supported and that the agency had based its judgment on unreliable studies."

Natural Gas Fracking:

Public health studies show the hydrofracturing, or fracking, process of drilling fouls the air and water and may contribute to earthquakes. Industry advocates question the certainty of that science and say the country needs cheap, "clean" fuel.

Mining and Cancer:

The Mining Awareness Resource Group, a mining-industry-funded organization, spent years going to the courts and to Congress for assistance in accessing data from, and delaying publication of, a study showing that miners exposed to diesel exhaust underground were at high risk of developing lung cancer. Twenty years after the study was launched, the Journal of the National Cancer Institute finally published the results.

Ever since a toxic black cloud dubbed the "Great Smog"—made up primarily of coal-burning emissions and diesel exhaust—hovered over London in 1952 and killed more than 4,000 people within days, environmental scientists had worried about the mysterious ingredients composing industrial haze. In the U.S., that concern intensified in 1973 following the Arab oil embargo, when power plants were expected to substitute cheap, high-sulfur coal for expensive oil. What could the nasty emissions from dirtier fuel do to people?

HSPH's Ben Ferris, a legendary public health professor who died in 1996, and Frank Speizer, professor of environmental science, proposed to find out: They would sample the air quality in six Eastern cities with varying degrees of pollution while simultaneously monitoring the health of thousands of those cities' residents. Among their team were the wiry, intense Jack Spengler, now the Akira Yamaguchi Professor of Environmental Health and Human Habitation, who built personal air quality monitoring equipment that participants wore; and the tall, reserved Dockery, who traveled from city to city, setting up air pollution monitors in residents' homes. Jim Ware, professor of biostatistics, joined the team in 1979. Later, Joel Schwartz, professor of environmental epidemiology, would join the team and become one of its most prolific authors.

Their goal was simple: to identify links between illness and death rates and air pollution levels. They sampled the air for toxic emissions, including sulfur dioxide and particulate matter, a brew of acids, metals, petroleum byproducts, diesel soot, and other potentially harmful substances that readily deposit deep in the lungs.

In the mid–1970s, no one had yet conducted a comprehensive study of particulates' effects on human health. Dockery and his colleagues expected to learn that the true threat of industrial haze would stem from sulfur dioxide. But it was the fine particles that were the biggest dangers (although the study did not show how these particles created illness, a missing link critics would highlight). Another surprise: indoor air pollution was more harmful than outdoor toxins, setting the stage for years of important research.

Today, because of Six Cities, it is conventional wisdom that particulate matter contributes significantly to a wide variety of illnesses across the spectrum of life, from asthma and bronchitis to sudden infant death syndrome and lung cancer.

Industry Responds

Public health considerations aside, the new standards forced dramatic changes on industry. The *New York Times* reported that old Midwestern power plants would have to install expensive pollution control equipment; states would need to invest in mass transit and other initiatives designed to reduce auto pollution; and factories that burned mountains of coal would have to switch to cleaner-burning fuels. How much those changes would cost depended upon who was doing the estimating: industry spokesmen said the bill would reach into the hundreds of billions of dollars. The EPA put the final tab at $6 to $8 billion.

As the debate grew more contentious, many experts—including Philip H. Abelson, former editor of Science magazine—pushed the EPA to delay regulations until the science was more certain. Abelson maintained that the makeup of particulate matter differed greatly from place to place. In an editorial, he queried, "How can the EPA minimize the effects of particulates if it does not know what they are or which, if any, have deleterious physiological effects?"

Others, like fellow HSPH faculty member John D. Graham, professor of policy and decision sciences at HSPH, were also critical of the EPA, arguing that the Clean Air Act's legal framework for rule making does not allow the agency to consider costs, just health outcomes. Graham had pioneered the study of risk analysis at HSPH, having founded and, from 1990 to 2001, directed the Harvard Center for Risk Analysis. From 2001 to 2006, he led the White House's Office of Information and Regulatory Affairs, making him what the Natural Resources Defense Council called "the second most powerful environmental official in the nation after George W. Bush." Today, he serves as Dean of Indiana University's School of Public and Environmental Affairs.

Over the years, Graham testified at many congressional hearings that there should be an opportunity for cost/benefit analysis during EPA rule making. "One of my key arguments is that practical people are going to do it anyway," he says. "We shouldn't make them do it behind closed doors. That's not good, because their arguments are then not open to public scrutiny."

The Battle Lines Harden


James Ware

Citizens for a Sound Economy blanketed the country with ads designed to influence public opinion. The group, which the Washington Post called the “pro-industry alliance at the center of an extraordinary, multimillion-dollar campaign to turn back EPA regulations for smog and soot,” attracted grassroots supporters by contending the new rules would force bans on such American icons as backyard barbecues, farm tractors, and wood stoves.

In addition, critics from industry, members of Congress, and some governors demanded that Harvard release the raw data. “We declined,” says James H. Ware, then HSPH acting dean and now Frederick Mosteller Professor of Biostatistics. The team had promised participants that their personal data would never be released. When Harvard refused, critics accused the researchers of conspiracy and pressured Congress to hold hearings. “The issue is the quality of the science,” said National Association of Manufacturers spokesman Richard Siebert. “In order for people to ascertain the science they need to understand the background data … What are they hiding?”
“It was a painful time,” says Dockery. “You’d get up in the morning and look in the paper and there you’d be again.”

Still, the scientists held their ground. “We knew that if we released the data, it would be endless aggravation and defending against attacks,” says Ware. “To have a hostile group combing through your data looking for anything to attack you about was not something any of us relished.” Furthermore, Frank Speizer told Dockery, to release the raw data would be to allow “biased groups” to manipulate it and to set a precedent that “will undermine future research by academic institutions.”

EPA under siege

"Uncertain Science" Claim

> When public health and industry collide, foes of regulation often claim that epidemiology is an uncertain science, says Sheila Jasanoff, Pforzheimer Professor of Science and Technology Studies at Harvard Kennedy School of Government. “The most favored method is to ‘deconstruct’ agency scientific claims, on grounds of methodological inadequacy,” she says. “The problem is that public health research often operates in zones of ignorance and uncertainty; it is relatively easy to find, or at least claim to find, ‘problems in the science.’”
>
> The inherent uncertainty of emerging science leads to fiery rhetoric on both sides—which is unfortunate, Jasanoff adds. “The constant debates about ‘good science’ and repeated charges of overregulation undermine trust in government and hinder a mature understanding of how to live prudently in complex industrial societies that will never be risk-free and where full scientific certainty on many issues will likely take very long to achieve.”
>
> Even today, the Six Cities debates linger. John Graham applauded HSPH’s decision to give its data to the nonpartisan organization Health Effects Institute for analysis. But 15 years later, he remains frustrated that Harvard didn’t share the original data earlier. “These findings are still utilized around the world,” Graham says. “They sit as a foundation for multibillion-dollar decisions in China, Brazil, and elsewhere. I would still like to see the data be made publicly available. It’s the basic principle of transparency in science.”

But the EPA, too, was under siege—from lobbyists and from Congress, which demanded the agency produce so-called “secret data” on which the new rules rested. In February 1997, EPA bowed to the pressure and urged Harvard to do so. As a compromise, the team came up with the idea of asking an independent scientific panel to audit the researchers’ findings. They gave a warehouse full of data to the Cambridge, Massachusetts–based Health Effects Institute (HEI), which was funded by both the automotive industry and the EPA.

It took HEI three years to reanalyze the data—an agonizing period of limbo for the scientists. But it was worth the wait. In 2000, HEI scientists confirmed the original Six Cities findings. It was a huge win for the School.

In 1997, while HEI was auditing the data, President Bill Clinton approved the new Clean Air Act’s PM2.5 regulations and tightened ozone standards. In 1999, Alabama Republican Senator Richard Shelby, still simmering about Harvard’s “hidden” data, inserted a single sentence into a 4,000-page budget bill that would change everything for future researchers. The still-controversial Shelby Amendment calls for those university scientists working on federally funded projects to share their data with anyone who requests it via the Freedom of Information Act.

When the issue of sharing primary data first arose, critics like HSPH’s Frank Speizer feared such a rule would dampen future research by dissuading potential participants whose confidentiality could no longer be protected. Today, the issue is so fraught that, even within HSPH, scientists find themselves on opposing sides. Doug Dockery calls the Shelby Amendment “a direct assault on research conducted by universities,” because privately funded studies aren’t subject to the same rules. In contrast, Jim Ware says, “As a matter of principle, the Shelby Amendment is right: When the federal government pays for research … that research ought to be made available for scrutiny by others and for debate and examination.”

The Long View

Today, Dockery looks out his 13th-floor window across the Charles River at the Cambridge skyline, a view that, decades earlier, had often been obscured by urban haze. “I can see a long way,” he says. “That’s gratifying.”

Over the last 30 years, air quality nationwide has improved dramatically, due to Clean Air Act rules based in part on Six Cities research. In 2009, Dockery and colleagues Arden Pope (now at Brigham Young University) and Majid Ezzati (now at Imperial College London) demonstrated that from 1980 to 2000, reductions in exposure to fine particulate matter had increased average American life spans by 1.6 years. “That’s huge,” Dockery says. “If you got rid of all cancers, the net effect on average life expectancy would be two years.”

The Clean Air Act and the policies triggered by HSPH’s Six Cities study are classic examples of how public health should work: good science shapes public policy, and policy, in turn, saves people’s lives.

A Steel Backbone

Jack Spengler

On a crowded shelf in his office, Dockery keeps two six-inch-thick binders of correspondence and media clippings from the Six Cities fight. Buried in them are memories—many painful—but also lessons for today’s public health professionals.

For Dockery, two stand out. First, “Solid, quality science does stand up over time.” Second: “How you present the information—how you translate the data—is extremely important.”

He believes the PM2.5 standards survived because, for the first time, the science made it possible to calculate the costs and finger the sources of air-pollution-related disease.

“We provided the basis for quantifying how many hospital visits, how many asthma attacks, how many COPD [chronic obstructive pulmonary disease] cases, how many heart attacks, and how many deaths were associated with these air pollutants,” he says. “It completely changed the discussion. When you actually used those numbers, suddenly the cost/benefit analysis became very clear—and suddenly, the benefits were found to far outweigh the cost of controls."

Years later, Office of Management and Budget (OMB) analysis confirmed Dockery's claims: in a 2011 report, the OMB stated, "Of [EPA's] 20 air rules, the rule with the highest estimated benefits is the Clean Air Fine Particle Implementation Rule, with benefits estimated at a minimum of $19 billion per year. While the benefits of this rule far exceed the costs, the cost estimate for the Clean Air Fine Particle Implementation Rule is also the highest at $7.3 billion per year."

Although not everyone agrees with OMB's assessment or even with the legitimacy of assigning a price tag to health outcomes (what is the monetary value of a human life saved?), many believe such data are more important than ever. The industry lobby has gained strength in the 15 years since the Six Cities brouhaha. In 2011, a hearing before the Republican-led House of Representatives subcommittee on new Clean Air Act rules was entitled, "Lights Out: How EPA Regulations Threaten Affordable Power and Job Creation."

Challenges in Today's Politics

The Debate Goes On

The controversy over standards for fine particulate matter air pollution continues today. In June 2012, a federal court order forced the EPA to propose new, tighter standards; the agency settled on reducing the allowed annual level from 15 micrograms per cubic meter to a range between 13 and 12.

But a 2011 report by the American Lung Association, Clean Air Task Force, and Earthjustice claims that this reduction doesn't go far enough. Their analysis, which cites Six Cities findings, argues that at those levels, a maximum of 15,000 premature deaths would be averted annually. The coalition argues that the EPA should adopt a more stringent annual limit of 11 micrograms per cubic meter, which its analysis shows would prevent nearly 36,000 premature deaths yearly.

The EPA is expected to issue final standards in December 2012.

Seen through a 2012 lens, it may be surprising that the Six Cities imbroglio wasn't a strictly partisan fight. Unlike today, earlier environmental battles didn't erupt along party lines. It was President Richard Nixon who established the EPA in 1970, setting the stage for a string of Republican environmental accomplishments, including the first major reauthorization of the Clean Air Act in 1990 under George H. W. Bush. "When you look at the record," says Dockery, "the Republican administrations have been better for environmental controls than the Democratic administrations."

Dockery believes today's political environment is actually far more difficult for science than it was in 1997. "Before, there was the cry that we wanted the best science for defining the regulation," he says. Now, he adds, referring to debates like those over global warming and certain childhood vaccinations, "What we're seeing is a total rejection of science as the basis for making regulatory decisions."

HSPH's John Spengler has become convinced that scientists studying today's environmental problems need both new communication skills and a steel backbone. "You really have to know you've got the personality to do this," he says. "If you choose a public health career and you believe in it, and if you have an urgent public health message that needs to be delivered, this is part of the territory."
To Spengler, that means public health educators have a new job to do: teaching scientists how to lead and how to deliver their messages to policymakers. "We teach people to be statisticians, epidemiologists, lab analysts, exposure scientists," he says. "But we must also equip them for the big fights."

Elaine Appleton Grant is assistant director of development communications and marketing at HSPH and a former public radio reporter.

Learn more

Harvard Six Cities Study Follow Up: Reducing Soot Particles Is Associated with Longer Lives (HSPH release, 2006)
Environmental Threats
HSPH researchers study environmental threats to health, such as hazardous substances found in the air, water, and wherever people live and work. The interplay of genes and environment on health and the importance of occupational safety are also key.
Department of Environmental Health
Harvard NIEHS Center for Environmental Health
EPA/Harvard Center for Ambient Particle Health Effects
Center for Children's Environmental Health & Disease Prevention Research

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Science at the heart of medicine

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October 30, 2012

Dr. William A. Burke, Chairman and
Other Members of the Governing Board
South Coast Air Quality Management District
21865 Copley Drive
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Dear Board Members:

I am writing to convey my emphatic support a 2012 Air Quality Management Plan (AQMP) Appendix I Health Effects that focuses on "the health impacts of particulate matter air pollution in the South Coast Air Basin," in accord with California Health and Safety Code Section 40471(b). In addition, I urge you to hold a Board hearing on the health impacts report and its peer review, in accord with this Code Section.

In particular, please address the September 25 public comments of Jonathan M. Samet, M.D., and the August 30 and September 20 public comments of James E. Enstrom, Ph.D. I have been a cancer epidemiologist for over 30 years, and I have been aware of the important research of these outstanding epidemiologists during this entire period. In addition, I have personally worked with Dr. Enstrom on environmental epidemiology issues. You need to take their criticism of Appendix I very seriously.

My own examination of the PM2.5 epidemiologic findings of Dr. Samet, Dr. Enstrom, and two dozen other highly qualified scientists, convincingly shows that there is no relationship between PM2.5 and total mortality in California and that the current US EPA National Ambient Air Quality Standard (NAAQS) for PM2.5 is not applicable to California or the South Coast Air Basin (SCAB). Therefore, the AQMP should request a waiver from this NAAQS, rather than proposing stricter emission controls.

In conclusion, the final 2012 AQMP must be based on the actual health impacts of particulate matter in the SCAB. Otherwise, I believe that it can be vigorously challenged on scientific, economic, and legal grounds. I am following this issue from New York because thePM2.5 NAAQS has national epidemiologic and regulatory significance and because the exaggeration of PM2.5 risks fits the pattern of examples described in my 2008 book "Hyping Health Risks."

Thank you for your attention to my comments.

Sincerely yours,

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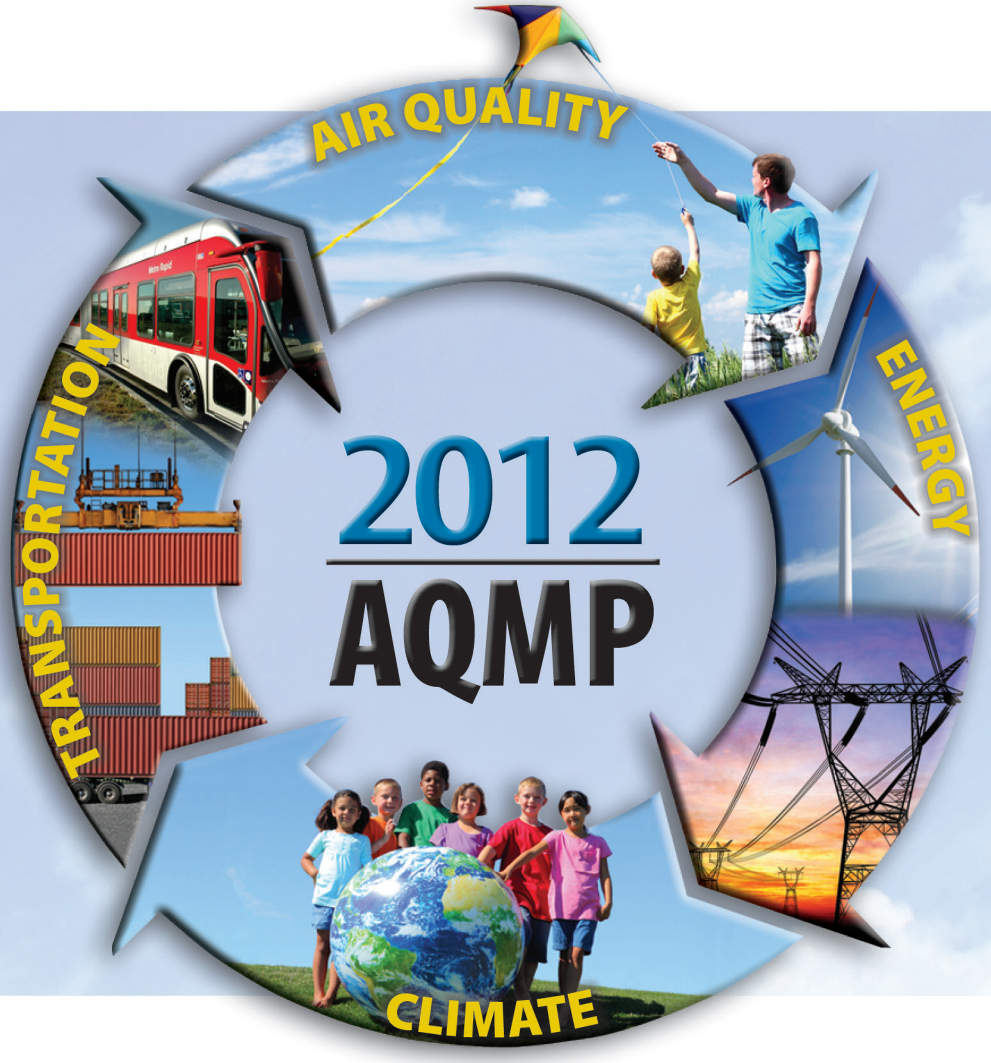
Appendix II

Air Quality Management Plan



Current Air Quality

February 2013

South Coast Air Quality Management District

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South Coast AQMD

FINAL 2012 AQMP
APPENDIX II

CURRENT AIR QUALITY

FEBRUARY 2013

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SUMMARY

SUMMARY

This appendix contains a detailed summary of the air quality in 2011 and the prior year trends for the South Coast Air Basin (Basin) and the Coachella Valley portion of Salton Sea Air Basin (SSAB), under the jurisdiction of the South Coast Air Quality Management District (District). The Basin includes Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino counties. In 2011, the District measured concentrations of air pollutants at 35 routine air monitoring stations in Southern California's Los Angeles, Orange, Riverside and San Bernardino counties, including two stations in the Coachella Valley. In addition, six source-specific lead (Pb) monitors were operated in 2011, near potential Pb emission sources.

Chapter 1 of this appendix presents descriptions of the air quality setting for the District's jurisdiction, including the relevant boundaries, weather factors and emissions for both the Basin and the Coachella Valley. It also briefly describes the properties and health effects of each criteria pollutant and the state and federal ambient air quality standards, along with revisions to the standards, both adopted and currently proposed. Criteria pollutants are those which have associated health-based National Ambient Air Quality Standards (NAAQS). Chapters 2 and 3 present summaries of current air quality for each of the criteria pollutants in the Basin and the Coachella Valley, respectively. These chapters include comparisons of the current concentrations compared to the state and federal standards, along with spatial, seasonal, and diurnal variations. Air quality statistics and trends presented in this Appendix provide information on the recent history and current status and progress toward attainment of the NAAQS and state standards, providing a baseline for planning toward future attainment.

Ozone (O_3) and fine particulate matter (PM2.5) are the main pollutants for which the U.S EPA has designated the Basin as nonattainment. The Coachella Valley is also a nonattainment area for ozone and PM10, but PM2.5 concentrations remain below the federal standards. PM2.5 concentrations in the Basin have improved considerably, with 2010 and 2011 the cleanest years on record for the area. However, the Basin had the highest number of days exceeding the federal ozone standard of any urban area nationwide in 2011.

The Los Angeles County portion of the Basin is also currently nonattainment for the recently lowered federal lead standard, due to source-specific monitoring near a stationary Pb source, as required under the new U.S. EPA regulation. The remaining ambient Pb monitoring measurements throughout the Basin are below the current Pb

NAAQS. Pb air quality and attainment has been addressed separately in the 2012 Lead SIP for Los Angeles County submitted to U.S. EPA in June 2012.

While the new federal 1-hour standard concentration level was exceeded on one day for nitrogen dioxide (NO_2) in 2011, it should be noted that this does not include nonattainment. The Basin has not been designated as nonattainment of the NAAQS, since the Basin has not exceeded the design value[1] form of the revised NO_2 standard (98th percentile concentration, averaged over 3 years).

Both the Basin and the Coachella Valley are currently listed as PM10 nonattainment areas by U.S. EPA, based on the current 24-hour PM10 NAAQS. However, all exceedances of the federal 24-hour PM10 NAAQS in recent years have been flagged in the U.S. EPA Air Quality System (AQS) database for exclusion based on the U.S. EPA Exceptional Events Regulation (due to high wind events and Independence Day fireworks displays). The District has requested that U.S. EPA consider redesignating both areas to attainment status. State and federal standards for carbon monoxide (CO), sulfur dioxide (SO_2), and sulfate (SO_4^{2-}) were not exceeded in the District.

[1] A design value is a statistic that describes the air quality status of a given area relative to the level and form of the National Ambient Air Quality Standards (NAAQS). For most criteria pollutants, the design value is a 3-year average and takes into account the form of the short-term standard (e.g., 98th percentile, fourth high value, etc.)

CHAPTER 1

INTRODUCTION

Air Quality Setting

District Jurisdiction and Boundaries
Weather Factors
Emissions

Ambient Air Quality Standards

Design Values
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AIR QUALITY SETTING

District Jurisdiction and Boundaries

California's first local air pollution control agency, the Los Angeles County Air Pollution Control District (LAAPCD), was formed in 1947, and APCDs were formed in Orange, Riverside, and San Bernardino Counties soon afterward. These four agencies combined in 1976 to form the Southern California APCD, which was later replaced by the South Coast Air Quality Management District, the Mojave Desert AQMD, (which covers the Mojave Desert Air Basin except for the portion within the South Coast Air District in the eastern portion of Riverside County), and the Antelope Valley APCD (which covers portions of Los Angeles County not within the South Coast Air Basin).

The South Coast Air Quality Management District (District) was established by state legislation effective February 1, 1977, and was assigned jurisdiction over air quality in the South Coast Air Basin (Basin). The Basin includes all of Orange County and the non-desert areas of Los Angeles, Riverside, and San Bernardino Counties. The District is also responsible for air quality in the Riverside County portion of the Salton Sea Air Basin (SSAB), which is primarily the Coachella Valley. The region encompassed by the District is shown in Figure 1-1.

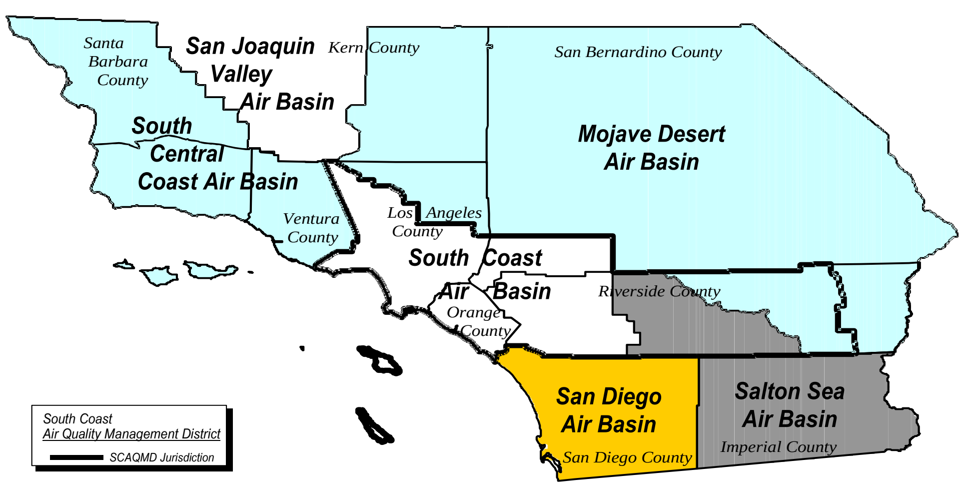


FIGURE 1-1

South Coast Air Quality Management District and Surrounding Jurisdictions

The Basin has an area of 6,800 square miles with a population of approximately 16 million people in 2011. The Los Angeles urban area (the nation's second largest), the Anaheim-Fullerton urban area, and the Riverside-San Bernardino urban area lie within the Basin's boundaries. About two-thirds of the Basin's population lives within Los Angeles County. The 2011 population in the Riverside county portion of the SSAB portion under the jurisdiction of the District was approximately 450,000. The District also has the jurisdiction over a small portion of the MDAB in Eastern Riverside County (see Figure 1-1). The area is sparsely populated desert and contains a portion of Joshua Tree National Park. Table 1-1 summarizes the historic, current and future projections of the population of the Basin and the Coachella Valley.

TABLE 1-1

Historic Population and Projections for South Coast Air Basin and Coachella Valley

Area	1980	1990	2000	2010	2020	2030
South Coast Air Basin	10,500,000	13,022,000	14,681,000	15,759,412	16,901,492	18,129,690
Coachella Valley	139,000	267,000	320,892	439,357	558,321	710,430

The SSAB and the Mojave Desert Air Basin (MDAB) have a combined area of approximately 32,200 square miles. The two Basins include the desert portions of Los Angeles, Riverside, and San Bernardino Counties, as well as Imperial County and part of Kern County.

In 2011, the District maintained a network of 33 regular air monitoring stations[2] in the Basin and two in the Coachella Valley area. In addition, six monitors measure source-specific lead near emissions sources. Figure 1-2 shows the locations of the ambient air monitoring stations along with the District boundaries. PM2.5 monitoring has been significantly increased throughout the District in recent years, using both Federal Reference Method (FRM) filter measurements and continuous measurements for real-time data. Table A-1 and Figure A-1 in the Attachment to Appendix II also show the District's current ambient air monitoring network.

[2] Not all criteria pollutants are measured at every station.

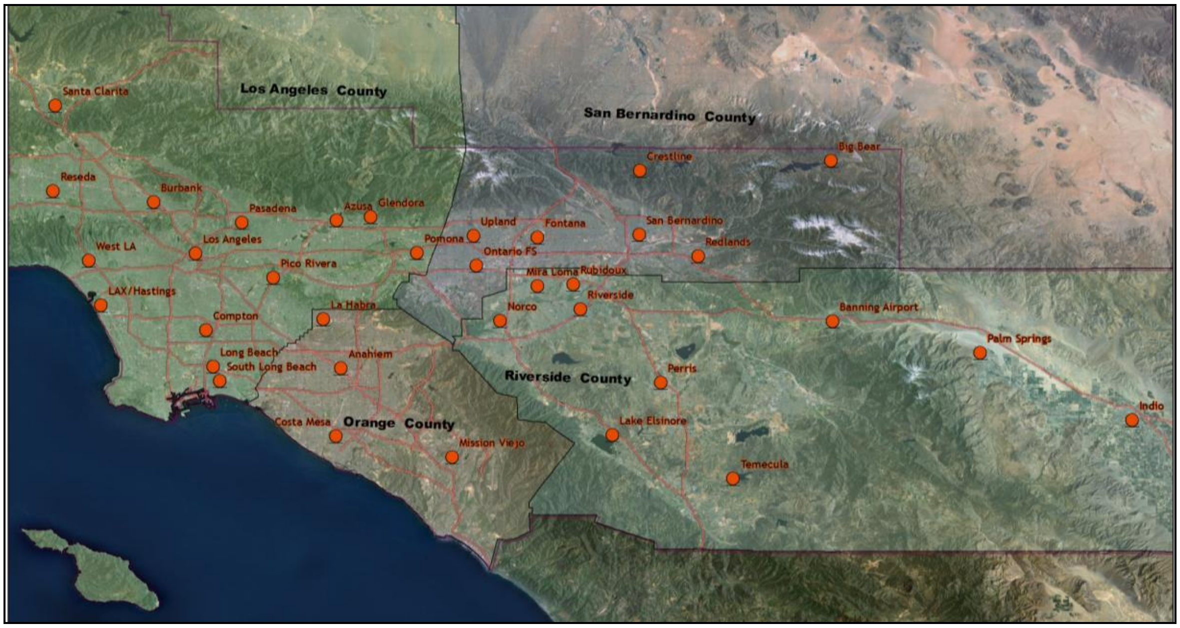


FIGURE 1-2

South Coast Air Quality Management District Ambient Air Monitoring Stations in 2011

Weather Factors

The climate of the District varies considerably between the coastal zone, inland valleys, mountain areas and deserts. Most of the Basin is relatively arid, with very little rainfall and abundant sunshine during the summer months. It has light winds and poor vertical mixing compared to other large urban areas in the U.S. The combination of poor air dispersion and abundant sunshine provides conditions especially favorable to the formation of photochemical smog and the trapping of particulates and other pollutants. The Basin is bounded to the north and east by mountains with maximum elevations exceeding 10,000 feet. The unfavorable combination of meteorology, topography, and emissions from the nation's second largest urban area results in the Basin having some of the worst air quality in the U.S.

The prevailing daytime sea breeze tends to transport pollutants and precursor emissions from coastal areas into the Basin's inland valleys, and from there, still further inland into neighboring areas of the SSAB, as well as the MDAB. Concentrations of primary pollutants (those emitted directly into the air) are typically highest close to the sources which emit them. However, secondary pollutants (those formed in the air by chemical reactions, such as ozone and the majority of PM2.5) reach maximum concentrations some distance downwind of the sources that emit the precursors, due to the fact that the polluted air mass is moved inland by the prevailing winds many miles to areas where maximum concentrations are reached.

Emissions

The quantity of each of the major pollutants emitted into the atmosphere of the Basin in 2008 is shown in Figure 1-3 (in thousands of Tons per Day). The year 2008 emissions are the base year emissions used for the Final 2012 AQMP. In that year, the Basin's annual average daily emissions were approximately 2880 tons of CO, 593 tons of volatile organic compounds (VOC), 754 tons of oxides of nitrogen (NO_x), 54 tons of oxides of sulfur oxides (SO_x), 170 tons of PM10, and 80 tons of PM2.5. Figure 1-4 shows the amount of each of the major pollutants emitted into the atmosphere in the Coachella Valley (in Tons per Day). These are much lower than those emitted in the Basin, by a factor of 10 to over 350, depending on the pollutant. The difference in local emissions between these two areas and the prevailing wind flows illustrate the importance of pollutant transport to the Coachella Valley's air quality.

Additional PM10 and PM2.5 material forms through chemical reactions of gaseous precursor emissions. Most emissions vary relatively little by season, but there are large seasonal differences in the atmospheric concentrations of pollutants due to seasonal variations in the weather. VOCs and NO_x are precursors of ozone, and they also react to form nitrates and solid organic compounds, which are a significant fraction of the ambient particulate matter. SO_2 reacts to form sulfates which are also significant contributors to the Basin's PM10 and PM2.5 levels. In addition to the particulates formed by the reaction of gaseous precursors, there is directly emitted PM10 and PM2.5, most of which is attributed to fugitive dust sources such as re-entrained road dust, construction activities, farming operations and wind-blown dust but also includes other directly-emitted substances such as diesel particulate. Details of the 2008 base year and future-year projected emissions inventories are contained in Chapter 3 and Appendix III.

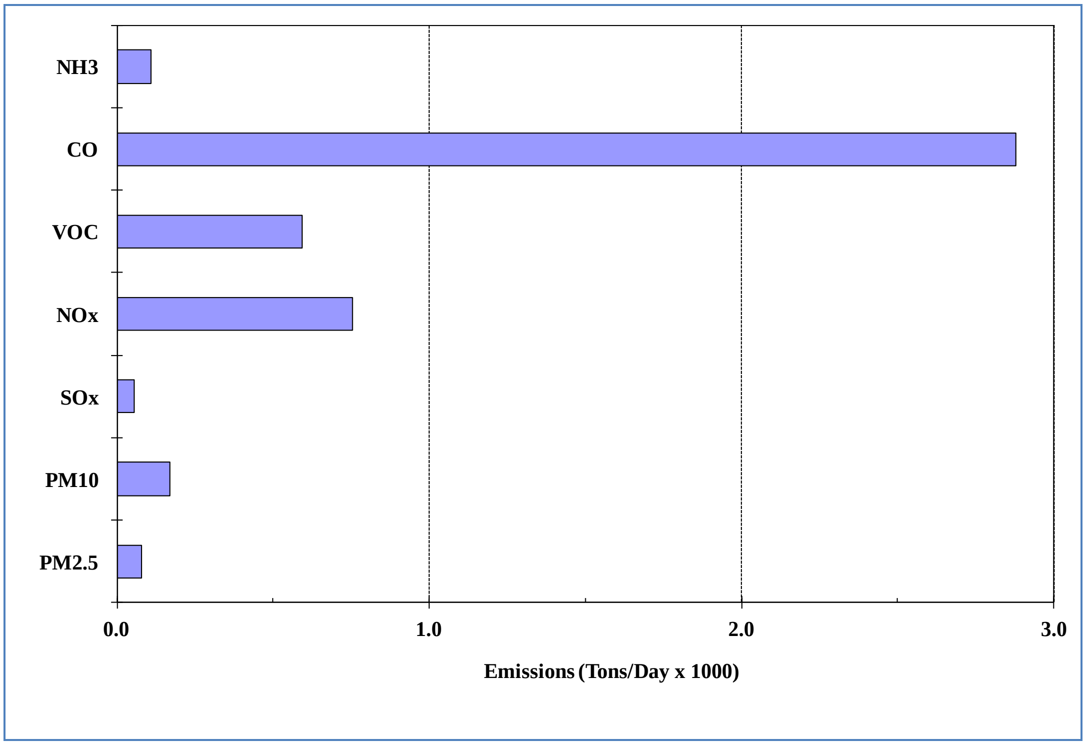


FIGURE 1-3

2008 South Coast Air Basin Average Daily Emissions (Thousand Tons per Day)

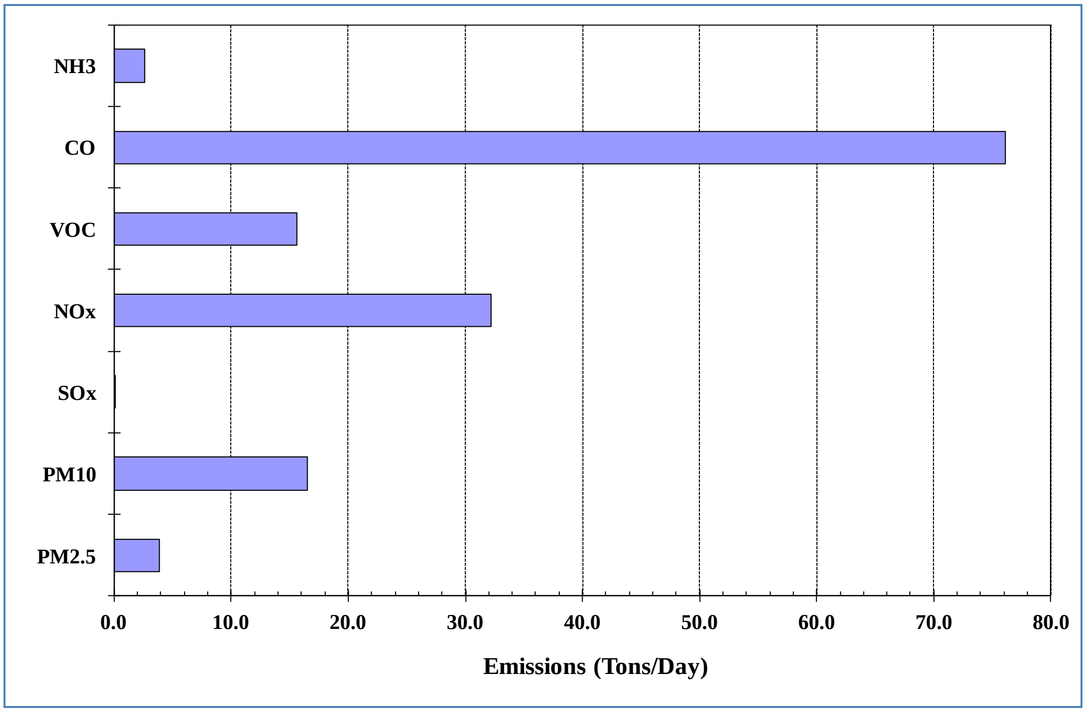


FIGURE 1-4

2008 Coachella Valley Average Daily Emissions (Tons per Day)

AMBIENT AIR QUALITY STANDARDS

Both the federal government and the State of California have adopted ambient air quality standards, which define the concentration below which long-term or short-term exposure to a pollutant is not expected to cause adverse effects to public health and welfare. The criteria pollutants, those that have health-based standards, are: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse and fine particulate matter (PM10 and PM2.5, respectively), lead (Pb), and sulfate (SO_4^{2-}, California only). California also has a welfare-based standard for visibly-reducing particles. In 2011, the District monitored ambient air quality for criteria pollutants at 35 routine monitoring sites throughout the Basin and in the neighboring Coachella Valley in the Riverside county portion of the Salton Sea Air Basin (SSAB), plus six additional source-specific lead monitors.

For several National Ambient Air Quality Standards (NAAQS), there are both primary and secondary standards. Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. This document focuses on the primary federal standards. The federal and state primary standards are summarized in Table 1-2, along with a brief summary of health effects. Further discussion of the health effects of air pollutants is presented in Chapter 2 and more detailed health information is presented in Appendix I.

TABLE 1-2

Current Primary Ambient Air Quality Standards and Health Effects

Air Pollutant	State Standard	Federal Standard (NAAQS)	Relevant Health and Welfare Effects[#]
	Concentration, Averaging Time	Concentration, Averaging Time	
Ozone (O_3)	0.09 ppm, 1-Hour 0.070 ppm, 8-Hour	0.075 ppm, 8-Hour (2008) 0.08 ppm 8-Hour (1997)	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) 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; (e) Vegetation damage; (f) Property damage
Carbon Monoxide (CO)	20 ppm, 1-Hour 9.0 ppm, 8-Hour	35 ppm, 1-Hour 9 ppm, 8-Hour	(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 (NO_2)	0.18 ppm, 1-Hour 0.030 ppm, Annual	100 ppb, 1-Hour 0.053 ppm, Annual	(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 (SO_2)	0.25 ppm, 1-Hour 0.04 ppm, 24-Hour	75 ppb, 1-Hour	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)	50 µg/m^3, 24-Hour 20 µg/m^3, Annual	150 µg/m^3, 24-Hour	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; (c) Increased risk of premature death
Suspended Particulate Matter (PM2.5)	12.0 µg/m^3, Annual	35 µg/m^3, 24-Hour 15.0 µg/m^3, Annual	
Sulfates-PM10 (SO_4^{2-})	25 µg/m^3, 24-Hour	N/A	(a) Decrease in lung function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead (Pb)	1.5 µg/m^3, 30-day	0.15 µg/m^3, 3-month rolling	(a) Learning disabilities; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount such that the extinction coefficient is greater than 0.23 inverse kilometers at relative humidity less than 70 percent, 8-hour average (10am - 6pm)	N/A	Visibility impairment on days when relative humidity is less than 70 percent

ppm – parts per million by volume ppb – parts per billion by volume

State standards are "not-to-exceed" values; Federal standards follow the design value form of the NAAQS

[#] More detailed health effect information can be found in the 2012 AQMP Appendix I or the U.S. EPA NAAQS documentation at http://www.epa.gov/ttn/naaqs/

Design Values

Air quality statistics can be presented in terms of the maximum concentrations measured at monitoring stations or in air basins, as well as for the number of days exceeding state or federal standards. These are instructive in regard to trends and the effectiveness of control programs. However, it should be noted that an exceedance of the concentration *level* of a federal standard does not necessarily lead to a violation of the to a nonattainment designation. The form of the standard as defined by the federal NAAQS regulations must also be considered. For 24-hour PM2.5, the *form* of the standard is the 98th percentile measurement of all the 24-hour PM2.5 samples at each station. For 8-hour O_3, the 4th highest measured 8-hour average concentration is used for each station. For NAAQS attainment/nonattainment decisions, the most recent 3 years of data are considered, along with the form of the standard, and are typically averaged to calculate a *Design Value* for each station. The overall design value for an air basin is the highest design value of all the stations in that basin. U.S. EPA also allows certain data to be flagged and not considered for NAAQS attainment status, when that data is influenced by exceptional events, such as high winds, wildfires, volcanoes, or some cultural events (Independence Day fireworks) that meet strict criteria. Table 1-3 shows the design value requirements utilizing the form of the federal standards for the federal criteria pollutants.

TABLE 1-3

Primary National Ambient Air Quality Standards (NAAQS) and Design Value Requirements

Pollutant	Averaging Time	Standard Level	Design Values and Form of Standards*
Ozone (O_3)	1-Hour** (1979)	0.12 ppm	Not to be exceeded more than once per year averaged over 3 years
	8-Hour (1997)	0.08 ppm	Annual fourth highest 8-hour average concentration, averaged over 3 years
	8-Hour (2008)	0.075 ppm	Annual fourth highest 8-hour average concentration, averaged over 3 years
Carbon Monoxide (CO)	1-Hour	35 ppm	Not to be exceeded more than once a year
	8-Hour	9 ppm	
Nitrogen Dioxide (NO_2)	1-Hour	100 ppb	Three-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations (rounded)
	Annual	0.053 ppm	Annual average concentration, averaged over 3 years
Sulfur Dioxide (SO_2)	1-Hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	24-Hour#	0.14 ppm	Not to be exceeded more than once per year
	Annual#	0.03 ppm	Annual arithmetic average
Particulate Matter (PM10)	24-Hour	150 µg/m^3	Not to be exceeded more than once per year averaged over 3 years
	Annual**	50 µg/m^3	Annual average concentration, averaged over 3 years
Particulate Matter (PM2.5)	24-Hour	35 µg/m^3	Three-year average of the annual 98th percentile of daily 24-hour concentration
	Annual	15.0 µg/m^3	Annual average concentration, averaged over 3 years
Lead (Pb)	3-Month Rolling##	0.15 µg/m^3	Highest rolling 3-month average of the three years

* Standard is attained when the design value (form of concentration listed) is equal to or less than the NAAQS; for pollutants with the design values based on "exceedances" (1-hour O_3, 24-hour PM10, CO, and 24-hour SO_2), the NAAQS is attained when the concentration associated with the design value is less than or equal to the standard:

- For 1-hour O_3 and 24-hour PM10, the standard is attained when the 4th highest daily concentrations of the 3-year period is less than or equal to the standard
- For CO and 24-hour SO_2, the standard is attained when the 2nd highest daily concentration of the most recent year is equal to or less than the standard

** Standard has been revoked. For 1979 1-hour O_3, nonattainment areas have some continuing obligations under the former 1979 standard. For 8-hour O_3, the standard has been lowered from (0.08 ppm to 0.075 ppm), but the 1997 O_3 standard and most related implementation requirements remain in place until further action by U.S. EPA

\# Annual and 24-hour SO_2 NAAQS will be revoked one year from attainment designations for the new (2010) 1-hour SO_2 standard

\#\# 3-month rolling Pb averages of the first year (of the three year period) include November and December monthly averages of the prior year. The 3-month average is based on the average of "monthly" averages

Summary of Criteria Pollutants and Air Quality Standards

Ambient air quality standards are periodically reviewed by U.S. EPA and state agencies to incorporate the findings from the most current research available on the effects of pollutants. Alert and advisory levels for advising the public about unhealthful air quality are also recommended. The section below summarizes the pollutant properties and health information, along with the air quality standards, including the recently revised or newly established standards and recently proposed revisions of the particulate NAAQS. Further discussion of the health effects of air pollutants is presented in Chapter 2 and more detailed health effects information is presented in Appendix I.

Particulate Matter Properties

Particulate matter (PM) air pollution is a complex mixture of small particles and liquid droplets, made up of a number of components, including acids and salts (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Particles originate from a variety of anthropogenic mobile and stationary sources and from natural sources. These particles can be emitted directly or formed in the atmosphere by transformations of gaseous emissions, such as sulfur oxides (SOx), nitrogen oxides (NOx), ammonia (NH_3) and volatile organic compounds (VOC). Examples of secondary particle formation include: 1) conversion of SOx and NOx to acid droplets or vapor that further react with ammonia to form ammonium sulfate and ammonium nitrate; and 2) reactions involving gaseous VOC, yielding organic compounds that condense on existing particles to form secondary organic aerosol (SOA) particles.

The size of particles is directly linked to their potential for causing health problems. Particles that are 10 micrometers (µm) in diameter or smaller (PM10) are of more concern than larger particles because those are the particles that generally pass through the throat and nose and enter the lungs. (A µm is 1/1000th of a millimeter; there are 25,400 micrometers in an inch.) Once inhaled, these particles can affect the heart and lungs and cause serious health effects. PM air pollution is typically grouped into two overlapping categories:

- *Inhalable coarse particles* (PM10), such as those found near roadways and dusty industries, are smaller than 10 µm in diameter. PM10 includes all PM2.5 particles;

- *Fine particles* (PM2.5), such as those found in smoke and haze, are 2.5 µm in diameter and smaller. These particles can be directly emitted from combustion sources, such as from diesel exhaust (soot) or forest fire smoke, or they can form when gases emitted from power plants, industries and motor vehicles react in the air. PM2.5 is a subset of PM10 particles.

PM10 Properties

Respirable particles (particulate matter less than about 10 micrometers in diameter) can accumulate in the respiratory system and aggravate health problems such as asthma, bronchitis, and other lung diseases. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to PM10.

PM10 particles are both directly emitted and formed chemically in the atmosphere from diverse emission sources. Major sources of PM10 include re-suspended road dust or soil entrained into the atmosphere by wind or activities such as construction and agriculture. These are mainly the coarser particles, in the PM10-PM2.5 coarse fraction range (often referred to as PM-Coarse, i.e., particles in the size range between 2.5 µm and 10 µm). Other components of PM10 form in the atmosphere (secondary PM10) from gaseous precursor emissions. These are mostly the smaller particles, mainly in the PM2.5 size range.

PM2.5 Properties

PM2.5, also known as fine particles, are the finer sized particles less than 2.5 µm in diameter, small enough to penetrate the defenses of the human respiratory system and lodge in the deepest recesses of the lung, causing potential adverse health impacts. The health effects include increased risks of heart attacks and strokes, aggravated asthma, acute bronchitis and chronic respiratory problems such as shortness of breath and painful breathing (in children, the elderly and sensitive people), and premature deaths (mainly in the elderly due to weaker immune systems). Sources of PM2.5 include diesel-powered vehicles such as buses and trucks, fuel combustion from automobiles, power plants, industrial processes, and wood burning.

In the Basin, much of the PM10 fraction is actually PM2.5 and smaller in size than 2.5 µm, a situation which has major implications for both health and atmospheric visibility. Reducing PM2.5 concentrations will therefore not only reduce the threat to the health of the Basin's population, but will also improve visibility in this region.

Total Suspended Particulate (TSP) Properties

Total suspended particulate (TSP) is the name applied to the complex mixture of particles suspended in the atmosphere, with no strict differentiation for particle size. TSP is collected on a glass fiber filter by means of a high volume sampler. Samples are collected for a 24-hour period every sixth day, and then returned to the District laboratory to be weighed for mass and chemically analyzed to determine the concentrations of sulfate, nitrate, and lead. The federal and state standards for lead are based on the analysis of TSP samples. In 2011, TSP samples were collected by the District at 14 sites. In addition, the District measured TSP lead at several source-specific sites in the vicinity of facilities known to emit lead, in order to comply with recent federal requirements to monitor those sources. The lead measurements throughout the Basin are detailed further at the end of this Chapter. Other than the specific health effects of lead, the fine fraction of TSP has greater effects on health and visibility than the coarse fraction. Of greatest concern to public health are the particles small enough to be inhaled into the lungs (PM10) and especially the smaller fine particles that are inhaled more deeply into the lungs (PM2.5). As a result the federal standard for TSP mass has been replaced with the PM10 and PM2.5 standards.

Particulate Matter (PM) Air Quality Standards

PM10 Air Quality Standards

In 1987, U.S. EPA adopted PM10 standards, replacing the earlier TSP standard. The District began PM10 monitoring in late 1984. U.S. EPA promulgated both a short-term 24-hour average standard (150 $\mu g/m^3$)[3] and an annual standard (50 $\mu g/m^3$). Over the years, the forms and levels of the federal PM10 standards were reviewed by U.S. EPA. Changes to the federal standards for PM10 became effective on December 17, 2006. U.S. EPA first proposed to revise the 24-hour PM10 standard by establishing a new indicator for coarse particles (particles generally between 2.5 and 10 μm in diameter, PM10-2.5), to include PM10-2.5 that is mainly generated by resuspended dust from high-density traffic on paved roads, industrial sources, and construction sources; but specifically excluding PM10-2.5 that is generated by rural windblown dust and soils and by agricultural and mining sources. U.S. EPA proposed to set the PM10-2.5 standard at a level of 70 $\mu g/m^3$. However, the coarse particle standard was not included as part of the final regulation which retained the 24-hour PM10 standard (150 $\mu g/m^3$). U.S. EPA also revoked the annual PM10 standard due to a cited lack of evidence of adverse health

[3] $\mu g/m^3$ = micrograms per cubic meter

effects linked to long-term exposure to coarse particles, beyond that already protected against by the PM2.5 annual standard. As part of the revision to the ambient air monitoring regulations in 2006, PM10-2.5 monitoring was required at National Core (NCore) multi-pollutant monitoring stations by January 1, 2011. Currently, the District measures PM10-2.5 at two NCore PM monitoring sites in the Basin (Central Los Angeles and Riverside-Rubidoux). In the most recent review of the PM standards completed in June of 2012, U.S. EPA did not propose changes to the PM10 standard.

PM2.5 Air Quality Standards

In 1997, U.S. EPA adopted new federal air quality standards for the subset of fine particulate matter, PM2.5, to complement existing PM10 standards that target the full range of inhalable particulate matter. The District began monitoring PM2.5 concentrations in 1999. Federal annual and 24-hour standards and a state annual standard for PM2.5 were established. In 2006, U.S. EPA significantly lowered the level of the 24-hour PM2.5 standard, from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, while retaining the level of the annual PM2.5 standard at 15 $\mu g/m^3$.

In the 2006 PM NAAQS review, U.S. EPA determined that individuals with pre-existing heart and lung diseases, older adults, and children are at greater risk from the effects associated with fine PM exposures. Based on the results of the previous studies and an extensive new body of scientific evidence that links the negative health impacts of PM2.5 exposure on these and possibly additional sensitive subpopulations (e.g., fetuses (unborn babies), newborns, and genetically susceptible populations) at lower levels than previously understood, U.S. EPA has proposed to strengthen the annual PM2.5 standard. On June 14, 2012 U.S. EPA proposed a lower annual standard with a concentration range between 12 and 13 $\mu g/m^3$. The current 24-hour standard of 35 $\mu g/m^3$ is proposed to remain unchanged. In addition, U.S. EPA proposed a requirement for near-roadway PM2.5 monitoring in urban areas. They also proposed adjustments to the Air Quality Index (AQI), which is used to report current and forecasted pollutant levels, to be consistent with the current 24-hour and new proposed annual PM2.5 standards. Final action on the proposed PM2.5 standard is anticipated by December 14, 2012.

For the 3-year (2009-2011) PM2.5 annual design value (the 3-year average of the annual PM2.5 averages), the Basin exceeded the current federal annual PM2.5 standard at only one location, (in Northwestern Riverside County at Mira Loma). Lowering the annual standard concentration to 13 or 12 $\mu g/m^3$ would have resulted in 6 to 10 additional stations exceeding the annual standard level in 2011. Figure 1-5 shows the effect of the proposed annual PM2.5 standard on the Basin's attainment status, based on the 2009-2011 annual PM2.5 design values.

Recently, ultrafine particles (UFP; diameter less than 0.1 µm) have received particular attention due to their ability to penetrate deep into the human respiratory tract, cross into the blood stream and other organs, and to cause adverse health effects in humans. However, UFPs are not currently regulated by the U.S. EPA (see Chapter 9 of the 2012 AQMP for additional details). Table 1-4 summarizes the history of the PM NAAQS to date.

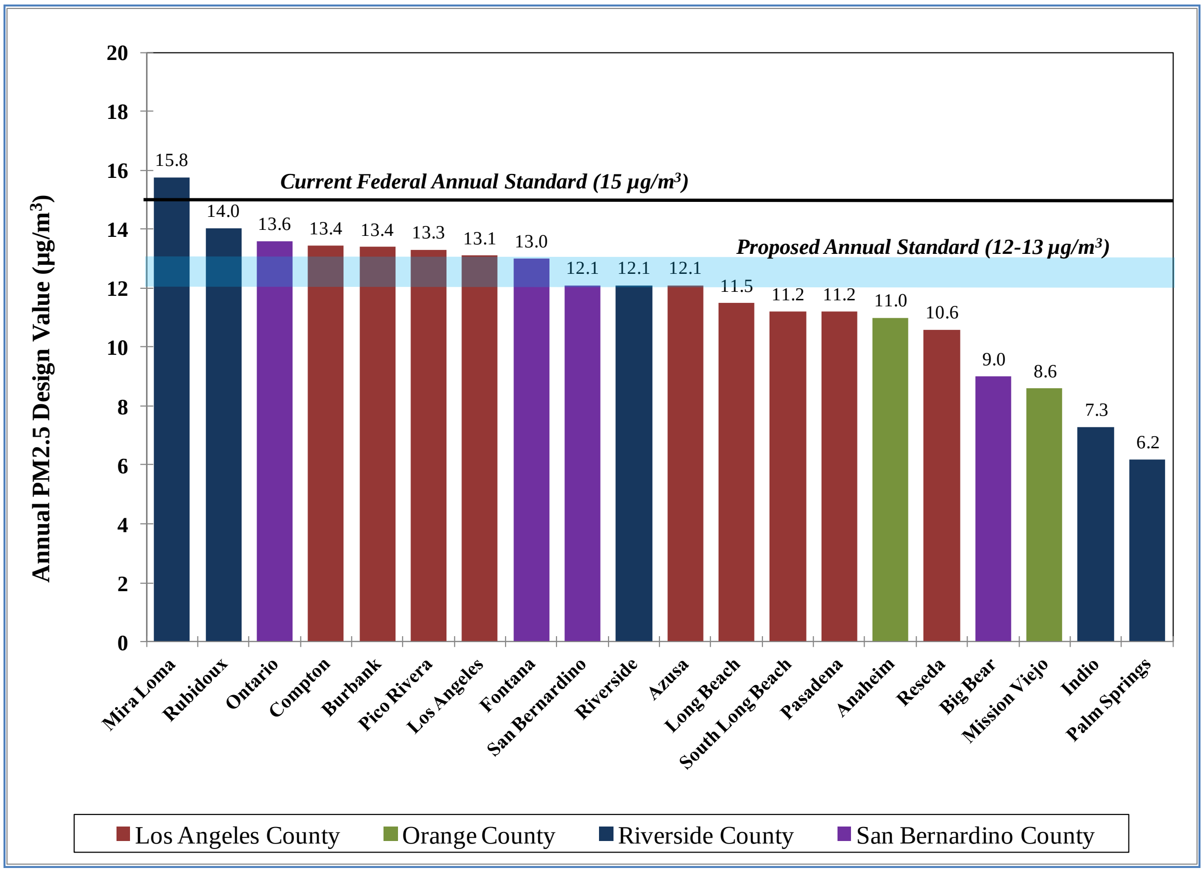


FIGURE 1-5

Annual PM2.5 3-Year (2009-2011) Design Values by Station Compared to Current and Proposed Federal Standards

TABLE 1-4

Summary of National Ambient Air Quality Standards (NAAQS) for Particulate Matter, 1971-Present (with Proposed)

Year of Final Rule	Indicator	Averaging Time	Level ($\mu g/m^3$)
1971	TSP - Total Suspended Particles ($\leq$ 25-45 µm)	24-hour	260
		Annual	75
1987	PM10	24-hour	150
		Annual	50
1997	PM2.5	24-hour	65
		Annual	15
	PM10	24-hour	150
		Annual	50
2006	PM2.5	24-hour	35
		Annual	15
	PM10	24-hour*	150
		Annual	(revoked)
2012 (proposed)	PM2.5	24-hour	35
		Annual	12-13**
	PM10	24-hour	150

* In the 1997 revision of the 24-hour PM10 standard, the form of the standard was revised to 99^{th} percentile, averaged over 3 years. When the 1997 standards were vacated, the form of 1987 standards remained in place (not to be exceeded more than once per year averaged over 3 years).

** A lower PM2.5 annual standard was proposed by U.S. EPA on June 14, 2012, with comments solicited on a concentration range from 12 to 13 $\mu g/m^3$

Ozone Properties

The Basin's unique air pollution problem was first recognized in the 1940's. The Los Angeles urban area smog was worse than other areas. Early research showed that ozone was being formed in the Basin's atmosphere from VOCs and NOx being emitted into the air in the presence of steady sunshine and trapped laterally by the mountainous terrain and vertically by strong low-altitude temperature inversions that act as a lid to vertical mixing of air. Regular monitoring of total oxidants was begun by the Los Angeles Air Pollution Control District (LAAPCD) in the 1950's, and annual maximum 1-hour ozone concentrations in excess of 0.60 ppm (600 ppb) were recorded at that time.

Ozone (O_3), a colorless gas with a sharp odor at very high concentrations, is a highly reactive form of oxygen. High ozone concentrations exist naturally high above the earth in the stratosphere. Some mixing of stratospheric ozone downward to the earth's surface does occur; however, the extent of ozone transport from aloft is limited. At the earth's surface in sites remote from urban areas, ozone concentrations are normally very low (0.03-0.05 ppm).

In urban areas, ozone is formed by a complicated series of chemical and photochemical reactions between VOCs, NOx, and the oxygen in the air. A decrease in ozone precursors may or may not result in a linear decrease in ozone. Ozone concentrations are dependent not only on overall precursor levels, but also on the ratio of the concentrations of VOCs to NOx , the reactivity of the specific VOCs present, the spatial and temporal distribution of emissions, the level of solar radiation, and other weather factors.

While ozone is beneficial in the stratosphere because it blocks 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.

The propensity of ozone to react with organic materials causes it to be damaging to living cells, and ambient ozone concentrations in the Basin are frequently sufficient to cause adverse 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 and damage to forests and other ecosystems.

Ozone Air Quality Standards

Studies have shown that even relatively low concentrations of ozone, if lasting for several hours, can significantly reduce lung function in normal healthy people. Effective September 16, 1997, the U.S. Environmental Protection Agency (U.S. EPA) adopted an

8-hour average federal ozone standard with a level of 0.08 ppm (not to exceed), intending to replace the 1-hour standard that was adopted in 1979 (0.12 ppm, not to exceed). This 8-hour ozone standard was more stringent than the 1-hour standard (0.12 ppm) and provided greater protection to public health. The 8-hour standard is intended to help protect people who spend a significant amount of time working or playing outdoors, a group that is particularly vulnerable to the effects of ozone. (Due to the monitoring and reporting requirements of the older ozone standards, a level of 0.085 ppm or 85 ppb is required to exceed the 1997 8-hour standard and 0.125 ppm or 125 ppb is required to exceed the 1979 1-hour standard.)

The U.S. EPA eventually revoked the 1979 federal 1-hour ozone standard, effective June 15, 2005. However, the South Coast Air Basin and the former Southeast Desert Modified Air Quality Management Area (which included the Coachella Valley) had not attained the 1-hour federal ozone standard by the attainment date and have some continuing obligations under the former standard.

The 8-hour standard was subsequently lowered from 0.08 to 0.075 ppm (75 ppb, not to exceed, i.e., 76 ppb exceeds), effective May 27, 2008. However, nonattainment areas of the 1997 8-hour ozone standard still have some continuing obligations to demonstrate attainment of that standard by the applicable attainment date. In 2010, U.S. EPA proposed to lower the 8-hour ozone standard again and solicited comments on a proposed standard between 0.060 and 0.070 ppm. U.S. EPA did not take final action on a lower ozone standard and the NAAQS currently remains at the 0.075 ppm, as established in 2008. Potential new ozone standards are under review with proposed regulations expected by 2014. Statistics presented in this Appendix refer to both the current (2008) 8-hour standard and the former 1997 8-hour and 1979 1-hour standards for purposes of historical comparison and assessment of progress towards attainment of those standards.

The State of California Air Resources Board (CARB), established a new 8-hour average state ozone standard (0.070 ppm), effective May 17, 2006. The earlier state 1-hour ozone standard (0.09 ppm) also continues to remain in effect. Comparisons of the current (2008) and 1997 8-hour ozone standards, along with the former 1-hour ozone standard, for the Basin and the Coachella Valley can be found in Chapters 2 and 7.

While the 1-hour ozone episode levels and the related health warnings still exist, they are essentially replaced by the more protective health warnings associated with the current NAAQS. The 1-hour O_3 episode warning levels include the state Health Advisory (0.15 ppm), Stage 1 (0.20 ppm), Stage 2 (0.35 ppm) and Stage 3 (0.50 ppm). Only the lowest of these 1-hour episode thresholds, the state Health Advisory, was exceeded in 2011. The last 1-hour O_3 Stage 1 episode occurred in 2003. The last Stage 2 episode occurred in 1988, and the last Stage 3 episode occurred in 1974.

CO Properties

Carbon monoxide (CO) is a colorless, odorless, relatively inert gas. It is a trace constituent in the unpolluted troposphere, and is produced by both natural processes and human activities. In remote areas far from human habitation, carbon monoxide occurs in air at an average background concentration of 0.04 ppm, primarily as a result of natural processes such as forest fires and the oxidation of methane. Global atmospheric mixing of CO from urban and industrial sources creates higher background concentrations (up to 0.20 ppm) near urban areas. The major source of CO in urban areas is incomplete combustion of carbon-containing fuels, mainly gasoline. In 2000, 98 percent of the CO emitted into the Basin's atmosphere was from mobile sources. Consequently, CO concentrations are generally highest in the vicinity of major concentrations of vehicular traffic. CO concentrations have continued to decrease due to reformulated fuels and more efficient combustion in newer vehicles.

As a primary pollutant, carbon monoxide is directly emitted into the air, and not formed in the atmosphere by chemical reaction of precursors as is the case with ozone and other secondary pollutants. Ambient concentrations of CO in the Basin exhibit large spatial and temporal variations, due to variations in the rate and locations at which CO is emitted, and in the meteorological conditions that govern transport and dilution. Unlike ozone, CO tends to reach high concentrations in the fall and winter months. The highest concentrations frequently occur on weekdays at times consistent with rush hour traffic and late at night during the coolest, most atmospherically stable portion of the day.

When carbon monoxide is inhaled in sufficient concentration, it can displace oxygen and bind with the hemoglobin in the blood, reducing the capacity of the blood to carry oxygen. Individuals most at risk from the effects of CO include heart patients, fetuses (unborn babies), smokers, and people who exercise heavily. Normal healthy individuals are affected at higher concentrations, which may cause impairment of manual dexterity, vision, learning ability, and performance of work. The results of studies concerning the combined effects of CO and other pollutants in animals have shown a synergistic adverse effect after exposure to CO and ozone.

CO Air Quality Standards

The state and federal CO standards have been reviewed recently, with no changes recommended. The CO standards are based on both short-term (1-hour; 35 ppm federal and 20 ppm state) and longer-term (8-hour; 9 ppm federal and 9.0 ppm state) exposures.

NO_2 Properties

Nitrogen dioxide (NO_2) is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from nitrogen (N_2) and oxygen (O_2) in air under conditions of high temperature and pressure which are generally present during combustion of fuels; NO reacts with the oxygen in air to give NO_2. NO_2 is largely responsible for the brownish tinge of polluted urban air. The two gases, NO and NO_2, are referred to collectively as oxides of nitrogen (NOx). In the presence of sunlight, NO_2 reacts to produce nitric oxide and an oxygen atom. The oxygen atom can react further to produce ozone, via a complex series of chemical reactions involving hydrocarbons (VOCs). NO_2 may also react to produce nitric acid (HNO_3) which reacts further to produce nitrates, which are a component of PM.

NO_2 is a respiratory irritant and reduces resistance to respiratory infection. Children and people with respiratory disease are most susceptible to its effects.

NO_2 Standards

U.S. EPA has established a new primary NO_2 1-hour standard to supplement the existing annual standard, at a level of 100 ppb (based on the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations for each station). U.S. EPA has also established new requirements for the NO_2 monitoring network in large metropolitan areas that will include monitors at locations within 50 meters of major roadways. This near-source monitoring requirement is in addition to the ambient monitoring requirements to measure the area-wide NO_2 concentrations that occur more broadly across communities. This rule became effective on April 12, 2010. The 1971 annual NO_2 federal standard (0.053 ppm) remains in effect. Effective March 20, 2008, the California Air Resources Board (CARB) revised the state NO_2 1-hour state standard from 0.25 ppm to 0.18 ppm, and established a new annual state standard of 0.030 ppm.

SO_2 Properties

Sulfur dioxide (SO_2) is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H_2SO_4), which contributes to acid deposition, and sulfates, which is a component of PM10 and PM2.5. Most of the SO_2 emitted into the atmosphere is produced by the burning of sulfur-containing fuels.

At sufficiently high concentrations, sulfur dioxide affects breathing and the defenses of the lungs, and it can aggravate respiratory and cardiovascular diseases. Asthmatics and people with chronic lung disease or cardiovascular disease are most sensitive to its effects. Sulfur dioxide also causes plant damage, damage to materials, and acidification of lakes and streams.

SO_2 Standards

U.S. EPA established a new 1-hour SO_2 standard at a level of 75 ppb, based on the 3-year average of the annual 99^{th} percentile of 1-hour daily maximum concentrations and has revoked both the 24-hour and annual primary SO_2 standards, effective June 2, 2010.

Sulfate Properties

Sulfates are chemical compounds which contain the sulfate ion (SO_4^{2-}) and are part of the mixture of solid materials which make up PM2.5, PM10 and TSP. Most of the sulfates in the atmosphere are produced by oxidation of sulfur dioxide. Oxidation of sulfur dioxide yields sulfur trioxide (SO_3) which reacts with water to produce sulfuric acid (H_2SO_4), which contributes to acid deposition. The reaction of sulfuric acid with basic substances such as ammonia yields sulfates, a component of PM.

Lead (Pb) Properties

Lead in the atmosphere is present as a mixture of a number of lead compounds. Leaded gasoline and lead smelters had historically been the main Basin sources of lead emitted into the air. Due to the phasing out of leaded gasoline, there has been a dramatic reduction in atmospheric lead in the Basin over the past three decades.

Lead Standards

The national standard for Lead (Pb) was revised on October 15, 2008 from a quarterly average of 1.5 $\mu g/m^3$ to a rolling 3-month average of 0.15 $\mu g/m^3$, with a maximum (not-to-be-exceeded) form, evaluated over a 3-year period (36 months). The current indicator of Pb in total suspended particles (Pb-TSP) was retained. The revision became effective on January 12, 2009.

U.S. EPA has also enhanced the Pb monitoring requirements in its 2008 NAAQS revisions, requiring air monitoring near Pb sources with potential 3-month average Pb concentration exceeding the revised standard of 0.15 $\mu g/m^3$. Pb monitoring is required in large urban areas with monitors located to measure Pb concentrations in areas impacted by resuspended dust from roadways, nearby industrial sources identified as significant Pb sources, hazardous waste sites, construction and demolition projects, or other fugitive dust sources of Pb. Following a petition in 2009, U.S. EPA revised the monitoring requirements, lowering the emission threshold at which monitoring is required for both source-oriented and large urban area-based non-source oriented monitoring. The monitoring revision became effective in January 2011. In 2011, the District's Pb monitoring network included 10 regular monitoring sites and an additional six source-specific sites, one of which exceeded the revised Pb standard (at a lead source in the City of Vernon, Los Angeles County). A separate Pb SIP addressing the 2008 Pb standard was submitted to U.S. EPA in June 2012.

Chapters 2 and 3 contain summaries of air quality in the South Coast Air Basin (Basin), and the Riverside County (Coachella Valley) portion of the Salton Sea Air Basin (SSAB), respectively. For ozone, PM10, and PM2.5, the pollutants for which the Basin is still designated as nonattainment of the federal standards, maps are presented which show the geographical air quality variability. Detailed air quality statistics for each of the District's monitoring locations in the Basin and SSAB are contained in the Attachment to this report, for the years 1995 through 2011. Please refer to Appendix II from the 2003 AQMP for the 1976-1989 prior-year statistics and to Appendix II from the 2007 AQMP for 1990-2005 data.

CHAPTER 2

AIR QUALITY IN THE SOUTH COAST AIR BASIN

Air Quality in the South Coast Air Basin

- Violations of Standards
- Design Values and NAAQS Attainment Status
- Air Quality Compared to Other U.S. Metropolitan Areas
- Air Quality Trends
- Spatial and Temporal Variability

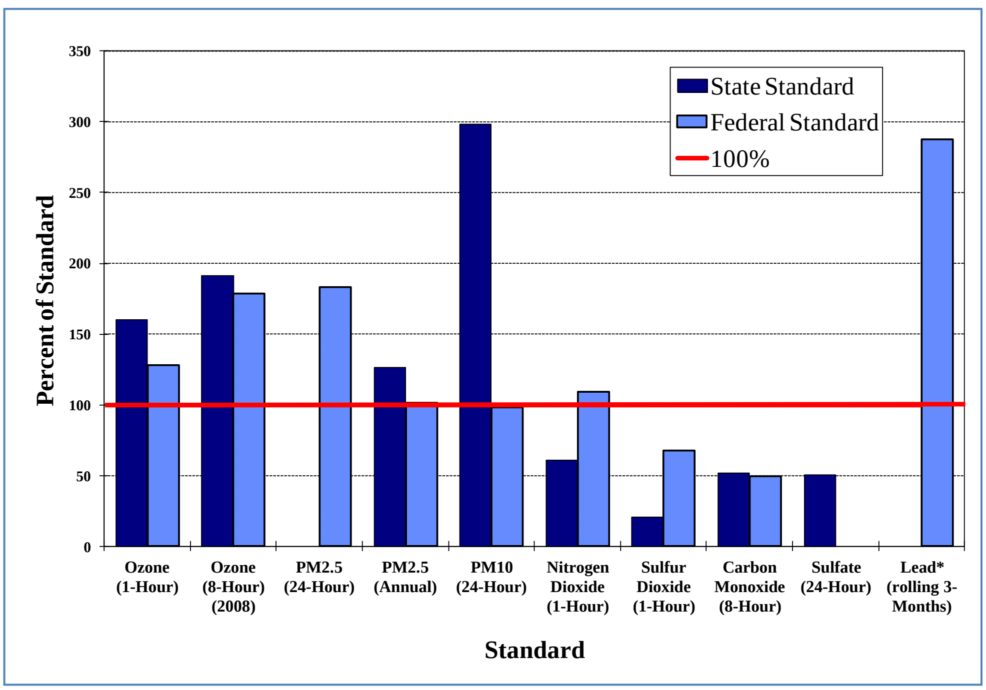
Pollutant-Specific Air Quality Discussion

- Particulate Matter (PM)
- Ozone (O_3)
- Nitrogen Dioxide (NO_2)
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO_2)
- Sulfate (SO_4^{2-})
- Lead (Pb)

AIR QUALITY IN THE SOUTH COAST AIR BASIN

Violations of Standards

In the South Coast Air Basin (Basin), the maximum pollutant concentrations measured at District monitoring stations in 2011 exceeded the levels of the federal and state standards for ozone (O_3), PM2.5, nitrogen dioxide (NO_2), and lead (Pb). In the year 2011, a total of 125 days exceeded the levels of the current short-term (24-hour average or less) federal standards for 8-hour O_3, 1-hour NO_2, or 24-hour PM2.5 at one or more Basin locations. As discussed below, the NO_2 reading did not cause a "violation" of the standard. The more stringent state 8-hour O_3 or 24-hour PM10 standards were exceeded on 137 days (based on the FRM filter data for PM10, which is not sampled every day). While the Basin exceeded the state annual and 24-hour PM10 standards, it did not exceed the 24-hour federal standard. The federal and state annual PM2.5 standards were exceeded in the Basin in 2011, with only one station exceeding the federal standard. While the state PM10 annual standard was exceeded, the revoked federal annual PM10 standard was not. The other criteria pollutants, sulfur dioxide (SO_2), carbon monoxide (CO), and sulfate (SO_4^{2-}), did not exceed federal or state standards. Figure 2-1 shows the Basin maximum pollutant concentrations for 2011, as a percentage of the federal and state standards.



* High lead concentrations recorded at monitoring sites adjacent to sources known to emit lead

FIGURE 2-1

2011 South Coast Air Basin Maximum Pollutant Concentrations
(as Percent of State and Federal Standards)

Design Values and NAAQS Attainment Status

As shown above, the Basin exceeded the pollutant concentration levels defined by the National Ambient Air Quality Standards (NAAQS) for ozone, PM2.5, NO_2, and Pb. However, attainment of the NAAQS is measured with the three-year design values that take into account the form of the federal standards and multi-year averages, as detailed previously in Table 1-3. The exceedances of the NO_2 standard level on one day in 2011 at two stations did not constitute a violation of the NAAQS or affect the Basin's NO_2 designation. The Basin did not exceed the federal standard for PM10 in 2011, or any year since 2008; the exceedances in 2007 and 2008 were flagged in the U.S. EPA AQS database to request exclusion from attainment consideration under the U.S. EPA Exceptional Events Rule. Figure 2-2 shows the federal ozone and PM design value status for the Basin, along with the Coachella Valley, for the 2009-2011 3-year period. The current U.S. EPA NAAQS attainment designations for the Basin are presented in Table 2-1.

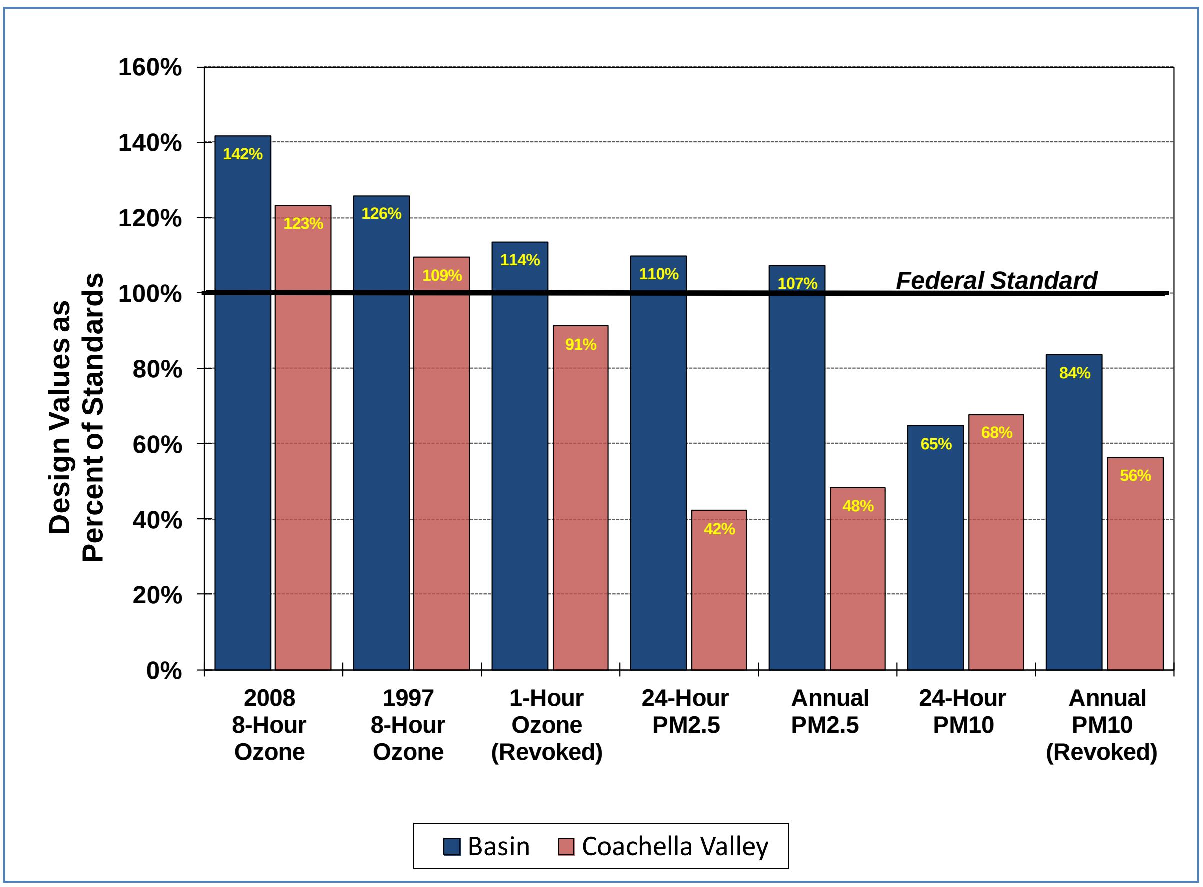


FIGURE 2-2
South Coast Air Basin and Coachella Valley 3-Year (2009-2011) Design Values
(Percentage of Federal Standards, by Criteria Pollutant)

TABLE 2-1

National Ambient Air Quality Standards (NAAQS) Attainment Status
South Coast Air Basin

Criteria Pollutant	Averaging Time	Designation[a)]	Attainment Date[b)]
1979 **1-Hour Ozone**[c)]	1-Hour (0.12 ppm)	Nonattainment (Extreme)	11/15/2010 (not attained)
1997 **8-Hour Ozone**[d)]	8-Hour (0.08 ppm)	Nonattainment (Extreme)	6/15/2024
2008 **8-Hour Ozone**	8-Hour (0.075 ppm)	Nonattainment (Extreme)	12/31/2032
CO	1-Hour (35 ppm) 8-Hour (9 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
NO_2[e)]	1-Hour (100 ppb)	Unclassifiable/Attainment	N/A
	Annual (0.053 ppm)	Attainment (Maintenance)	9/22/1998
SO_2[f)]	1-Hour (75 ppb)	Designations Pending	N/A
	24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)
PM10	24-hour (150 μg/m^3)	Nonattainment (Serious)[g)]	12/31/2006 (redesignation request submitted)[g)]
PM2.5	24-Hour (35 μg/m^3)	Nonattainment	12/14/2014[h)]
	Annual (15.0 μg/m^3)	Nonattainment	4/5/2015
Lead (Pb)	3-Months Rolling (0.15 μg/m^3)	Nonattainment (Partial)[i)]	12/31/2015

a) U.S. EPA often only designates Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration

c) 1979 1-hour O_3 standard (0.12 ppm) was revoked, effective June 15, 2005 ; however, the Basin did not attain this standard based on 2008-2010 data and has continuing obligations under the former standard

d) 1997 8-hour standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the 1997 O_3 standard and most related implementation rules remain in place until the 1997 standard is revoked by U.S. EPA

e) New NO_2 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO_2 standard retained

f) The 1971 annual and 24-hour SO_2 standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard. Area designations are expected in 2013, with the Basin likely designated Unclassifiable /Attainment

g) Annual PM10 standard was revoked, effective December 18, 2006; redesignation request to attainment of the 24-hour PM10 standard is pending with U.S. EPA

h) Attainment deadline for the 2006 24-Hour PM2.5 NAAQS is December 14, 2014

i) Pb partial nonattainment designation – Los Angeles County portion of the Basin only

Air Quality Compared to Other U.S. Metropolitan Areas

Despite significant improvement, the Basin still has some of the worst air quality in the nation in terms of the number of days per year exceeding the federal standards. In 2011, the U.S. location with the highest number of days over the federal 8-hour average ozone standard was located in the Basin (Central San Bernardino Mountains-Crestline, 84 days). The Basin exceeded the 24-hour average PM2.5 standard on multiple days, but the 98th percentile PM2.5 concentration (which is used to compare with the federal PM2.5 standard) exceeded the standard at one location only in Northwestern Riverside County (Mira Loma). The Basin did not exceed the federal 24-hour average and annual PM10 standards in 2011.

Figures 2-3 and 2-4 show maximum pollutant concentrations in 2011 for the Basin compared to other urban areas in the U.S. and California, respectively. Maximum concentrations in all of these areas exceeded the 2008 federal 8-hour average O_3 standard. The annual PM2.5 standard was exceeded in the South Coast Air Basin and in one other California air basin (San Joaquin Valley). The 24-hour PM2.5 standard, however, was exceeded in a few of the other large U.S. urban areas and in many California air basins. The 24-hour PM10 standard was exceeded in one of the U.S. urban areas shown (Phoenix), although potential flagging of exceptional events may affect the treatment of that data. It is important to note that maximum pollutant concentrations do not necessarily indicate potential NAAQS violations and subsequent nonattainment designations, as the design values that are used for attainment status are based on the form of the standard.

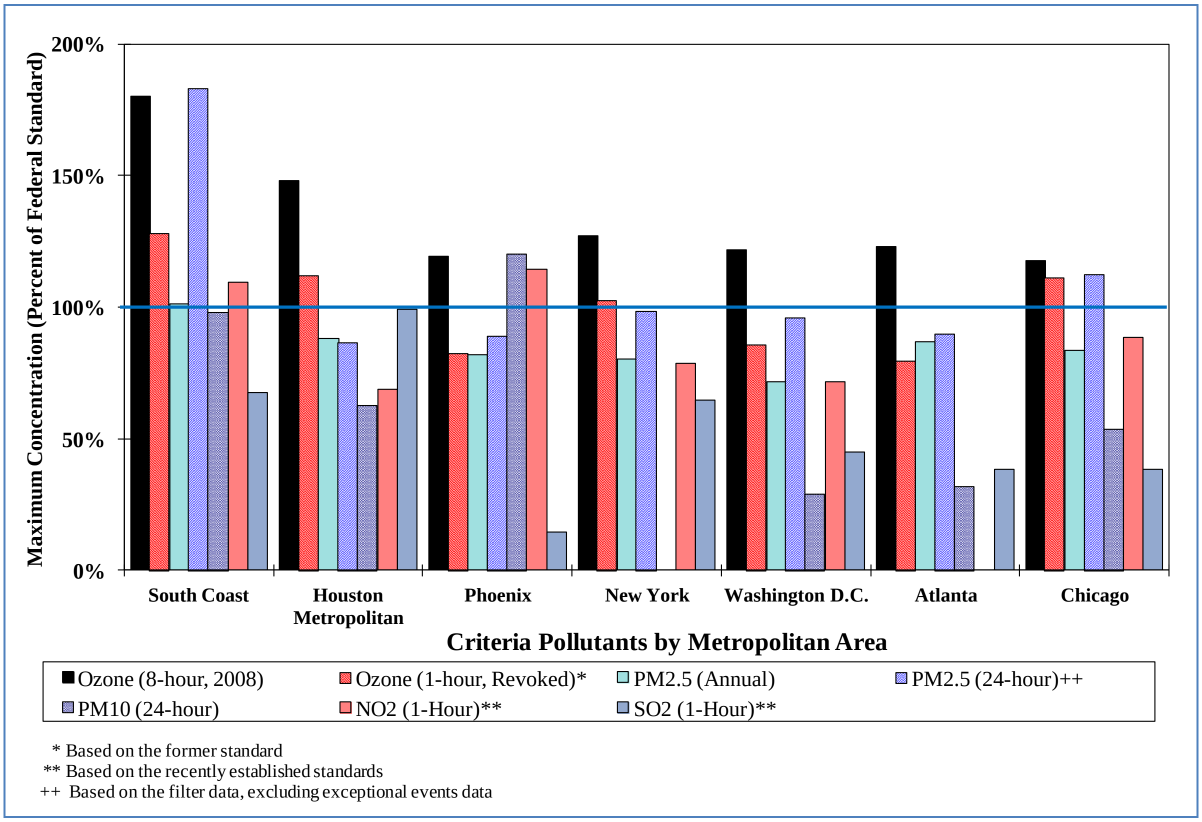


FIGURE 2-3

2011 South Coast Air Basin Air Quality Compared to Other U.S. Urban Areas
(Maximum Pollutant Concentrations as Percentages of the Corresponding Federal Standards)

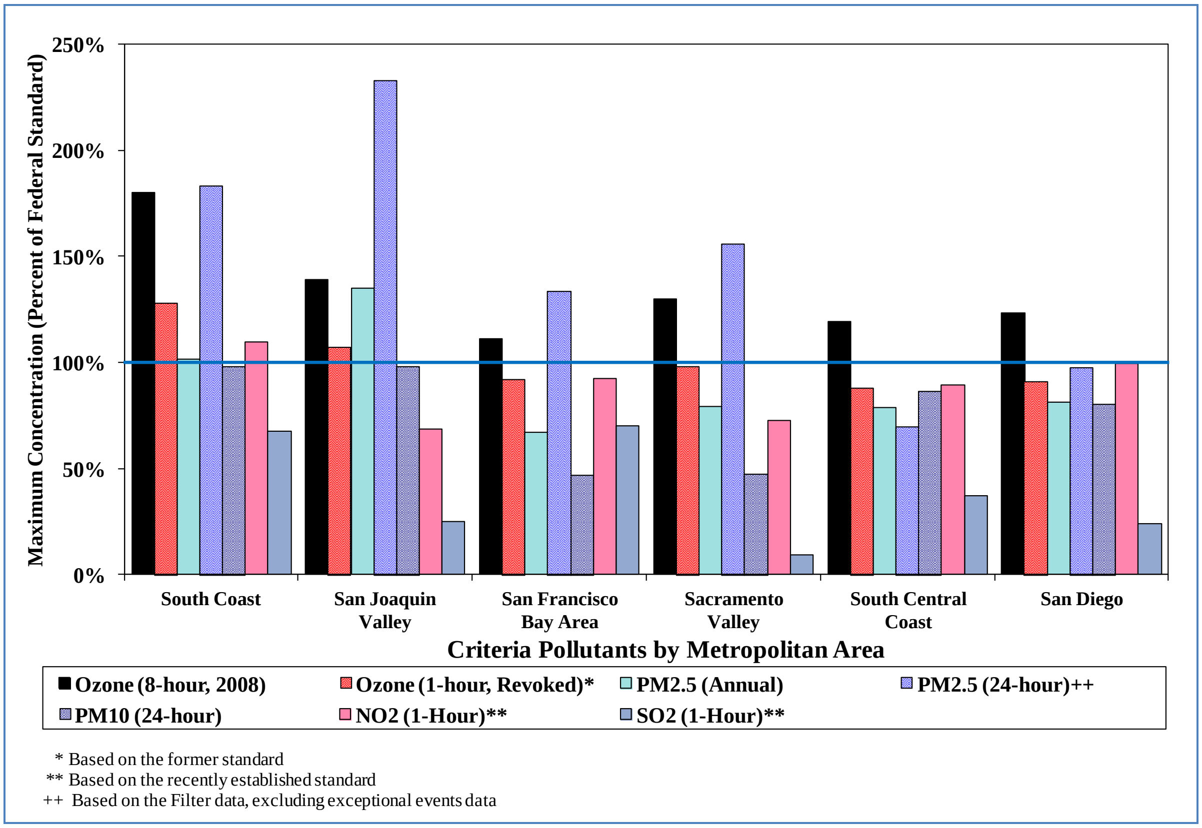


FIGURE 2-4

2011 South Coast Air Basin Air Quality Compared to Other California Air Basins
(Maximum Pollutant Concentrations as Percentages of the Corresponding Federal Standards)

NO_2 concentrations exceeded the recently established 1-hour standard in the Basin and Phoenix (on one day each). Denver, Colorado (not shown in Figure 2-3), was the only other U.S. urban area exceeding the NO_2 standard in 2011. SO_2 concentrations were below the recently established 1-hour federal standard in the Basin and all of the urban areas shown in Figures 2-3 and 2-4. However, the SO_2 standard was exceeded in other U.S. areas, with the highest concentrations recorded in Hawaii, due to volcanic emissions. The CO standards were not exceeded in the U.S. in 2011.

In 2011, the Central San Bernardino Mountains area in the Basin recorded the highest maximum 1-hour and 8-hour average ozone concentrations in the nation (0.160 and 0.136 ppm, respectively). The highest 8-hour average concentration was more than one and a half times the federal standard level. In 2011, seven out of ten stations with the highest maximum 8-hour average ozone concentrations in the nation were located in the Basin[4]. The South Coast Air Basin also exceeded the 8-hour ozone standard on more

[4] The 10 highest measured O_3 concentrations in 2011 included 7 Basin stations: Central San Bernardino Mountains (Crestline), East San Bernardino Valley (Redlands), Central San Bernardino Valley (Fontana and San Bernardino), Santa Clarita Valley (Santa Clarita), Northwest San Bernardino Valley (Upland), and Metropolitan Riverside (Rubidoux).

days (106) than most other urban areas in the country in 2011, with only California's San Joaquin Valley exceeding on more days (109).

Air Quality Trends

There have been significant improvements in the Basin's air quality over the years since measurements began, with PM2.5 showing the most dramatic improvement in recent years. Figure 2-5 shows the trend (1990-2011) of *basin-days*[5] exceeding the federal standards for ozone and particulates, as a percentage of days with monitoring data. Figure 2-6 shows the trend of maximum pollutant concentrations in the Basin for the past two decades, as percentages of the corresponding federal standards. Note that this is based on maximum concentrations and that actual attainment of the standards is based on the design value. The pollutant-specific sections of this chapter contain additional trends by pollutant.

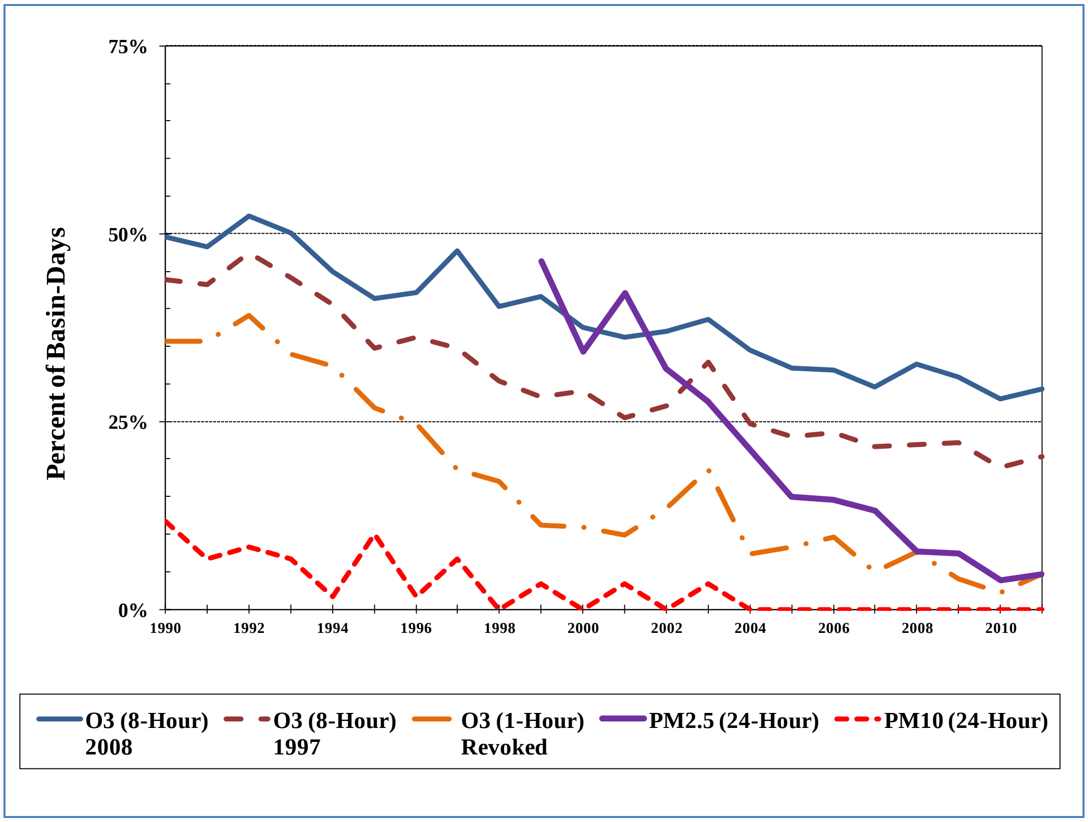


FIGURE 2-5

Trend of Basin-Days Exceeding Federal Standards, 1990-2011

[5] A "basin-day" is recorded if one or more locations in the air basin exceeded the level of the standard. Multiple locations exceeding on the same day count as a single basin-day.

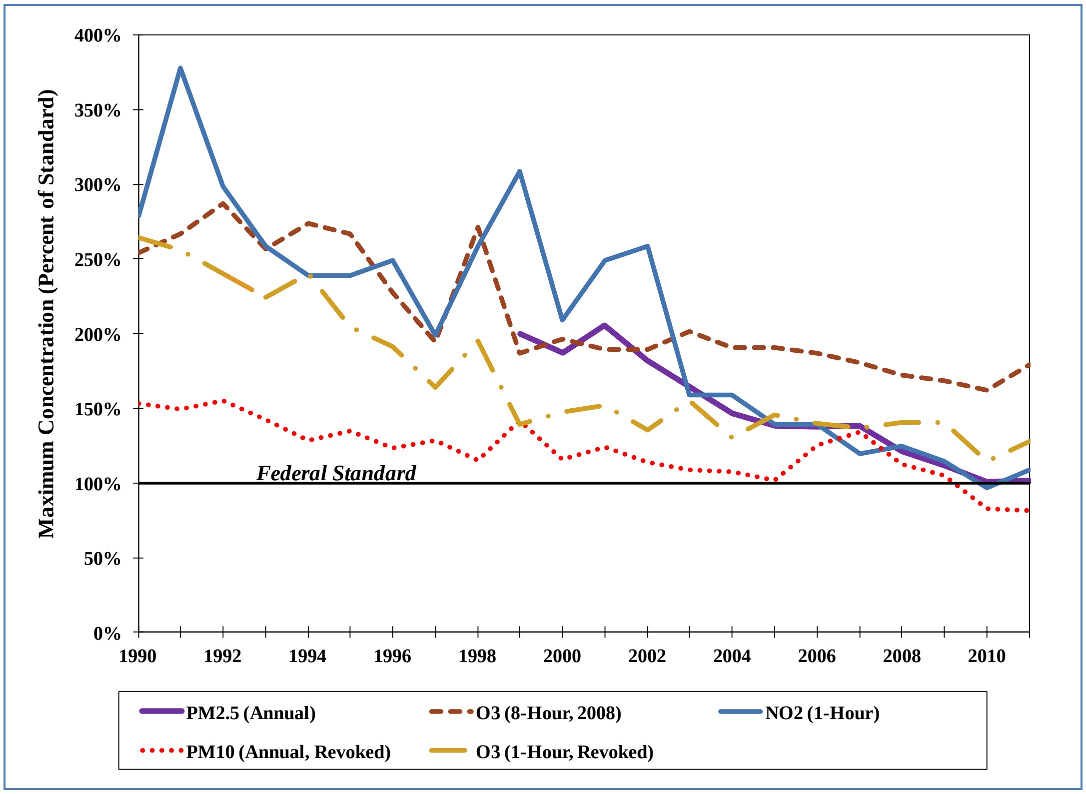


FIGURE 2-6
Trends of South Coast Air Basin Maximum Pollutant Concentrations
(Percentages of Federal Standards)

Spatial and Temporal Variability

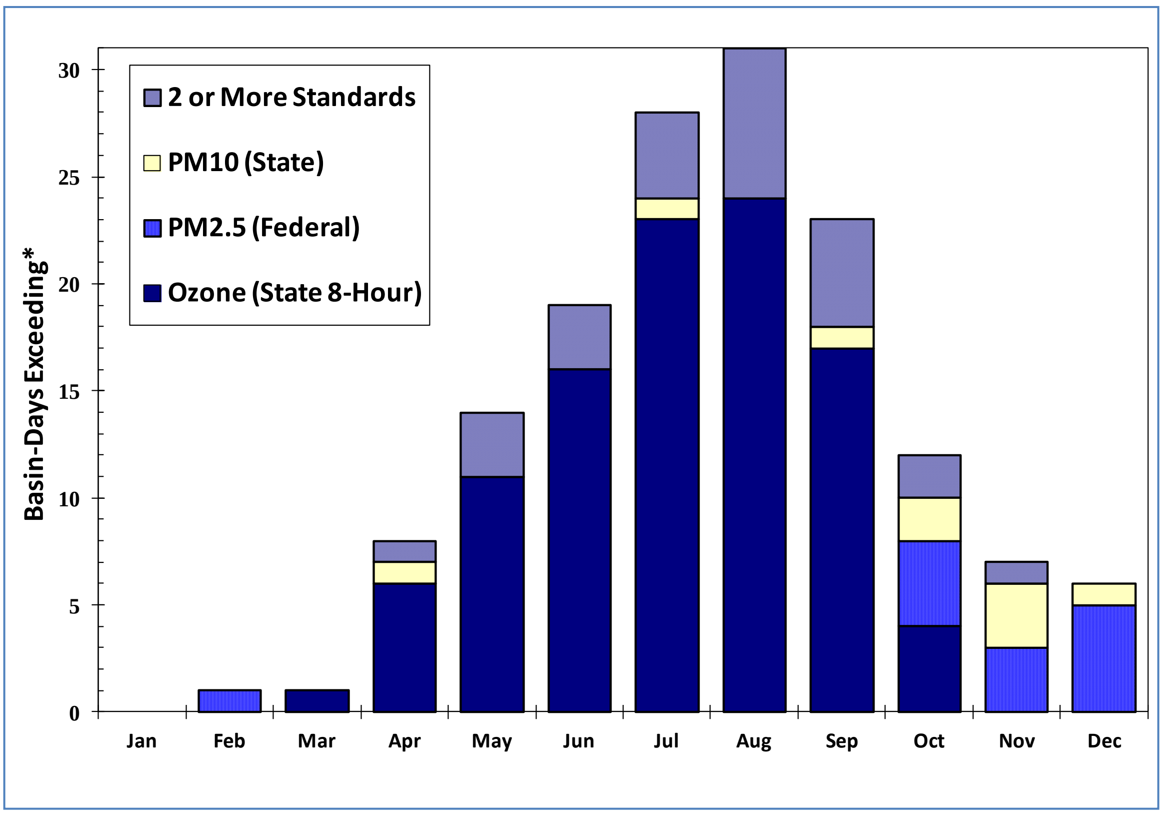
Air quality in the Basin varies widely by season and by area. The highest pollutant concentrations were all recorded in, or downwind of, the densely populated areas of the Basin. The number of days exceeding the current (2008) 8-hour federal ozone standard (0.075 ppm[6], or 75 ppb[7], not to exceed) varied widely by location, from zero to 84 days. Exceedances were fewest along the coast, increasing in the inland valleys to a maximum in the Basin's Central San Bernardino Mountains. The District station in the Central San Bernardino Mountains area (Crestline-Lake Gregory) exceeded the 2008 federal 8-hour average ozone standard most frequently (84 days).

Ozone concentrations tend to be higher on weekends than on weekdays, although this difference is less distinct in recent years. The time of day with highest average ozone concentrations is in the early to middle afternoon, although the inland areas of the Basin will peak later in the afternoon on the higher days. Day-of-week and time-of-day PM2.5 concentrations vary considerably by location but, overall for 2009-2011, weekday

[6] ppm = parts per million, by volume
[7] ppb = parts per billion, by volume; 1 ppm = 1000 ppb

PM2.5 concentrations were slightly higher on Fridays and daily peaks occur in the morning, after the period of heaviest traffic.

The Basin's air quality concentrations and the occurrence of exceedances vary with season due to seasonal differences in the weather, sunlight for photochemical reactions, and to a lesser extent, seasonal variations in emissions. High ozone concentrations are generally recorded during the May to October "smog season" and exceedances of the federal and state standards are most frequent in July and August. Particulate matter (PM10 and PM2.5) levels do not have as clear of a pattern as ozone, and high concentrations may be recorded throughout the year. However, high PM10 and PM2.5 concentrations are typically recorded during late fall and winter months. Figure 2-7 shows the number of Basin-wide days per month when the most stringent of the state or federal standards were exceeded in the Basin in 2011. Additional spatial and temporal analyses are presented in the pollutant-specific sections that follow.



* The term Basin-days represents the number of days a standard was exceeded by at least one monitoring station in the Basin

FIGURE 2-7

Number of Basin-Days per Month Exceeding the Most Stringent State or Federal Standards in 2011

POLLUTANT-SPECIFIC AIR QUALITY DISCUSSION

Particulate Matter (PM)

PM10 and PM2.5 concentrations are monitored throughout the District by samples collected on quartz or teflon filters in samplers with size selective inlets; this is known as the Federal Reference Method (FRM). Some stations also have continuous monitors, using either Beta Attenuation Monitor (BAM) or Tapered Element Oscillating Microbalance (TEOM) instrumentation. This data is available in real-time and is used for air quality forecasting and public reporting of current conditions. Where the continuous BAM or TEOM PM10 monitors have been certified by U.S. EPA to be Federal Equivalent Methods (FEM), the continuous PM10 data is averaged for the 24-hour period (midnight to midnight) and used for comparison to the standards on days when a valid FRM filter measurement was not collected. For PM2.5, there are significant differences between the FEM and FRM results that have been recognized by national assessments of the technologies. The District measures FRM PM2.5 on a daily basis at the critical stations in the Basin, and does not use the FEM PM2.5 data to compare to the NAAQS. This issue is being explicitly addressed in U.S. EPA's new proposed PM2.5 NAAQS, and future use of FEM data will be consistent with the final federal requirements. In 2011, the District measured PM10 and PM2.5 concentrations at 25 and 21 locations, respectively, including two locations in the Coachella Valley for both. Figures 2-8 and 2-9 show the PM2.5 and PM10 monitoring sites, respectively, in the District's jurisdiction.

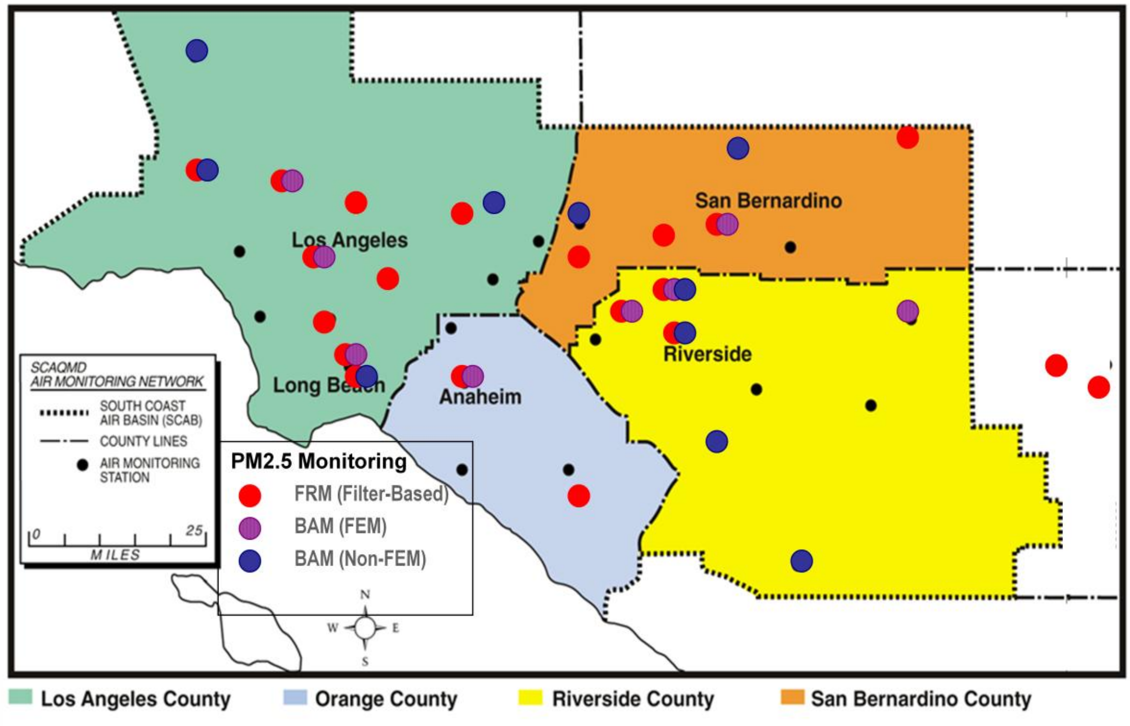


FIGURE 2-8
South Coast Air Quality Management District PM2.5 Air Monitoring

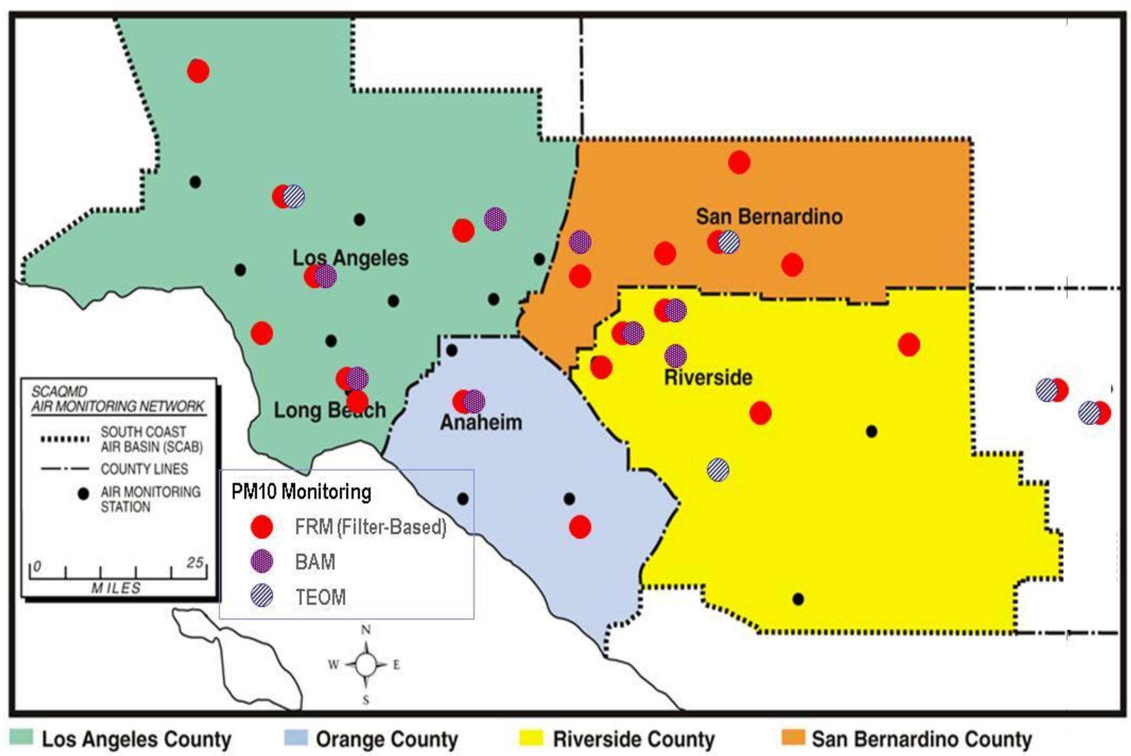


FIGURE 2-9
South Coast Air Quality Management District PM10 Monitoring

PM2.5 Air Quality

The District began routine monitoring of PM2.5 regularly in 1999 and the number of PM2.5 monitoring stations has increased in recent years. In 2011, the District monitored PM2.5 concentrations at 25 routine sampling locations (including 2 in the Coachella Valley), 22 with Federal Reference Method (FRM) filter samplers and 7 with Federal Equivalent Method (FEM) continuous monitors (shown in Figure 2-8). Only one of FEM monitor is not collected with an FRM sampler. The FRM PM2.5 measurements, based on samplers with size-selective inlets using teflon filters, are collected for a 24-hour period every 3 days at most locations, except for seven stations that historically have higher concentrations where daily FRM samples are collected. One station in the Big Bear Lake area has a 24-hour sample collected every 6 days.

All PM2.5 data from sites in the District's network using FRM samplers are suitable for comparison to PM2.5 NAAQS for attainment purposes. The PM2.5 network also includes continuous FEM and non-FEM Beta Attenuation Monitors (BAM) throughout the District's jurisdiction. At the sites where both 24 hour FRM PM2.5 samplers and FEM PM2.5 continuous analyzers are deployed together, the 24 hour FRM PM2.5 sampler remains the primary analyzer used for attainment purposes. On many days, there is poor comparability of the FEM PM2.5 monitors and the FRM method. Therefore, the continuous hourly measurements that are available in real time are used primarily for forecasting and public notification of PM2.5 air pollution levels.

The highest 24-hour PM2.5 measurement recorded in 2011 in the Basin (94.6 $\mu g/m^3$ on July 5 at East San Gabriel Valley at Azusa) was flagged in the U.S. EPA Air Quality System (AQS) database for exclusion under the U.S. EPA Exceptional Event Rule, due to Independence Day fireworks displays. With this data included, the 2009-2011 24-hour design value for Azusa would exceed the federal standard level in 2011 and the 3-year design value. With that exceptional event flagged (pending further documentation and U.S. EPA concurrence), the only station with a 24-hour design value exceeding the 24-hour federal standard is in Metropolitan Riverside County (Mira Loma). The daily FRM sampler at Mira Loma exceeded the 24-hour federal standard on 8 days in 2011. The annual and 24-hour design values for the former Basin maximum station in Metropolitan Riverside County (Riverside-Rubidoux) are currently below the federal standards, based on the 2009-2011 data.

The federal 24-hour PM2.5 standard concentration level was exceeded at 75 percent of the locations monitored in the District in 2011. With the one exceptional event day flagged, the Basin's next-highest 24-hour average (65.0 $\mu g/m^3$) occurred in the Central

San Bernardino Valley (City of San Bernardino) and was 183 percent of the federal 24-hour PM2.5 standard. However, that location did not exceed the 98th percentile design value form of the standard in 2011, nor the 2009-2011 3-year design value.

In 2011, the federal annual average PM2.5 standard was exceeded at one location (Metropolitan Riverside at Mira Loma). The maximum annual average recorded there (15.3 μg/m^3) was 101 percent of the federal standard and 126 percent of the state standard. The maximum 24-hour and annual average PM2.5 concentrations in 2011 are summarized by county in Tables 2-2 and 2-3, respectively, along with comparisons to the federal and state standards. Tables A-9 to A-12 in the Attachment to this appendix show the annual arithmetic mean, percentage of sampling days over the 24-hour federal standard, maximum 24-hour average concentrations, and 98th percentile 24-hour concentrations for the years 1999-2011 at all monitoring stations.

TABLE 2-2

2011 Maximum 24-hour Average PM2.5 Concentrations by Basin and County

Basin/County	Maximum 24-Hr Average[#] (μg/m^3)	Percent of Federal Standard* (35 μg/m^3)	Area
South Coast Air Basin			
Los Angeles**	49.5	139	East San Gabriel Valley
Orange	39.2	110	Central Orange County
Riverside	60.8	171	Metropolitan Riverside County
San Bernardino	65.0	183	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside***	35.4	99.7	Coachella Valley

\# Based on FRM data

* Although maximum 24-hour concentrations exceed the standard, the 98th percentile form of the 2009-2011 design value only exceeded the standard at one station in Metropolitan Riverside County

** One higher concentration that was recorded due to "Independence Day" firework activities has been flagged for exclusion from NAAQS comparison in accordance with the U.S. EPA Exceptional Events Regulation; with this data included, the 2009-2011 design value for East San Gabriel Valley would also exceed the federal standard

*** While this concentration of 35.4 μg/m^3 is near the level of the standard, it is technically not exceeding the standard (35.5 μg/m^3 exceeds); this concentration was associated with a high wind exceptional event

TABLE 2-3

2011 Maximum Annual Average PM2.5 Concentrations by Basin and County

Basin/County	Annual Average* (µg/m³)	Percent of Federal Standard (15 µg/m³)	Percent of State Standard (12 µg/m³)	Area
South Coast Air Basin				
Los Angeles	13.2	87	109	Central Los Angeles
Orange	11.0	73	90	Central Orange County
Riverside	15.3	101	126	Metropolitan Riverside County
San Bernardino	13.2	87	109	Southwest San Bernardino Valley
Salton Sea Air Basin				
Riverside	7.2	48	60	Coachella Valley

* Based on FRM data

PM2.5 Spatial Variation

Figure 2-10 shows the 2011 annual average arithmetic mean PM2.5 concentrations mapped throughout the Basin. Like PM10, PM2.5 annual concentrations were higher in the inland valley areas of Metropolitan Riverside County. Figure 2-11 shows the 2011 24-hour PM2.5 concentrations, using the 98^{th} percentile form of the standard, mapped throughout the Basin. As is seen with the annual average, the 98^{th} percentile concentration only exceeds the 24-hour federal standard in the Metropolitan Riverside County area (Mira Loma). A larger area is just below the NAAQS, with concentrations in the 30 to 35 $\mu g/m^3$ range, from the eastern San Fernando Valley and Central Los Angeles in the western Basin through the urban areas of Riverside and San Bernardino.

The higher PM2.5 concentrations in the Basin are mainly due to the secondary formation of smaller particulates resulting from mobile, stationary and area source emissions of gases (NOx, SOx, NH_4, VOC) that are converted to particulate matter in the atmosphere. In contrast to PM10, PM2.5 concentrations were low in the Coachella Valley area of SSAB. While PM10 concentrations are normally higher in the desert areas due to windblown and fugitive dust emissions, PM2.5 is relatively low in the desert due to fewer combustion-related emissions sources.

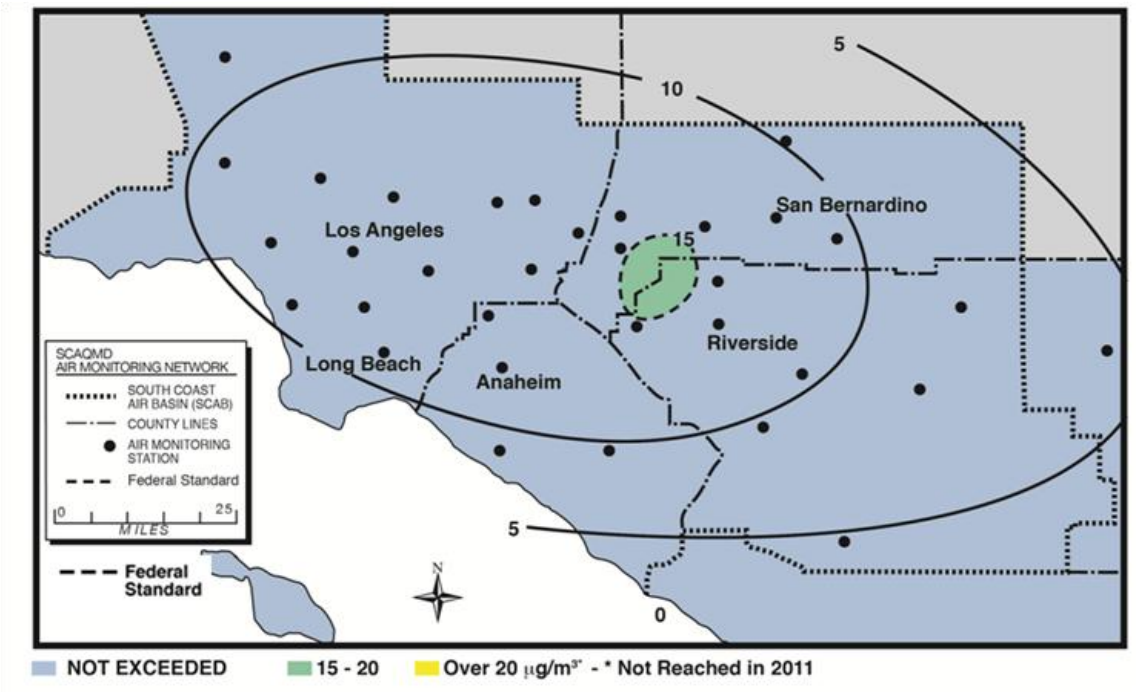


FIGURE 2-10

Annual Average PM2.5 (µg/m^3) in 2011

(Annual PM2.5 NAAQS = 15 µg/m^3, annual arithmetic mean)

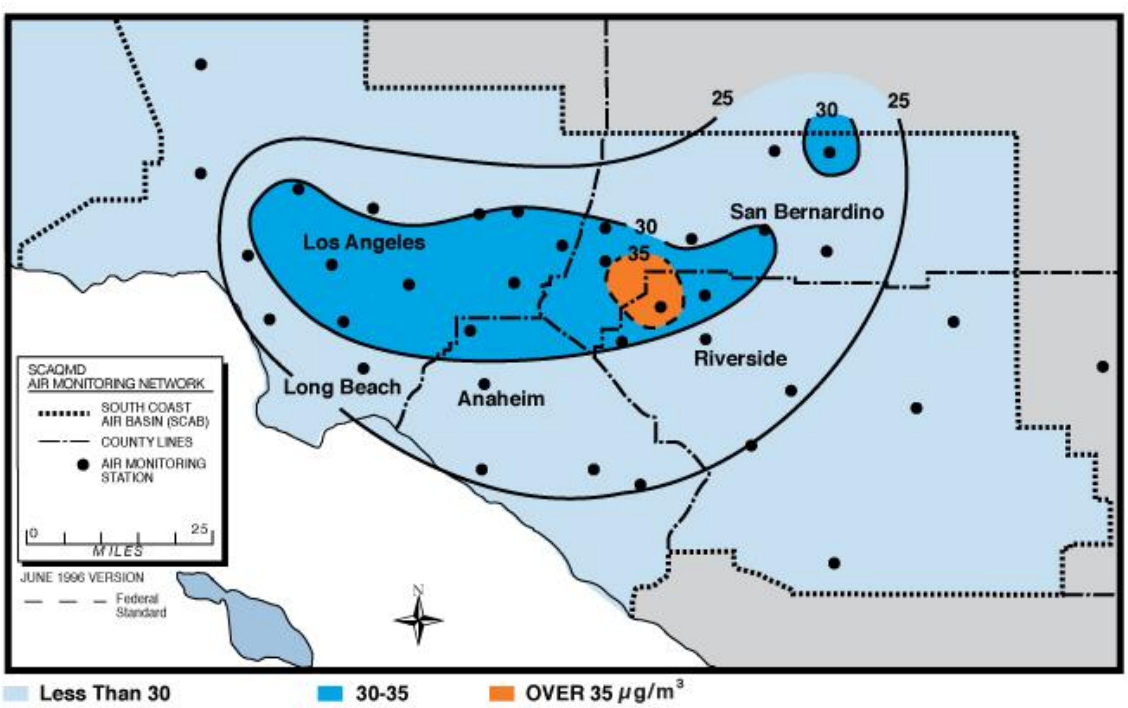


FIGURE 2-11

98th Percentile 24-Hour Average PM2.5 (µg/m^3) in 2011

(24-hour PM2.5 NAAQS = 35 µg/m^3)

PM2.5 Trends

Figure 2-12 shows the Basin 3-year design values (plotted by end year) for the current 24-hour and annual PM2.5 standards, for the period from 2001 through 2011. This illustrates the significant progress toward attainment of the standards in the last ten years.

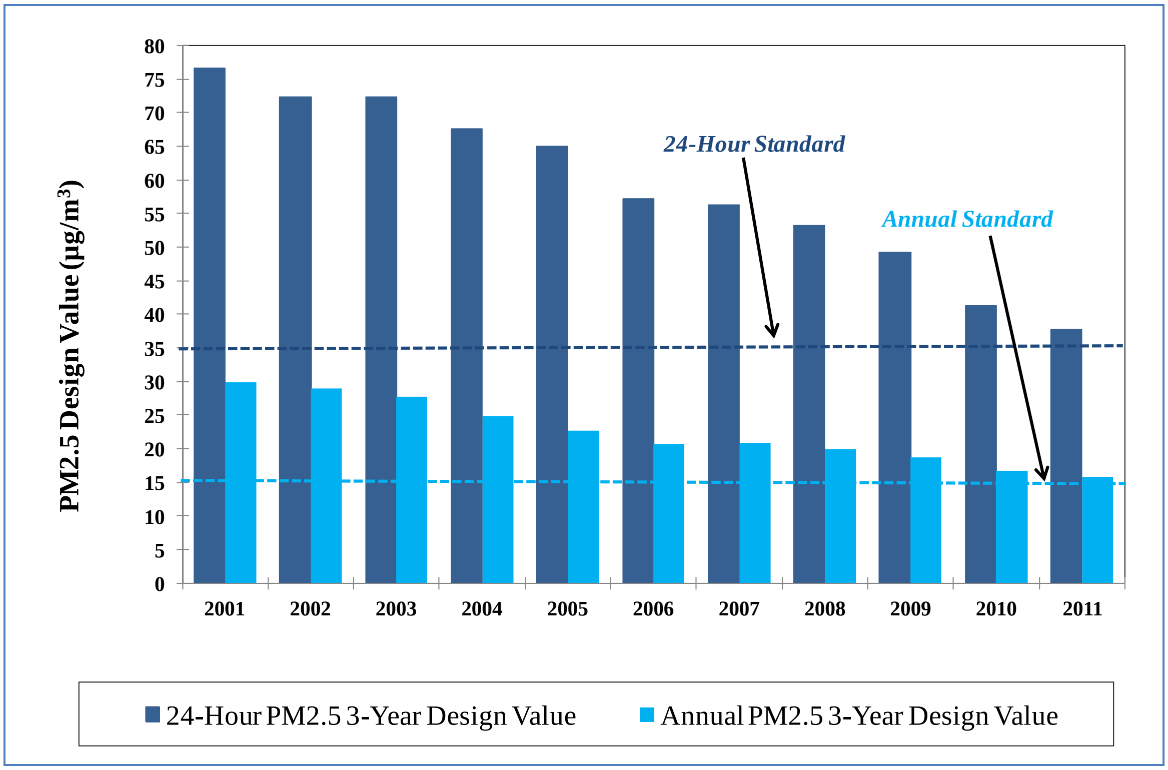


FIGURE 2-12

South Coast Air Basin PM2.5 Design Value Trends, 2001-2011

PM2.5 Temporal Variation

Seasonal and day-of-week variations in PM2.5 concentrations are complex and location dependant, and may vary from year to year depending on meteorological conditions, the presence of large wildfires, and other factors. Previous analyses showed that the highest PM2.5 concentrations tend to occur in the fall, of most years. That held true in 2011. Figure 2-13 shows the Basin-wide monthly averaged PM2.5 concentrations, by month for the year 2011. In that year, the monthly PM2.5 averages were highest in October, followed closely by December. The somewhat lower multi-station averages in November 2011 likely resulted from an above-normal number of offshore wind days in that month that generally provided good dispersion and brought cleaner air from the deserts into the Basin.

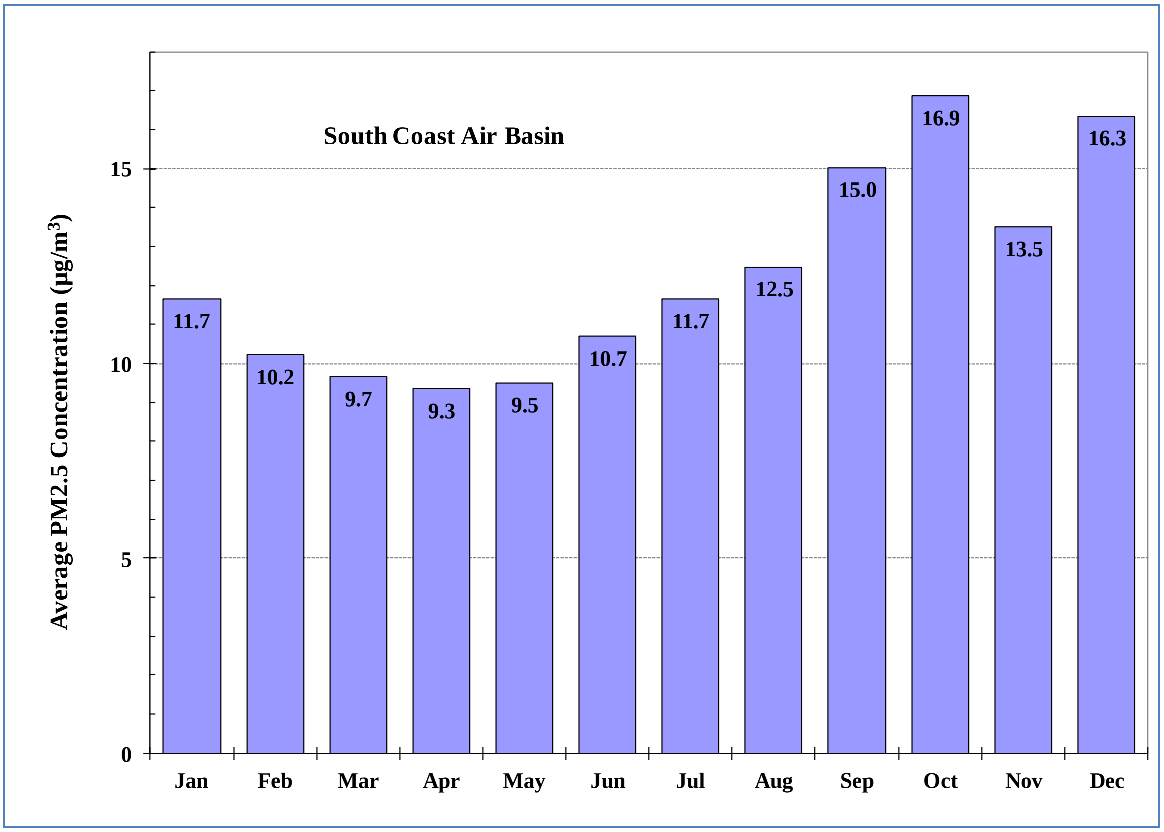


FIGURE 2-13

2011 PM2.5 Variation of Basin-wide FRM Monthly Average Concentration

Figure 2-14 shows an analysis of day-of-week variation in Basin-wide PM2.5 daily concentrations averaged for the three most recent years (2009-2011). This shows that Fridays have slightly higher average PM2.5, possibly due to increased traffic and/or build up of pollution over multiple week-days. Saturdays and Thursdays follow, but the average difference from the lowest day (Monday) to the highest (Friday) is only 3.2 $\mu g/m^3$.

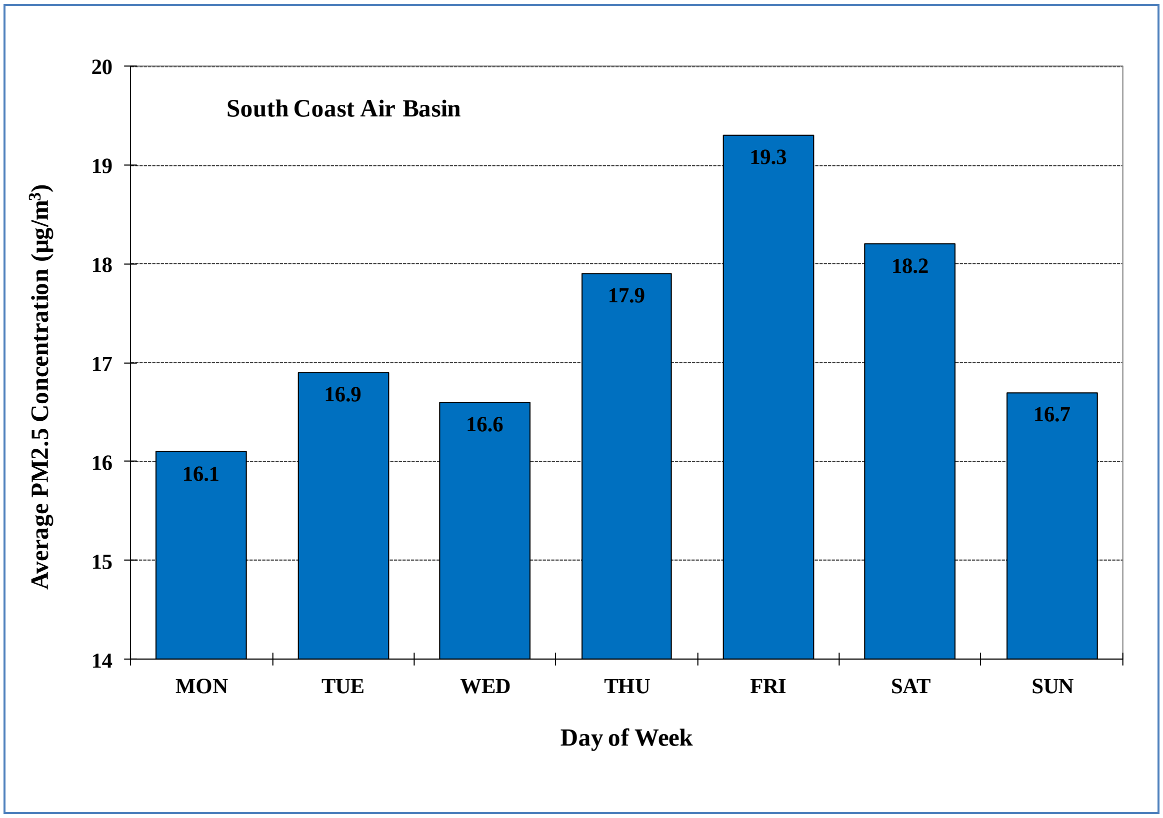


FIGURE 2-14

PM2.5 Basin-wide Day-of-Week Variation of 24-hour Average FRM PM2.5 Concentrations, 2009-2011

Figure 2-15 shows average PM2.5 concentration by hour of the day for the period 2009-2011, based on the hourly BAM sampler data. The diurnal plots are for the Basin maximum PM2.5 monitor (Metropolitan Riverside at Mira Loma), Central Los Angeles (Downtown), Central Orange County (Anaheim), and the average of several sites throughout the Basin. In general, PM2.5 concentrations peak around 8 a.m. (Pacific Standard Time), with the morning traffic. They decrease in the early afternoon, then peak in the evening due to secondary aerosol formation following evening traffic, and late at night when the lower nighttime temperature inversion traps the pollutants in a shallower layer near the surface.

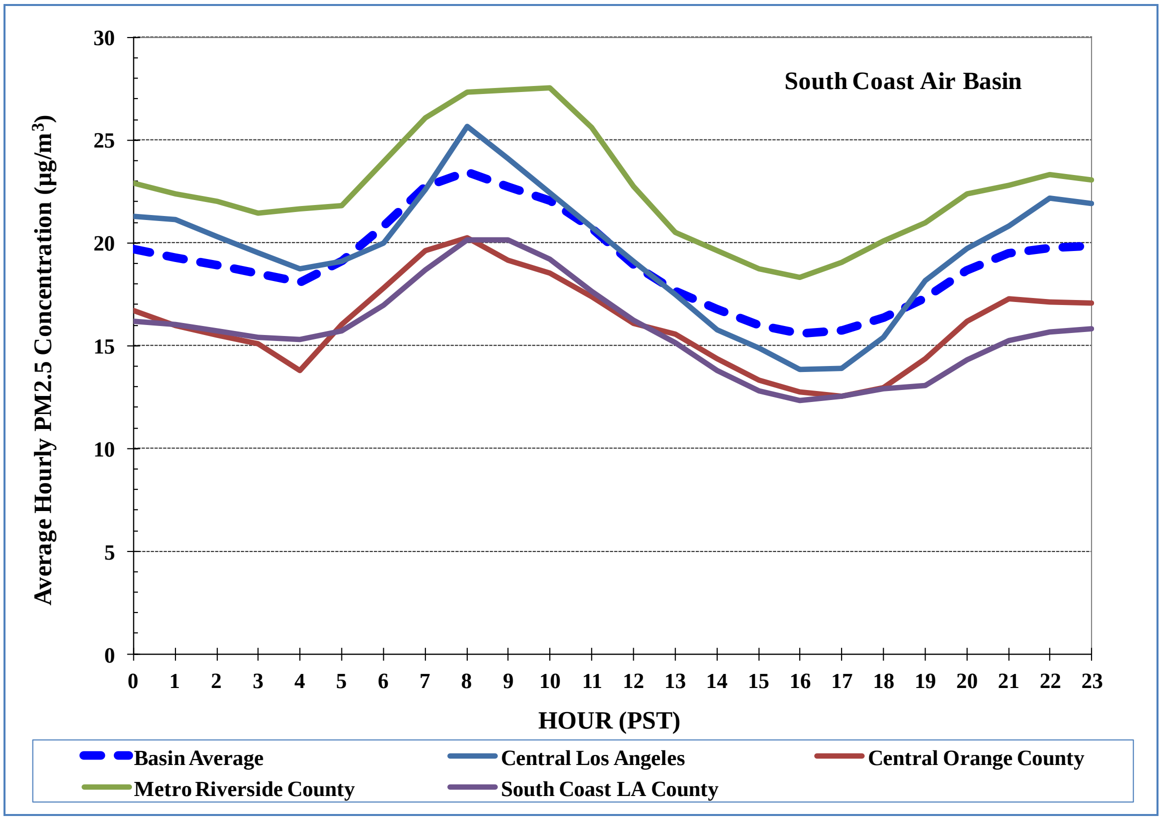


FIGURE 2-15

Diurnal Variation of Hourly FEM PM2.5, Averaged by Time of Day (2009-2011)

PM2.5 Speciation

PM2.5 speciation sampling to determine the chemical components of PM2.5 is also a part of the District's PM2.5 measurement program. Currently, PM2.5 speciation samplers are deployed at four representative locations in each of the Basin's counties (Anaheim, Fontana, Los Angeles and Rubidoux). Analysis of the filters from the ambient network Speciation Air Sampling System (SASS) samplers are conducted at the District's laboratory. Figure 2-16 shows the trends of the annual concentration of six PM2.5 component species: Elemental Carbon (EC), Organic Carbon (Organics), Sulfate (SO_4), Nitrate (NO_3), Ammonium (NH_4), and Crustal Elements (soils). Most of the components show a downward trend in recent years. Figure 2-17 shows the composition from the speciation sampler at the Riverside-Rubidoux station, comparing the 2010 annual average to the 2010 peak 24-hour average sampled at this location. This is the closest PM2.5 speciation station to the Basin maximum PM2.5 station (Riverside-Mira Loma) and it was the Basin maximum location before monitoring began at Mira Loma. On the high day, the nitrate becomes a larger fraction of the mass compared to the annual average, indicating the importance of secondary atmospheric processes to the PM2.5 composition in Riverside County.

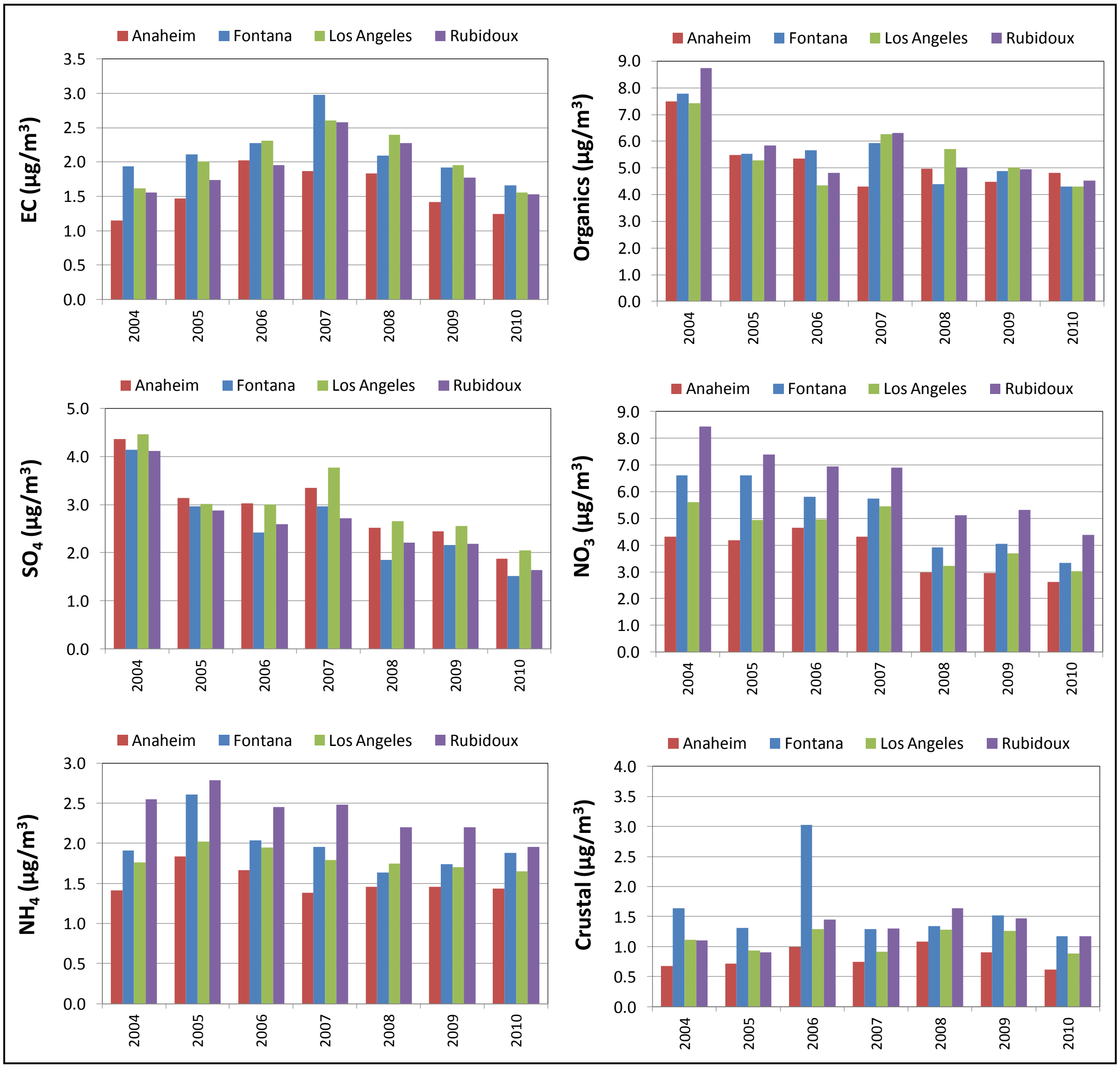


FIGURE 2-16

South Coast Air Basin PM2.5 SASS Speciation Network Annual Trends 2004-2010
Annual Averaged PM2.5 Elemental Carbon (EC), Organics, Sulfate (SO_4), Nitrate (NO_3), Ammonia (NH_4), and Crustal Component Concentrations, for Anaheim, Fontana, Los Angeles, and Rubidoux Stations

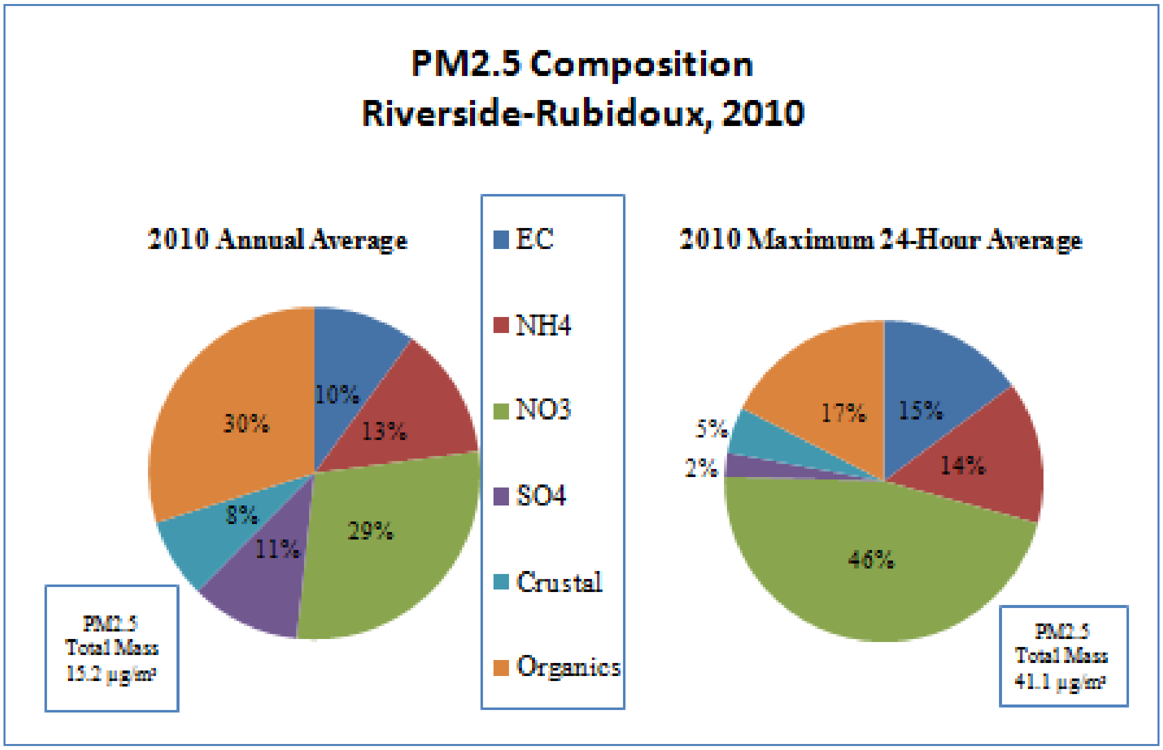


FIGURE 2-17
2010 PM2.5 Speciation for Annual Average and Highest Day
(Riverside-Rubidoux SASS Speciation Sampler)

PM10 Air Quality

In 2011, the District measured PM10 concentrations at 23 locations throughout the Basin and two locations in the Salton Sea Air Basin (Coachella Valley), as shown in Figure 2-9. Size-selective inlet (SSI) manual high volume FRM samplers are operated at 19 sites in the Basin and two sites in the Coachella Valley to meet the requirements for PM10 Federal Reference Method (FRM) sampling. All of these FRM monitors operate on a one-in-six-day schedule, with the exception of two that operate on a one-in-three-day schedule (Riverside-Rubidoux in the Basin and Indio in the Coachella Valley).

PM10 continuous analyzers, including Beta Attenuation Monitor (BAM) and Tapered Element Oscillating Microbalance (TEOM), are operated at 13 sampling sites, including four that are not collocated with FRM samplers. Real-time monitors, for the most part, are clustered in the higher concentration areas. At locations where both FRM samplers and PM10 continuous analyzers are deployed together, the data is generally combined for attainment purposes, with the FRM data considered the primary data source.

The highest annual PM10 concentrations were recorded in and around the metropolitan Riverside County area and further inland in the San Bernardino Valley areas. The federal 24-hour standard (150 µg/m^3) was not exceeded at any of the locations monitored in 2011, although Riverside County came close with a 24-hour concentration of 152 µg/m^3 (98 percent of the federal 24-hour standard; the concentration must reach 155 µg/m^3 to exceed the NAAQS). The revoked annual average PM10 federal standard (50 µg/m^3) was also not exceeded in the Basin in 2011.

The more stringent state annual (20 µg/m^3) and 24-hour (50 µg/m^3) PM10 standards were exceeded in more than two-thirds of the areas monitored. The state 24-hour standard was also exceeded most frequently in the Basin's inland valleys, centered on Metropolitan Riverside County. Maximum 24-hour and annual average PM10 concentrations in 2011 are shown in Tables 2-4 and 2-5. For each routine District ambient air monitoring station, the annual arithmetic mean, percent of sampling days exceeding state and federal standards, and maximum 24-hour average concentrations are shown in Tables A-6 to A-8 in the Attachment for the years 1995-2011. Please refer to Appendix II from the 2003 AQMP for the 1976-1989 prior-year statistics and to Appendix II from the 2007 AQMP for 1990-2005 data.

TABLE 2-4

2011 Maximum 24-hour Average PM10 Concentrations by Basin and County

Basin/County	Maximum 24-Hr Average* (µg/m^3)	Percent of Federal Standard (150 µg/m^3)#	Percent of State Standard (50 µg/m^3)	Area
South Coast Air Basin				
Los Angeles	119	77	233	Central Los Angeles
Orange	79	51	155	Central Orange County
Riverside	152	98	298	Metropolitan Riverside County
San Bernardino	127	82	249	Central San Bernardino Valley
Salton Sea Air Basin**				
Riverside	120	77	235	Coachella Valley

* Based on the FRM and FEM data

** Higher concentrations were recorded for high wind events in the Coachella Valley which have been flagged for exclusion from NAAQS comparison in accordance with the U.S. EPA Exceptional Events Rule

A level of 155 µg/m^3 is needed to exceed the federal standard, thus percentages are based on 155 µg/m^3

TABLE 2-5
2011 Maximum Annual Average PM10 Concentrations by Basin and County

Basin/County	Annual Average* (µg/m³)	Percent of Federal Standard** (50 µg/m³)	Percent of State Standard (20 µg/m³)	Area
South Coast Air Basin				
Los Angeles	32.7	64	163	East San Gabriel Valley
Orange	24.9	49	124	Central Orange County
Riverside	41.4	81	206	Metropolitan Riverside County
San Bernardino	31.8	62	158	Central San Bernardino Valley
Salton Sea Air Basin				
Riverside	32.6	64	162	Coachella Valley

* Based on the FRM and FEM data
** The federal annual PM10 standard was revoked in 2006

PM10 Spatial Variation

Figure 2-18 shows the contour map of the annual average (arithmetic mean) PM10 concentrations distribution in the Basin in 2011. The areas with the highest annual average PM10 concentrations were located in the Metropolitan Riverside County area. The maximum annual average recorded (41.4 µg/m³) was 81 percent of the former federal annual PM10 standard.

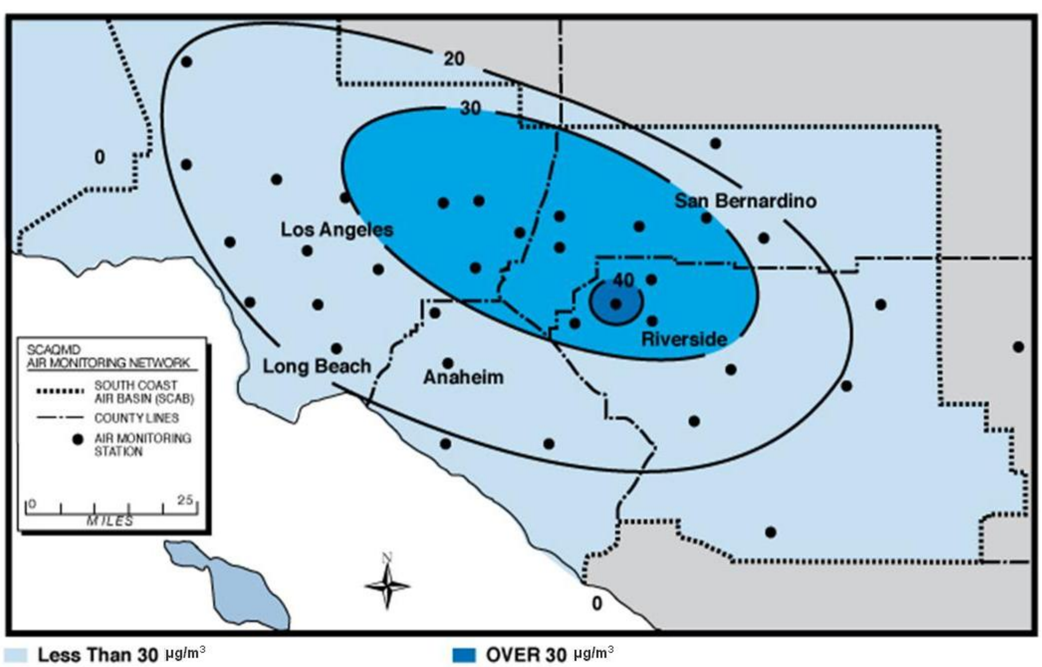


FIGURE 2-18
Annual Arithmetic Mean PM10 Particulate Matter (µg/m³) in 2011

PM10 Trends

Figure 2-19 shows the trend for the period between 2000 and 2011 of the design value form of the 24-hour federal PM10 standards for the Basin (i.e., the fourth highest 24-hour average PM10 concentration in three years). It also shows the trend for the design value form of the revoked annual federal PM10 standard, that is, the 3-year average of the annual arithmetic mean concentrations. Since 2005, the Basin has remained below the design value form of the federal PM10 standard (150 μg/m^3). The District has petitioned U.S. EPA to consider redesignation of the Basin to attainment for the PM10 standard. The most recent year, 2011, was also remained below the revoked federal annual PM10 standard (50 μg/m^3).

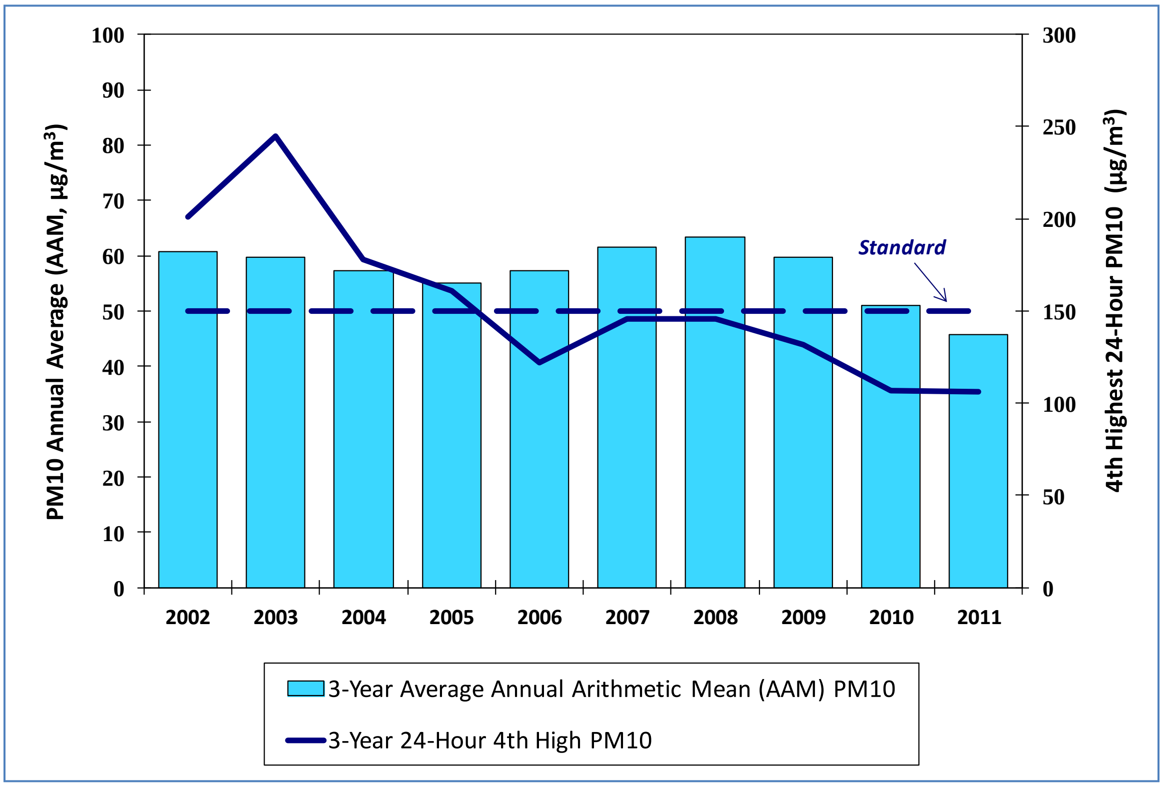


FIGURE 2-19

PM10 Particulate Matter Design Value Trend

(2000 through 2011 data, 3-Year Average of Annual Arithmetic Mean and 4th Highest 24-Hour PM10 Concentration in 3 Years, μg/m^3)

PM10 Temporal Variation

Exceedances of the 24-hour PM10 federal standard in the Basin have become rare in recent years. In fact, the only exceedances in the Basin for several years have been associated with exceptional events, such as high wind natural events or cultural events (Independence Day fireworks). As a consequence, variations in exceedances of the state standard are considered here for the seasonal and day-of-week patterns in the Basin, using the FRM and FEM PM10 measurements combined.

Previous analyses of seasonal variations in PM10 show that the monthly average PM10 concentrations and the monthly average number of days exceeding the state standard tend to peak in summer and fall in the inland valley area of the Basin where PM10 concentrations are highest. However, in the South Coastal Los Angeles County area (Long Beach), monthly average PM10 concentrations and the average number of days exceeding the state standard were highest in the late fall and winter months.

Figure 2-20 shows the number of days in each month exceeding the state standard at one or more Basin locations over the period 2009-2011. Overall, the greatest number of exceedances of the state standard occurred in the summer months. Due to the higher number of exceedances in the inland valleys, the pattern for the Basin is more similar to those for individual sites in the inland valley areas. Figure 2-21 shows the monthly exceedances for stations in two areas, Metropolitan Riverside County (Riverside-Rubidoux) and South Coastal Los Angeles County (Long Beach). As was found in the previous analyses, the number of days exceeding state standards are more frequent in the summer and fall months in the inland valley areas, but higher in the late fall and winter months in the coastal areas. Most of the coastal high values occur at that time due to windblown dust from the strong, offshore Santa Ana winds that occur in the fall and winter.

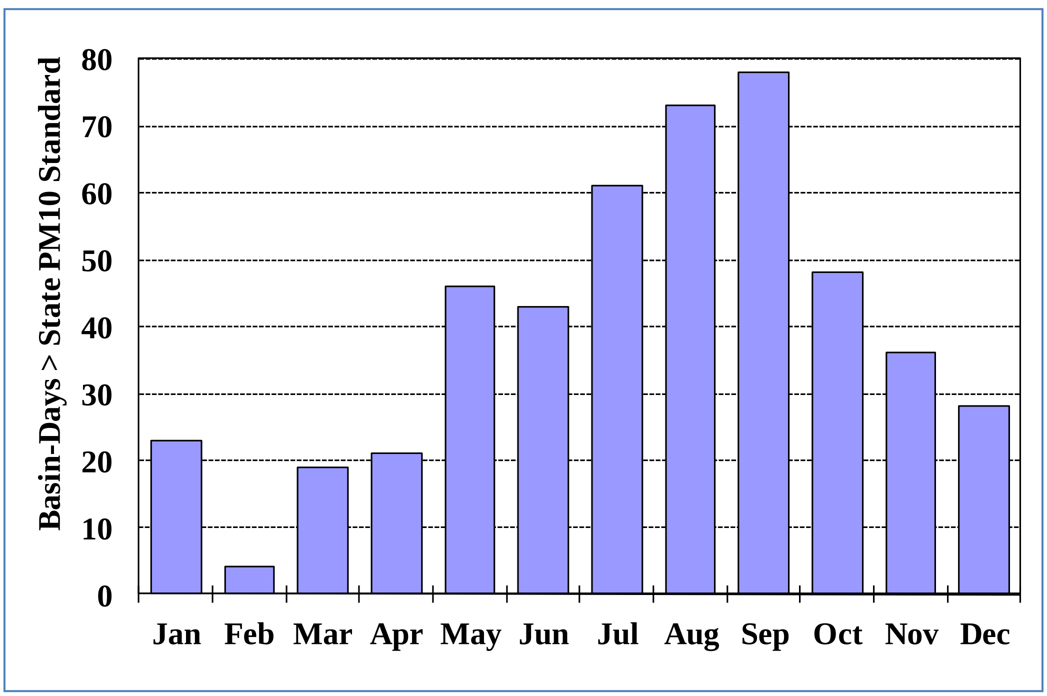


FIGURE 2-20

Basin-Days Exceeding the State PM10 Standard (50 µg/m^3) by Month, 2009-2011

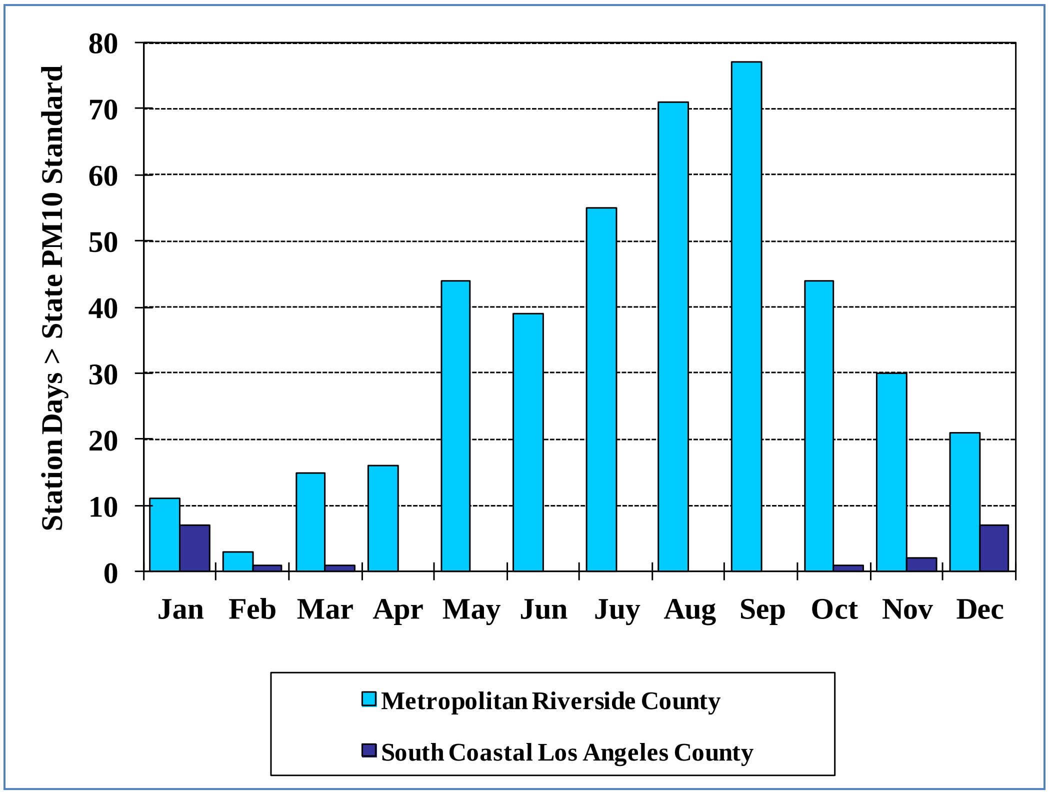


FIGURE 2-21

Number of Station Days Exceeding State PM10 Standard (50 µg/m^3) by Month, 2009-2011

Figure 2-22 shows the total number of days exceeding the state standard by day of week in the Basin and at selected sites in each county, for the period 2009-2011. The highest numbers of PM10 state standard exceedances occur on Thursday and Friday, possibly due to vehicle traffic, especially truck traffic, on those days and more construction activities than the weekend. Stations in the western Basin showed significant improvement on the weekends. On Sundays, the number of exceedances was lowest across the Basin, on average.

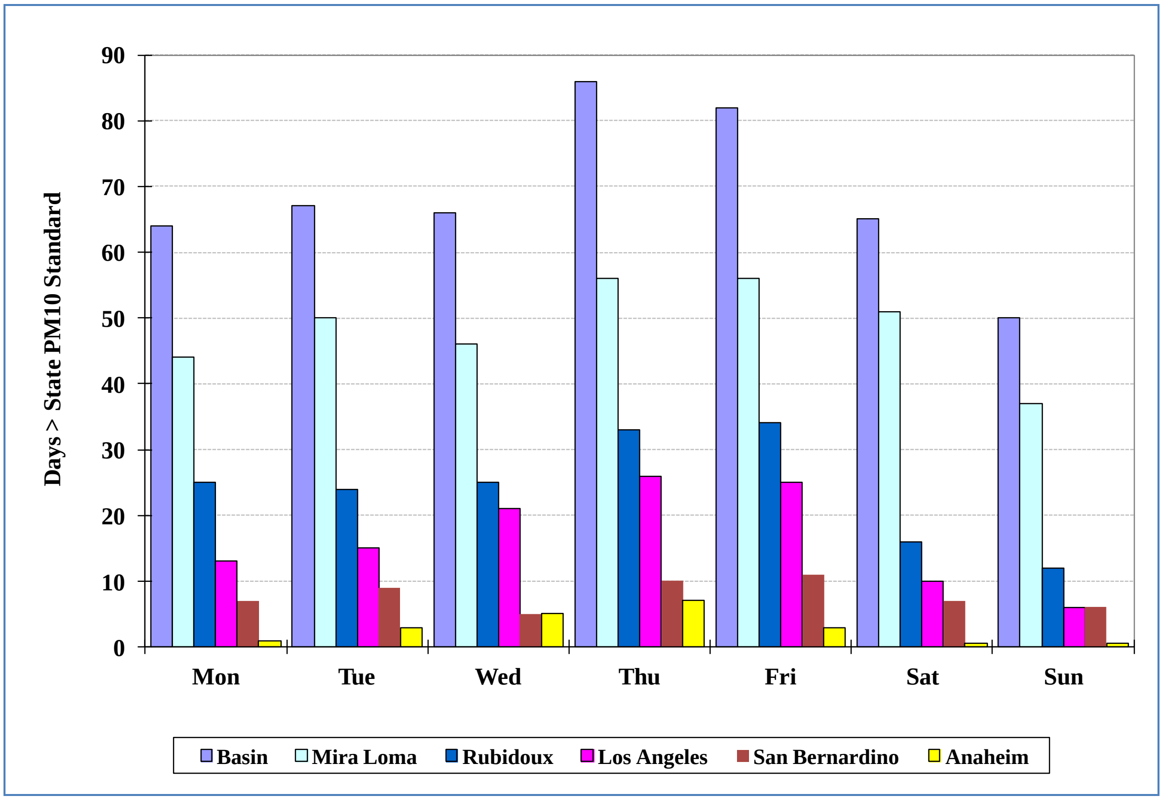


FIGURE 2-22

PM10 Day-of-Week Variation, 2009-2011
(Number of Days Exceeding the State Standard (50 µg/m^3) by Day of Week,
for Basin and Individual Stations)

Figure 2-23 shows average PM10 concentrations for each hour of the day for the period 2009-2011 for the entire Basin and for select monitoring stations in the Basin, based on the hourly BAM and TEOM data. On average, PM10 concentrations show a peak near 0900 to 1100 PST in the morning, just after the heaviest morning traffic rush-hour traffic.

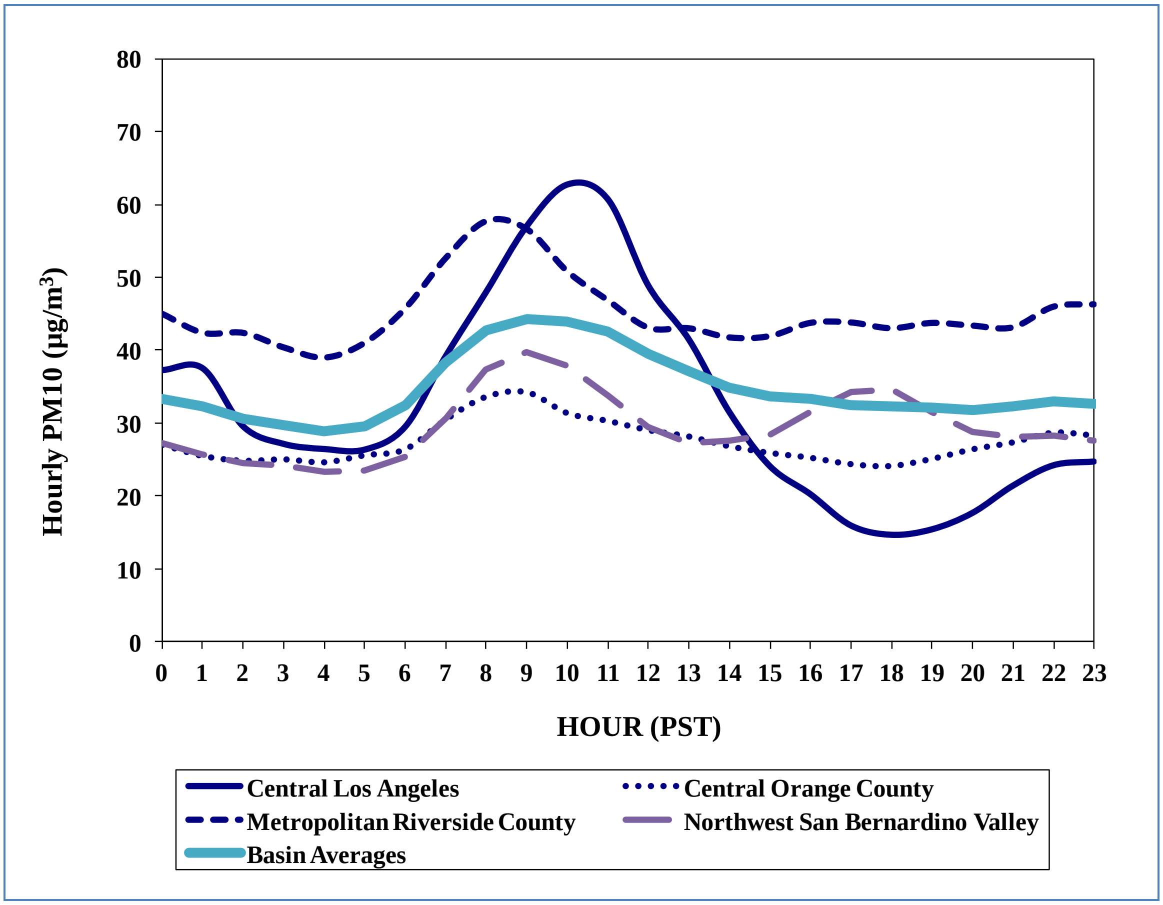


FIGURE 2-23
PM10 Diurnal Variation, 2011
(Annual Averaged FEM Hourly PM10 Concentrations, by Hour of the Day)

Ozone

<u>Current Ozone Air Quality</u>

In 2011, the District monitored ozone concentrations at 29 locations in the Basin and two in the Coachella Valley portion of the SSAB. All counties of the Basin and the Coachella Valley exceeded the current (2008) 8-hour ozone standard (0.075 ppm) in 2011. That standard was exceeded on 106 days, Basin-wide. All counties in the Basin, except Orange County, exceeded the 1997 8-hour ozone standard (0.08 ppm). The highest 8-hour average (0.136 ppm) in 2011 occurred in the Central San Bernardino

Mountains (Crestline) and was 180 percent of the 2008 8-hour ozone standard and 160 percent of the 1997 standard.

The revoked 1979 federal 1-hour ozone standard was exceeded on 16 days in the Basin, with all counties exceeding, except Orange County. The maximum 1-hour concentration (0.160 ppm) also occurred in the Central San Bernardino Mountains (Crestline) and was 128 percent of the 1979 1-hour standard.

The more stringent California state standards were exceeded almost everywhere in the Basin, except for a few coastal stations, with the greatest number of exceedances occurring in the Central San Bernardino Mountains (Crestline) and adjacent valleys. The California state 1-hour (0.09 ppm) and 8-hour (0.070 ppm) standards were exceeded on 90 days and 125 days, respectively. The highest 1-hour average and 8-hour average ozone concentrations recorded in 2011 (0.160 ppm and 0.136 ppm) were 176 percent and 192 percent of the state standards, respectively.

In 2011, all stations measured 1-hour ozone well below the Stage 1 episode level (0.20 ppm, 1-hour). Except for one day in 2003, the stage 1 episode level has not been exceeded in the Basin since 1998. There have been no exceedances of the Stage 2 episode level (1-hour average ozone ≥ 0.35 ppm) since 1988 and the Stage 3 episode level (1-hour average ozone ≥ to 0.50 ppm) has not been exceeded since 1974. The maximum concentrations measured in the Basin in 2011 exceeded the California 1-hour ozone Health Advisory level (0.15 ppm) at two stations on one day (July 2), with 1-hour concentrations of 0.160 ppm (Central San Bernardino Mountains – Crestline) and 0.151 ppm (East San Bernardino Valley - Redlands).

Tables 2-6 and 2-7 show the maximum 1-hour and 8-hour O_3 concentrations by air basin and county, along with the percentages over the federal and state standards. Tables A-2 through A-5 in the Attachment show the number of days exceeding the federal 8-hour and 1-hour ozone standards, as well as the 4^{th} high 8-hour average and maximum 1-hour concentrations, at all routine District air quality monitoring stations, for the period 1995-2011. Please refer to Appendix II from the 2003 AQMP for the 1976-1989 prior-year statistics and to Appendix II from the 2007 AQMP for 1990-2005 data.

TABLE 2-6

2011 Maximum 1-Hour Average Ozone Concentrations by Basin and County

Basin/County	Maximum 1-Hr Average (ppm)	Percent of Federal Standard (0.12 ppm)	Percent of State Standard (0.09 ppm)	Area
South Coast Air Basin				
Los Angeles	0.144	115	158	Santa Clarita Valley
Orange	0.095	76	104	North Orange County
Riverside	0.133	106	146	Lake Elsinore
San Bernardino	0.160	128	176	Central San Bernardino Mountains
Salton Sea Air Basin				
Riverside	0.124	99	136	Coachella Valley

TABLE 2-7

2011 Maximum 8-Hour Average Ozone Concentrations by Basin and County

Basin/County	Maximum 8-Hr Average (ppm)	Percent of Federal Standard (0.075 ppm)	Percent of State Standard (0.07 ppm)	Area
South Coast Air Basin				
Los Angeles	0.122	162	172	Santa Clarita Valley
Orange	0.083	110	117	Saddleback Valley
Riverside	0.115	152	162	Metropolitan Riverside County
San Bernardino	0.136	180	192	Central San Bernardino Mountains
Salton Sea Air Basin				
Riverside	0.098	130	138	Coachella Valley

Ozone Spatial Variation

The number of days exceeding federal standards for ozone in the Basin varies widely by area. Figures 2-24 and 2-25 map the number of days in 2011 exceeding the current 8-hour and former 1-hour ozone federal standards in different areas of the Basin in 2011. The former 1-hour federal standard was not exceeded in areas along or near the coast in the Counties of Los Angeles and Orange, due in large part to the prevailing sea breeze which transports emissions inland before high ozone concentrations can be reached. The standard was exceeded most frequently in the Central San Bernardino Mountains. Ozone exceedances also extended through San Bernardino and Riverside County valleys in the eastern Basin, as well as the northeast and northwest portions of Los Angeles

County in the foothill and valley areas. The number of exceedances of the 8-hour federal ozone standard was also lowest at the coastal areas, increasing towards the Riverside and San Bernardino valleys and the adjacent mountain areas. The Central San Bernardino Mountains area recorded the greatest number of exceedances of the 1-hour and 8-hour federal standards (8 days and 84 days, respectively) and 8-hour state standard (103 days). While the Coachella Valley did not exceed the former 1-hour ozone standard in 2011, the current 8-hour federal standard was exceeded on 54 days.

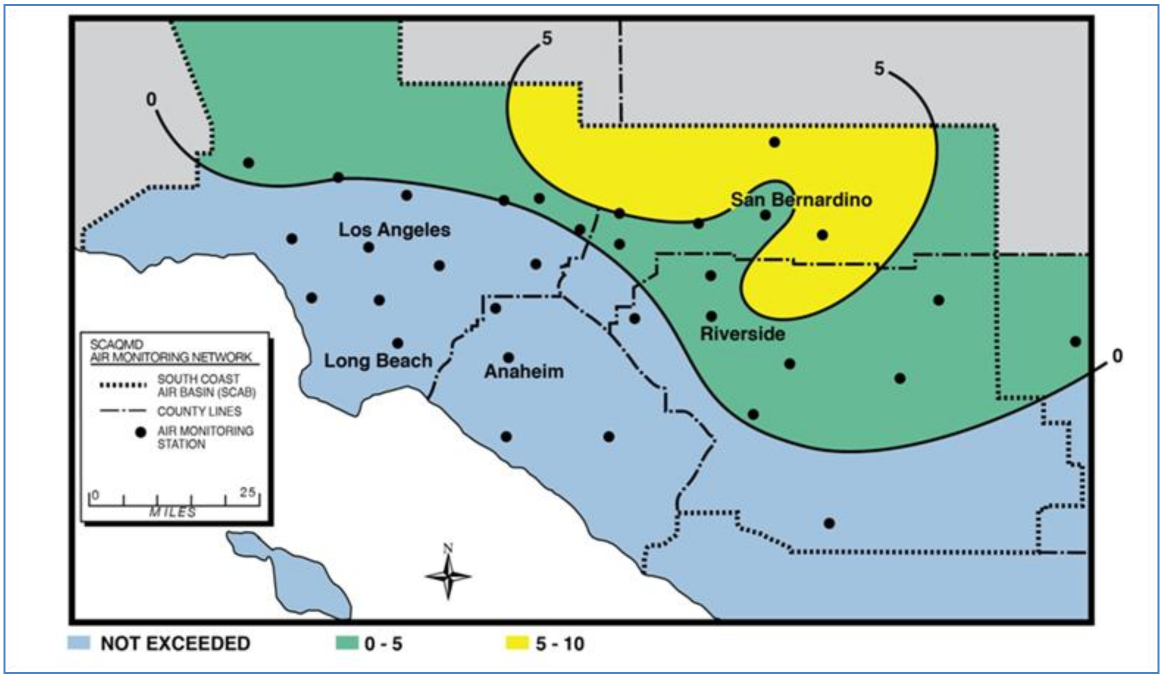


FIGURE 2-24

Number of Days in 2011 Exceeding the 1979 1-Hour Ozone Federal Standard
(1-hour average Ozone standard > 0.12 ppm)

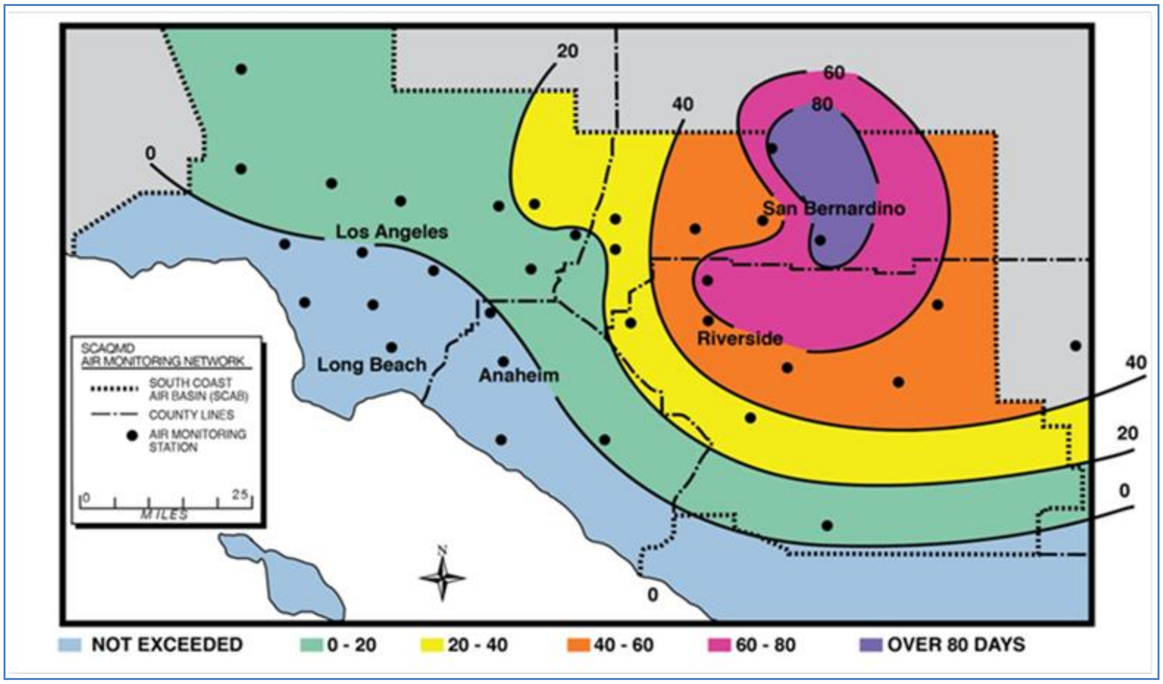


FIGURE 2-25

Number of Days in 2011 Exceeding the Current (2008) Federal 8-Hour Ozone Standard
(8-hour average Ozone standard > 0.075 ppm)

Ozone Trends

The rate of ozone air quality improvement has been dramatic since the concerted effort to manage air quality in the Basin began in the 1970s. Significant improvements were seen throughout the 1990s. While the rate of improvement in ozone has slowed somewhat in the past decade, the overall trend, as well as the expectation for the future, is continuing gradual improvement. Figure 2-26 shows the Basin-wide trend (1990-2011) of number of days exceeding the 2008 and 1997 8-hour ozone standards and the former (1979) 1-hour ozone standard, along with the trend of Basin maximum 8-hour averaged ozone concentrations. Figure 2-27 shows the trend (1990-2011) of the 8-hour and 1-hour ozone 3-year design values for the Basin.

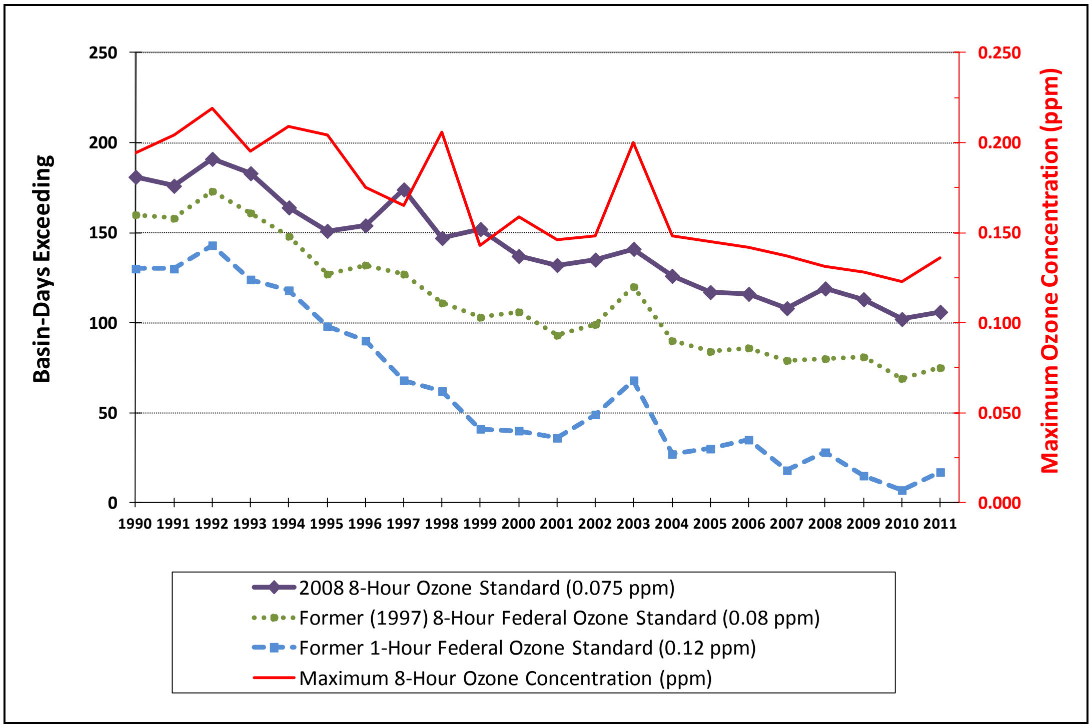


FIGURE 2-26

Trend of Annual Basin Days Exceeding Federal 8-Hour and 1-hour Ozone Standards (left axis) and Peak Concentrations (red line, right axis)
(South Coast Air Basin; by year, 1990-2011)

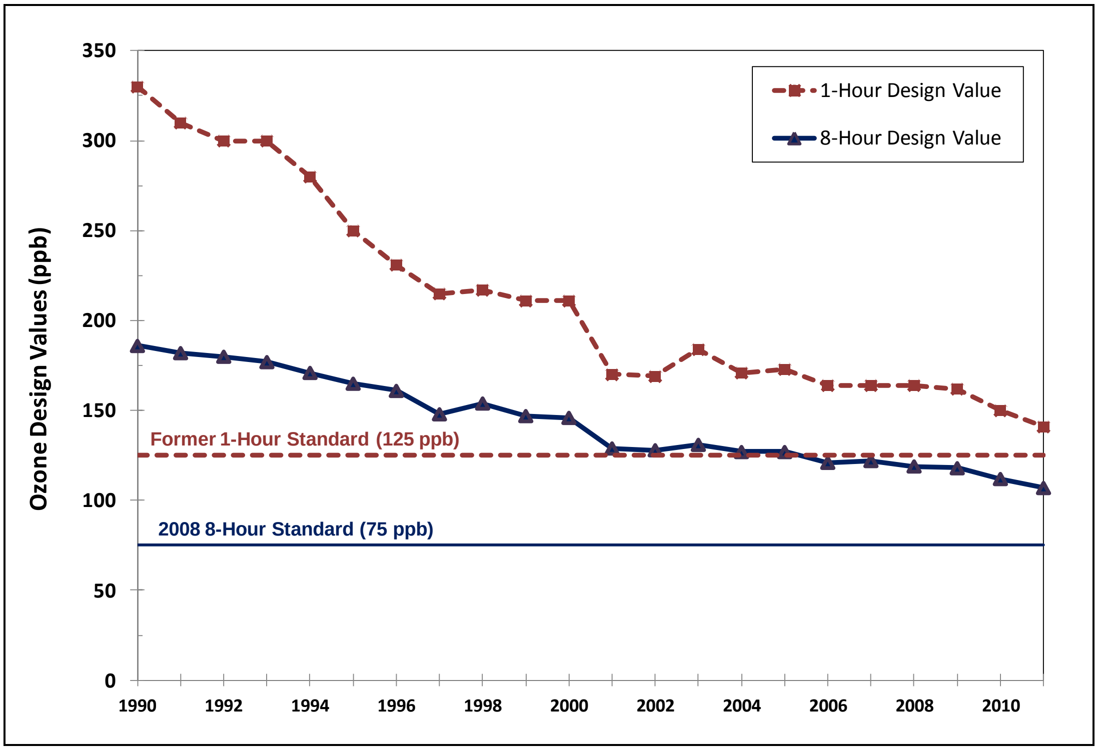


FIGURE 2-27

South Coast Air Basin Ozone Design Value Trends, 1990-2011
(1 ppb = 0.001 ppm)

Ozone Temporal Variation

Because photochemical reactions require sunlight to proceed, ozone formation is favored by strong solar radiation. Solar radiation is more intense and of longer duration in summer than in winter and summertime temperature inversions are stronger and more persistent. This causes ozone concentrations to be higher in summer than in winter. Peak ozone concentrations generally occur near the middle of the day during the period May through September.

Figure 2-28 shows the number of days per month that one or more monitoring stations exceeded the most recent (2008) federal 8-hour ozone standard level for the years 2000, 2005 and 2011. Most exceedances occur in July and August, with most days exceeding the federal standard in those months. Up until the late 1980's it was common to have days exceeding the federal ozone standard as early as February and as late as November. By the late 1990's there were no exceedances in the months of November through February. There have been relatively few exceedances in March or October in more recent years. The frequency of exceedances in the spring (April-June) has continued to decline in recent years.

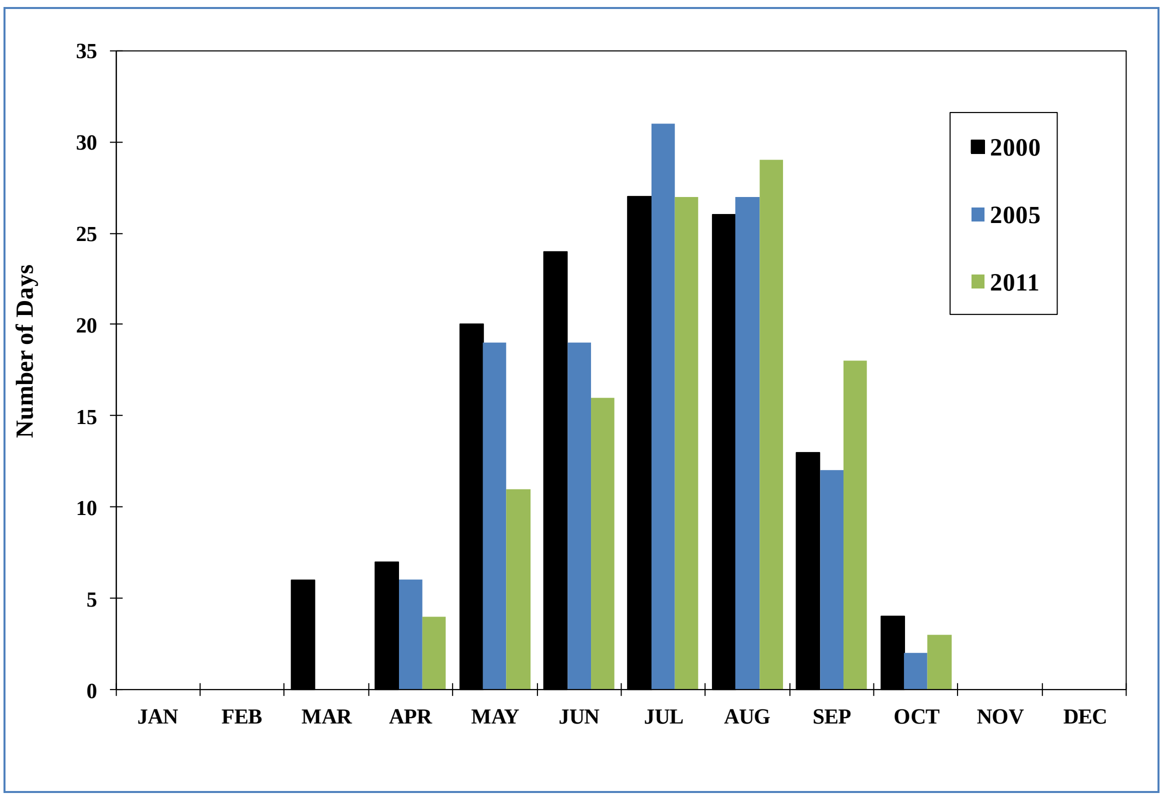


FIGURE 2-28

Monthly Distribution of Basin Days Exceeding the (2008) Federal 8-hour Ozone Standard (South Coast Air Basin, for Years 2000, 2005 and 2011)

Since the mid-1970s, it has been documented that ozone concentrations in the Basin are higher on weekends than on weekdays, in spite of the fact that ozone precursors are lower on weekends than on weekdays. Similar effects have been observed in some other metropolitan areas in the nation such as San Francisco, Washington D.C., Philadelphia, and New York. This "weekend effect" was quite pronounced in previous years in the Basin. CARB has sponsored several research projects to study the causes of elevated ozone levels on weekends in the Basin. Changes in daily patterns that impact the quantity and temporal loading of emissions have been suggested as strongly contributing to these observations. Carryover of matured precursors from weekdays to weekends is also suggested as a contributing factor. It is generally expected that this difference will decrease as ozone precursor emissions continue to decline.

In 2005, more exceeding station-days[8] in the Basin occurred on either Saturdays or Sundays than any one weekday by more than a factor of two. The number of exceedances was slightly higher on Sundays than Saturdays. Figure 2-29 shows the number of station-days exceeding the federal 8-hour ozone standard for each day of the week in the Basin for the year 2011. In 2011, the weekends were still higher than the weekdays, with Sundays having the most exceedances, but by a much smaller margin than in earlier analyses. Averaged ozone concentrations by day-of-week also show a pattern similar to the average number of exceedances, with weekends somewhat higher than weekdays.

[8] The term *station-days* represents the total number of days the standard was exceeded at individual monitoring stations summed for all stations in the Basin.

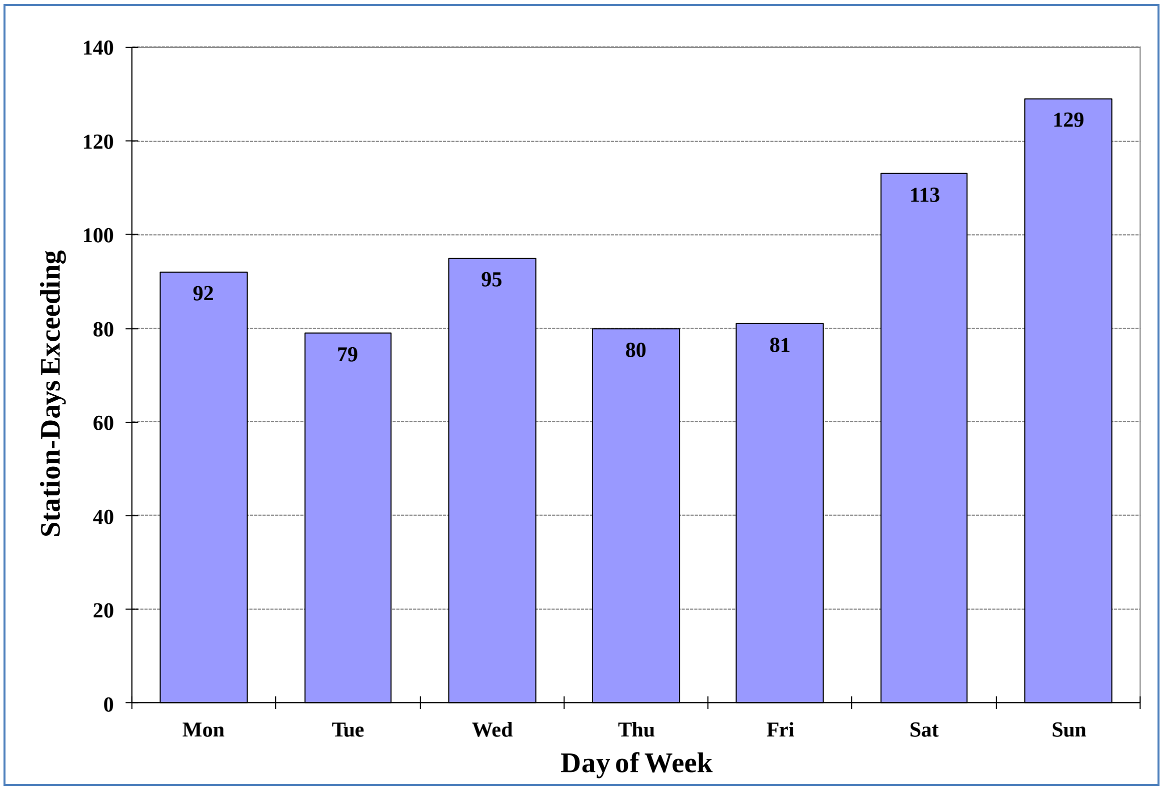


FIGURE 2-29
8-Hour Ozone Day-of-Week Variation, 2011
(Basin Station-Days Exceeding the 2008 Federal Ozone Standard)

Because time and sunlight are required for precursor organic gases and nitrogen oxides to react to form ozone, peak ozone concentrations usually occur from afternoon to early evening. By this time, the prevailing sea breeze has moved the polluted air mass miles inland from the major sources of precursor emissions. Ozone concentrations in the Basin are typically low during early morning hours, increasing rapidly after sunrise and peaking in the afternoon. However, peak concentrations occur earlier in the day for coastal areas and later in the day for locations further downwind.

Figure 2-30 illustrates the average of the smog season (May-October) 1-hour ozone concentrations for each hour of the day (shown in Pacific Standard Time), by station, for the year 2011. The average peak occurs near noon at the coastal stations (LAX) and most stations in the Basin reach their peak by the 2 p.m. The far inland stations at Central San Bernardino Valley (San Bernardino) and Central San Bernardino Mountains (Crestline, where the highest concentrations have been measured in recent years) peak near 3 or 4 p.m., but the ozone at Crestline decreases at a slower rate in the evening, leading to higher 8-hour ozone values. On the worst smog days, this station can remain relatively high through the night.

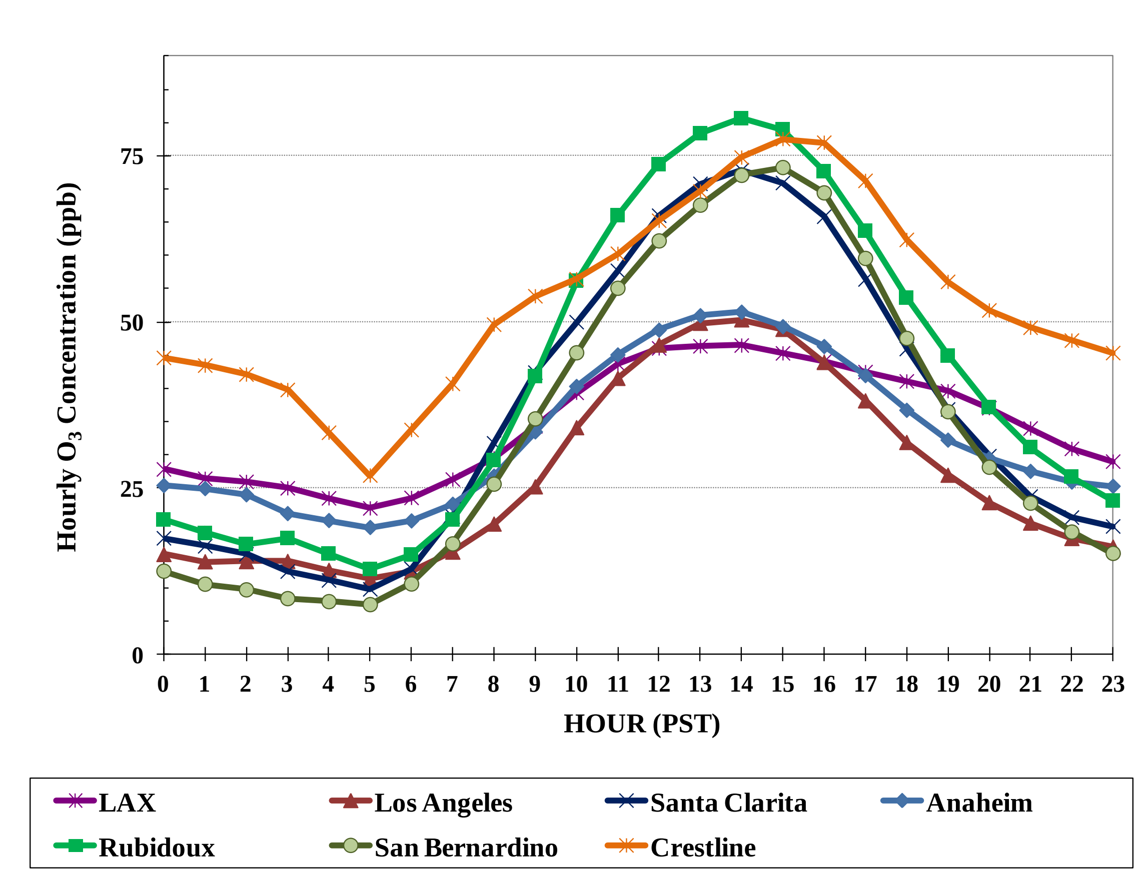


FIGURE 2-30

Diurnal Variation of Basin May-October 2011 Averaged Hourly Ozone Concentrations

Carbon Monoxide (CO)

<u>CO Air Quality</u>

The District currently monitors carbon monoxide air quality at 26 of its 34 air monitoring stations, including one station in the Coachella Valley. The highest CO concentrations are found in coastal and central Los Angeles County. The highest 8-hour average CO concentration in 2011 (4.7 ppm) was recorded in South Central Los Angeles county and was 49 percent of the federal 8-hour standard (9 ppm) and 52 percent of the state 8-hour standard (9.0 ppm). In recent years, the Basin has measured the lowest concentrations since carbon monoxide monitoring began in this region, several decades ago. The highest 1-hour average concentration in 2011 (6 ppm) was 17 percent of the federal 1-hour standard (35 ppm) and 29 percent of the state 1-hour standard (20 ppm). Concentrations in the less urbanized areas of the Basin and in the SSAB were well below the standards.

Carbon monoxide has continued to remain below the federal standards at all locations monitored since 2003. U.S. EPA redesignated the Basin to attainment of the federal CO standards, effective June 11, 2007. The highest concentrations are typically recorded in Los Angeles County, in the area of South Central Los Angeles. There have also been no exceedances of the Stage 1 episode (federal alert) level (8-hour average CO greater than or equal to 15 ppm) since 1997. Table 2-8 shows the 2011 maximum 8-hour and 1-hour average carbon monoxide concentrations by Basin and county. The annual maximum 8-hour CO concentrations at all District air monitoring stations are shown in Table A-13 in the Attachment, for the period 1995-2011.

TABLE 2-8

2011 Maximum 8-Hour and 1-Hour CO Concentrations by Basin and County

Basin/County	Maximum 8-Hr Average (ppm)	Percent of Federal Standard (9 ppm)	Maximum 1-Hr Average (ppm)	Percent of Federal Standard (35 ppm)	Area
South Coast Air Basin					
Los Angeles	4.7	49	6.0	17	South Central L.A. County
Orange	2.2	23	3.4	10	North Coastal Orange County
Riverside	1.9	20	2.7	8	Metropolitan Riverside County
San Bernardino	1.7	18	1.8	5	Central San Bernardino Valley
Salton Sea Air Basin					
Riverside	0.6	6	3.0	8	Coachella Valley

Nitrogen Dioxide (NO_2)

<u>NO_2 Air Quality</u>

In 2011, the District monitored NO_2 concentrations at 26 locations, including one in the Coachella Valley. For the newly-promulgated 1-hour NO_2 standard, the Basin had not exceeded the federal annual standard for NO_2 (0.053 ppm or 53 ppb) since 1991, when the Los Angeles County portion of the Basin recorded the last exceedance of the standard in any U.S. county. The level of the recently established 1-hour average NO_2 federal standard (100 ppb), however, was exceeded on one day in 2011. The state NO_2 standards were not exceeded in the Basin.

The maximum 1-hour and annual average NO_2 concentrations for 2011 are shown in Table 2-9, by basin and county. The Basin maximum annual average NO_2 concentration (24.6 ppb, recorded in the Pomona/Walnut Valley area) was 46 percent of the federal annual NO_2 standard and 82 percent of the state annual standard (0.030 ppm or 30 ppb). The maximum 1-hour average NO_2 concentration in the Basin (109.6 ppb, in Central Los Angeles County) was 109 percent of the new federal standard (100 ppb) and 61 percent of the state standard (180 ppb). Concentrations in the downwind Coachella Valley areas were much lower than in the Basin.

The exceedances of the federal 1-hour NO_2 standard in 2011 occurred on the same day at two stations in Los Angeles County (Central Los Angles and Long Beach). When considering the 98th percentile form of the federal standard or the 3-year design value, the Basin did not exceed the NAAQS and attainment status is not affected. Although the Basin is in attainment of the state and federal standards, NO_2 is still a concern since it is a precursor to both ozone and particulate matter. Further control of oxides of nitrogen will be required to attain the ozone and particulate standards.

The annual averages and annual maximum 1-hour average concentrations for each monitoring station in the District for the years 1995-2011 are shown in Tables A-14 and A-15, respectively, in the Attachment.

TABLE 2-9

2011 Maximum 1-Hour and Annual Average NO_2 Concentrations by Basin and County

Basin/County	Maximum 1-Hour Average (ppb)	Percent of Federal Standard (100 ppb)	Maximum Annual Average (ppb)	Percent of Federal Standard (53 ppb)	Area
South Coast Air Basin					
Los Angeles	109.6*	109	24.6	46	Central Los Angeles County; Pomona/Walnut Valley
Orange	73.8	73	16.8	31	North Orange County
Riverside	63.3	63	16.9	32	Metropolitan Riverside County
San Bernardino	76.4	76	21.1	39	Central San Bernardino Valley
Salton Sea Air Basin					
Riverside	44.7	44	8.0	15	Coachella Valley

* Although the maximum 1-hour concentrations exceeded the standard, the 98th percentile form of the design value did not exceed the NAAQS

Sulfur Dioxide (SO_2)

<u>SO_2 Air Quality</u>

In 2011, sulfur dioxide was measured at eight Basin locations. Based on the review of the SO_2 standards, U.S. EPA has established the 1-hour SO_2 standard to protect the public health against short-term exposure. The level of the standard is now set at 75 ppb 1-hour average, revoking the existing annual (0.03 ppm) and 24-hour (0.14 ppm) federal standards, effective August 2, 2010. No violations have occurred of the current federal

1-hour standards, the former federal annual or 24-hour standards, or the state standards (0.25 ppm, 1-hour or 0.04 ppm, 24-hour). The annual and 24-hour federal standards were last exceeded in the 1960's and the state standards were last exceeded in 1990.

The maximum 1-hour average SO_2 concentrations recorded in the District in 2011 are shown in Table 2-10. The highest 1-hour average SO_2 concentration (51.2 ppb in Metropolitan Riverside County) was 68 percent of the federal 24-hour standard. While SO_2 concentrations in the Basin no longer exceed standards, SO_2 is a precursor of sulfate, which is a component of PM10 and PM2.5. The highest 24-hour average SO_2, measured in the South Coastal Los Angeles County area, near the Ports of Los Angeles and Long Beach was 0.013 ppm, 32 percent of the state standard. Annual maximum 1-hour average SO_2 concentrations for each air monitoring station for the years 1995-2011 are shown in Table A-16 in the Attachment.

TABLE 2-10

2011 Maximum 1-Hour Average SO_2 Concentrations by Basin and County

Basin/County	Maximum 1-hr Average (ppb)	Percent of Federal Standard (75 ppb)	Area
South Coast Air Basin			
Los Angeles	19.8	26	Central Los Angeles
Orange	7.7	10	North Coastal Orange County
Riverside	51.2	68	Metropolitan Riverside County
San Bernardino	12.3	16	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	N.D.		Coachella Valley

N.D. = No Data. Historical measurements and lack of emissions sources indicate concentrations are well below standards.

Sulfate (SO_4^{2-})

<u>Sulfate Air Quality</u>

In 2011, sulfate concentrations were measured at 21 Basin locations and one in the Coachella Valley. The current form of the state standard (25 µg/m^3) is based on sulfate from PM10 (24-hour average); there is no federal sulfate standard. In 2011, the state PM10-sulfate standard was not exceeded anywhere in the Basin and this standard has not been exceeded in the Basin or the Coachella Valley in many years. Maximum concentrations by air basin and county are shown in Table 2-11. The maximum sulfate concentration (12.6 µg/m^3) recorded in the District was 50 percent of the state standard.

The maximum 24-hour average concentrations at each District air monitoring station for the years 1995-2011 are shown in Table A-17 in the Attachment.

TABLE 2-11

2011 Maximum 24-Hour Average Sulfate (PM10) Concentrations by Basin and County

Basin/County	Maximum 24-hr Average ($\mu g/m^3$)	Percent of State Standard (25 $\mu g/m^3$)	Area
South Coast Air Basin			
Los Angeles	8.0	32	Central Los Angeles County
Orange	6.5	26	Central Orange County
Riverside	5.3	21	Metropolitan Riverside County
San Bernardino	6.0	24	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	5.7	23	Coachella Valley

Lead (Pb)

Current Lead Air Quality

In 2011 lead concentrations were measured at ten Basin urban ambient air monitoring stations and six source-specific stations near major Pb emissions sources. Except for the source-specific monitoring that is now required under the new NAAQS, there have been no violations of the lead standards at the District's regular ambient air monitoring stations since 1982, primarily as a direct result of the removal of Pb from gasoline. However, monitoring at two stations immediately adjacent to stationary sources of Pb have recorded exceedances of the standards in localized areas of the Basin in more recent years.

U.S. EPA designated the Los Angeles County portion of the Basin (excluding the high desert areas, and San Clemente and Santa Catalina Islands) as nonattainment for the recently revised (2008) federal Pb standard (0.15 $\mu g/m^3$, rolling 3-month average), due to the source-specific monitoring under the new federal regulation. This designation was based on two source-specific monitors in the Los Angeles County Cities of Vernon and Industry exceeding the new standard in the 2007-2009 period of data used by U.S. EPA. For the most recent 2009-2011 design value data period, only one of these stations (Vernon) still exceeded the Pb standard, with a maximum 3-month rolling average of 0.67 $\mu g/m^3$ that was measured in 2009 (432 percent of the federal standard). In 2011, the maximum rolling 3-month average at the Vernon site was 0.46 $\mu g/m^3$ (297 percent of the federal standard). A separate PB SIP addressing the 2008 lead standard in the Basin was submitted to U.S. EPA in June 2012.

The remainder of the Basin, other than the one source specific monitor in the Los Angeles County nonattainment area, is currently attaining the new Pb standard, including both ambient and source-specific monitoring. The old (1978) Pb standard (1.5 $\mu g/m^3$, as a quarterly average) remained in effect until one year after the area was designated for the 2008 standard, for areas in attainment of the 1978 standard. While the entire Basin has remained in attainment of the 1978 lead standard, U.S. EPA's current Pb designations for the new standard became effective on December 31, 2010 so the old standard is now fully superseded by the 2008 revised NAAQS. Nonetheless, the revoked (1978) federal lead standard (1.5 $\mu g/m^3$, as a quarterly average) and the state Pb standard (1.5 $\mu g/m^3$, as a 30-day average) were not exceeded in the District's ambient network in 2011. The highest 30-day average in 2011 at the source-specific monitor at Vernon was 0.45 $\mu g/m^3$ (30 percent of the state standard). The highest 30-day average for an ambient Pb monitor was 0.02 $\mu g/m^3$ (less than 2 percent of the state standard).

Table 2-12 shows the maximum 3-month rolling average Pb concentrations recorded in 2011, for each county in the Basin. The state standard maximum monthly average and federal standards maximum quarterly and 3-month rolling average lead concentrations at each District air monitoring site for the years 1995-2011 are given in Tables A-18 to A-20 in the Attachment.

TABLE 2-12

2011 Maximum 3-Month Rolling Pb Concentrations by Basin and County

Basin/County	Maximum 3-Month Rolling Average (μg/m^3)	Percent of Federal Standard (0.15 μg/m^3)	Area
South Coast Air Basin			
Los Angeles*	0.46	297	Central Los Angeles
Orange	N.D.		
Riverside	0.01	6	Metropolitan Riverside County
San Bernardino	0.01	6	Northwest San Bernardino Valley, Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	N.D.		Coachella Valley

* This high lead concentration was measured at a site immediately downwind of a lead source.
N.D. = No Data. Historical measurements indicate concentrations are well below standards.

CHAPTER 3

AIR QUALITY IN THE RIVERSIDE COUNTY PORTION OF THE SALTON SEA AIR BASIN (COACHELLA VALLEY)

Air Quality in the SSAB, Riverside County (Coachella Valley)

Fine Particulate Matter (PM2.5)
Particulate Matter (PM10)
Ozone (O_3)
Carbon Monoxide (CO)
Nitrogen Dioxide (NO_2)
Sulfur Dioxide (SO_2)
Sulfate (SO_4^{2-})
Lead (Pb)

AIR QUALITY IN THE SSAB, RIVERSIDE COUNTY (COACHELLA VALLEY)

In 2011, the District monitored air quality at two routine locations in the Riverside county portion of the Salton Sea Desert Air Basin (SSAB), both in the Coachella Valley. Figure 3-1 shows a map of the area and topography. One monitoring station (Palm Springs) is located immediately downwind of the densely populated South Coast Air Basin (Basin). The second station (Indio) is located further downwind in the Coachella Valley.

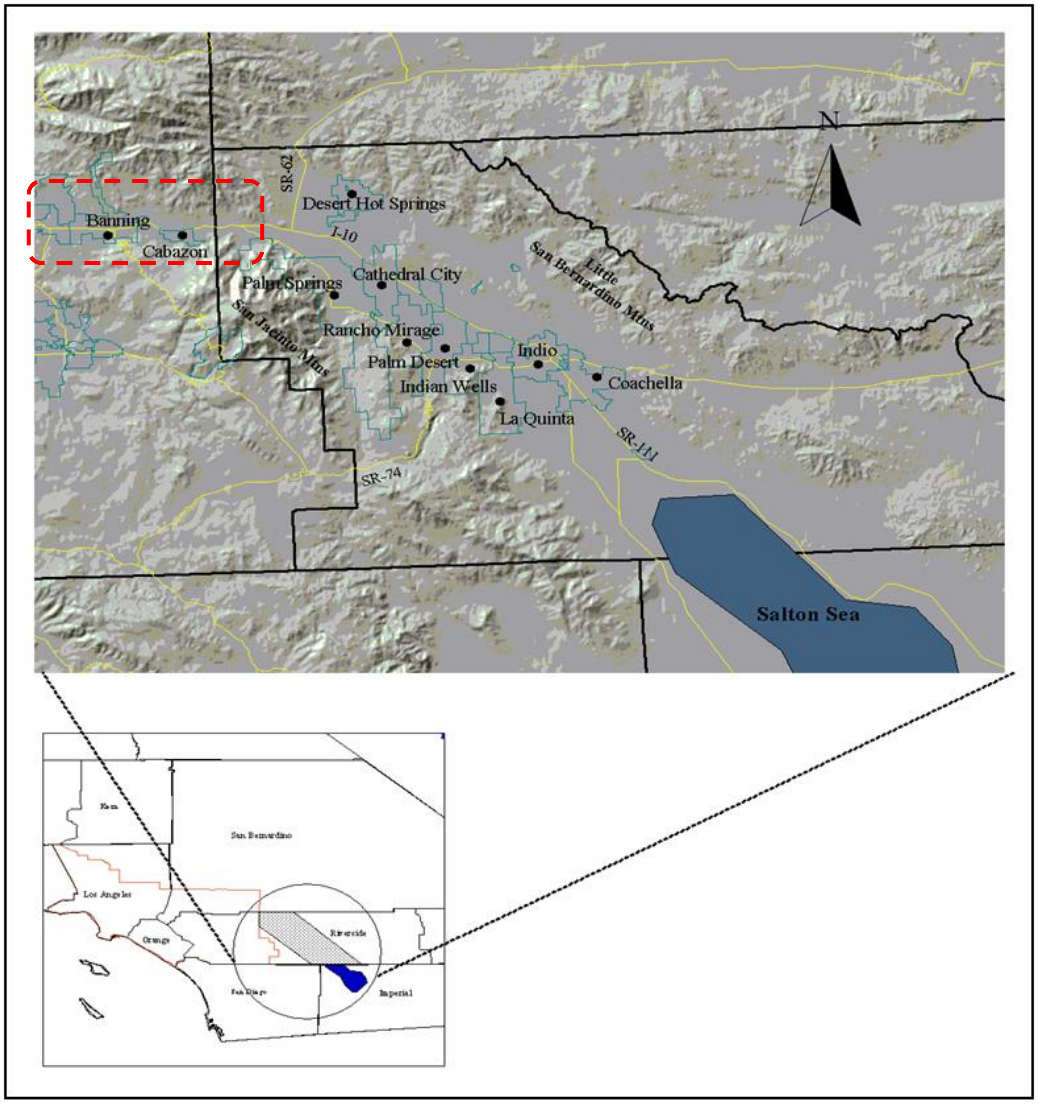


FIGURE 3-1
Location and Topography of the Coachella Valley
(Dashed red box indicates the San Gorgonio Pass; District Coachella Valley air monitoring stations are located at Palm Springs and Indio)

Federal and state standards for PM2.5, carbon monoxide (CO), and nitrogen dioxide (NO_2) were not exceeded in the Coachella Valley in 2011, nor was the state standard for Sulfate (SO_4^{2-}, from PM10). However, the Coachella Valley exceeded state and federal standards for ozone (O_3) and PM10. The most current (2008) federal 8-hour O_3 standard was exceeded on 54 days in this area in 2011.

The two days in 2011 that exceeded the 24-hour PM10 National Ambient Air Quality Standards (NAAQS) were flagged by the District for consideration under the U.S. EPA Exceptional Events Rule[9], due to high-wind natural events (windblown dust from thunderstorm outflows). With those days flagged, the Coachella Valley did not violate the 24-hour PM10 NAAQS.

The maximum concentrations measured at the District's Coachella Valley air monitoring stations in 2011 are shown in Figure 3-2, as percentages of the state and federal standards. Figure 3-3 shows the Coachella Valley 3-year (2009-2011) design values, as percentages of the current and revoked federal standards.

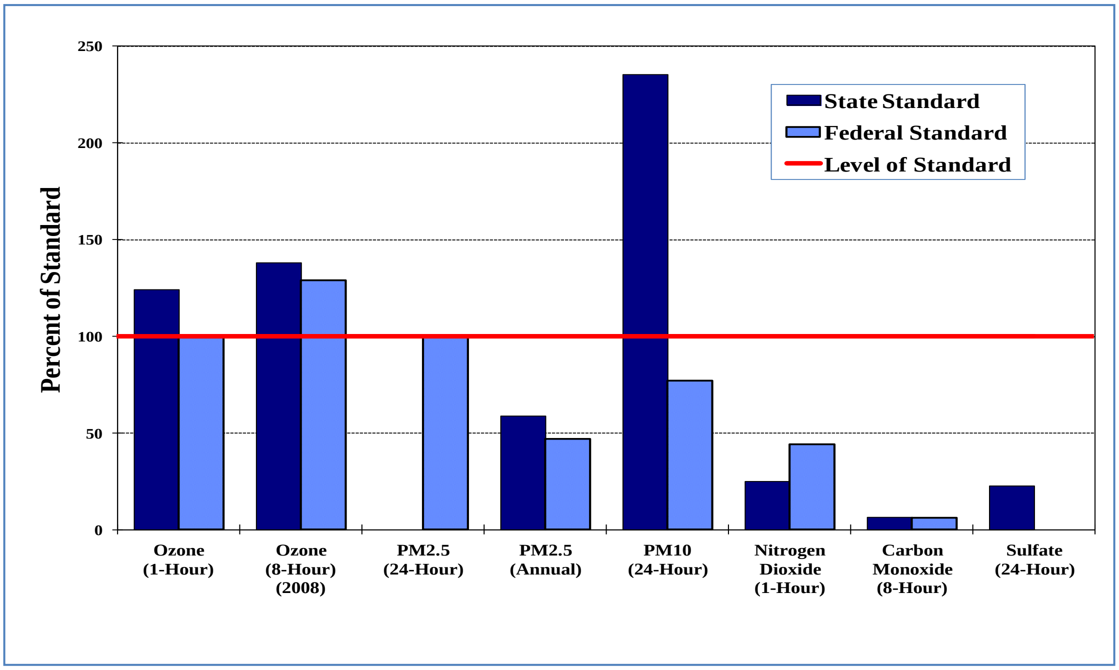


FIGURE 3-2
Coachella Valley 2011 Maximum Pollutant Concentrations
as Percent of State and Federal Standards

[9]The U.S. EPA Exceptional Events Rule, *Treatment of Data Influence by Exceptional Events*, became effective May 21, 2007. The previous U.S. EPA *Natural Events Policy* for Particulate Matter was issued on May 30, 1996. Under the Exceptional Events Rule, U.S. EPA allows certain data to be flagged in the U.S. EPA Air Quality System (AQS) database and not considered for NAAQS attainment status when that data is influenced by exceptional events, such as high winds, wildfires, volcanoes, or some cultural events (Independence Day fireworks) that meet strict requirements.

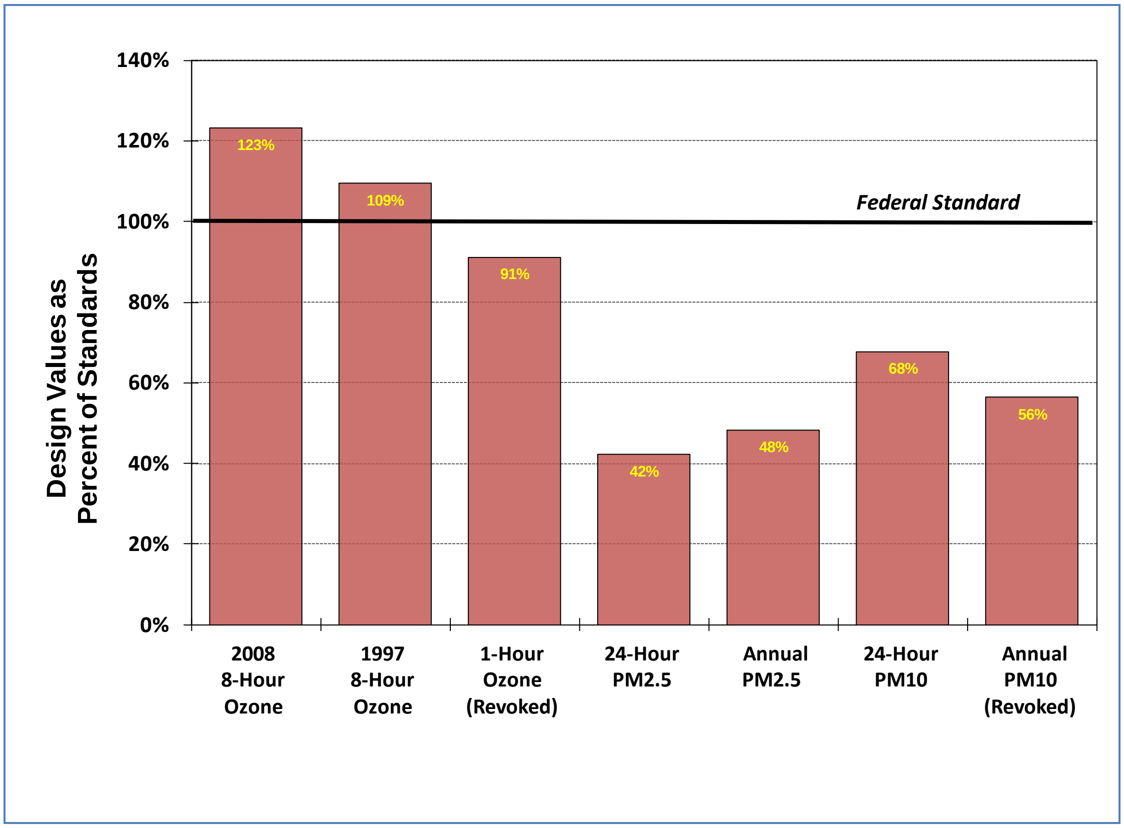


FIGURE 3-3

Coachella Valley 3-Year (2009-2011) Design Values as Percent of Federal Standards

The current NAAQS, as attainment designations for the Coachella Valley are presented in Table 3-1. Coachella Valley station data is also included, along with the Basin stations, in the tables by pollutant for the years 1995-2011, in the Attachment to this Appendix.

TABLE 3-1

National Ambient Air Quality Standards (NAAQS) Attainment Status
Coachella Valley Portion of the Salton Sea Air Basin

Criteria Pollutant	Averaging Time	Designation[a)]	Attainment Date[b)]
1979 **1-Hour Ozone**[c)]	1-Hour (0.12 ppm)	Nonattainment (Severe-17)	11/15/2007 (not timely attained[c])
1997 **8-Hour Ozone**[d)]	8-Hour (0.08 ppm)	Nonattainment (Severe-15)	6/15/2019
2008 **8-Hour Ozone**	8-Hour (0.075 ppm)	Nonattainment (Severe-15)	12/31/2027
CO	1-Hour (35 ppm) 8-Hour (9 ppm)	Unclassifiable/Attainment	N/A
NO_2[e)]	1-Hour (100 ppb)	Unclassifiable/Attainment	N/A
	Annual (0.053 ppm)	Unclassifiable/Attainment	N/A
SO_2[f)]	1-Hour (75 ppb)	Designations Pending	N/A
	24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassifiable/Attainment	N/A
PM10	24-hour (150 $\mu g/m^3$)	Nonattainment (Serious)[g)]	12/31/2006 (redesignation request submitted)
PM2.5	24-Hour (35 $\mu g/m^3$) Annual (15.0 $\mu g/m^3$)	Unclassifiable/Attainment	N/A
Lead (Pb)	3-Months Rolling (0.15 $\mu g/m^3$)	Unclassifiable/Attainment	N/A

a) U.S. EPA often only designates Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable
b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration
c) 1-hour O_3 standard (0.13 ppm) was revoked, effective June 15, 2005; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, did not attain this standard based on 2005-2007 data and has some continuing obligations under the former standard (latest 2009-2011 data shows attainment)
d) 1997 8-hour O_3 standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the 1997 O_3 standard and most related implementation rules remain in place until the 1997 standard is revoked by U.S. EPA
e) New NO_2 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO_2 standard retained
f) The 1971 annual and 24-hour SO_2 standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard. Area designations expected in 2012, with SSAB likely designated Unclassifiable /Attainment
g) Annual PM10 standard was revoked, effective December 18, 2006; redesignation request to Attainment of the 24-hour PM10 standard is pending with U.S. EPA

Fine Particulate Matter (PM2.5)

PM2.5 has been measured in Coachella Valley since 1999 when the District began PM2.5 monitoring, using filter-based Federal Reference Method (FRM) samplers on a 1-in-3-day schedule. PM2.5 has remained relatively low compared to the South Coast Air Basin due to fewer combustion-related emissions sources and also the increased vertical mixing and horizontal dispersion in the desert area. In 2011, federal PM2.5 standards (35 µg/m^3, 24-hour average; 15.0 µg/m^3, annual average) were not exceeded at either of the two Riverside County SSAB air monitoring sites. The Coachella Valley maximum 24-hour average and annual average concentrations recorded in 2011 (35.4 µg/m^3 and 7.2 µg/m^3) were, respectively, 99.7 percent and 48 percent of the federal 24-hour and annual standards.

While not exceeding the 24-hour federal standard, the relatively high 24-hour concentration of 35.4 µg/m^3 was unusual for the Coachella Valley and occurred at Indio on one of the exceptional event days that had extremely high PM10 due to windblown dust from thunderstorm activity. The second high 24-hour PM2.5 average for the Coachella Valley was 26.3 µg/m^3 (74 percent of the federal standard), at Palm Springs. When looking at the 3-year design values (2009-2011) that considers the form of the federal standard, the Coachella Valley PM2.5 24-hour design value is 15.0 µg/m^3 (42 percent of the short-term standard) and the PM2.5 annual design value is 7.3 µg/m^3 (48 percent of the annual standard).

The annual PM2.5 state standard (12.0 µg/m^3) was not exceeded in the Coachella Valley, with the maximum annual average of 7.2 µg/m^3 (at Palm Springs) at 60 percent of the standard. This suggests that the Coachella Valley will also be in attainment of the upcoming revision to the federal annual PM2.5 standard, which has been proposed within a range from 12.0 to 13.0 µg/m^3. The Coachella Valley was between 55 and 60 percent of the proposed new PM2.5 annual standard for the year 2011. Figure 3-4 shows the trend of the annual average PM2.5 and PM10 concentrations in the Coachella Valley for the station showing the highest PM10 measurements from 1990 through 2011. Tables A-9 to A-12 in the Attachment to this appendix show the annual arithmetic mean, percentage of sampling days over the 24-hour federal standard, maximum 24-hour average concentrations, and 98^{th} percentile 24-hour concentrations for the years 1999-2011 for all monitoring stations, including the two in the Coachella Valley.

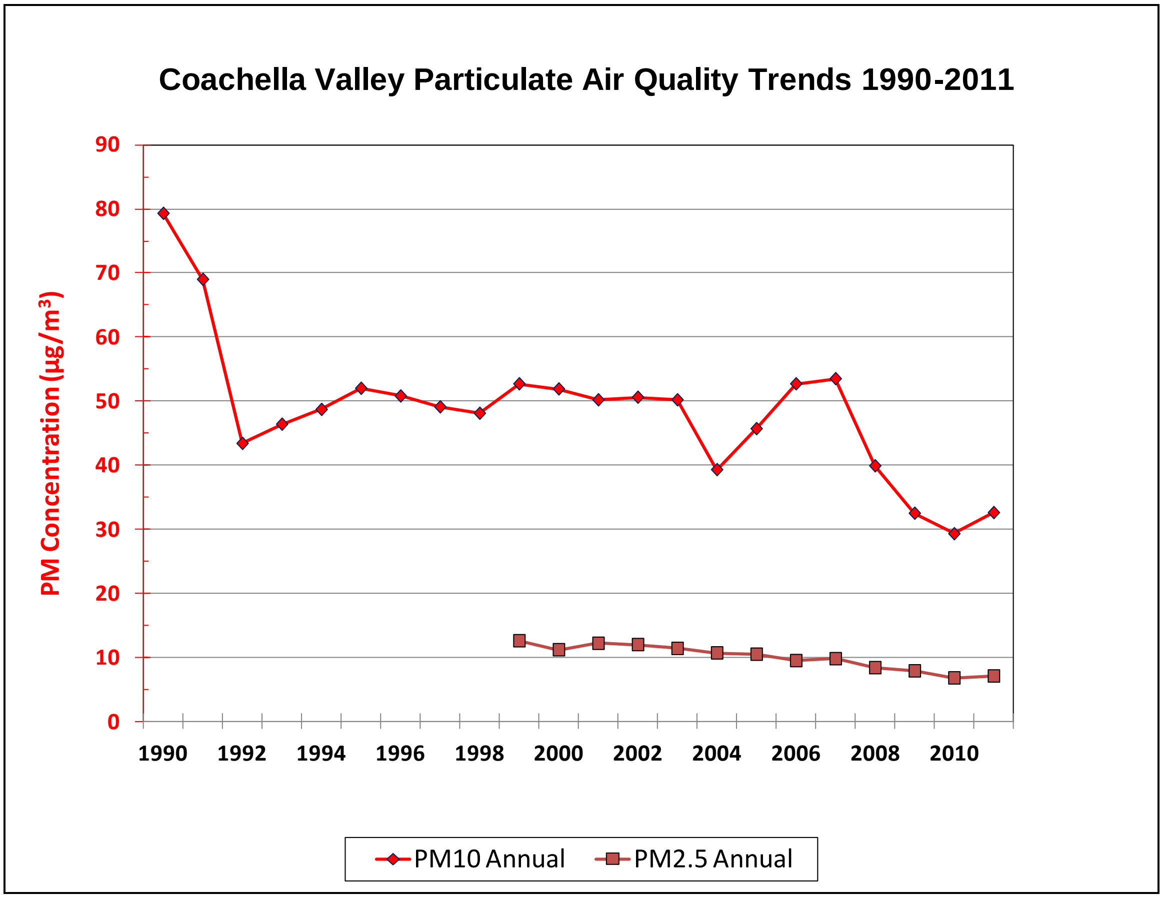


FIGURE 3-4

Coachella Valley Trend of Annual Average PM2.5 and PM10, 1990-2011

Particulate Matter (PM10)

Although exceedances of the ozone standard in the Coachella Valley area are due primarily to the transport of ozone from the densely populated areas of the Basin upwind, the same cannot be said for PM10 exceedances. PM10 exceedances in the Coachella Valley are primarily due to locally generated sources of fugitive dust (e.g., natural wind-blown sources, construction and agricultural activities, and re-entrained dust from paved road travel) and not as a result of secondary particulates generated from precursor gaseous emissions. PM10 is the only pollutant which has sometimes reached higher concentrations in the SSAB than in the Basin.

The Coachella Valley is subject to frequent high winds which generate wind-blown sand and dust, especially from disturbed soil and natural desert blowsand[10]. Air forced

[10] The blowsand process is a natural sand migration caused by the action of winds on the vast areas of sand in the Coachella Valley. The sand is supplied by weather erosion of the surrounding mountains and foothills. Although the sand migration is somewhat disrupted by urban growth in the Valley, the overall region of blowsand activity encompasses approximately 130 square miles, extending from near Cabazon in the San Gorgonio Pass to near Indio.

through the San Gorgonio Pass (also referred to as Banning Pass) creates strong northwesterly winds along the centerline of the Coachella Valley. This forcing is often related to the marine air mass and westerly onshore (sea-breeze) flows in the South Coast Air Basin pushing through the Pass. At other times, storm systems with frontal passages create strong winds through the Pass and along the Valley. Hourly averaged winds measured near Cathedral City, in the Whitewater River Wash near the centerline of the Valley, exceeded 25 mph for at least one hour on approximately one third of the days between 2005 and 2009.

High PM10 concentrations in the Coachella Valley can also be caused by desert dust and sand entrained by downdraft outflows from the thunderstorm activity that is common in the southwestern U.S. deserts in the summer. On some of the high days, transport of wind-generated dust and sand occurs with relatively light winds in the Coachella Valley, when deeply entrained dust from desert thunderstorm outflows travels to the Coachella Valley from the desert areas of southeastern California, Arizona, Nevada, or northern Mexico. All days in recent years that exceeded the 24-hour federal PM10 standard at Indio or Palm Springs would not have exceeded except for the contribution of windblown dust and sand due to strong winds in the upwind source area (high-wind natural events).

PM10 is measured daily at both Indio and Palm Springs by supplementing the primary 1-in-3-day Federal Reference Method (FRM) filter sampling at Indio and the 1-in-6-day FRM at Palm Springs with secondary continuous hourly Federal Equivalent Method (FEM) measurements at both stations.

In 2011, two high-wind exceptional events occurred in the Coachella Valley that caused high 24-hour PM10 concentrations (397 and 344 $\mu g/m^3$, at Palm Springs and Indio, respectively on July 3; 375; and 265 $\mu g/m^3$ at Indio and Palm Springs, respectively on August 28). The high PM10 concentrations measured on these days were due to strong outflows from thunderstorms over Arizona and northern Mexico that deeply entrained dust and sand and transported it to the Coachella Valley. These natural events have been flagged in the U.S. EPA Air Quality System (AQS) database to be excluded for comparison to the NAAQS, as allowed by the U.S. EPA Exceptional Events Rule. Further documentation and U.S. EPA concurrence is pending.

After application of the U.S. EPA Exceptional Event Rule (and its predecessor, the Natural Events Policy) to high wind natural events in the Coachella Valley, no days since the mid-1990s have exceeded the federal 24-hour PM10 standard at Indio or Palm Springs. As a result, AQMD requested that U.S. EPA redesignate the Coachella Valley from nonattainment to attainment of the PM10 NAAQS. Further action on this request by U.S. EPA is pending[11].

After flagging the high-wind natural events that exceeded the 24-hour PM10 federal standard, the federal PM10 standard was not exceeded in the Riverside County part of SSAB in 2011. The next highest PM10 24-hour concentration in the Coachella Valley was 120 $\mu g/m^3$, 77 percent of the 24-hour NAAQS. The former annual average PM10 federal standard (50 $\mu g/m^3$) was not exceeded, even with the exceptional events included. The highest annual average PM10 concentration in the Coachella Valley in 2011 was 32.6 $\mu g/m^3$ (65 percent of the revoked annual federal standard), with the exceptional events excluded. When considering the form of the federal PM10 standards, after consideration for the exceptional events, the 3-year (2009-2011) 24-hour PM10 design value for the Coachella Valley was 105 $\mu g/m^3$ (68 percent of the NAAQS) and the annual design value was 31 $\mu g/m^3$ (56 percent of the revoked annual PM10 NAAQS).

In 2011, the state 24-hour PM10 standard (50 $\mu g/m^3$) was exceeded on 19 days (21 days if the high-wind events are included) in the Coachella Valley, which is 5.2 percent of the sampling days (using FRM and FEM data combined). The peak value of 120 $\mu g/m^3$, not including the exceptional events, was 238 percent of the state 24-hour standard. The state annual standard (20 $\mu g/m^3$) was also exceeded. The annual average PM10 concentration of 32.6 $\mu g/m^3$ was 151 percent of the state standard.

For each routine District ambient air monitoring station, the annual arithmetic mean, percent of sampling days exceeding state and federal standards, and maximum 24-hour average concentrations are shown in Tables A-6 to A-8 in the Attachment for the years 1995-2011. Please refer to Appendix II from the 2003 AQMP for the 1976-1989 prior-year statistics and to Appendix II from the 2007 AQMP for 1990-2005 data.

Ozone (O_3)

Ozone in the atmosphere of the Riverside County portion of SSAB is both directly transported from the Basin and formed photochemically from precursors emitted upwind. These precursors are emitted in greatest quantity in the coastal and central Los Angeles County areas of the Basin. The Basin's prevailing sea breeze causes polluted air to be transported inland. As the air is being transported inland, ozone is formed, with peak concentrations occurring in the inland valleys of the Basin in an area extending from eastern San Fernando Valley through the San Gabriel Valley into the Riverside-San

[11] U.S. EPA has requested additional temporary PM10 monitoring in the southeastern Coachella Valley to further assess windblown dust in that area; this project is currently ongoing.

Bernardino area and the adjacent mountains. As the air is transported still further inland into the desert areas, ozone concentrations typically decrease somewhat due to dilution, although ozone standards can still be exceeded. Ozone concentrations and the number of days exceeding the federal ozone standard are greatest in summer; there are typically no exceedances during the winter months.

In 2011, the 1979 1-hour federal ozone standard level was not exceeded in the Coachella Valley, with 2011 being the fourth consecutive year with no exceedances of the former short-term standard. The maximum 1-hour concentration measured was 0.124 ppm, just below (99 percent of) the former 1-hour federal standard (0.125 ppm exceeds). The former (1997) 8-hour federal ozone standard was exceeded on 18 days. The current, more stringent, 2008 8-hour federal standard (0.075 ppm) was exceeded on 54 days. The maximum 8-hour ozone concentration was 0.098 ppm (130 percent of the 2008 standard and 115 percent of the 1997 standard).

The state 1-hour and 8-hour ozone standards were exceeded on 25 days and 78 days, respectively, in the Coachella Valley in 2011. The maximum 1-hour average O_3 concentration (0.124 ppm) was 136 percent of the state 1-hour standard (0.09 ppm). The maximum 8-hour average O_3 concentration (0.098 ppm) was 138 percent of the state 8-hour standard (0.070 ppm). The 1-hour ozone health advisory level (0.15 ppm) has not been exceeded in the Coachella Valley area since 1999. No stage 1 ozone episode levels (0.20 ppm) have been recorded in the Coachella Valley area since 1989.

Tables A-2 through A-5 in the Attachment show the number of days exceeding the federal 8-hour and 1-hour ozone standards, as well as the 4^{th} highest 8-hour average and maximum 1-hour concentrations, at all routine District air quality monitoring stations including the two Coachella Valley sites, for the period 1995-2011. Please refer to Appendix II from the 2003 AQMP for the 1976-1989 prior-year statistics and to Appendix II from the 2007 AQMP for 1990-2005 data. Figure 3-5 shows the trend of the total number of days exceeding federal (2008 8-hour and former 1979 1-hour) and state (8-hour and 1-hour) ozone standards at Coachella Valley monitoring sites for the years 1990-2011. Figure 3-6 shows the trend of the maximum 1-hour and 8-hour ozone concentrations in the Coachella Valley from 1990 through 2011.

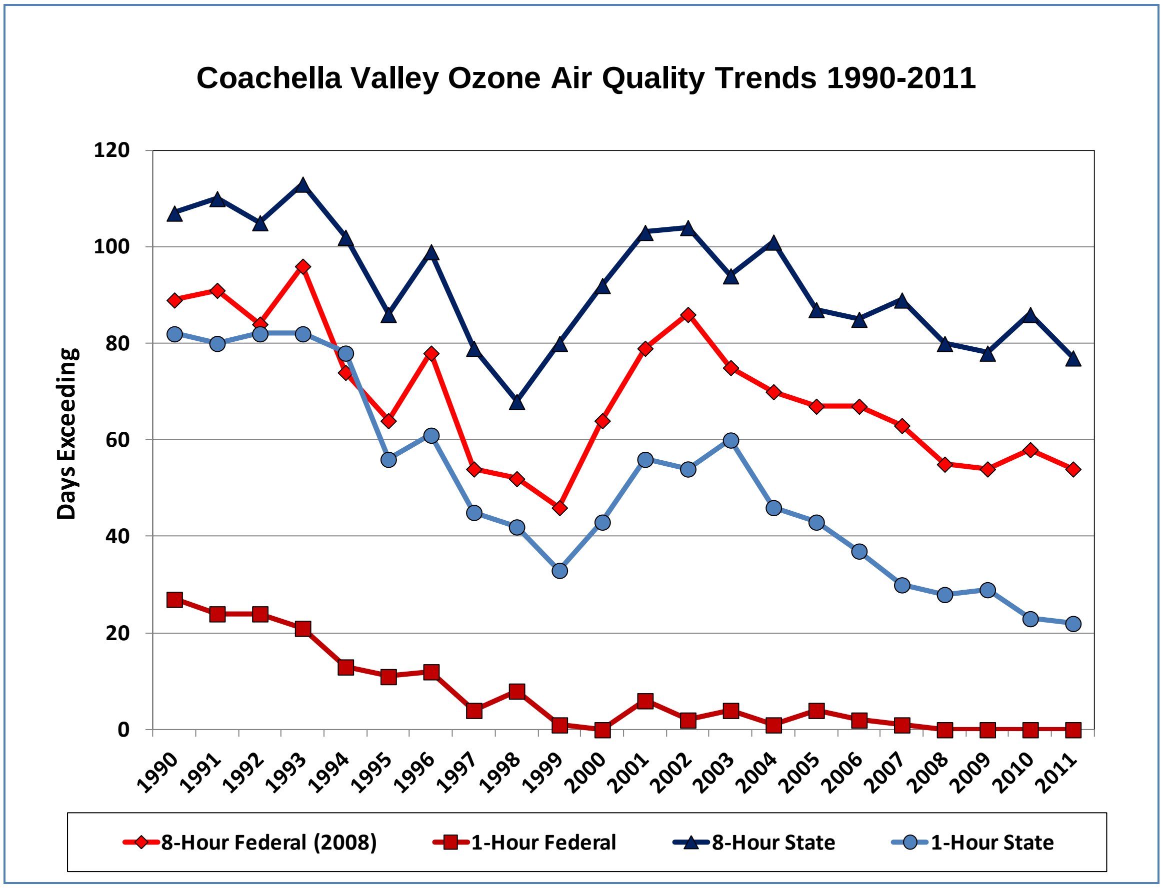


FIGURE 3-5
Coachella Valley Federal and State Ozone Trends, 1990-2011
(Number of Days Exceeding Standards)

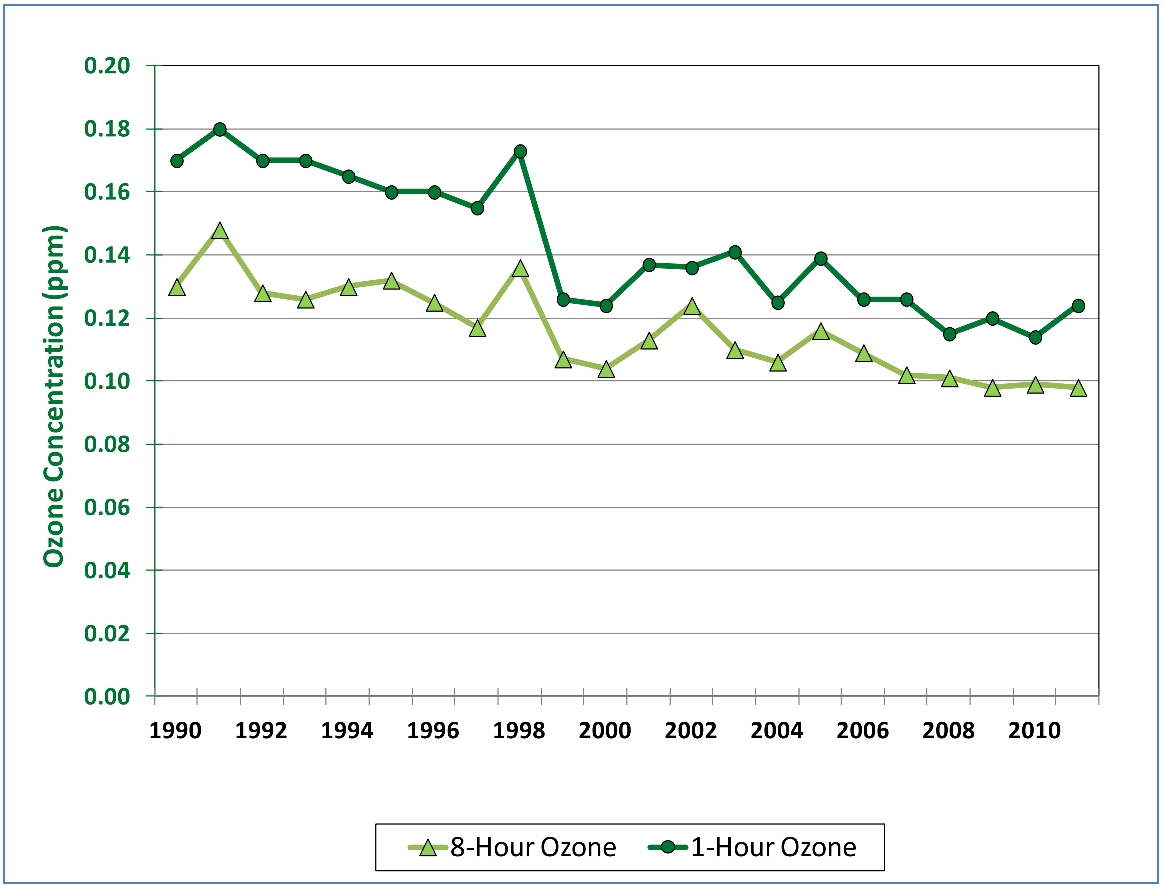


FIGURE 3-6

Trends of Coachella Valley Maximum 1-hour and 8-hour Ozone Concentrations, 1990-2011

Carbon Monoxide (CO)

Carbon monoxide was measured at one Coachella Valley air monitoring station in 2011. Neither the federal nor state standards were exceeded. The maximum 8-hour average CO concentration recorded in 2011 (0.6 ppm) was less than 7 percent of both the federal (9 ppm) and state (9.0 ppm) standards. The maximum 1-hour CO concentration (3.0 ppm) was 8 percent of the federal (35 ppm) and 15 percent of the state (20 ppm) 1-hour CO standards. Historical carbon monoxide air quality and trends in the Riverside county SSAB area shows that the area has not exceeded the federal CO standards in nearly three decades.

The annual maximum 8-hour CO concentrations at all District air monitoring stations, including the Coachella Valley, are shown in Table A-13 in the Attachment, for the period 1995-2011.

Nitrogen Dioxide (NO_2)

Nitrogen dioxide was measured at one station in the Coachella Valley in 2011. The maximum 1-hour average NO_2 concentration (44.7 ppb) was 44 percent of the new (2010) federal 1-hour standard (100 ppb) and 25 percent of the state 1-hour standard (180 ppb). The maximum annual average NO_2 concentration (8.0 ppb) was 15 percent of the federal annual standard (53 ppb) and 27 percent of the state annual standard (30 ppb).

The annual averages and annual maximum 1-hour average concentrations for each monitoring station in the District (including the Coachella Valley) for the years 1995-2011 are shown in Tables A-14 and A-15, in the Attachment.

Sulfur Dioxide (SO_2)

Sulfur dioxide concentrations were not measured in the Riverside County SSAB in 2011. Historical measurements have shown SO_2 concentrations to be well below the state and federal standards and there are no significant emissions sources of SO_2 in the Coachella Valley.

Sulfate (SO_4^{2-})

Sulfate from PM10 was measured at one station in the Coachella Valley in 2011. The maximum 24-hour average sulfate concentration was 5.7 $\mu g/m^3$ (23 percent of the 25 $\mu g/m^3$ state sulfate standard). There is no federal sulfate standard. The maximum 24-hour average concentrations at each District air monitoring station, including the Coachella Valley, for the years 1995-2011 are shown in Table A-17 in the Attachment.

Lead (Pb)

Lead concentrations were not measured at either of the two Coachella Valley air monitoring stations in 2011. Measurements in past years have shown concentrations to be less than the state and federal standards and no major sources of lead emissions are located in the Coachella Valley.

ATTACHMENT TO APPENDIX II

TABLE A-1
Air Monitoring Stations and Source/Receptor Areas

AREA #	SOURCE/RECEPTOR AREA*	LOCATION	STN #
LOS ANGELES COUNTY			
1	Central LA	Los Angeles	087
2	Northwest Coastal LA County	West Los Angeles	091
3	Southwest Coastal LA County 1	Hawthorne (moved)	094
3	Southwest Coastal LA County 2	LAX-Hastings	820
4	South Coastal LA County 1	North Long Beach	072
4	South Coastal LA County 2	South Long Beach	077
4	South Coastal LA County 3	Long Beach, Port	033
6	West San Fernando Valley	Reseda	074
7	East San Fernando Valley	Burbank	069
8	West San Gabriel Valley	Pasadena	088
9	East San Gabriel Valley 1	Azusa	060
9	East San Gabriel Valley 2	Glendora	591
10	Pomona/Walnut Valley	Pomona	075
11	South San Gabriel Valley	Pico Rivera	085
12	South Central LA County 1	Lynwood (moved)	084
12	South Central LA County 2	Compton	112
13	Santa Clarita Valley	Santa Clarita	090
ORANGE COUNTY			
16	North Orange County	La Hebra	3177
17	Central Orange County	Anaheim	3176
18	North Coastal Orange County	Costa Mesa	3195
19	Saddleback Valley 1	El Toro (moved)	3186
19	Saddleback Valley 2	Mission Viejo	3812
RIVERSIDE COUNTY			
22	Norco/Corona	Norco	4155
23	Metropolitan Riverside County 1	Riverside – Rubidoux	4144
23	Metropolitan Riverside County 2	Riverside – Downtown	4146
23	Mira Loma	Mira Loma	4165
24	Perris Valley	Perris	4149
25	Lake Elsinore Area	Lake Elsinore	4158
26	Temecula Valley	Temecula – Lake Skinner	4031
29	Banning Airport	Banning Airport	4164
30	Coachella Valley 1**	Palm Springs	4137
30	Coachella Valley 2**	Indio	4157
SAN BERNARDINO COUNTY			
32	Northwest San Bernardino Valley	Upland	5175
33	Southwest San Bernardino Valley	Ontario	5817
34	Central San Bernardino Valley 1	Fontana	5197
34	Central San Bernardino Valley 2	San Bernardino	5203
35	East San Bernardino Valley	Redlands	5204
37	Central San Bernardino Mountains	Crestline – Lake Gregory	5181
38	East San Bernardino Mountains	Big Bear Lake	5818

* Source/receptor areas and area numbers are mapped in Figure A-1

** Salton Sea Air Basin

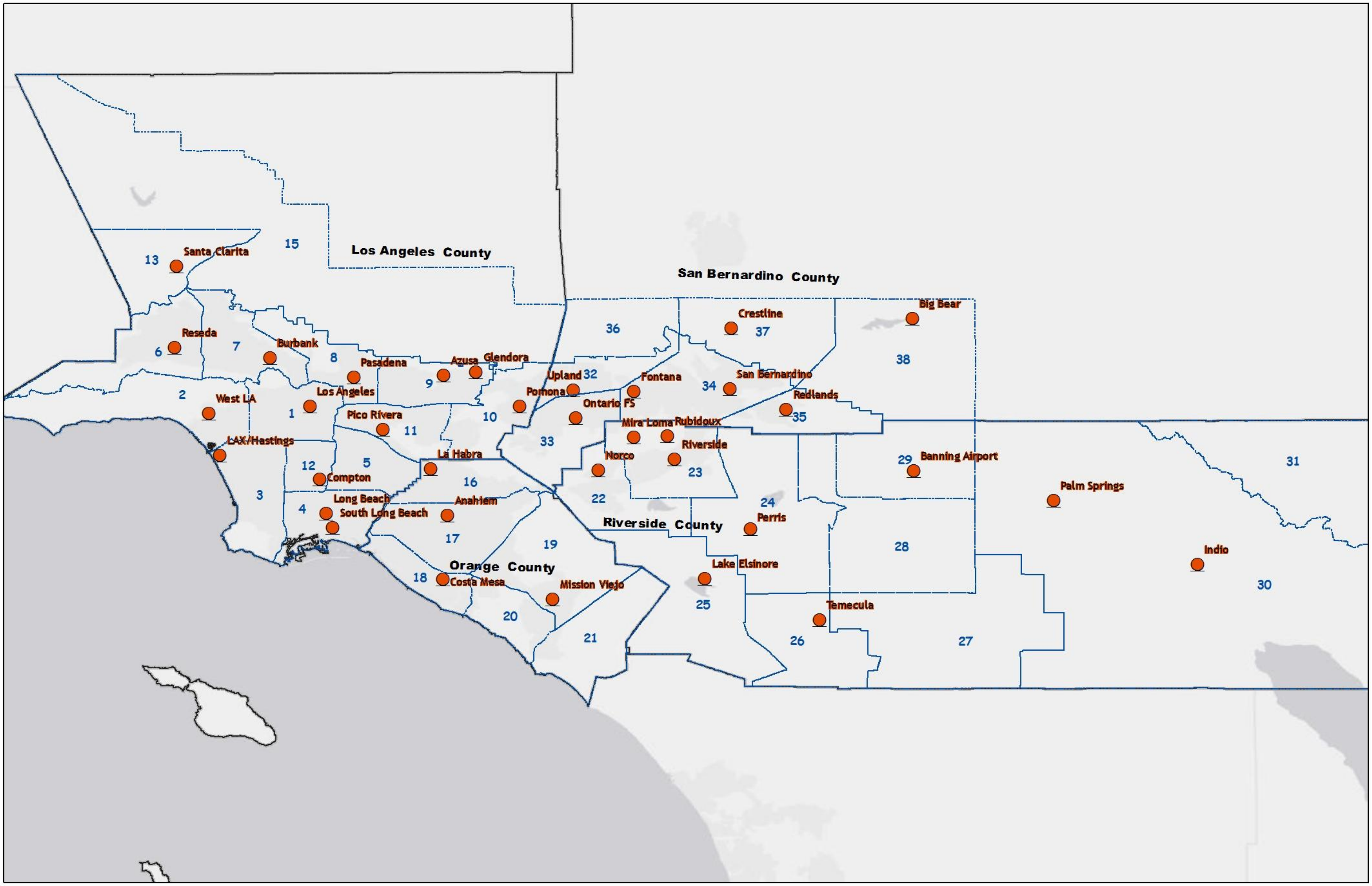


FIGURE A-1
South Coast Air Basin and Adjoining Areas of Salton Sea Air Basin
(with Source/Receptor Areas)

TABLE A-2
Ozone – Number of Days Exceeding the 2008 Federal Standard
(0.075 ppm, 8-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	88	53	26	33	19	27	25	17	35	21	14	17	20	28	17	4	12
069	East San Fernando Valley	49	25	15	24	15	23	7	14	38	36	10	23	13	17	14	5	6
072	South Coastal Los Angeles County 1	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0
073	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
074	West San Fernando Valley	39	49	11	23	7	10	21	44	73	62	26	33	28	26	19	22	26
075	Pomona/Walnut Valley	73	36	16	28	14	10	5	24	38	22	17	27	18	35	23	7	16
084	South Central Los Angeles County 1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	0	0
085	South San Gabriel Valley	46	24	15	22	4	9	5	3	14	6	0*	4	5	5	3	1	0
087	Central Los Angeles	21	17	8	11	5	8	4	6	8	5	2	3	3	3	2	1	0
088	West San Gabriel Valley	70	45	21	26	10	25	23	19	40	25	12	23	11	16	12	3	5
090	Santa Clarita Valley	66	68	42	39	25	36	41	90	89	74	68	62	44	62	64	28	31
091	Northwest Coastal Los Angeles County	10	10	6	2	1	1	1	1	12	5	4	0	2	2	3	1	0
094	Southwest Coastal Los Angeles County 1	5	9	8	0	1	0	6	0	1	--	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	12	1	0	0	0	0	0	0
591	East San Gabriel Valley 2	105	69	45	49	19	30	49	33	58	33	26	29	26	45	42	24	30
ORANGE COUNTY:																		
3176	Central Orange County	8	7	1	7	1	3	0*	1	11	29	2	3	1	4	1	1	0
3177	North Orange County	18	13	8	6	4	7	2	2	7	3	0	7	8	5	3	1	0
3186	Saddleback Valley 1	8	11	5	14	--	--	--	--	--	--	--	--	--	--	--	--	--
3195	North Coastal Orange County	3	2	1	2	0	2	0	0	7	5	0	0	0	3	0	1	1
3812	Saddleback Valley 2	--	--	--	--	--	4	8	6	15	16	6	13	5	15	10	2	2
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	52	73	54	47	38	61	77	82	70	55	61	61	58	51	53	55	49
4144	Metropolitan Riverside County	104	99	79	69	46	50	50	64	86	70	55	57	46	64	35	50	68
4149	Perris Valley	101	93	67	41	17	71	85	72	72	44	16	83	73	77	67	53	54
4157	Coachella Valley 2**	44	46	3	22	30	18	40	45	40	50	34	28	29	27	24	22	19
4158	Lake Elsinore	82	18	1	63	64	65	77	67	57	43	41	54	35	69	37	23	28
4031	Temecula Valley	0	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14
4164	Banning Airport	--	--	127	63	63	64	72	86	84	64	64	74	43	74	70	62	41
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	44	23	47	22	40	36
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	97	52	52	47	24	32	52	32	46	28	30	51	35	50	49	42	36
5181	Central San Bernardino Mountains	113	120	89	111	104	94	103	112	107	92	98	96	93	97	92	75	84
5197	Central San Bernardino Valley 1	88	75	47	56	30	26	43	34	69	48	45	46	43	58	48	38	39
5203	Central San Bernardino Valley 2	109	105	89	60	54	50	62	42	62	55	56	56	51	63	62	47	39
5204	East San Bernardino Valley	118	111	105	72	68	76	73	74	101	74	44	62	58	75	73	61	80
	District Maximum	118	120	127	111	104	94	103	112	107	92	98	96	93	97	92	75	84

* Less than 12 full months of data ** Salton Sea Air Basin Refer to 2003 AQMP for 1976 to 1994 data

TABLE A-3
Ozone – Number of Days Exceeding the Former (1979) 1-Hour Federal Standard
(0.12 ppm, 1-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	63	26	11	19	2*	11	9	5	11	2	4	7	3	7	4	0	0
069	East San Fernando Valley	20	6	2	7	0	3	2	1	4	2	2	6	0	1	1	0	0
072	South Coastal Los Angeles County 1	0	0	0*	0	1	0	0	0	0	0	0	0	0	0	0	0	0
033	South Central Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
074	West San Fernando Valley	8	11	0	7	0	0	2	9	14	2	2	6	1	0	1	0	3
075	Pomona/Walnut Valley	47	16	7	18	2	3	1	5	13	4	3	9	2	5	1	0	0
084	South Central Los Angeles County 1	0	1	0	0	0	0	0	0	0	0	0	0	0	0*	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0	0	0
085	South San Gabriel Valley	20	32	6	10	0	2	1	0	1	0	--	1*	2	0	1	0	0
087	Central Los Angeles	5	24	0	5	1	1	0	0	1	0	0	0	0	0	1	0	0
088	West San Gabriel Valley	44	54	5	14	0	7	1	3	7	1	2	5	3	0	3	0	0
090	Santa Clarita Valley	26	68	13	16	0	1	9	32	35	13	11	20	2	8	5	1	3
091	Northwest Coastal Los Angeles County	1	13	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
094	Southwest Coastal Los Angeles County 1	0	1	0	0	1	0	0	0	0	0*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0*	0	0	0	0	0	0	0
591	East San Gabriel Valley 2	73	49	18	28	3	11	13	12	22	5	8	10	3	12	7	0	4
ORANGE COUNTY:																		
3176	Central Orange County	2	1	0	2	0*	1	0*	0	2	0	0	0	1	0	0	0	0
3177	North Orange County	4	5	1	5	0	1	0	0	1	0	0	3	1	0	0	0	0
3186	Saddleback Valley 1	1	2	2	2	0	1*	--	--	--	--	--	--	--	--	--	--	--
3195	North Coastal Orange County	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3812	Saddleback Valley 2	--	--	--	--	--	2*	1	2	4	0	1	0	0	0	0	0	0
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	9	12	4*	8	1	0	6	2	4	1	4	2	1	0	0	0	0
4144	Metropolitan Riverside County	52	36	13*	32	3	3	7	12	18	8	3	8	2	8	0	1	4
4149	Perris Valley	36	31	6	8	0	15	19	4	7	2	1	12	4	4	1	0	2
4157	Coachella Valley 2**	3	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
4158	Lake Elsinore	23	17	4	22	5	1	12	6	7	2	3	3	3	6	1	0	1
4031	Temecula Valley	0	0*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
4164	Banning Airport	--	--	--	25	5	4	16	13	27	7	10	8	1	10	1	0	3
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	4	0	4	0	0	1
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	67	35	12	30	4	10	14	5	15	3	8	14	7	9	3	1	5
5181	Central San Bernardino Mountains	65	62	29	57	30	17	26	22	34	9	18	9	13	16	7	6	8
5197	Central San Bernardino Valley 1	57	38	10	32	4	7	13	8	26	7	9	12	9	8	3	2	5
5203	Central San Bernardino Valley 2	61	63	32	39	14	7	18	6	19	6	9	10	8	11	2	1	2
5204	East San Bernardino Valley	69	65	35	43	12	11	21*	23	38	12	6	11	7	12	1	1	7
	District Maximum	73	68	35	57	30	17	26	32	38	13	18	20	13	16	7	6	8

* Less than 12 full months of data   ** Salton Sea Air Basin   Refer to 2003 AQMP for 1976 to 1994 data

TABLE A-4
Ozone – Annual Maximum 4th Highest 8-Hour Average (ppb)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	138	127	113	126	95	108	102	97	104	92	87	90	96	101	91	76	82
069	East San Fernando Valley	106	98	95	101	84	97	87	91	96	89	81	97	88	92	86	77	81
072	South Coastal Los Angeles County 1	71	73	67	65	68	66	60	59	63	70	59	56	56	64	64	57	60
033	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	57
074	West San Fernando Valley	101	110	83	100	81	80	89	111	119	101	98	103	92	95	93	87	91
075	Pomona/Walnut Valley	136	113	95	120	89	88	82	99	109	95	96	108	102	100	95	81	86
084	South Central Los Angeles County 1	51	57	53	51	41	50	54	49	57	65	63	64	56	55+	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	50	61
085	South San Gabriel Valley	105	93	97	102	80	86	81	74	82	78	51	78	79	77	72	59	63
087	Central Los Angeles	91	93	81	96	79	85	76	77	82	77	70	75	72	73	73	64	60
088	West San Gabriel Valley	130	117	100	117	86	104	90	95	101	93	85	96	89	91	95	75	77
090	Santa Clarita Valley	130	123	116	127	95	97	112+	131	137	107	118	112	101	108	103	88	101
091	Northwest Coastal Los Angeles County	81	88	78	70	69	71	64	73	83	76	76	67	67	73	75	70	62
094	Southwest Coastal Los Angeles County 1	78	86	83	63	66	65	79	64	70	56*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	86*	68	62	66	65	61	59	62
591	East San Gabriel Valley 2	148	140	121	142	96	112	110	110	123	95	97	106	104	112	108	91	95
ORANGE COUNTY:																		
3176	Central Orange County	82	81	68	87	61	74	66	69	80	88	75	70	73	76	68	64	67
3177	North Orange County	96	90	82	93	78	83	73	71	80	75	65	89	82	78	75	71	69
3186	Saddleback Valley 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3195	North Coastal Orange County	75	70	70	76	70	67	69	66	79	75	66	60	65	75	66	60	67
3812	Saddleback Valley 2	--	--	--	--	--	87	72	81	95	84	78	90	80	92	84	69	74
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	106	116	101	108	98	96	111	109	105	99	108	98	97	96	96	93	92
4144	Metropolitan Riverside County	142	130	118	136	104	106	109	109	120	111	105	111	99	111	89	94	107
4149	Perris Valley	132	122	105	115	91	111	124	107	116	95	82	113	103	106	101	100	94
4157	Coachella Valley 2**	96	98	82	97	89	87	93	97	100	94	92	85	87	88	85	84	85
4158	Lake Elsinore	126	108	111	128	106	98	111	104	112	102	97	101	97	108	96	88	92
4031	Temecula Valley	81	67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	73
4164	Banning Airport	101	107	93	81	114+	102	116	113	127	112	119	104	95	108	100	99	100
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	105	103	100	109	86	92	96
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	145	138	112	137	103	117	120	105	114	102	101	112	112	108	102	91	98
5181	Central San Bernardino Mountains	167	155	125	183	133	122	133	131	130	122	130	111	126	120	108	109	106
5197	Central San Bernardino Valley 1	143	137	115	132	98	100	123	114	132	111	113	114	112	110	100	94	105
5203	Central San Bernardino Valley 2	152	145	127	145	115	111	128	105	123	112	113	118	117	112	101	96	101
5204	East San Bernardino Valley	162	138	126	148	115	112	131	117	137	119	113	124	112	112	100	97	113
	District Maximum	167	155	127	183	133	122	133	131	137	122	130	124	126	120	108	109	113

+ Site relocated * Less than 12 full months of data ** Salton Sea Air Basin

TABLE A-5
Ozone – Annual Maximum 1-Hour Average (ppm)

	LOCATION	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
087	Central Los Angeles	.34	.21	.30	.31/	.29	.32	.40	.26	.29	.30	.22	.22
060	East San Gabriel Valley 1	.38	.32	.40	.45	.41	.35	.36	.39	.31	.36	.31	.30
069	East San Fernando Valley	.35	.31	.30	.39	.35	.27	.25	.31	.26	.30	.28	.23
091	Northwest Coastal Los Angeles County	.28	.18/	.24/	.26	.21	.23	.28	.23	.27/	.27	.20	.28
072	South Coastal Los Angeles County 1	.16	.15	.19	.21	.20	.23	.22	.30	.27	.23	.18	.17
033	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--
074	West San Fernando Valley	.27	.34	.27	.33	.38	.25	.22	.26	.26	.25	.22	.22
075	Pomona/Walnut Valley	.36	.32	.41	.35	.37	.33	.31	.34	.31	.33	.27	.29
094	Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	--	.19	.20
820	Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	--	--	--
088	West San Gabriel Valley	.34	.32	.42	.44	.41	.33	.37/	.34	.30	.37	.26	.28
090	Santa Clarita Valley	.33	.33	.32	.32	.36	.29	.26/	.29	.27	.24	.24	.21
084	South Central Los Angeles County 1	.24	.24	.18	.29	.18	.21	.26	.23	.27	.21	.20	.24
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--
085	South San Gabriel Valley	.35	.32	.43	.39	.39	.35	.39	.33	.27	.31	.24	.28
591	East San Gabriel Valley 2	--	--	--	--	.49	.39	.36	.38	.34	.39	.35	.33
3176	Central Orange County	.30	.19	.29	.33	.28	.26	.26	.30	.25	.25	.20	.22
3177	North Orange County	.30	.25	.35	.38	.31	.27	.32	.27	.32	.34	.25	.24
3195	North Coastal Orange County	.16	.18	.22	.21/	.16	.20	.18	.25	.25	.21	.17	.16
3186	Saddleback Valley 1	.23	.20	.34	.32	.34	.33	.27	.29	.30	.28	.23	.20
3812	Saddleback Valley 2	--	--	--	--	--	--	--	--	--	--	--	--
4137	Coachella Valley 1**	.22	.21	.20	.24	.21	.19	.19	.19	.20	.24	.18	.17
4157	Coachella Valley 2**	.16	.19	.17	.21	.11	.18	.17	.18	.19	.20	--	.16
4155	Norco/Corona	.33	.36	.40	.33/	.34	.37	.35	.35	.30	.35	.27	.24
4141	Hemet/San Jacinto Valley	.19	.25	.27	--	--	--	--	--	.18*	.23	.18	.18
4144	Metropolitan Riverside County 1	.36	.35	.39	.34	.37	.30	.31	.36	.32	.35	.25	.29
4149	Perris Valley	.22	.28	.32	.25	.29	.24	.28	.26	.22	.29	.22	.20
4150	San Gorgonio Pass	.28	.27	.30	.27	.26	.23	.24	.26	.25	.29	.22	.21
4164	BanningAirport	--	--	--	--	--	--	--	--	--	--	--	--
4163	Temecula Valley	.21	.17	.23	--	--	--	--	--	--	--	--	--
4158	Lake Elsinore	.20	.23	.30	--	--	--	--	--	--	--	--	--
5203	Central San Bernardino Valley 2	.32	.37	.36	.34	.36	.36/	.30	.32	.30	.27/	.30	.25
5204	East San Bernardino Valley	.35	.33	.39	.34/	.32	.24	.29	.30	.29	.33/	.29	.24
5175	Northwest San Bernardino Valley	--	--	--	--	--	--	--	.36	.32	.33	.29	.28
5197	Central San Bernardino Valley 1	.38	.39	.42	.42	.42	.35/	.31	.32	.32	.34	.31	.29
5181	Central San Bernardino Mountains 1	.23	.32	.33	.40	.31	.35	.32	.28	.34	.30	.26	.29
	District Maximum	.38	.39	.43	.45	.49	.39	.40	.39	.34	.39	.35	.33

* Less than 12 full months of data. / Station location change

** Salton Sea Air Basin

Refer to 2003 AQMP for 1955 to 1975 data

TABLE A-5 (continued)
Ozone – Annual Maximum 1-Hour Average (ppm)

LOCATION	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
087 Central Los Angeles	.21	.25	.20	.19	.20	.16	.19	.17	.14	.12	.15	.13
060 East San Gabriel Valley 1	.30	.33	.23	.28	.27	.24	.25	.21	.20	.16	.20	.14
069 East San Fernando Valley	.24	.20	.20	.22	.22	.18	.17	.17	.14	.13	.18	.12
091 Northwest Coastal Los Angeles County	.24	.25	.16	.18	.17	.18	.16	.14	.14	.11	.13	.12
072 South Coastal Los Angeles County 1	.16	.16	.12	.11	.15	.14	.16	.11	.11	.10	.12	.13
033 South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--
074 West San Fernando Valley	.25	.23	.19	.22	.17	.19	.14	.15	.21	.12	.16	.10
075 Pomona/Walnut Valley	.29	.25	.24	.24	.26	.21	.24	.22	.19	.16	.18	.14
094 Southwest Coastal Los Angeles County	.22	.19	.10	.11	.15	.13	.11	.12	.13	.11	.09	.15
820 Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	--	--	--
088 West San Gabriel Valley	.29	.27	.26	.23	.27	.22	.26	.21	.17	.14	.17	.12
090 Santa Clarita Valley	.30	.25	.23	.24	.22	.22	.26	.21	.17	.16	.18	.12
084 South Central Los Angeles County 1	.21	.14	.15	.16	.17	.12	.12	.09	.10	.08	.09	.12
112 South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--
085 South San Gabriel Valley	.30	.26	.19	.26	.26	.19	.22	.18	.14	.13	.18	.12
591 East San Gabriel Valley 2	.34	.34	.29	.32	.30	.28	.30	.22	.21	.17	.22	.14
3176 Central Orange County	.27	.24	.18	.25	.22	.17	.21	.13	.13	.10	.11	.10*
3177 North Orange County	.29	.26	.21	.21	.21	.19	.25	.16	.15	.13	.18	.12
3195 North Coastal Orange County	.13	--	.15	.17	.15	.13	.12	.11	.10	.10	.12	.10
3186 Saddleback Valley 1	.21	.23	.19	.24	.16	.16	.18	.15	.14	.13	.16	.10
3812 Saddleback Valley 2	--	--	--	--	--	--	--	--	--	--	--	--
4137 Coachella Valley 1**	.20	.19	.17	.18	.15*	.17	.17	.16	.16	.16	.17	.13
4157 Coachella Valley 2 **	--	.16	.16	.18	.14	.16	.12	.14	.12	.11	.13	.13
4155 Norco/Corona	.25	.23	.17	.22	.23	.16	.17	.19	.16	--	--	--
4141 Hemet/San Jacinto Valley	.18	.19	.22	.19	.15	.18	.16	.15	.12	--	--	--
4144 Metropolitan Riverside County	.28	.27	.29	.24	.26	.26	.25	.21	.20	.19	.20	.14
4149 Perris Valley	.23	.21	.19	.20	.21	.20	.18	.20	.18	.14	.15	.11
4150 San Gorgonio Pass	.26	.23	.22	.20	.16	.16	.20	.18	.19	.13	.12/	--
4164 Banning Airport	--	--	--	--	--	--	--	--	--	--	.17	.14
4031 Temecula Valley	--	--	--	.17*	.13	.13	.10*	.11	.10	--	--	--
4158 Lake Elsinore	--	.24	.19	.20	.17	.19	.19	.19	.15	.16	.17	.14
5203 Central San Bernardino Valley 2	.28	.30	.29	.25	.28	.21	.25	.20	.24	.20	.21	.16
5204 East San Bernardino Valley	.29	.27	.30	.25	.27	.27	.23	.24	.22	.20	.22	.15
5175 Northwest San Bernardino Valley	.35	.32	.29	.27	.28	.24	.25	.24	.22	.19	.21	.15
5197 Central San Bernardino Valley 1	.29	.32	.27	.29	.28	.24	.25	.22	.22	.17	.20	.14
5181 Central San Bernardino Mountains 1	.29	.27	.33	.27	.28	.24	.27	.26	.20	.21	.24	.17
District Maximum	.35	.34	.33	.32	.30	.28	.30	.26	.24	.21	.24	.17

* Less than 12 full months of data. / Station location change

** Salton Sea Air Basin

Refer to 2003 AQMP for 1955 to 1975 data

TABLE A-5 (concluded)
Ozone – Annual Maximum 1-Hour Average (ppm)

LOCATION	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
087 Central Los Angeles	.136	.116	0.122	0.152	0.110	0.121	0.108	0.115	0.109	0.139	0.098	0.087
060 East San Gabriel Valley 1	.174	.189	0.136	0.150	0.134	0.145	0.165	0.158	0.135	0.15	0.104	0.111
069 East San Fernando Valley	.152	.129	0.128	0.134	0.137	0.142	0.166	0.116	0.133	0.145	0.111	0.12
091 Northwest Coastal Los Angeles County	.104	.099	0.118	0.134	0.107	0.114	0.099	0.117	0.11	0.131	0.099	0.098
072 South Coastal Los Angeles County 1	.118	.091	0.084	0.099	0.090	0.091	0.081	0.099	0.093	0.089	0.101	0.073
033 South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	0.074
074 West San Fernando Valley	.109	.140	0.152	0.179	0.131	0.138	0.158	0.129	0.123	0.135	0.122	0.13
075 Pomona/Walnut Valley	.152	.144	0.150	0.161	0.131	0.140	0.151	0.153	0.141	0.138	0.115	0.119
094 Southwest Coastal Los Angeles County	.095	.098	0.088	0.110	0.069*	--	--	--	--	--	--	--
820 Southwest Coastal Los Angeles County	--	--	--	--	0.120*	0.086	0.084	0.087	0.086	0.077	0.089	0.078
088 West San Gabriel Valley	.157	.160	0.137	0.152	0.130	0.145	0.151	0.149	0.122	0.176	0.101	0.107
090 Santa Clarita Valley	.131/	.184	0.169	0.194	0.158	0.173	0.156	0.135	0.16	0.14	0.126	0.144
084 South Central Los Angeles County 1	.089	.077	0.072	0.081	0.083	0.111	0.088	0.102	0.078*	--	--	--
112 South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	0.104	0.081	0.082
085 South San Gabriel Valley	.139	.132	0.111	0.128	0.104	0.077	--	0.135	0.107	0.131	0.112	0.096
591 East San Gabriel Valley 2	.172	.190	0.152	0.162	0.134	0.160	0.175	0.147	0.156	0.15	0.124	0.134
3176 Central Orange County	.132	.114	0.103	0.136	0.120	0.095	0.113	0.127	0.105	0.093	0.104	0.088
3177 North Orange County	.137	.107	0.121	0.165	0.099	0.094	0.146	0.152	0.104	0.115	0.118	0.095
3195 North Coastal Orange County	.102	.098	0.087	0.107	0.104	0.085	0.074	0.082	0.094	0.087	0.097	0.093
3186 Saddleback Valley 1	.129	--	--	--	--	--	--	--	--	--	--	--
3812 Saddleback Valley 2	.119	.125	0.136	0.153	0.116	0.125	0.123	0.108	0.118	0.121	0.117	0.094
4137 Coachella Valley 1**	.124	.137	0.136	0.141	0.125	0.139	0.126	0.126	0.11	0.12	0.114	0.124
4157 Coachella Valley 2 **	.112	.114	0.114	0.123	0.111	0.114	0.103	0.106	0.12	0.097	0.1	0.099
4155 Norco/Corona	--	--	--	--	--	--	--	--	--	--	--	--
4141 Hemet/San Jacinto Valley	--	--	--	--	--	--	--	--	--	--	--	--
4144 Metropolitan Riverside County	.140	.143	0.155	0.169	0.141	0.144	0.151	0.131	0.146	0.116	0.128	0.128
4149 Perris Valley	.164	.152	0.147	0.155	0.128	0.088	0.169	0.139	0.142	0.125	0.122	0.125
4150 San Gorgonio Pass	--	--	--	--	--	--	--	--	--	--	--	--
4164 Banning Airport	.138	.149	0.160	0.166	0.156	0.144	0.139	0.129	0.149	0.133	0.124	0.127
4031 Temecula Valley	--	--	--	--	--	--	--	--	--	--	--	0.105
4158 Lake Elsinore	.128	.151	0.139	0.154	0.130	0.149	0.142	0.13	0.139	0.128	0.107	0.133
5203 Central San Bernardino Valley 2	.149	.184	0.147	0.160	0.157	0.163	0.154	0.153	0.157	0.15	0.129	0.135
5204 East San Bernardino Valley	.152	.167*	0.158	0.174	0.160	0.146	0.165	0.149	0.154	0.145	0.128	0.151
5175 Northwest San Bernardino Valley	.184	.171	0.139	0.155	0.138	0.149	0.166	0.145	0.155	0.146	0.131	0.145
5197 Central San Bernardino Valley 1	.169	.165	0.159	0.176	0.149	0.150	0.159	0.144	0.162	0.142	0.143	0.144
5181 Central San Bernardino Mountains 1	.176	.171	0.161	0.163	0.163	0.182	0.164	0.171	0.176	0.149	0.142	0.16
District Maximum	.176	.190	0.169	0.194	0.163	0.182	0.175	0.171	0.176	0.176	0.143	0.160

* Less than 12 full months of data. / Station location change

** Salton Sea Air Basin

Refer to 2003 AQMP for 1955 to 1975 data

TABLE A-6
Particulate Matter (PM10)# – Annual Arithmetic Mean (µg/m³)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	49	45	46	41	56	46	45	46	44	35	35	32	36+	35	32	30	33
069	East San Fernando Valley	42	42	45	36	44	39	41	38	38*	38	34	36	40	36	39	30	29
072	South Coast Los Angeles County 1	39	35	41	32	39	38	37	36	33	33	30	31	30+	29	31	22	24
077	South Coast Los Angeles County 2	--	--	--	--	--	--	--	--	--	38	43	45	41+	36	33	27	29
087	Central Los Angeles	43	41	43	37	45	40	44	39	35	33	30	30	33	31*	33	27	29
090	Santa Clarita Valley	37	33	33	30	38	33	32	33	32	28	26		30+	26	23	21	21
094	Southwest Coastal Los Angeles County 1	36	33	36	33	36	36	37	37	30	31*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	25	23	27	29	26	25	21	22
ORANGE COUNTY:																		
3176	Central Orange County	44	35	39	36	49	40	36	34	33	34	28	33	31+	29+	31	22	25
3186	Saddleback Valley 1	38	30	35	31	37	29	--	--	--	--	--	--	--	--	--	--	--
3812	Saddleback Valley 2	--	--	--	--	29	28	26	31	27	24	19	23	23	23	24	18	19
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	27	29	26	26	29	24	27+	27	27	26	26	25+	31	23+*	23	19	19+
4144	Metropolitan Riverside County 1	69	61	65	56	72	60	63	59	57	56	52	54	55+	47	43	33	34
4149	Perris Valley	47	40	45	38	50	41	41	45	44	41	39	45	55+	38*	35	28	29
4150	San Gorgonio Pass	30	34	38	28	--	--	--	--	--	--	--	--	--	--	--	--	--
4155	Norco/Corona	54	44	50	47	55	49	--	45	41	38	32	37	40+	34	36	27	28
4157	Coachella Valley 2**	52+	51+	49+	48+	53	52+	50+	51+	50+	39+	46	53+	54+	40+	33+	29	33+
4163	Temecula Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4164	Banning Airport	--	--	--	27	35	29	35	28	29	29	27	31	33	26	26	22	20
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	64	69	57	53	42	41
SAN BERNARDINO COUNTY:																		
5171	Southwest San Bernardino Valley 1	54	51	51	47	55	--	--	--	--	--	--	--	--	--	--	--	--
5181	Central San Bernardino Mountains	20	24	24	25	27	24	--	37*	26*	26	26	26	26	24*	25	19	19
5197	Central San Bernardino Valley 1	61	55	54	50	60	53	51	50	47*	48	50	54	55+	40	40	34	32
5203	Central San Bernardino Valley 2	57	53	51	46	57	50	52	50	45	49	42	46	51+	43	42	32	32
5204	East San Bernardino Valley	48	46	43	41	47	46	47	41	37	39	33	36	40	29	30	26	26
5817	Southwest San Bernardino Valley 2	--	--	--	--	66	50	52	45	43	43	41	42	43+	39	36	32	31
	District Maximum	69	61	65	56	72	60	63	59	57	56	52	64	69+	57	53	42	41

* Less than 12 full months of data.
** Salton Sea Air Basin
+ Excludes data flagged for exceptional events
# Federal Reference Method (FRM) filter data only

Refer to 2003 AQMP for 1985-1994 data

TABLE A-7
Particulate Matter (PM10)# – Percent of Sampling Days Exceeding State (50 µg/m^3) and Federal (150 µg/m^3) 24-Hour Standards

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	40/2	41/0	40/0	28/0	58/0	42/0	38/0	40/0	35/0	15/0	22/0	12/0	20/0+	27/0	14/0	9/0	15/0
069	East San Fernando Valley	25/0	25/0	30/0	15/0	35/0	23/0	23/0	12/0	14/0*	12/0	8/0	19/0	19/0	13/0	18/0	2/0	4/0
072	South Coast Los Angeles County 1	19/0	15/0	18/0	10/0	22/0	21/0	17/0	9/0	7/0	7/0	9/0	10/0	9/0+	2/0	5/0	0/0	0/0
077	South Coast Los Angeles County 2	--	--	--	--	--	--	--	--	--	20/0	31/0	33/0	38/0+	16/0	9/0	3/0	0/0
087	Central Los Angeles	23/0	18/0	25/0	17/0	33/0	25/0	33/0	15/0	10/0	8/0	7/0	5/0	9/0	4/0	7/0	0/0	2/0
090	Santa Clarita Valley	14/0	9/0	9/0	6/0	21/0	7/0	7/0	12/0	16/0	3/0	2/0	2/0	9/0+	4/0	2/0	0/0	0/0
094	Southwest Coastal Los Angeles County 1	21/0	8/0	7/0	12/0	10/0	16/0	14/0	20/0	5/0	13/0*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0/0*	0/0	0/0	5/0	0/0	2/0	0/0	0/0
ORANGE COUNTY:																		
3176	Central Orange County	23/2	10/0	18/0	20/0	39/0	13/0	20/0	8/0	10/0	12/0	5/0	13/0	9/0+	5/0	2/0	0/0	3/0
3186	Saddleback Valley 1	18/0	7/0	7/0	10/0	10/0	3/0	--	--	--	--	--	--	--	--	--	--	--
3812	Saddleback Valley 2	--	--	--	--	3/0	3/0	5/0	8/0	4/0	0/0	0/0	2/0	5/0	0/0	2/0	0/0	0/0
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	4/0	3/0	2/0	5/0	5/0	0/0	2/0+	5/0	7/0	3/0	3/0	4/0+	11/0	9/0+*	2/0	0/0	0/0+
4144	Metropolitan Riverside County 1	62/7	68/2	70/2	54/0	72/2	70/0	67/0	69/0	57/2	61/0	56/0	60/0	57/0+	41/0	29/0	6/0	13/0
4149	Perris Valley	38/0	33/0	32/0	26/0	50/0	22/0	27/0	39/0	33/0	25/0	32/0	35/0	56/0+	27/0*	16/0	2/0	5/0
4150	San Gorgonio Pass	12/0	19/0	25/0	9/0	--	--	--	--	--	--	--	--	--	--	--	--	--
4155	Norco/Corona	47/3	33/0	42/2	40/0	55/0	48/0	33/0	34/0	26/0	19/0	9/0	18/0	17/0+	15/0	12/0	0/0	3/0
4157	Coachella Valley 2**	44/2	50/0+	43/0+	40/0+	54/0	50/0+	45/0+	45/0+*	42/0+	20/0+*	34/0	50/0+	61/0+	22/0+	8/0+	5/0	2/0+
4163	Temecula Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4164	Banning Airport	--	--	--	4/0	12/0	8/0	13/2	11/0	15/0	12/0	3/0	15/0	15/0	2/0	2/0	2/0	2/0
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	70/0	75/0+	57/0	56/0	42/0	42/0
SAN BERNARDINO COUNTY:																		
5171	Southwest San Bernardino Valley 1	51/5	53/0	36/2	34/0	56/0	--	--	--	--	--	--	--	--	--	--	--	--
5181	Central San Bernardino Mountains	2/0	0/0	0/0	0/0	0/0	0/0	--	19/0	0/0*	2/0	0/0	2/0	4/0	0/0*	2/0	0/0	0/0
5197	Central San Bernardino Valley 1	57/3	57/0	48/0	47/0	61/0	52/0	57/0	53/0	54/0*	48/0	48/0	52/0	59/0+	23/0	22/0	17/0	7/0
5203	Central San Bernardino Valley 2	53/0	58/0	45/0	38/0	56/0	53/0	52/0	56/0	39/0	48/0	38/0	42/0	49/0+	32/0	21/0	5/0	5/0
5204	East San Bernardino Valley	41/2	42/0	38/0	32/0	40/0	44/0	45/0	32/0	26/0	33/0	21/0	20/0	32/0	7/0	3/0	2/0	3/0
5817	Southwest San Bernardino Valley 2	--	--	--	--	67/2	45/0	42/2	41/0	29/0	29/0	32/0	27/0	24/0+	24/0	15/0	5/0	5/0

* Less than 12 full months of data

** Salton Sea Air Basin

\+ Excludes data flagged for exceptional events

Federal Reference Method (FRM) filter data only

Refer to 2003 AQMP for 1985-1994 data

TABLE A-8
Particulate Matter (PM10)# – Annual Maximum 24-Hour Average (μg/m³)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	157	100	116	87	103	94	106	91	119	83	76	81	83+	98	74	70	65
069	East San Fernando Valley	135	110	92	75	82	74	86	71	81*	74	92	71	109	66	80	51	61
072	South Coastal Los Angeles County 1	146	113	87	69	79	105	91	74	63	72	66	78	75+	62	62	44	43
077	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	83	131	117	123+	81	83	76	50
087	Central Los Angeles	141	138	102	80	88	80	97	65	81	72	70	59	78	66*	72	42	53
090	Santa Clarita Valley	87	91	67	60	75	64	62	61	72	54	55	53	131+	91	56	40	45
094	Southwest Coastal Los Angeles County 1	136	107	79	66	69	74	75	121	58	52*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	47*	44	45	128	50	52	37	41
ORANGE COUNTY:																		
3176	Central Orange County	172	101	91	81	122	126	93	69	96	74	65	104	75+	61+	63	43	53
3186	Saddleback Valley 1	122	79	86	70	111	60	--	--	--	--	--	--	--	--	--	--	--
3812	Saddleback Valley 2	--	--	--	--	56	98	60	80	64	47	41	57	74	42	56	34	48
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	68	130	63	72	104	44	53+	75	108	79	66	73+	83	75+*	140	37	42+
4144	Metropolitan Riverside County 1	219	162	163	116	153	139	136	130	164	137	123	109	118+	115	77	75	82
4149	Perris Valley	145	87	139	98	112	87	86	100	142	83	80	125	120+	85*	80	51	65
4150	San Gorgonio Pass	138	122	227	76	--	--	--	--	--	--	--	--	--	--	--	--	--
4155	Norco/Corona	177	94	158	93	136	129	109+	78	116	76	79	74	93+	86	79	50	60
4157	Coachella Valley 2**	199	117+	144+	114+	119	114+	149+	139+	124+	83+	106	122+	146+	128+	132+	107	106+
4163	Temecula Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4164	Banning Airport	--	--	--	62	86	69	219	70	79	82	76	75	78	51	99	55	51
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	124	142	135	108	89	79
SAN BERNARDINO COUNTY:																		
5171	Southwest San Bernardino Valley 1	167	129	208	92	112	--	--	--	--	--	--	--	--	--	--	--	--
5181	Central San Bernardino Mountains	53	45	47	45	47	49	--	52*	47*	52	49	63	89	41*	57	39	43
5197	Central San Bernardino Valley 1	178	130	122	101	116	108	106	102	101*	106	108	142	111+	75	75	62	84
5203	Central San Bernardino Valley 2	148	136	108	114	134	108	106	94	98	118	72	92	136+	76	66	63	56
5204	East San Bernardino Valley	172	128	103	97	92	109	102	83	92	88	61	103	97	58	52	57	71
5817	Southwest San Bernardino Valley 2	--	--	--	--	--	124	166	91	149	93	74	78	115+	90	70	87	70
	District Maximum	219	162	227	116	153	139	219	139	164	137	131	142+	146+	135	140	107	106

* Less than 12 full months of data.

** Salton Sea Air Basin

\+ Excludes data flagged for exceptional events

Federal Reference Method (FRM) filter data only

Refer to 2003 AQMP for 1985-1994 data

TABLE A-9
Fine Particulate Matter (PM2.5)[#] – Annual Arithmetic Mean (μg/m^3)

STN#	LOCATION	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:														
060	East San Gabriel Valley	23.9	20.2	21.7	21.0	19.3	18.3	17.0	15.5	15.9	14.1	13.2	10.9	12.1
069	East San Fernando Valley	22.9	21.4	24.8	24.0	22.1	19.1	17.9	16.6	16.8	14.1	14.4	12.6	13.2
072	South Coastal Los Angeles County 1	20.7	19.6	21.2	19.5	18.0	17.9	16.0	14.2	14.6	14.2	13.0	10.6	11.0
074	West San Fernando Valley	17.3	18.0	18.4	18.9	16.5	15.6	13.9	12.9	13.1	11.9	11.4	10.3	10.2
077	South Coastal Los Angeles County 2	--	--	--	--	20.5	16.5	14.7	14.5	13.7	13.7	12.5	10.4	10.7
084	South Central Los Angeles County1	24.3	23.0	24.5	23.3	20.3	18.5	17.5	16.7	15.9	15.5	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	14.7	12.6	13.0
085	South San Gabriel Valley	25.7	24.0	25.4	24.0	20.6	20.0	17.0	16.7	16.7	15.1	14.8	12.6	12.5
087	Central Los Angeles	23.0	21.9	22.9	22.1	21.4	19.7	18.1	15.6	16.8	15.7	14.3	11.9	13.0
088	West San Gabriel Valley	19.9	19.4	20.9	20.3	18.6	16.6	15.1	13.4	14.3	12.9	12.3	10.4	10.9
ORANGE COUNTY:														
3176	Central Orange County	26.0	20.3	22.0	18.6	17.3	17.0	14.7	14.1	14.5	13.6	11.7	10.2	11.0
3812	Saddleback Valley	16.6	14.7	15.8	15.5	13.1	12.0	10.7	11.0	11.3	10.3	9.4	8.0	8.5
RIVERSIDE COUNTY:														
4137	Coachella Valley 1**	--	9.7	10.7	10.0	9.0	8.9	8.4	7.7	8.7	7.2	6.6	6.0	6.0
4144	Metropolitan Riverside County 1	30.2	28.3	31.0	27.4	24.8	22.1	21.0	19.0	19.1	16.5	15.3	13.2	13.6
4146	Metropolitan Riverside County 2	26.7	25.3	28.2	27.1	22.6	20.8	18.0	17.0	18.1	13.4	13.5	11.1	11.8
4157	Coachella Valley 2**	12.8	11.2	12.2	12.0	11.4	10.7	10.5	9.5	9.8	8.4	8.0	6.9	7.2
4165	Mira Loma	--	--	--	--	--	--	--	20.6	21	18.2	16.8	15.2	15.3
SAN BERNARDINO COUNTY:														
5197	Central San Bernardino Valley 1	25.7	24.5	24.9	24.3	22.1	19.9	18.9	17.6	19	15.4	14.2	12.1	12.6
5203	Central San Bernardino Valley 2	25.6	25.9	26.1	25.8	22.2	21.9	17.4	17.8	18.3	13.5	12.9	11.3	12.2
5817	Southwest San Bernardino Valley	25.4	24.1	26.5	25.4	23.8	20.9	18.8	18.5	17.9	15.6	14.8	12.9	13.2
5818	East San Bernardino Mountains	10.3	10.2	11.2	11.5	10.6	9.7	12.1	11.2	10.4	9.2	9.9	8.5	8.4
	District Maximum	30.2	28.3	31.0	27.4	24.8	22.1	21.0	20.6	21.0	18.2	16.8	15.2	15.3

* Less than 12 full months of data.

** Salton Sea Air Basin

Federal Reference Method (FRM) filter data only

TABLE A-10
Fine Particulate Matter (PM2.5)# – Percent of Sampling Days Exceeding the Federal Standard (35 µg/m^3)##

STN#	LOCATION	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:														
060	East San Gabriel Valley	17	9	14	12	9	8	6*	3*	7	2	4	1	2
069	East San Fernando Valley	18	14*	16	19	14	10	8	6	9	2	2	1	2
072	South Coastal Los Angeles County 1	9	11*	14	9	7	7	4	2*	4	2	2	0	0
074	West San Fernando Valley	8*	8	7	10	7	4	4	1	1	2	1	1	1
077	South Coastal Los Angeles County 2	--	--	--	--	10	5	2	2	2	2	1	0	1
084	South Central Los Angeles County 1	18	14	16	18	9	7	7	4	4	3	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	3	1	0
085	South San Gabriel Valley	20	13	22	19	9	9	9*	6	5	4	2	0	1
087	Central Los Angeles	15	13	15	13	14	7	7	3	6	3	2	1	1
088	West San Gabriel Valley	9*	6	8	11	10	6	4	1	3	2	3	0	1
ORANGE COUNTY:														
3176	Central Orange County	17	14*	16*	9	7	6	4	2	4	4	1	0	1
3812	Saddleback Valley	4*	4	5	3	3	3	0	1	2	0	1	0	0
RIVERSIDE COUNTY:														
4137	Coachella Valley 1**	--	0	1	1	0	0	0*	0	0	0	0	0	0
4144	Metropolitan Riverside County 1	30	26*	33	25	21	15	11	11	11	4	4	1	1
4146	Metropolitan Riverside County 2	25	22	23	24	19	13	5	9	8	3	2	2	2
4157	Coachella Valley 2**	0*	0	0	0	0	0	2	0	0	0	0	0	0
4165	Mira Loma	--	--	--	--	--	--	--	12	12	9	6	2	3
SAN BERNARDINO COUNTY:														
5197	Central San Bernardino Valley 1	17	19	15	19	14	14	6	6	9	5	2	2	2
5203	Central San Bernardino Valley 2	21	21*	23	24	15	15	3	8	11	3	2	2	2
5817	Southwest San Bernardino Valley	22	14	21	18	17	13	7	7	6	5	3	1	2
5818	East San Bernardino Mountains	--	0	0	0	0	0	4	2*	2	2	2	0	0
	District Maximum	30	22	33	25	21	15	11	12	12	9	6	2	3

* Less than 12 full months of data.

** Salton Sea Air Basin

Federal Reference Method (FRM) filter data only

Effective December 17, 2006, U.S. EPA has strengthen the standard level from 65 µg/m^3 to 35 µg/m^3

TABLE A-11
Fine Particulate Matter (PM2.5)# – Annual Maximum 24-Hour Average (μg/m^3)

STN#	LOCATION	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:														
060	East San Gabriel Valley	81.3	92.5	79.7	72.4	121.2	75.6	132.7*	52.8*	63.8	53.1	72.1	44.4	49.5
069	East San Fernando Valley	79.5	84.4*	94.7	63.0	120.6	60.1	63.2	50.7	56.5	57.5	67.5	43.7	47.8
072	South Coastal Los Angeles County 1	66.9	81.5*	72.9	62.7	115.2	66.6	53.9	58.5*	82.9	57.2	63	35	39.7
074	West San Fernando Valley	79.0*	67.5	71.1	48.8	47.5	56.2	39.6	44.1	43.3	50.5	39.9	40.7	39.8
077	South Coastal Los Angeles County 2	--	--	--	--	--	59.7	50.8	53.6	68	60.9	55.8	33.7	42.0
084	South Central Los Angeles County 1	67.8	82.1	73.1	64.0	54.8	55.8	54.6	55	49	44.2	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	69.2	38.2	35.3
085	South San Gabriel Valley	85.6	89.5	77.3	61.0	90.3	60.7	58.2*	72.2	63.6	47.3	71.1	34.9	41.2
087	Central Los Angeles	69.3	87.8	73.4	66.3	83.7	75.0	73.7	56.2	64.2	78.3	61.7	39.2	49.3
088	West San Gabriel Valley	73.0*	66.3	78.1	57.8	89.0	59.4	62.9	45.9	68.9	66	52	35.2	43.8
ORANGE COUNTY:														
3176	Central Orange County	68.7	113.9*	70.8*	68.6	115.5	58.9	54.7	56.2	79.4	67.9	64.6	31.7	39.2
3812	Saddleback Valley	56.6*	94.7	53.4	58.5	50.6	49.4	35.4	47	46.9	32.6	39.2	19.9	33.4
RIVERSIDE COUNTY:														
4137	Coachella Valley 1**	--	28.5	44.7	42.3	21.2	27.1	26.2*	24.8	32.5	18.1	21.8	12.8	26.3
4144	Metropolitan Riverside County 1	111.2	119.6*	98.0	77.6	104.3	91.7	98.7	68.5	75.7	57.7	54.5	46.5	60.8
4146	Metropolitan Riverside County 2	90.0	79.3	74.9	75.5	73.3	93.8	95.0	55.3	68.6	43	42.2	43.7	51.6
4157	Coachella Valley 2**	29.6*	28.6	33.5	26.8	26.8	28.5	44.4	24.3	26.8	21.6	27.5	16.0	35.4
4165	Mira Loma	--	--	--	--	--	--	--	63.0	69.7	50.9	49.2	54.2	56.3
SAN BERNARDINO COUNTY:														
5197	Central San Bernardino Valley 1	98.0	72.9	74.8	66.6	98.1	71.4	96.8	52.6	77.5	49	46.4	42.6	60.1
5203	Central San Bernardino Valley 2	121.5	89.8*	78.5	82.1	73.9	93.4	106.3	55	72.1	43.5	37.8	39.3	65.0
5817	Southwest San Bernardino Valley	85.8	73.4	71.2	64.8	88.9	86.1	87.8	53.7	72.8	54.2	46.9	46.1	52.9
5818	East San Bernardino Mountains	32.1	29.0	34.6	34.1	35.0	28.6	38.8	40.1*	45.4	36.8	40.8	35.4	30.6
	District Maximum	121.5	119.6	98.0	82.1	121.2	93.8	132.7	72.2	82.9	78.3	72.1	54.2	60.8

* Less than 12 full months of data.

** Salton Sea Air Basin

Federal Reference Method (FRM) filter data only

TABLE A-12
Fine Particulate Matter (PM2.5)# – Annual 24-Hour Average 98th Percentile Concentration (µg/m³)

STN#	LOCATION	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:														
060	East San Gabriel Valley	64	62	61	51	56	54	53	39	49	35	43	35	31
069	East San Fernando Valley	50	83	69	55	60	49	51	43	48	35	34	33	34
072	South Coastal Los Angeles County 1	51	64	49	47	47	46	41	35	41	36	34	28	28
074	West San Fernando Valley	40	50	57	45	45	53	36	32	33	26	27	30	24
077	South Coastal Los Angeles County 2	--	--	--	--	53	42	38	35	34	35	30	27	27
084	South Central Los Angeles County1	53	63	66	53	52	53	48	45	46	37	--	--	--
112	South Cenral Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	38	32	32
085	South San Gabriel Valley	60	71	67	58	50	52	54	43	50	38	35	32	32
087	Central Los Angeles	52	73	58	55	61	50	53	39	51	40	34	27	32
088	West San Gabriel Valley	60	54	55	49	48	47	43	32	45	32	36	25	26
ORANGE COUNTY:														
3176	Central Orange County	66	66	59	48	52	48	42	41	47	39	32	25	28
3812	Saddleback Valley	45	37	46	46	38	39	31	26	35	27	24	17	29
RIVERSIDE COUNTY:														
4137	Coachella Valley 1**		23	33	23	20	23	25	16	21	17	15	13	13
4144	Metropolitan Riverside County 1	79	77	74	66	77	60	58	54	54	41	40	32	31
4146	Metropolitan Riverside County 2	62	67	66	64	56	54	41	48	57	39	34	27	28
4157	Coachella Valley 2**	30	26	30	22	25	27	25	19	27	19	17	12	16
4165	Mira Loma	--	--	--	--	--	--	--	53	60	47	41	36	37
SAN BERNARDINO COUNTY:														
5197	Central San Bernardino Valley 1	66	65	70	57	54	63	48	44	65	47	33	31	28
5203	Central San Bernardino Valley 2	72	70	68	66	58	72	43	48	68	41	35	30	33
5817	Southwest San Bernardino Valley	86	65	65	57	67	60	50	42	53	45	36	31	35
5818	East San Bernardino Mountains	31	27	30	32	29	23	37	40	34	33	29	28	31
	District Maximum	86	83	74	66	77	72	58	54	68	47	43	36	37

* Less than 12 full months of data.

** Salton Sea Air Basin

\# Federal Reference Method (FRM) filter data only

TABLE A-13
Carbon Monoxide – Annual Maximum 8-Hour Average (ppm)
(To Be Compared to Federal Standard (9 ppm) and State Standard (9.0 ppm), 8-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	6.3	4.0	4.3	3.9	3.9	4.9	2.9	2.4	2.6	2	1.7	1.7	1.8	1.6	1.7	1.3	1.4
069	East San Fernando Valley	12.0	9.3	7.4	7.5	9.0	6.1	4.9	4.6	4.7*	3.7	3.4	3.5	2.8	2.6	2.9	2.4	2.4
072	South Coastal Los Angeles County 1	6.6	6.9	6.7	6.6	5.4	5.8	4.7	4.6	4.7	3.4	3.5	3.4	2.6	2.6	2.2	2.1	2.6
033	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.3
074	West San Fernando Valley	10.3	8.5	9.8	9.3	7.6	9.8	6.0	4.8	4.1	3.5	3.5	3.4	2.8	2.9	2.8	2.6	2.8
075	Pomona/Walnut Valley	6.1	5.0	5.0	7.3	6.7	4.9	3.4	3.3	4.4	3.1	2.5	2.1	2	2	1.8	1.8	1.6
084	South Central Los Angeles County 1	13.86	17.3	17.0	13.4	11.0	10.0	7.7	10.1	7.3	6.7	5.9	6.4	5.1	4.3*	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.6	3.6	4.7
085	South San Gabriel Valley	7.86	8.1	6.2	6.1	5.6	5.3	4.0	4	4	3.6	2.4*	2.7*	2.9	2.1	2.1	1.9	2.4
087	Central Los Angeles	8.37	8.4	7.9	6.1	6.3	6.0	4.6	4	4.6	3.2	3.1	2.6	2.2	2.1	2.2	2.3	2.4
088	West San Gabriel Valley	9.12	7.1	6.0	6.3	6.6	7.4	5.0	4	3.8	3.4	2.8	2.8	2.3	2.1	2.1	2	2.2
090	Santa Clarita Valley	4.12	3.9	6.8	3.4	3.6	4.9	3.1	1.9	1.7	3.7	1.3	1.3	1.2	1.1	1.4	1.1	0.8
091	Northwest Coastal Los Angeles County	5.62	4.5	4.4	4.5	3.8	4.3	3.0	2.7	2.7	2.3	2.1	2	2	2	1.5	1.4	1.6
094	Southwest Coastal Los Angeles County 1	8.86	11.6	10.3	9.4	8.4	7.0	5.1	6.1	5	4.4*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	3.0*	2.1	2.3	2.4	2.5	1.9	2.2	1.8
591	East San Gabriel Valley 2	--	--	--	--	--	3.1	2.5--	2.3	2.1	2	1.9	2	2	3	2.1	1.3	1.1
ORANGE COUNTY:																		
3176	Central Orange County	8.00	7.5	5.8	5.3	5.3	6.8	4.7	5.4	3.9	4.1	3.3	3	2.9	3.6	2.7	2	2.1
3177	North Orange County	6.62	6.9	6.0	6.1	5.3	6.1	4.7	4.4	4.1	4	3.1	3	2.9	2.9	2.3	1.8	2.1
3186	Saddleback Valley 1	4.00	4.0	3.6	3.1	2.5	2.3	--	--	--	--	--	--	--	--	--	--	--
3195	North Coastal Orange County	6.57	7.3	5.8	7.0	6.4	6.3	4.6	4.3	5.8	4.1	3.2	3	3.1	2	2.2	2.1	2.2
3812	Saddleback Valley 2	--	--	--	--	--	3.3	2.4	3.6	1.8	1.6	1.6	1.8	2.2	1.1	1	0.9	1
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	1.50	1.6	1.4	1.6	1.8	1.6	1.5	1.2	1.3*	1	0.8	1	0.8	0.6	0.7	0.5	0.6
4144	Metropolitan Riverside County 1	5.71	5.0	5.8	4.6	4.4	4.3	3.4	3	3.7	3	2.5	2.1	2.9	2	1.9	1.8	1.4
4146	Metropolitan Riverside County 2	6.50	5.4	5.0	4.6	4.1	4.3	4.5	3.9	3.4	2.1	2.4	2.3	2.1	2	1.8	1.7	1.5
4157	Coachella Valley 2**	--	--	--	--	--	2.1	--	--	--	--	--	--	--	--	--	--	--
4158	Lake Elsinore	--	--	--	--	--	2.0	2.0	2	1.3*	0.9	1	1	1.4	1	0.7	0.6	0.7
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	2.7	2.1	1.9	2.4	1.9	1.9
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	--	--	--	--	--	2.6	1.8	1.6	2.9	2.1	1.8	1.8	1.7	1.6	1.5	1.8	1.3
5197	Central San Bernardino Valley 1	--	--	--	--	--	--	--	--	--	2.1*	2.1	2	1.8	1.9	1.5	1.4	1.1
5203	Central San Bernardino Valley 2	6.3	4.6	6.0	4.6	4.0	4.3	3.3	3.3	4.6	3.3	2.4	2.3	2.3	1.8	1.9	1.7	1.7
	District Maximum	13.9	17.3	17.0	13.5	11.7	10.0	7.7	10.1	7.3	6.7	5.9	6.4	5.1	4.3	4.6	3.6	4.7

* Less than 12 full months of data.
** Salton Sea Air Basin
Refer to 2003 AQMP for 1976-1994 data

TABLE A-14
Nitrogen Dioxide – Annual Average (pphm)
(To Be Compared to Federal Standard (5.34 pphm) and State Standard (3.0 pphm), Annual Average of All Hours)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	4.64	4.15	3.38	3.64	3.90	3.66	3.31	3.36	2.96	2.04	2.51	2.58	2.53	2.3	1.94	1.85	1.9
069	East San Fernando Valley	4.54	4.61	4.24	4.16	4.56	4.15	4.19	4.02	3.56*	3.32	2.94	2.74	2.89	2.85	2.74	2.41	2.21
072	South Coastal Los Angeles County 1	3.67	3.42	3.33	3.39	3.42	3.13	3.08	2.98	2.88*	2.80	2.41	2.15	2.07	2.08	2.12	1.98	1.77
033	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	21.2
074	West San Fernando Valley	3.17	3.07	2.60	2.66	2.87	2.85	2.66	2.48	2.6*	2.14	2.02	1.74	1.86	1.8	1.71	1.67	1.49
075	Pomona/Walnut Valley	4.56	4.26	4.33	4.33	5.03	4.35	3.71	3.65	3.52	3.14	3.12	3.07	3.18	3.02	2.74	2.62	2.46
084	South Central Los Angeles County 1	4.63	4.12	4.28	3.93	4.28	3.86	3.69	3.57	3.12	3.01	--	3.06	2.91	3.01*	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.14	1.79	1.86
085	South San Gabriel Valley	4.56	3.93	3.63	3.69	3.91	3.66	3.52	3.44	3.53	3.05	3.12	2.83*	2.49	2.63	2.59	2.29	2.37
087	Central Los Angeles	4.50	4.36	4.30	3.98	3.91	4.04	3.78	3.27	3.38	3.28	3.08*	2.88	2.99	2.75	2.81	2.5	2.31
088	West San Gabriel Valley	3.75	3.78	3.41	3.51	3.79	2.96	3.45	3.35	3.22	2.70	2.78	2.45	2.46	2.35	2.21	1.96	2.03
090	Santa Clarita Valley	3.05	--	--	--	2.84	2.46	2.39	2.00	2.21	2.04	2.41	1.84	1.96	1.65	1.51	1.43	1.33
091	Northwest Coastal Los Angeles County	2.78	2.89	2.85	2.71	2.91	2.73	2.51	2.49	2.31	1.98	1.90	1.73	2	1.84	1.7	1.56	1.39
094	Southwest Coastal Los Angeles County 1	3.05	2.85	2.80	2.95	2.95	2.75	2.50	2.44*	2.38	3.10*	1.78	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	1.36*	1.34	1.55	1.4	1.43	1.59	1.21	1.34
591	East San Gabriel Valley 2	3.80	3.28	3.00	2.76	3.28	2.90	2.74	2.72	2.71	2.40	2.24	2.06	2.27	1.82	1.7	1.54	1.29
ORANGE COUNTY:																		
3176	Central Orange County	3.71	3.19	3.32	3.36	3.27	3.00	2.93*	2.44	2.40	1.99	2.11	1.97	2.08	2.03	1.79	1.75	1.68
3177	North Orange County	3.91	3.54	3.29	3.44	3.51	3.04	2.75	2.56	2.84	2.52	2.49	2.24	2.19	2.06	2.06	2.01	1.77
3195	North Coastal Orange County	2.39	2.06	1.99	2.00	2.09	2.05	1.82	1.87	1.99	1.51	1.31	1.45	1.32	1.32	1.3	1.13	1.00
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	2.23	2.10	1.58	1.70	1.95	1.78	1.75	1.72	1.73*	1.30	1.20	1.03	1.03	0.93	0.81	0.85	0.8
4144	Metropolitan Riverside County 1	3.06	2.94	2.62	2.25	2.25	2.36	2.47	2.37	2.17	1.72	2.22	1.99	2.06	1.92	1.71	1.68	1.66
4146	Metropolitan Riverside County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	2.58*	2	1.72	1.69
4157	Coachella Valley 2**	--	--	--	--	--	0.99	--	--	--	--	--	--	--	--	--	--	--
4158	Lake Elsinore	2.08	1.82	1.65	1.74	2.00	1.75	1.85	1.73	1.82*	1.51	1.42	1.51	1.74	1.29	1.29	1.01	0.96
4164	Banning Airport	--	--	--	2.15	2.43	2.37	2.11	1.99	1.93*	1.65	1.48	1.61	1.47	1.28	1.09	1.16	0.95
4165	Mira LOma	--	--	--	--	--	--	--	--	--	--	--	1.94	1.81	1.74	1.58	1.51	1.53
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	4.64	3.87	3.41	3.59	3.98	3.80	3.84	3.69	3.49	3.05	3.13	3.1	2.76	2.35	2.39	2.04	1.96
5197	Central San Bernardino Valley 1	4.24	3.86	3.65	3.62	3.88	3.64	3.58	3.34*	3.07	2.73	3.10	2.7	2.39	2.07	2.35	2.31	2.11
5203	Central San Bernardino Valley 2	4.04	3.84	3.53	3.39	3.58	3.25	3.03	2.96	2.70	2.61	2.59	2.52	2.45	2.17	1.96	1.88	1.69
	District Maximum	4.64	4.61	4.33	4.33	5.03	4.35	4.19	4.02	3.56	3.32	3.13	3.10	3.18	3.02	2.81	2.62	2.46

* Less than 12 full months of data. ** Salton Sea Air Basin Refer to 2003 AQMP for 1976-1994 data

TABLE A-15
Nitrogen Dioxide – Annual Maximum 1-Hour Average (ppm)
(To Be Compared to Federal Standard (0.100 ppm) and State Standard (0.18 ppm), 1-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
060	East San Gabriel Valley 1	0.22	0.15	0.16	0.14	0.16	0.15	0.12	0.12	0.12	0.10	0.09	0.11	0.12	0.10	0.10	0.077	0.080
069	East San Fernando Valley	0.18	0.20	0.20	0.14	0.18	0.17	0.25	0.26	0.14	0.12	0.09	0.10	0.09	0.11	0.09	0.082	0.068
072	South Coastal Los Angeles County 1	0.21	0.17	0.20	0.16	0.15	0.14	0.13	0.13	0.14	0.12	0.14	0.10	0.11	0.13	0.11	0.093	0.106
033	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.090
074	West San Fernando Valley	0.14	0.16	0.20	0.14	0.12	0.11	0.09	0.09	0.13	0.08	0.09	0.07	0.08	0.09	0.07	0.075	0.056
075	Pomona/Walnut Valley	0.18	0.18	0.15	0.15	0.16	0.14	0.13	0.11	0.12	0.11	0.08	0.10	0.10	0.11	0.10	0.097	0.087
084	South Central Los Angeles County 1	0.21	0.25	0.20	0.16	0.18	0.14	0.15	0.14	0.13	0.10	0.11	0.14	0.10	0.12*	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.09	0.077	0.075
085	South San Gabriel Valley	0.23	0.17	0.15	0.14	0.16	0.14	0.14	0.12	0.14	0.12	0.09	0.10*	0.11	0.10	0.10	0.079	0.091
087	Central Los Angeles	0.24	0.25	0.20	0.17	0.21	0.16	0.14	0.14	0.16	0.16	0.13	0.11	0.10	0.12	0.12	0.089	0.110
088	West San Gabriel Valley	0.22	0.19	0.17	0.16	0.16	0.17	0.15	0.15	0.14	0.12	0.10	0.12	0.09	0.11	0.08	0.071	0.087
090	Santa Clarita Valley	0.16	--	--	--	0.10	0.10	0.10	0.10	0.12	0.09	0.09	0.08	0.08	0.07	0.06	0.059	0.060
091	Northwest Coastal Los Angeles County	0.20	0.18	0.14	0.13	0.13	0.16	0.11	0.11	0.12	0.09	0.08	0.08	0.08	0.09	0.08	0.071	0.081
094	Southwest Coastal Los Angeles County 1	0.18	0.15	0.17	0.15	0.13	0.13	0.11	0.10	0.12	0.08	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0.09*	0.09	0.10	0.08	0.09	0.08	0.076	0.098
591	East San Gabriel Valley 2	0.20	0.14	0.13	0.13	0.14	0.13	0.12	0.10	0.12	0.12	0.09	0.10	0.11	0.10	0.09	0.079	0.078
ORANGE COUNTY:																		
3176	Central Orange County	0.18	0.15	0.10	0.13	0.12	0.13	0.12	0.10	0.13	0.12	0.09	0.11	0.10	0.09	0.07	0.073	0.074
3177	North Orange County	0.20	0.16	0.15	0.13	0.16	0.12	0.13	0.12	0.16	0.12	0.09	0.09	0.08	0.08	0.10	0.083	0.070
3195	North Coastal Orange County	0.18	0.14	0.12	0.12	0.12	0.11	0.08	0.11	0.11	0.10	0.09	0.10	0.07	0.08	0.07	0.070	0.061
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	0.09	0.08	0.07	0.07	0.07	0.07	0.08	0.10	0.06	0.07	0.10	0.09	0.06	0.05	0.05	0.046	0.045
4144	Metropolitan Riverside County 1	0.15	0.11	0.12	0.10	0.13	0.10	0.15	0.10	0.09	0.09	0.08	0.08	0.07	0.09	0.08	0.065	0.063
4146	Metropolitan Riverside County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.09*	0.08	0.061	0.057
4157	Coachella Valley 2**	--	--	--	--	--	0.06	--	--	--	--	--	--	--	--	--	--	--
4158	Lake Elsinore	0.21	0.10	0.11	0.09	0.11	0.08	0.09	0.07	0.08	0.06	0.07	0.07	0.06	0.06	0.06	0.051	0.050
4164	Banning Airport	--	--	--	0.26	0.31	0.21	0.24	0.15	0.09	0.08	0.07	0.11	0.08	0.08	0.06	0.066	0.061
4165	Mira Loma	--	--	--	--	--	--	--	--	--	--	--	0.08	0.07	0.10	0.08	0.062	0.059
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	0.20	0.15	0.15	0.14	0.13	0.15	0.13	0.12	0.11	0.11	0.10	0.10	0.10	0.09	0.11	0.079	0.069
5197	Central San Bernardino Valley 1	0.17	0.17	0.14	0.15	0.15	0.12	0.13	0.12*	0.12	0.06	0.10	0.09	0.09	0.10	0.11	0.072	0.076
5203	Central San Bernardino Valley 2	0.16	0.15	0.14	0.11	0.14	0.10	0.11	0.11	0.10	0.12	0.0.08	0.09	0.08	0.09	0.08	0.069	0.062
	District Maximum	0.24	0.25	0.2	0.26	0.31	0.21	0.25	0.26	0.16	0.16	0.14	0.14	0.12	0.13	0.12	0.097	0.110

* Less than 12 full months of data. ** Salton Sea Air Basin Refer to 2003 AQMP for 1976-1994 data

TABLE A-16
Sulfur Dioxide – Annual Maximum 1-Hour Average (ppm)
(To Be Compared to Federal Standard (0.075 ppm) and State Standard (0.25 ppm), 1-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
60	East San Gabriel Valley 1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
69	East San Fernando Valley	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01*	0.02	0.01	0.01	0.01	0.01	0.01	0.015	0.009
72	South Coastal Los Angeles County 1	0.14	0.04	0.04	0.08	0.05	0.05	0.05	0.03	0.03	0.04	0.04	0.03	0.11	0.09	0.02	0.040	0.015
33	South Coastal Los Angeles County 3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.043
74	West San Fernando Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
84	South Central Los Angeles County	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
85	South San Gabriel Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
87	Central Los Angeles	0.01	0.01	0.02	0.14	0.05	0.08	0.03	0.02	0.05*	0.08	0.07	0.03	0.01	0.01	0.01	0.010	0.020
88	West San Gabriel Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
90	Santa Clarita Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
91	Northwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
94	Southwest Coastal Los Angeles County 1	0.06	0.06	0.1	0.03	0.09	0.17	0.04	0.07	0.03	0.03*	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0.02*	0.04	0.02	0.02	0.02	0.02	0.026	0.012
ORANGE COUNTY:																		
3176	Central Orange County	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3177	North Orange County	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3195	North Coastal Orange County	0.02	0.01	0.03	0.02	0.02	0.02	0.01	0.03	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.010	0.008
RIVERSIDE COUNTY:																		
4144	Metropolitan Riverside County	0.01	0.01	0.04	0.03	0.03	0.11	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.018	0.051
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5197	Central San Bernardino Valley 1	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.03*	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.007	0.012
5203	Central San Bernardino Valley 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	District Maximum	0.14	0.06	0.1	0.14	0.09	0.17	0.05	0.07	0.05	0.08	0.07	0.03	0.11	0.09	0.02	0.04	0.051

* Less than 12 full months of data.
** Salton Sea Air Basin
Refer to 2003 AQMP for 1976-1994 data

TABLE A-17
Sulfate (PM10) – Annual Maximum 24-Hour Average (μg/m^3)
(To Be Compared to State Standard of 25 μg/m^3, 24-Hour Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
60	East San Gabriel Valley 1	12.7	11.9	12.9	10.5	16.9	14.3	12.7	12.3	13.1	10.8	10.8	17.0	34.2	17.3	7.3	7.3	6.6
69	East San Fernando Valley	14.9	12.0	14.7	9.8	11.4	15.7	14.6	12.2	15.3	11.0	11.8	13.3	10.2	10.8	8.8	8.0	7.4
72	South Coastal Los Angeles County 1	18.2	14.9	11.3	12.8	13.1	11.9	15.0	14.4	15.6	14.7	10.8	16.5	10.3	9.7	9.5	10.0	6.1
77	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	15.0	15.9	13.5	17.9	8.4	11.0	7.3	12.6	5.9
87	Central Los Angeles	16.2	14.7	16.2	10.3	16.7	14.6	16.2	13.5	14.5	10.5	11.7	13.1	9.4	12.7	9.5	7.5	8.0
89	Santa Clarita Valley 1	11.2	8.4	10.4	7.2	17.3	--	--	--	--	--	--	--	--	--	--	--	--
90	Santa Clarita Valley 2	--	--	--	--	--	--	9.2	9.2	11.2	8.9	9.3	8.8	9.2	6.7	6.0	6.9	6.1
94	Southwest Coastal Los Angeles County1	18.1	16.1	15.3	11.6	17.6	--	--	--	--	--	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	12.6	11.0	12.4	10.7	13.4	8.4	8.5	5.9
ORANGE COUNTY:																		
3176	Central Orange County	14.5	17.3	14.7	12.9	9.6	--	9.9	11.8	11.3	12.2	9.0	12.8	12.1	8.7	7.6	6.6	6.5
3186	Saddleback Valley 1	12.3	15.1	14.2	9.1	8.8	--	--	--	--	--	--	--	--	--	--	--	--
3812	Saddleback Valley 2	--	--	--	--	8.6	12.3	10.1	10.9	10.5	9.2	9.2	9.4	8.8	6.8	6.1	7.4	4.8
RIVERSIDE COUNTY:																		
4137	Coachella Valley 1**	6.8	5.7	5.9	5.5	5.4	6.2	6.0	5.3	6.5	5.2	5.5	4.9	5.8	5.2	4.8	5.1	4.4
4144	Metropolitan Riverside County 1	22.3	14.9	14.8	10.0	11.1	10.7	11.3	10.5	12.4	24.8	10.5	10.9	13.7	7.3	8.3	7.2	5.3
4149	Perris Valley	13.5	8.0	9.1	7.9	8.7	7.4	8.3	7.9	6.9	7.8	7.7	9.0	10.1	6.5	6.3	5.8	4.4
4150	San Gorgonio Pass	7.3	8.5	8.7	6.5	2.7	--	--	--	--	--	--	--	--	--	--	--	--
4155	Norco/Corona	13.6	11.3	13.1	9.8	10.1	11.0	10.2	10.5	9.9	10.1	7.1	10.7	18.9	13.4	10.7	7.0	5.1
4157	Coachella Valley 2**	10.4	6.7	5.8	5.4	4.9	6.9	7.5	7.2	6.2	6.7	6.1	5.4	5.2	5.6	5.1	4.8	5.7
4164	Banning Airport				6.1	4.6	6.9	6.4	8.0	5.8	6.7	7.1	7.5	6.2	6.3	5.4	5.5	4.4
4165	Mira Loma Van Buren	--	--	--	--	--	--	--	--	--	--	--	10.1	19.6	8.6	5.9	5.3	5.4
SAN BERNARDINO COUNTY:																		
5181	Central San Bernardino Mountains	4.8	5.2	4.7	4.5	3.0	5.1	5.2	4.0	3.7	4.7	5.9	4.2	3.9	4.4	3.9	4.7	4.0
5197	Central San Bernardino Valley 1	14.2	11.0	11.2	9.8	11.6	11.6	11.3	11.6	12.4	10.2	9.0	11.7	22.2	8.9	6.1	6.2	6.0
5203	Central San Bernardino Valley 2	11.9	11.6	9.2	13.1	10.8	10.6	10.3	10.8	11.4	10.4	9.3	10.0	9.7	8.3	5.6	6.6	5.5
5204	East San Bernardino Valley	11.3	9.9	8.8	9.6	9.8	10.2	9.0	9.7	9.0	10.5	8.6	11.7	11.3	7.4	5.4	6.6	4.9
5817	Southwest San Bernardino Valley	--	--	--	4.6	10.1	10.2	11.4	10.7	11.0	11.1	9.3	11.2	22.8	12.4	7.0	7.3	5.5
	District Maximum	22.3	17.3	16.2	13.1	17.6	15.7	16.2	14.4	15.6	24.8	13.5	17.9	34.2	17.3	10.7	12.6	8.0

* Less than 12 full months of data.
** Salton Sea Air Basin
Refer to 2003 AQMP for 1976-1994 data

TABLE A-18
Lead (TSP) – Annual Maximum Calendar Quarter Mean (µg/m^3)
(To Be Compared to Former Federal Standard of 1.5 µg/m^3, Calendar Quarter Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
69	East San Fernando Valley	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
72	South Coastal Los Angeles County 1	0.04	0.08	0.03	0.04	0.05	0.04	0.04	0.02	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
77	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	0.01	0.01	0.01	0.01	0.01	0.01
84	South Central Los Angeles County 1	0.06	0.05	0.07	0.04	0.09	0.06	0.10	0.04	0.04	0.03	0.02	0.02	0.03	0.02*	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.01*	0.02	0.01	0.01
85	South San Gabriel Valley	0.06	0.06	0.06	0.05	0.09	0.06	0.05	0.05	0.04	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.01
87	Central Los Angeles	0.06	0.06	0.07	0.04	0.07	0.05	0.05	0.03	0.03	0.03	0.02	0.01	0.03	0.02	0.01	0.01	0.01
94	Southwest Coastal Los Angeles County	0.04	0.03	0.05	0.04	0.04	0.05	0.04	0.02	0.03	0.01	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	--	--	0.01	0.01	0.01	0.01	0.01	0.01
LOS ANGELES COUNTY (Source-Specific):																		
	Van Nuys Airport, Van Nuys	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.04
	Trojan Battery, Santa Fe Springs	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08	0.10	0.07	0.08
	Quemetco, City of Industry	--	--	--	--	--	--	--	--	--	--	--	--	--	0.06*	0.10	0.10	0.06
	Exide (Rehrig), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	--	2.41	0.48	0.39	0.45
	Exide (ATSF), Vernon	--	--	--	--	--	--	--	--	--	--	--	0.21	0.52	0.22	0.08	0.05	0.06
	Exide (Ayers St.), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.02	0.02	--
ORANGE COUNTY:																		
3176	Central Orange County	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RIVERSIDE COUNTY:																		
4144	Metropolitan Riverside County 1	0.04	0.04	0.04	0.04	0.05	0.05	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
4146	Metropolitan Riverside County 2	0.03	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
5203	Central San Bernardino Valley	0.04	0.04	0.04	0.03	0.05	0.05	0.04	0.02	0.08	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
	District Maximum	0.06	0.08	0.07	0.05	0.09	0.06	0.10	0.05	0.08	0.03	0.03	0.21	0.52	2.41	0.48	0.39	0.45

* Less than 12 full months of data.

Refer to 2003 AQMP for 1976-1994 data

TABLE A-19

Lead (TSP) – Annual Maximum Monthly Average (μg/m^3)

(To Be Compared to State Standard of 1.5 μg/m^3, Monthly Average)

STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
69	East San Fernando Valley	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
72	South Coastal Los Angeles County 1	0.05	0.09	0.05	0.07	0.06	0.05	0.05	0.03	0.10	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01
77	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.01
84	South Central Los Angeles County 1	0.06	0.09	0.07	0.04	0.17	0.09	0.23	0.04	0.04	0.03	0.03	0.02	0.03	0.03	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.01	0.01
85	South San Gabriel Valley	0.07	0.09	0.08	0.07	0.21	0.09	0.07	0.06	0.05	0.03	0.03*	0.03	0.04	0.02	0.04	0.02	0.01
87	Central Los Angeles	0.07	0.08	0.07	0.06	0.13	0.06	0.06	0.05	0.15	0.03	0.03	0.02	0.04	0.02	0.02	0.01	0.01
94	Southwest Coastal Los Angeles County	0.04	0.04	0.06	0.06	0.05	0.08	0.04	0.02	0.17	0.01	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
LOS ANGELES COUNTY (Source-Specific):																		
	Van Nuys Airport, Van Nuys	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	0.06
	Trojan Battery, Santa Fe Springs	--	--	--	--	--	--	--	--	--	--	--	--	--	0.10	0.15	0.08	0.12
	Quemetco, City of Industry	--	--	--	--	0.28	0.44	0.46	0.15	0.18	0.13	0.38	0.10	--	0.06*	0.11	0.12	0.07
	Exide (Rehrig), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	1.97*	2.88	0.80	0.48	0.54
	Exide (ATSF), Vernon	--	--	--	--	--	--	--	--	--	--	--	0.23	1.01	0.25	0.09	0.08	0.07
	Exide (Ayers St.), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04*	0.03	0.02	--
ORANGE COUNTY:																		
3176	Central Orange County	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RIVERSIDE COUNTY:																		
4144	Metropolitan Riverside County 1	0.04	0.08	0.07	0.08	0.06	0.06	0.04	0.03	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01
4146	Metropolitan Riverside County 2	0.05	0.05	0.07	0.10	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
SAN BERNARDINO COUNTY:		0.05	0.04	0.04	0.05	0.07	0.07	0.05	0.02	0.08	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01
5175	Northwest San Bernardino Valley	0.05	0.06	0.04	0.05	0.07	0.06	0.05	0.03	0.14	0.02	0.02	0.03	0.04	0.02	0.01	0.01	0.01
5203	Central San Bernardino Valley	0.07	0.09	0.08	0.10	0.28	0.44	0.46	0.15	0.18	0.13	0.38	0.23	1.01	2.88	0.80	0.48	0.54
	District Maximum	0.07	0.09	0.08	0.10	0.21	0.09	0.23	0.06	0.17	0.03	0.03	0.28	0.23	1.97	2.88	0.80	0.45

* Less than 12 full months of data.

Refer to 2003 AQMP for 1976-1994 data

TABLE A-20
Lead (TSP) – Annual Maximum 3-Month Rolling Average (μg/m^3)
(To Be Used for Comparison to Federal Standard of 0.15 μg/m^3, 3-Month Rolling Average)

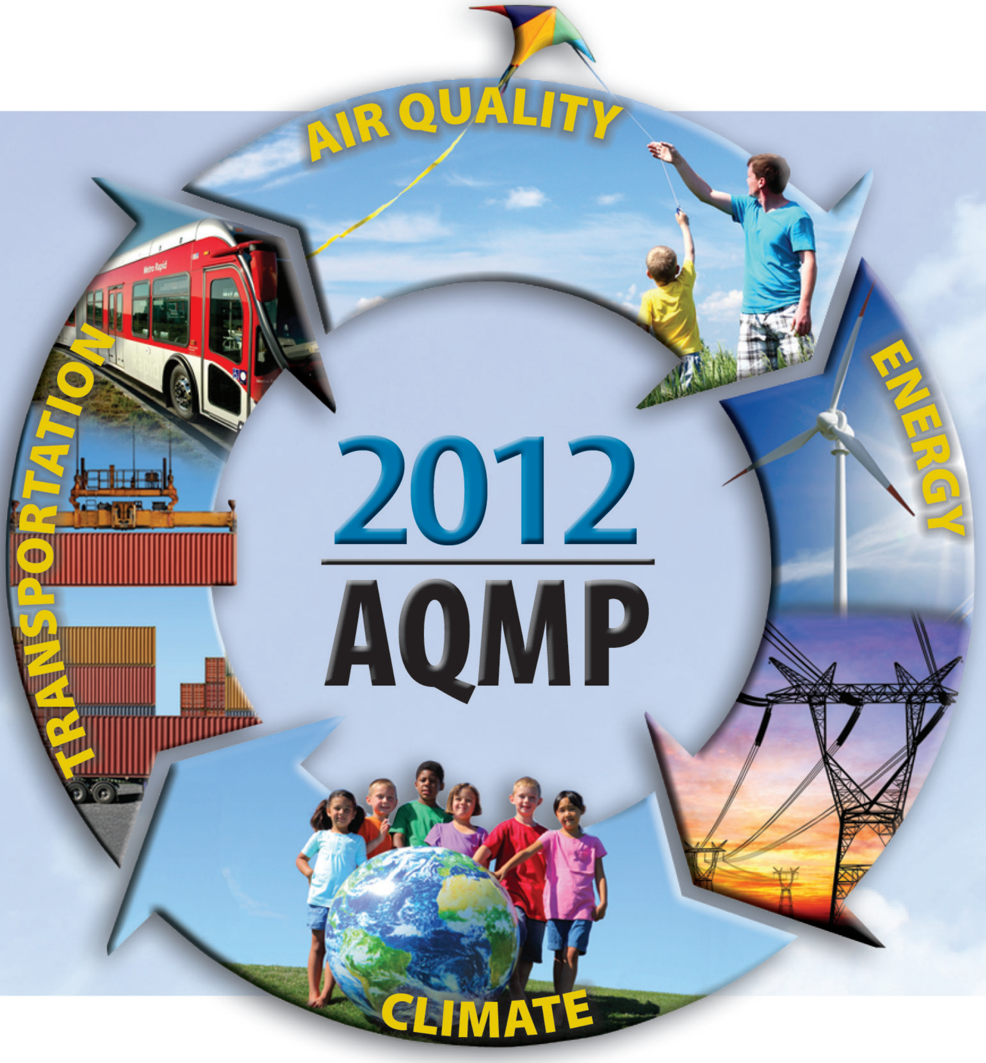
STN#	LOCATION	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LOS ANGELES COUNTY:																		
69	East San Fernando Valley	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
72	South Coastal Los Angeles County 1	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.03	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01
77	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.01
84	South Central Los Angeles County 1	0.05	0.07	0.07	0.05	0.09	0.07	0.11	0.04	0.04	0.03	0.03	0.02	0.03	0.03	--	--	--
112	South Central Los Angeles County 2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.02	0.01	0.01
85	South San Gabriel Valley	0.06	0.06	0.07	0.06	0.10	0.08	0.05	0.05	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.01	0.01
87	Central Los Angeles	0.06	0.06	0.07	0.05	0.07	0.05	0.05	0.04	0.06	0.06	0.02	0.01	0.03	0.02	0.02	0.01	0.01
94	Southwest Coastal Los Angeles County	0.04	0.04	0.05	0.05	0.04	0.05	0.04	0.03	0.07	0.07	--	--	--	--	--	--	--
820	Southwest Coastal Los Angeles County	--	--	--	--	--	--	--	--	--	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
LOS ANGELES COUNTY (Source-Specific):																		
	Van Nuys Airport, Van Nuys	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.04	0.04
	Trojan Battery, Santa Fe Springs	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08	0.12	0.07	0.11
	Quemetco, City of Industry	--	--	--	--	0.22	0.37	0.33	0.12	0.15	0.11	0.22	0.09	--	--	0.10	0.10	0.06
	Exide (Rehrig), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	--	2.49	0.66	0.39	0.46
	Exide (ATSF), Vernon	--	--	--	--	--	--	--	--	--	--	--	0.21	0.55	0.22	0.08	0.05	0.06
	Exide (Ayers St.), Vernon	--	--	--	--	--	--	--	--	--	--	--	--	--	0.03	0.02	0.02	--
ORANGE COUNTY:																		
3176	Central Orange County	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RIVERSIDE COUNTY:																		
4144	Metropolitan Riverside County 1	0.04	0.05	0.04	0.05	0.05	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.01	0.01
4146	Metropolitan Riverside County 2	0.03	0.03	0.05	0.06	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
SAN BERNARDINO COUNTY:																		
5175	Northwest San Bernardino Valley	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.02	0.04	0.03	0.02	0.01	0.02	0.01	0.01	0.01	0.01
5203	Central San Bernardino Valley	0.04	0.05	0.03	0.04	0.05	0.05	0.05	0.03	0.08	0.07	0.01	0.02	0.02	0.02	0.01	0.01	0.01
	District Maximum	0.06	0.07	0.07	0.06	0.22	0.37	0.33	0.12	0.15	0.11	0.22	0.21	0.55	2.49	0.66	0.39	0.46

* Less than 12 full months of data.

Refer to 2003 AQMP for 1976-1994 data

Appendix III

Air Quality Management Plan



Base and Future Year Emission Inventory

February 2013

South Coast Air Quality Management District
Cleaning the air that we breathe...™

FINAL 2012 AQMP
APPENDIX III

BASE AND FUTURE YEAR EMISSION INVENTORY

FEBRUARY 2013

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CHAPTER 1

INVENTORY DEVELOPMENT

Background
Air Contaminants
Inventory Source Categories
- **Stationary Sources**
- **Mobile Sources**

Inventory Type
- **Average Annual Day Inventory**
- **Planning Inventory**

BACKGROUND

To protect the public health and welfare, federal and state standards limit concentration levels of air contaminants in ambient air, an emission inventory of air pollutants and their sources is essential to identify the major contributors of air contaminants and the measures required to reduce air pollution. 2008 is the base year used to project future year emissions for the Final 2012 Air Quality Management Plan (AQMP). The 2008 base year emissions inventory reflects adopted District air regulations that are implemented as of June, 2012 and CARB rules adopted by August 2011. Both the federal and state Clean Air Acts specify 1990 as the base year to measure emission reduction progress. In these inventories, only anthropogenic sources (i.e., those associated with human activity) are considered.

This appendix includes six attachments: Attachment A – Average Annual Emissions Summary by Major Source Category; Attachment B – Summer Planning Emissions Summary by Major Source Category; Attachment C – Top South Coast Air Basin (SCAB) VOC and NOx producers which emitted equal to or greater than ten (10) tons per year in 2008; Attachment D – On-Road Emissions by Vehicle Category; Attachment E – Emissions from Diesel Fuel Combustion by Major Source Category; and Attachment F – 2008 Base Year Greenhouse Gas Emission Inventory Methodology and 2008 Greenhouse Gas Emissions Summary by Major Source Category. The years of 2008, 2014, 2017, 2019, 2023, and 2030 are provided in Attachments A, B, D and E, except year 2017 in Attachment D. Since Year 2017 transportation activity data is not provided by Southern California Association of Governments (SCAG), year 2017 on-road data is derived from the interpolation of the data between 2014 and 2019.

Information necessary to produce the emission inventory for the Basin is obtained from the District and other governmental agencies, including California Air Resources Board (CARB), California Department of Transportation (Caltrans), and SCAG. Each of these agencies is responsible for collecting data (e.g., industry growth factors, socio-economic projections, travel activity levels, emission factors, emission speciation profile, and emissions) and developing methodologies (e.g., model and demographic forecast improvements) required to generate a comprehensive emissions inventory. Entire statewide emissions inventories are compiled and maintained by CARB in its emission related information databases named California Emission Inventory Development and Reporting System (CEIDARS), and California Emission Forecasting and Planning Inventory System (CEFIS). CARB is the agency responsible for developing the emissions inventory for all the mobile sources, except the aircraft. CARB provided on-road and most of the off-road inventories using its EMFAC 2011 and 2011 In-Use Fleet Off-Road Models. Caltrans provides SCAG with information regarding highway projects. SCAG incorporates these data into their Travel Demand Model for estimating/projecting vehicle miles traveled (VMT) and speeds. SCAG's socio-economic and transportation activities projections in their 2012 Regional Transportation Plan (RTP) are applied in the Final 2012 AQMP. On-road emissions are derived from the emission factors in CARB's EMFAC2011 and transportation activities and speed distribution from SCAG's Travel Demand Model.

AIR CONTAMINANTS

Currently, air quality standards exist for the following criteria air contaminants: ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), fine suspended particulate less than 10 microns (PM10), fine particulate less than 2.5 microns (PM2.5), lead, and sulfate. This appendix presents emission levels in the Basin for the criteria air contaminants and their precursors. Specifically, data are included for emissions of total organic gases (TOG), volatile organic compounds (VOC), oxides of nitrogen (NOx), oxides of sulfur (SOx), CO, particulate matter (PM), PM10, PM2.5, and ammonia (NH3).

Ozone is formed from photochemical reactions involving other air contaminants so it is not inventoried. Although air quality standards for NOx and SOx are based on NO_2 and SO_2, respectively, emissions of NOx and SOx are in the emissions inventory because multiple species of NOx and SOx contribute to the formation of particulate, and NOx and VOC react in the presence of sunlight to produce ozone.

TOG incorporates all gaseous compounds containing the element carbon with the exception of the inorganic compounds, CO, carbon dioxide (CO_2), carbonic acid, carbonates, and metallic carbides. VOC, a subset of TOG, includes all organic gases in TOG except acetone, ethane, methane, methylene chloride, methylchloroform, perchloroethylene, methyl acetate, parachlorobenzotrifluoride, and a number of Freon-type gases. It should be noted that this definition of VOC is different from the one used by the CARB, which includes some compounds not considered as VOCs according to U.S. EPA. Table III-1-1 lists the compounds that are exempt in U.S. EPA's VOC list, but are included in CARB's VOC list. Certain CFCs are still included in CARB's VOC list. According to CARB, the total emission inventory difference between U.S. EPA VOC and CARB's VOC is very small.

PM represents all airborne particulate matter. Important subsets of PM are PM10 and PM2.5. In the Final 2012 AQMP, the amount of VOC in TOG and the amount of PM10 and PM2.5 in PM are calculated for each process primarily using species and size fraction profiles provided by CARB. Besides average annual day emissions that are reported for all criteria pollutants, summer planning inventories (VOC and NOx) are reported for ozone purposes.

TABLE III-1-1

List of Compounds Exempt in U.S. EPA's Definition of VOC; Included in CARB's Definition of VOC

COMPOUND	CAS *
3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422-56-0
1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507-55-1
1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC-43-10mee)	138495-42-8
difluoromethane (HFC-32)	75-10-5
ethylfluoride (HFC-161)	353-36-6
1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
1,1,2,2,3-pentafluoropropane (HFC-245ca)	679-86-7
1,1,2,3,3-pentafluoropropane (HFC-245ea)	24270-66-4
1,1,1,2,3-pentafluoropropane (HFC-245eb)	431-31-2
1,1,1,3,3-pentafluoropropane (HFC-245fa)	460-73-1
1,1,1,2,3,3-hexafluoropropane (HFC-236ea)	431-63-0
1,1,1,3,3-pentafluorobutane (HFC-365mfc)	406-58-6
chlorofluoromethane (HCFC-31)	593-70-4
1-chloro-1-fluoroethane (HCFC-151a)	1615-75-4
1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$)	163702-07-6
2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane $(CF_3)_2CFCF_2OCH_3$)	163702-08-7
1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$)	163702-05-4
2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane $(CF_3)_2CFCF_2OC_2H_5$)	163702-06-5
1, 1, 1, 2, 2, 3, 3-heptafluoro-3-methoxy-propane (n-$C_3F_7OCH_3$) or HFE-7000	375-03-1
3-ethoxy-1, 1, 1, 2, 3, 4, 4, 5, 5, 6, 6, 6 – dodecafluoro-2-(trifluoromethyl) hexane (HFE-7500)	297730-93-9
1, 1, 1, 2, 3, 3, 3-heptafluoropropane (HFC 227ea)	431-89-0
Methyl formate ($HCOOCH_3$)	107-31-3
Tert butyl acetate (TBAC)	540-88-5

* Chemical Abstract Service (CAS) identification numbers have been included in brackets [ ] for convenience.

INVENTORY SOURCE CATEGORIES

Stationary Sources

Stationary sources of emissions are grouped into two categories - point sources and area sources. Point source emissions are from facilities having one or more pieces of equipment registered and permitted with the District. Therefore, the District is able to collect facility emission-related information from the larger of these facilities. Area source emissions are from numerous small facilities or pieces of equipment, such as gasoline-dispensing facilities, residential water heaters, consumer products and architectural coatings, for which locations may not be specifically identified. For modeling purposes, area source emissions are spatially allocated to grid cells using demographic data (e.g., population, housing, and land use).

Point Sources

The 2008 point source emission inventory is based on the emissions data reported by point source facilities in the calendar year 2008 Annual Emissions Reporting (AER) Program. This program applies to facilities emitting 4 tons or more of VOC, NOx, SOx, or PM or emitting more than 100 tons of CO per year, as specified in Rule 301(e). Facilities subject to the AER Program calculate and report their emissions primarily based on their throughput data (e.g., fuel usage, material usage), appropriate emission factors or source tests, and control efficiency (if applicable). Under the calendar year 2008 AER Program, approximately, 1,800 facilities reported their annual emissions to the District. Emissions from smaller industrial facilities not subject to the AER program, which represent a small fraction of the overall inventory, are included as part of the area source inventory.

In order to prepare the point source inventory, emissions data for each facility were categorized based on U.S. EPA's Source Classification Codes (SCCs) for each emission source category. Since the AER program collects emissions data on an aggregate basis (i.e., equipment and processes with same emission factor are grouped and reported together), facility's equipment permit data were used in conjunction with the reported data to assign the appropriate SCC codes and develop the inventory at the SCC level. For modeling purposes, facility location is specified in Universal Transverse Mercator (UTM) coordinates. Business operation activity profile is also recorded. Facility business type is assigned to the facilities based on North American Industry Classification System (NAICS) Code according to their primary activity. The growth projections and impact of the AQMP on the local economy are presented by NAICS.

Area Sources

The District and CARB shared the responsibility for developing the 2008 area source emissions inventory for approximately 400 area source categories. Specifically, the District developed the area source inventory for about 150 categories whereas CARB developed the remaining area source categories (such as consumer products, and degreasing). For each area source category, a specific methodology is used for estimating emissions. In the 2008 area source inventory, a number of existing methodologies were used with updated activity data such as fuel data or sales data (e.g., fuel combustion categories, oil/gas production). Five new categories (i.e., LPG transmission, Storage and pipeline cleaning, three architectural coating colorants) were added to the inventory, other existing methodologies were refined based on more recent studies (e.g., landfills, composting waste, consumer products, architectural coatings), and some of the area sources were expanded (i.e., Commercial/Industrial internal combustion to include portable equipment engines).

Changes in Point Sources

The point source inventory continued its downward trend primarily due to the implementation of existing stationary source regulations. As indicated in Figure 1-1, the point sources decreased between 2002 and 2008 in VOC, NOx and SOx emissions. The decreases are from 52, 41, and 20 tons per day to 34, 34 and 13 tons per day for VOC, NOx and SOx respectively. In addition to the effect of existing regulations, another reason for the decreases is due to the recessionary impacts.

Changes in Area Sources

The area source inventory also decreased between 2002 and 2008 for all criteria pollutants, except NOx. Figure 1-2 shows VOC, NOx, SOx and PM2.5 changed from 265, 48, 2, 51 tons per day to 231, 53, 1 and 39 tons per day between 2002 and 2008. The reason for NOx increase is because the expansion of fuel consumption to include commercial and industrial portable equipment emissions.

Rule Implementation

A list of the District's VOC, NOx, PM2.5 and SOx emission reduction commitment by measure/adopted date by pollutant since 2007 State Implementation Plan (SIP) is presented in Table III-1-2. Table III-1-3 lists SCAB NOx, VOC, PM2.5, and SOx emission progress since 2007 SIP to date on CARB rules for year of 2014 and year 2023.

COMPARISON OF 2002 BASE YEAR IN 2007 AQMP AND 2008 BASE YEAR IN 2012 AQMP

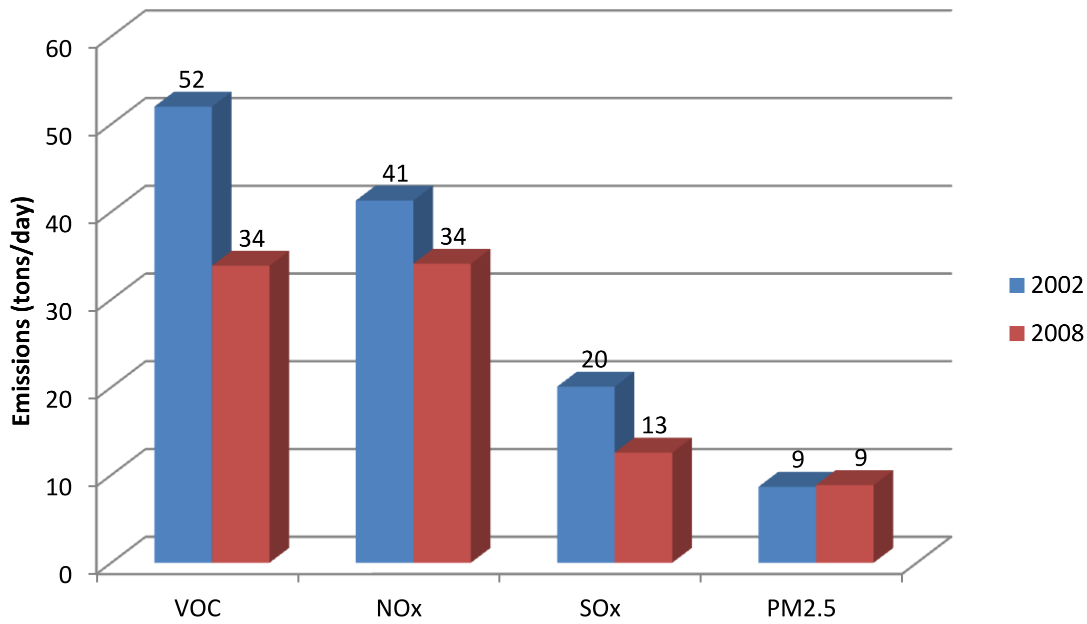


FIGURE III-1-1

Total Point Source Emissions
(VOC & NOx – Summer Planning; SOx & PM2.5 – Annual Average Inventory)

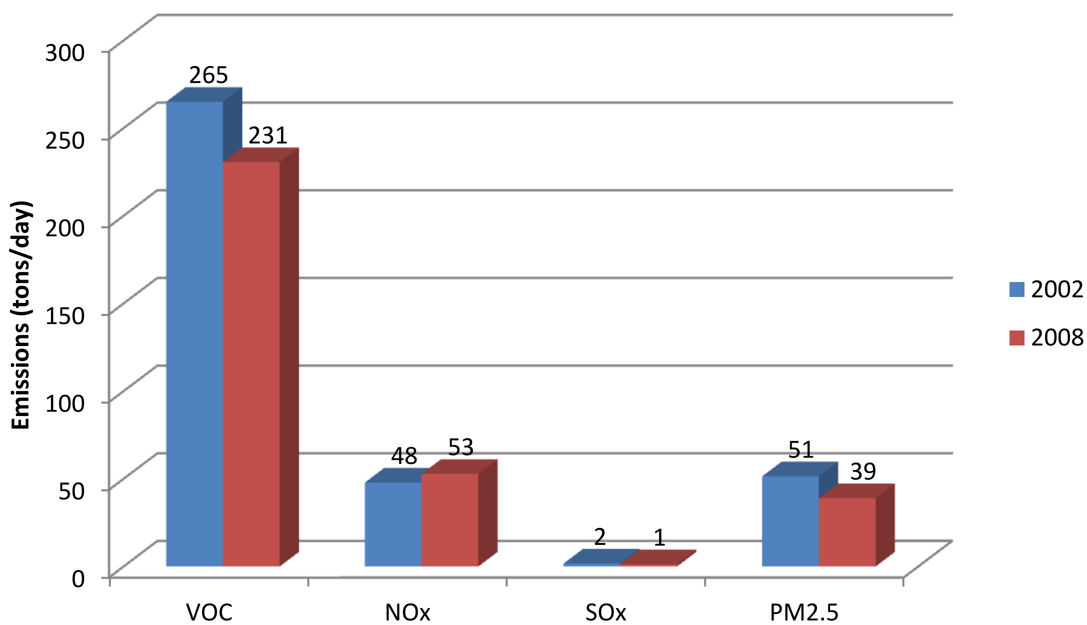


FIGURE III-1-2

Total Area Source Emissions
(VOC & NOx – Summer Planning; SOx & PM2.5 – Annual Average Inventory)

TABLE III-1-2

2007 AQMP Emission Reductions (tons per day) by Measure/Adoption Date

Control Measure #	CONTROL MEASURE TITLE	Adoption Date	ACHIEVED [a]	
			2014	**2023**
VOC EMISSIONS				
FUG-04	Pipeline and Storage Tank Degassing[VOC]- R1149	2008	0.04	0.04
BCM-03	Emission Reductions from Wood Burning Fireplaces and Wood Stoves [All]	2008	0.44	0.70
MCS-01	Facility Modernization [NOx, VOC, PM] - *R1110.2*	2008+	0.3	0.3
CTS-01	Emission Reductions from Lubricants [VOC][R1144]	2009	3.9	3.2
CTS-04	Emission Reductions from the Reduction of VOC Content of Consumer Products Not Regulated by the State Board [VOC][R1143]	2009	9.7	10.1
MCS-04	Further Emission Reductions from Greenwaste Composting Operations [VOC][R1133.3]	2011	0.88	0.88
MCS-07	Application of All Feasible Measures [VOC][R1113, R1177] [b]	2011	7.2	11.1
		TOTAL VOC REDUCTIONS (TPD)	**22.5**	**26.4**
CMB-01	NOx Reduction from Non-RECLAIM Ovens, Dryers and Furnaces [NOx][R1147]	2008	3.5	4.1
BCM-03	Emission Reductions from Wood Burning Fireplaces and Wood Stoves [All][R445]	2008	0.06	0.10
	SOON Program	2008	1.8	NA
MCS-01	Facility Modernization [NOx, VOC, PM] - *R1110.2, PR1146, PR1146.1*	2008+	2.17	3.15
CMB-03	Further NOx Reductions from Space Heaters [NOx]	2009	0.1	3.0
		TOTAL NOx REDUCTIONS (TPD)	**7.6**	**10.3**
BCM-03	Emission Reductions from Wood Burning Fireplaces and Wood Stoves [PM2.5]	2008	1.0	1.6
MCS-01	Facility Modernization [NOx, VOC, PM] - *R1155* [c]	2009	NA	NA
		TOTAL PM2.5 REDUCTIONS (TPD)	**1**	**1.6**

TABLE III-1-2 (concluded)

2007 AQMP Emission Reductions (tons per day) by Measure/Adoption Date

Control Measure #	CONTROL MEASURE TITLE	Adoption Date	ACHIEVED [a]	
			2014	**2023**
SOx EMISSIONS				
CMB-02	Further SOx Reductions for RECLAIM (BARCT) [SOx]	2010	4.0	5.7
		TOTAL SOx REDUCTIONS (TPD)	**4.0**	**5.7**

[a] 2014 reductions estimated in average annual day, 2023 in planning inventory.
[b] Includes achieved VOC reductions from Rule 1113: 4.1 tpd (2014); 4.4 tpd (2023) and Rule 1177: 3.1 tpd (2014); 6.7 tpd (2023)
[c] R1155 was adopted as part of MCS-01 implementation in 2009, but PM2.5 reduction potential cannot be quantified.
NA: Not Applicable, no SIP reductions quantified in the 2007 AQMP

TABLE III-1-3

South Coast Air Basin Remaining Emissions Due to CARB Actions

CARB REGULATIONS	COMMITMENT		ACHIEVED	
	2014[a]	2023[b]	2014[a]	2023[b]
NOx EMISSIONS (TPD)[c]				
Smog Check Improvements (BAR)	134.2	74.3	131.6	73.1
Cleaner In-Use Heavy-Duty Trucks & Buses	151.2	76.8	132.6	49.4
Cleaner In-Use Off-Road Equipment (over 25hp)	28.0	18.9	27.5	15.8
Ship Auxiliary Engine Cold Ironing & Clean Tech.	23.7	40.3	15.6	12.0
Cleaner Main Ship Engines and Fuel - Main Engines	38.5	65.8	20.9	21.3
Accelerated Intro. of Cleaner Line-Haul Locomotives	18.3	21.0	18.3	21.0
Clean Up Existing Harbor Craft	15.2	18.4	11.1	8.4
Cargo Handling Equipment	3.2	1.8	3.2	1.8
New Emission Standards for Recreational Boats	11.0	18.3	11.0	18.3
Co-Benefits from Greenhouse Gas Reduction Measures	0.0	--	0.0	--
All other local, state, and federal emissions	166	157	159	147[d]
TOTAL NOx REMAINING EMISSIONS WITH RULES ADOPTED TO DATE	**589**	**493**	**530**	**368**
VOC EMISSIONS (TPD)[c]				
Smog Check Improvements (BAR)	132.1	97.4	123.5	92.1
Cleaner In-Use Heavy-Duty Trucks & Buses	8.7	6.6	5.4	5.3
Cleaner In-Use Off-Road Equipment (over 25hp)	2.6	2.0	2.5	1.7
Ship Auxiliary Engine Cold Ironing & Clean Tech.	0.9	1.5	0.7	0.9
Cleaner Main Ship Engines and Fuel - Main Engines	1.9	3.2	1.4	2.5
Accelerated Intro. of Cleaner Line-Haul Locomotives	2.3	2.4	2.3	2.4
Clean Up Existing Harbor Craft	1.2	1.0	1.1	0.5
Cargo Handling Equipment	0.3	0.6	0.3	0.6
New Emission Standards for Recreational Boats	37.9	50.8	37.9	50.8
Expanded Off-Road Rec. Vehicle Emission Standards	6.7	13.4	6.7	13.4
Consumer Products Program	102.6	109.5	96.7	102.4
All other local, state, and federal emissions	221	241	206	226[d]
TOTAL VOC REMAINING EMISSIONS WITH RULES ADOPTED TO DATE	**518**	**529**	**485**	**498**

TABLE III-1-3 (concluded)

South Coast Air Basin Remaining Emissions Due to CARB Actions

CARB REGULATIONS	COMMITMENT		ACHIEVED	
	2014[a]	**2023**[b]	**2014** [a]	**2023** [b]
PM2.5 EMISSIONS (TPD)[c]				
Smog Check Improvements (BAR)	7.8	--	7.5	--
Cleaner In-Use Heavy-Duty Trucks & Buses	6.0	--	3.4	--
Cleaner In-Use Off-Road Equipment (over 25hp)	1.3	--	1.3	--
Ship Auxiliary Engine Cold Ironing & Clean Tech.	0.5	--	0.4	--
Cleaner Main Ship Engines and Fuel - Main Engines	3.9	--	0.4	--
Accelerated Intro. of Cleaner Line-Haul Locomotives	0.7	--	0.7	--
Clean Up Existing Harbor Craft	0.6	--	0.4	--
Cargo Handling Equipment	0.1	--	0.1	--
All other local, state, and federal emissions	74	--	73	--
TOTAL PM2.5 REMAINING EMISSIONS WITH RULES ADOPTED TO DATE	**95**	**--**	**87**	**--**
SOx EMISSIONS (TPD)[c]				
Cleaner In-Use Heavy-Duty Trucks & Buses	0.3	--	0.3	--
Ship Auxiliary Engine Cold Ironing & Clean Tech.	1.1	--	0.8	--
Cleaner Main Ship Engines and Fuel - Main Engines	38.7	--	1.7	--
All other local, state, and federal emissions	21	--	17	--
TOTAL SOX REMAINING EMISSIONS WITH RULES ADOPTED TO DATE	**61**	--	**20**	--

a. The 2014 emissions data reflect the 2014 Emissions Inventory that was included in the March 2011 *Progress Report on Implementation of PM2.5 State Implementation Plans*.
b. The 2023 emissions data tables reflect the 2023 Emissions Inventory that was current as of August 2011.
c. These are remaining emissions. If achieved emissions are lower than the committed emissions, it means the SIP targets are met.
d. Includes benefits of local emission reductions that were not reflected in the revised RFP estimates.

Improved/Updated Methodologies

Fuel Combustion Sources - The emissions from commercial and industrial internal combustion engines were updated to include portable equipment emissions which were overlooked in the 2007 AQMP. The update causes increases in emissions for this category.

Landfills - The emission estimation methodology for this area source category was revised to incorporate the CARB's landfill GHG emission inventory data to calculate the amount of Methane (CH4) being generated in 2008. The TOG and VOC emissions were estimated using the emission factors from the "1982 Task Force Report", which were the same factors used to estimate TOG/VOC emissions for this source category in the 2007 AQMP. The baseline emissions from this source category in 2012 AQMP had drastically increased as compared with 2002 baseline used in 2007 AQMP. This was due to erroneous activity data reported by the point sources in 2002.

Metal Coating Operations - This area source category in the 2007 AQMP included the emissions from the small permitted facilities with VOC emissions below 4 tons per year. However, emissions from such smaller permitted facilities maybe underrepresented in the 2007 AQMP. During the amendment development process for Rule 1107, staff discovered numerous small shops using coating materials with compliant high solid concentrations, which are subsequently thinned beyond the allowable limit permitted by Rule 1107. The revised inventory adjusts the 2007 AQMP inventory to account for excess emissions from these coating activities as well.

LPG Transmission - This is a new area source category created to include the fugitive emissions associated with transfer and dispensing of LPG and is based on emission rates derived from SCAQMD source tests conducted in 2008 and 2011 and on sale volumes provided by the industry association and category breakdowns.

Storage Tanks and Pipeline Cleaning - A new area source category was added to include the emissions from the degassing of storage tanks and pipelines. As part of Rule 1149 amendment, the previous inventory for this category was updated to reflect more frequent degassing events as well as effectiveness of control techniques. It was determined that the actual degassing events were more than triple the amount estimated when the rule was originally developed. It was also assumed that once degassing rule requirements were fulfilled, there were no more fugitive emissions; however, a review of degassing logs indicated that sludge and product residual in the storage tanks significantly increase the emissions emanating from the storage tanks. Finally, the source category was expanded to include previously exempted tanks and pipelines.

Livestock Waste - The inventory for this category was updated to reflect the split of dairy cattle into milking cows, dry cows, calves, and heifers fractions since each has a different VOC emission factor as a function of their manure production.

Gasoline Dispensing - For this source category, the 2008 baseline emissions are the projected values as estimated in 2007 AQMP. However, in the 2007 AQMP, the emissions from gasoline dispensing were adjusted to account for 75% compliance levels identified in various audits conducted by the District since 1997. Based on the recent tests conducted at retail gas dispensing facilities on their In-Station Diagnostic (ISD) System, about 18% of the facilities demonstrated non-compliance (i.e., failed the test). As such, to account for this nonconformance with the requirements, the 75% compliance rate was carried over to 2012 AQMP.

Consumer Products - This category was updated to reflect the three most recent surveys conducted by CARB's Stationary Source Division (SSD) for the years 2003, 2006, and 2008. Together these surveys collected updated product information and ingredient information for approximately 350 product categories. Based on the survey data, CARB staff determined the total product sales and total VOC emissions for the various product categories. Before the emissions inventory was updated, some of the existing categories were split out into more specific categories, others were combined, and new categories were added to better reflect changes in formulations of existing products. The updated survey data reflect VOC reductions from several rulemaking with the net result being an overall emissions decrease. The updates conclude that the projected 2008 emissions in the 2007 AQMP are the same as the 2008 emissions in the Final 2012 AQMP (98 tons per day).

Architectural Coatings - Three new area source categories were added under this category to accurately track the emissions from the colorants. VOC emissions from colorants, pigments added at the point of sale that impart the selected color, had specifically been excluded from Rule 1113, both in terms of the baseline emissions and any VOC restrictions. During the June 3, 2011 Rule 1113 amendment, VOC limits were included in the Rule. The emissions for architectural coatings were also updated to include the 2008 sales and emissions data that the manufacturers submitted under Rule 314 – Fees for Architectural Coatings. Rule 314 requires manufacturers to annually report the quantity and emissions of their architectural coatings sold into or within the District's jurisdiction. This data provides more accurate and updated emission estimates.

Composting - The emission estimation methodology for this area source category was revised to include the emissions from green waste composting covered under District

Rule 1133.3. The 2007 AQMP only included the emissions from co-composting, as it relates to the District Rule 1133.2.

Biogenic Volatile Organic Compounds - Emissions of biogenic volatile organic compounds (BVOCs) were updated to reflect the day specific temperature, relative humidity, and solar radiation inputs used in the ozone and PM2.5 air quality modeling. BVOC emissions were modeled for everyday in 2008. The 2008 BVOC inventory was developed by CARB.

Fugitive Dust - Subsequent to the approval of the 2003 AQMP, CARB released updated emission factors for several fugitive dust sources. The Final 2007 AQMP incorporated those updated emission factors and/or 2002 activity data for source categories such as entrained paved and unpaved road dust, construction, windblown dust, and farming operations. One of the more significant changes was that the factors used to quantify the PM2.5 fraction of PM10 were updated based on studies by the Dust Emissions Joint Forum of the Western Regional Air Partnership (WRAP). These fractions represented the latest technical information for deriving the PM fine fraction (PM2.5-10) of crustal fugitive dust from various sources, including paved and unpaved roads, agriculture, aggregate handling and storage piles, construction/demolition, and wind erosion. The fractions are currently in AP-42 guidance for fugitive dust sources (U.S. EPA, November 2006). As noted in the 2007 AQMP, the unspecified category emissions inventories were develop to reflect emissions from private paved and unpaved roads, and emissions from aggregate processing and storage based on facilities subject to Rule 1156 (cement manufacturing) and Rule 1157 (aggregate and related operations). The 2008 baseline inventory for the 2012 AQMP also includes these updates. In addition, the paved road emissions inventory methodology was modified using the latest AP-42 method for quantifying emissions from paved roads (January 2011). In conjunction with CARB, in using this latest paved road methodology, California-specific PM2.5/PM10 fraction (15%) and silt loading variables were used in lieu of the AP-42 default factors. Overall emission estimates were lower for the 2012 AQMP. Table III-1-4 indicates the changes in PM2.5 (tons per day) to the fugitive dust inventories. The updated paved road emissions methodology resulted in a significant reduction in emissions, as did the lower construction emissions which are a result of depressed economy.

TABLE III-1-4

Comparison of 2002 and 2008 PM2.5 Emissions (Tons per day)

SOURCE CATEGORY	2007 AQMP	FINAL 2012 AQMP
	2002 Inventory	**2008 Inventory**
Paved Road Dust	18.9	7.0
Unpaved Road Dust	1.4	0.6
Construction	4.0	2.1
Windblown	0.4	0.3
Farming Operations	0.2	0.3
TOTAL	**24.9**	**10.3**

Special Studies

Aircraft – The aircraft emissions inventory is updated for the 2008 base year and the 2035 forecast year based on the latest available activity data and calculation methodologies. A total of 43 airports were identified as having aircraft operations within the District boundaries including commercial air carrier, air taxi, general aviation, and military aircraft operations. The sources of activity data included airport operators (for several commercial and military airports), Federal Aviation Administration's (FAA) databases (i.e., Bureau of Transportation Statistics, Air Traffic Activity Data System, Terminal Area Forecast), and SCAG's projections. For commercial air carrier operations, SCAG's 2035 forecast, which is consistent with the forecast adopted for the 2012 Regional Transportation Plan (RTP), was used reflecting the future aircraft fleet mix. The emissions calculation methodology was primarily based on the application of FAA's Emissions and Dispersion Modeling System (EDMS) model for airports with detailed activity data for commercial air carrier operations (by aircraft make and model). For other airports and aircraft types (i.e., general aviation, air taxi, military), the total number of landing and takeoff activity data was used in conjunction with the U.S. EPA's average emission factors by major aircraft type (e.g., general aviation, air taxi, military). For the intermediate milestone years, the emissions inventories were linearly interpolated between 2008 and 2035.

Ammonia Sources –New 2008 ammonia emissions inventory has been developed for the Final 2012 AQMP development. In conjunction with the ongoing efforts by CARB to develop a state-wide inventory, the District and CARB staffs have worked extensively to develop a new and comprehensive 2008 ammonia inventory for all ammonia source categories. All source categories were reviewed and updated for emission factors, activity data, and spatial and temporal surrogates. Two new source categories of wood combustion and off-road mobile sources were added to the 2008 inventory. There has been a change in major ammonia emission sources. In 2002 inventory, major sources were on-road mobile (30%), livestock (22%), and domestic (21%) sources while domestic (23%), on-road mobile (20%), industrial (19%), composting (17%) and livestock (14%) sources are major ammonia sources in new 2008 inventory. 2008 Basin total ammonia emissions is 107 tons per day that is 12 tons per day less than 2002 Basin total ammonia emissions of 119 tons per day. 2008 Basin ammonia emissions from livestock, fertilizer application and on-road mobile emissions are decreased from 2002 emissions while soil, landfill, industrial, and composting emissions are increased from 2002 emissions. This updated ammonia emissions inventory has been used for PM modeling for the Final 2012 AQMP development. Table III-1-5 summarizes the changes to the ammonia inventory.

TABLE III-1-5

Comparison of 2002 and 2008 Ammonia Emissions (Tons per day)

SOURCE CATEGORY	2007 AQMP	FINAL 2012 AQMP
	2002 Inventory	**2008 Inventory**
Livestock	26.0	15.5
Soil	1.4	1.8
Domestic	25.1	25.0
Landfill	1.1	3.5
Composting	9.7	17.7
Fertilizer	6.1	1.5
Sewage Treatment	0.1	0.2
Wood Combustion	--	0.1
Industrial	13.2	20.2
On-Road Mobile Source	36.1	21.3
Off-Road Mobile Sources	--	0.1
TOTAL	**118.8**	**107.0**

Mobile Sources

On-Road Mobile Sources

The Final 2012 AQMP emission estimates for on-road motor vehicles come from applying the emission rates in CARB's EMFAC2011 model to the transportation activity data provided by Southern California Association of Government (SCAG) in its adopted 2012 Regional Transportation Plan (RTP). The California Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), and SCAG supply CARB with data necessary to develop the on-road mobile source emissions inventory. DMV maintains a count of registered vehicles and Caltrans provides highway network, traffic counts and road capacity data. SCAG maintains the regional transportation model containing the temporal and spatial distribution of motor vehicle activity (travel time, travel speed, and volume of traffic for AM-peak, mid-day, PM-peak, evening and night hours). In addition, SCAG periodically conducts origin and destination surveys to validate the regional transportation model. SCAG also updates a demographic database for population, housing, employment and patterns of land use within the District's jurisdiction.

Emission rate data in the EMFAC2011 are collected from various sources, such as individual vehicles in a laboratory setting, tunnel studies and certification data, etc. Vehicle activity data are obtained from regional planning agencies, such as SCAG. The EMFAC2011 model calculates exhaust and evaporative emission rates by vehicle type for different vehicle speeds and environmental conditions (temperature and relative humidity). Temperature and humidity profiles are used to produce month specific, annual average, and episodic inventories.

Parameters accounted for by the EMFAC2011 include the following: type of emissions control technology, fuel type, distribution of operating speeds, speed and temperature correction factors, and the reduction in emissions resulting from the state's motor vehicle regulatory programs.

The EMFAC2011 includes the following mobile source breakdowns:

(1) eight vehicle classes (light-duty passenger; light-duty trucks under 3,750 pounds; light- duty trucks between 3,750 pounds and 5,750 pounds; medium-duty trucks between 5,751 pounds and 8,500 pounds; light-heavy-duty trucks between 8,501 pounds and 10,000 pounds; light-heavy-duty trucks between 10,001 pounds and 14,000 pounds; medium heavy duty trucks between 14,001 pounds and 33,000 pounds ; and heavy-heavy-duty-trucks for over 33,000 pounds);

(2) two vehicle fuel types (gas and diesel);

(3) truck types (ports, agriculture, construction, interstate, out-of-state, public fleet, utility fleet, power take off, tractor);

(4) in-state and out-of-state;

(5) forty-five calendar years (1990-2035);

(6) two vehicle exhaust processes (starts and running);

(7) four evaporative processes (diurnal, hot soak, running loss, and resting loss);

(8) seven pollutants (HC, CO, CO2, NOx, PM, SOx, lead); and

(9) fuel consumption.

To develop the detailed emission inputs needed by air quality dispersion models such as the Community Multi-scale Air Quality model (CMAQ) and Comprehensive Air Quality Model with eXtentions (CAMx), emissions from on-road motor vehicles are estimated at the grid level using Caltrans' Direct Travel Impact Model (DTIM). DTIM calculates emissions based on detailed information regarding each link (roadway segment) in an area for each hour of the day. The required inputs of DTIM include traffic volume, traffic speed, vehicle fleet characteristics, ambient temperature, and emission factors of vehicle fleets.

It should be noted that even though the EMFAC2011 is expanded to include more sub-vehicle class categories for some of the major vehicle class categories (i.e., medium-heavy duty diesel trucks & heavy-heavy diesel trucks) based on their weights (heavy or small), types (agricultural, construction, CA international registration plan), by road types (in-state or out-of-state), etc, the on-road mobile sources emissions in the Final 2012 AQMP are reported by major vehicle class categories to compare with previous inventory reporting.

The characteristics of DTIM include:

(1) emissions calculations based on specific information, such as link speed, link volume, and temperature;

(2) spatial and temporal distribution of emissions to provide hourly gridded emissions; and,

(3) emission impacts of various types of transportation and regional planning alternatives (e.g., changes in roadway network configuration, or public transportation services).

DTIM reformats and sorts emission rates for all vehicle classes produced by the EMFAC2011. It then produces average emission rates for specific vehicle classes identified by the user. Finally, it produces regional mobile source emissions and hourly gridded mobile emissions. DTIM does this by combining emission rates with vehicle activity estimates derived from a transportation demand model and supplemental information on temperatures and temporal patterns.

The EMFAC2011 was the basis for on-road planning inventories, emission budgets, and rate-of-progress calculations. EMFAC2011 has been updated to:

- Include the impacts of recently adopted diesel regulations including the Truck and Bus Rule and other diesel truck fleet rules: the Pavley Clean Car Standard, and the Low Carbon Fuel Standard.

- Reflect the latest emissions inventory methods for heavy duty trucks and buses, and the impact of the economic recession.

A detailed description of the EMFAC2011 changes is available at CARB's website (http://www.arb.ca.gov/msei/msei.htm).

Several additional external adjustments are made to EMFAC2011 to reflect CARB's rules and regulations which were adopted after the development of EMFAC2011. The adjustments include the advanced clean cars regulations adopted in January 2012, reformulated gasoline, and Smog Check improvements. Figure 1-3 compares the 2008 and 2023 on-road baseline emissions between EMFAC2007 V2.3 and EMFAC2012 used in the 2007 AQMP and Final 2012 AQMP, respectively. It should be noted that the comparison for 2008 reflects changes in methodology, but the comparison for 2023 also includes adopted rules and updated growth projections since the release of EMFAC2007. In general, the emissions are lower in EMFAC2011 than in EMFAC2007. The lower emissions can be attributed to additional rules and regulations which reduce emissions, future growth corrections, and recessionary impacts.

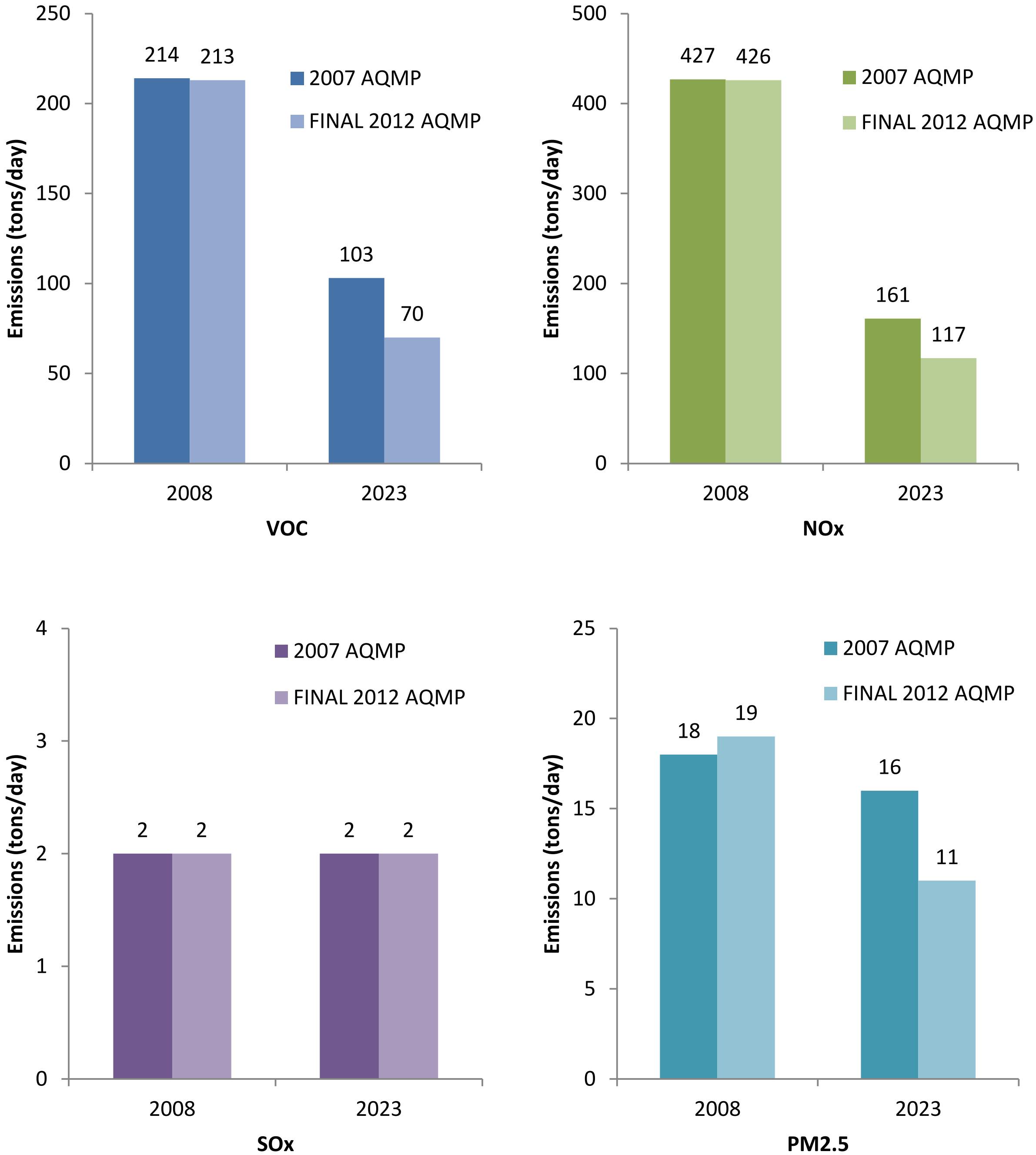


FIGURE III-1-3

Comparison of On-Road Emissions Between EMFAC2007 V2.3 (2007 AQMP)
and EMFAC2011 (Final 2012 AQMP)
(VOC & NOx – Summer Planning; SOx & PM2.5 – Annual Average Inventory)

Off-Road Mobile Sources

Mobile sources not included in the on-road mobile source emissions inventory are considered as off-road mobile sources. CARB uses a number of models to estimate emissions for more than one hundred off-road equipment types. The models account for the effects of various adopted regulations, technology types, and seasonal conditions on emissions. The models combine population, equipment activity, horsepower, load factors, population growth, retirement factors, and emission factors to yield the annual emission by county, air basin or statewide. Temporal usage profiles are used to develop seasonal emission estimates which are then spatially allocated to the county or air basin using surrogates such as population.

The emission inventories were developed using CARB's 2011 In-Use Off-Road Fleet Inventory model for the Final 2012 AQMP. The 2011 In-Use-Off-Road Fleet Inventory model was last updated in 2011 and most data was obtained several years before. It reflects CARB's rules and regulations adopted since the 2007 AQMP. The description of these models is presented as follows:

- **2011 In-Use Off-Road Fleet Inventory Model -** This is an Access database model that forecasts future vehicle population data by type, model year, and horsepower from the Off-Road Simulation Model (OSM). The Model was developed in 2010 to support the analysis for amendments to the In-Use Off-Road Diesel Fueled Fleets Regulation. The equipment population in CARB's In-Use Off-Road Fleet Inventory Model is updated using the equipment population reported to CARB for rule compliance. According to CARB, the total population in 2009 was 26% lower than had been anticipated in 2007 due to fleet downsizing during the recent recession. The equipment hours of use in the Model are updated based on the reported activity data between 2007 and 2009. According to CARB, the new data indicated in most cases 30% or greater reduced activity in 2009 compared to 2007 as a result of the recession. The equipment load factor in CARB's In-Use Off-Road Fleet Inventory model is updated using a 2009 academic study and information from engine manufacturers. According to CARB, the new data suggest the load factors should be reduced by 33%. The model calculates NOx, PM, and VOC, CO2 and SOx emissions. The models can be downloaded from CARB's website at http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

- **Cargo Handling Emission Inventory Model -** This is an Access database model for diesel equipment subject to regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards. Cargo handling equipment has been updated for population, activity, recessionary impacts on growth, and engine load. The updates are based on new information collected since 2005. The new information includes CARB's regulatory reporting data which provides an accounting of all the cargo handling equipment in the state including their model year, horsepower and activity. In addition, the Ports of Los Angeles and Long Beach have developed annual emissions inventories and a number of the major rail yards and other ports in the state have completed individual emission inventories. The model can be downloaded from CARB's website at http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

- **Transportation Refrigeration Unit (TRU) Model** – This is an Access database model for diesel engines subject to Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets and Facilities Where TRUs Operate (TRU Rule). The TRU model was developed to support analysis for the 2011 amendments to the TRU Rule. The current inventory is based on updated activity, population, growth and turn-over data, and updated emission factors and takes into consideration the requirements of the TRU Rule. The model can be downloaded from CARB's website at http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

- **Ocean Going Vessel (OGV) Model** – This is an Access database model for marine vessels and engines. Ocean-going vessel emissions in the Final 2012 AQMP include CARB's fuel regulation for ocean-going vessels and the 2007 shore power regulation. In addition, the improvements and corrections include recoding the model for speed, updating auxiliary engine information, updating ship routing, revising vessel speed reduction compliance rates, and an adjustment factor to account for the effects of the recession. In March 2010, the International Maritime Organization (IMO) officially designated the waters within 200 miles of the North American Coast as an Emissions Control Area (ECA). Beginning August 2012, this requires ships that travel these waters to use fuel with a sulfur content of less than or equal to 1.0% and in 2015 the sulfur limit will be further reduced to 0.1%. Additionally, vessels built after January 1, 2016 will be required to meet the most stringent IMO Tier 3 NOx emission levels while transiting within the 200 mile ECA zone. Outer Continental Shelf (OCS) emissions (i.e. emissions from vessels beyond the three-mile state waters line) are included in the ships emissions. The model can be downloaded from CARB's website at http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

- **Commercial Harbor Craft Emission Inventory Models** – These are newly developed models. Three Access database models were developed for diesel engines which are subject to regulation to reduce emissions from diesel engines on commercial harbor craft operated with California Waters and 24 nautical miles of the California baseline (Harbor Craft Rule). One model was originally developed in 2007 to support the analysis for the Harbor Craft Rule. The other two models were developed to support analysis for the 2010 amendments to the rule which added additional vessel categories to the Harbor Craft Rule. The inventory values from the three models are added together to obtain the AQMP values The model can be downloaded from CARB's website at http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles

- **Aircraft -** The aircraft emissions inventory is updated for the 2008 base year and the 2035 forecast year based on the latest available activity data and calculation methodologies. A total of 43 airports were identified as having aircraft operations within the District boundaries including commercial air carrier, air taxi, general aviation, and military aircraft operations. The sources of activity data include airport operators (for several commercial and military airports), FAA's databases (i.e., Bureau of Transportation Statistics, Air Traffic Activity Data System, Terminal Area Forecast), and SCAG. For commercial air carrier operations, SCAG's 2035 forecast, which is consistent with the forecast adopted for the 2012 RTP, reflects the future aircraft fleet mix. The emissions calculation methodology is primarily based on the application of FAA's Emissions and Dispersion Modeling System (EDMS) model for airports with detailed activity data for commercial air carrier operations (by aircraft make and model). For other airports and aircraft types (i.e., general aviation, air taxi, military), the total number of landing and takeoff activity data is used in conjunction with the U.S. EPA's average emission factors by major aircraft type (e.g., general aviation, air taxi, military). For the intermediate milestone years, the emissions inventories are linearly interpolated between 2008 and 2035.

- **Locomotives** – The locomotive inventories reflect the 2008 U.S.EPA locomotive regulations and adjustments due to the economic activity.

Figure 1-4 shows a comparison of the off-road baseline emissions in the 2007 AQMP and Final 2012 AQMP. In general, the emissions are lower in the 2011 In-Use Off-Road Fleet Inventory model, except for 2008 SOx emissions. The projected 2008 off-road NOx emissions in the 2007 AQMP have 339 tons per day. The 2008 base year off-road NOx emissions in the Final 2012 AQMP are 208 tons per day. The 2011 In-Use Off-Road Fleet Inventory emissions are low because more rules and regulations adopted since 2007 OFFROAD model are included, updated data are used, and future growth corrections and recession impact are included. The higher 2008 SOx emissions estimated reflects the delay in the implementation of the ocean going vessels fuel SOx standard.

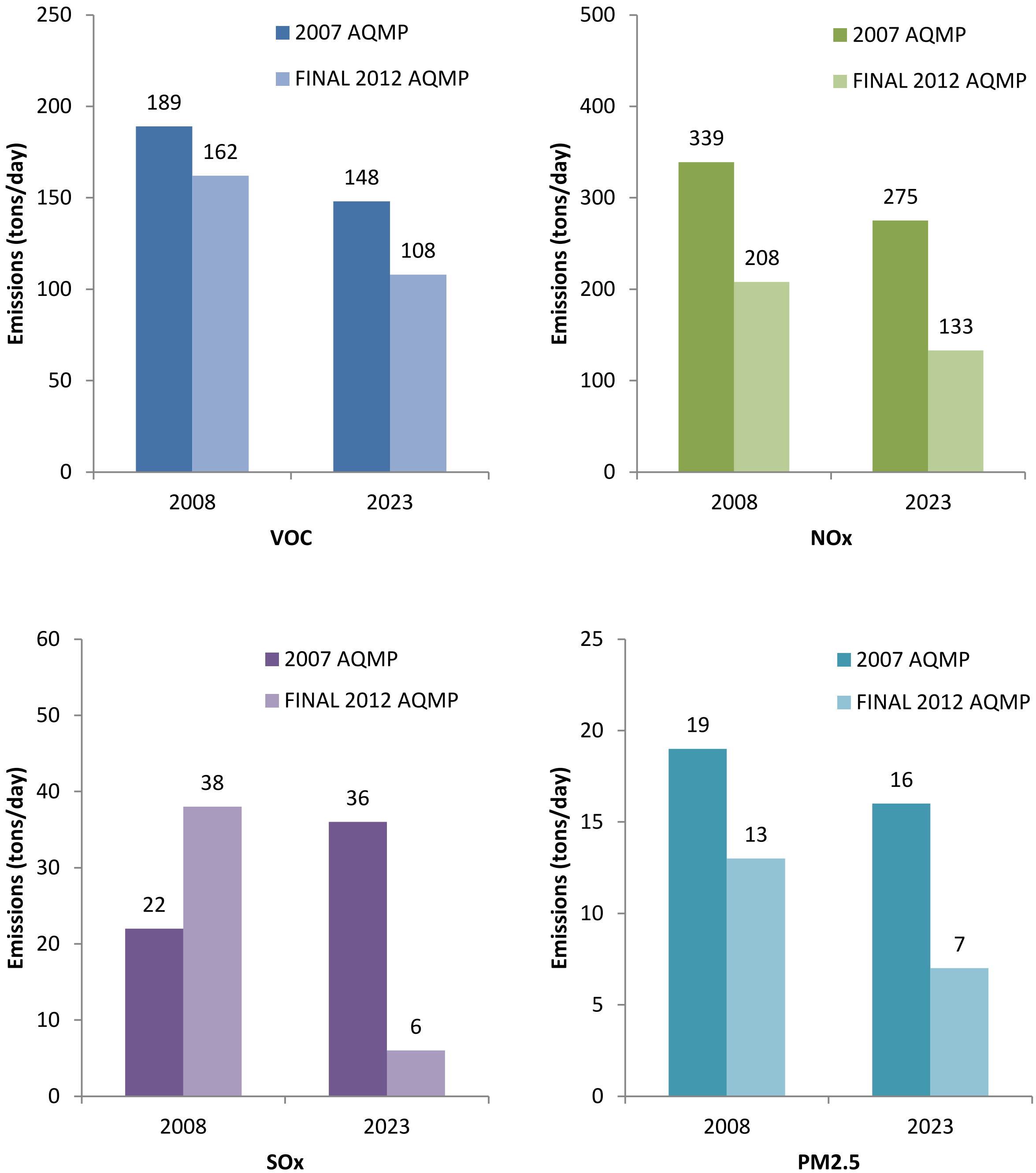


FIGURE III-1-4

Comparison of Off-Road Emissions Between 2007 AQMP and Final 2012 AQMP
(VOC & NOx – Summer Planning; SOx & PM2.5 – Annual Average Inventory)

INVENTORY TYPE

Different inventories are prepared for the Final 2012 AQMP for regulatory and SIP performance tracking, and transportation conformity. Two inventory types are included in the Final 2012 AQMP. They are annual average inventory and summer planning inventory.

Average Annual Day Inventory

The average annual day emissions inventory was derived primarily by dividing the annual total emissions by 365, except for the emissions derived from CARB's EMFAC2011 (on-road mobile sources) and In-Use Off-Road Fleet Inventory (most off-road mobile sources) models. In addition, the average annual day inventory was developed for all criteria pollutants regardless of their attainment status. The average annual day emissions are used to estimate cost-effectiveness of proposed control measures and future tracking of AQMP implementation (e.g., annual progress report on rule adoption).

Planning Inventory

Summer planning inventory provides the basis for tracking emission reduction progress specified by the federal Clean Air Act (CAA) and California Clean Air Act (CCAA). The CAA requires the District to produce a plan for reducing all non-attainment pollutants or their precursors by fifteen percent between 1990 and 1996, and three percent each year thereafter, averaged every consecutive three years until reaching the attainment date. The CCAA requires emission reductions by five percent or more per year, averaged every three consecutive years until 2000. In addition, the CAA specifies 1990 as the base year, whereas the CCAA specifies 1987 as the base year.

SCAB is designated as an extreme non-attainment area for Ozone for the federal air quality standards, and a non-attainment area for Ozone for the state air quality standards. The intent of the summer planning inventory is to characterize emission levels representative of those that occur during the typical season of air quality violations. The summer, or ozone, planning inventory contains emissions of ozone precursors (i.e. VOC and NOx) during the summertime.

The challenge of bringing the Basin air quality into compliance with state and federal ozone air quality standards is complicated by the fact that ambient concentrations of ozone are typically at their highest during the summer (defined as May through October for planning purposes). Any strategy designed to mitigate air pollution in the Basin must consider this summer variation in ambient air quality.

CARB has developed guidelines for the development of planning inventories. For point sources emission estimates represent an "average annual operating day." Emissions from point sources are calculated by dividing the total annual emissions produced by a source by the number of days the source was in operation. For example, if a company emitted 150 tons in a year and the production lines operated 5 days a week for 40 weeks, then the average operating emissions from this facility are calculated to be 150 tons divided by 200 days or 0.75 tons per day.

For area and other mobile sources, planning emissions represent an "average seasonal operating day." As an example, VOC emissions produced by asphalt road-paving operations are calculated by taking into account the variation in monthly levels and weekly operating days for paving activity during the year. Road paving varies from maximum rates during the summer season. Paving activity varies throughout the week with, on average, five operating days in a week. The allocation of annual area source emissions among the seasons is based on estimated relative monthly and weekly emissions patterns. As pointed out earlier, sources included in CARB's In-Use Off-Road Fleet Inventory model include seasonal activity and temperature profiles which are used to develop the planning inventories. CARB's summer planning on-road emission rates in the EMFAC2011 are applied to incorporate with SCAG's updated activity data in the 2012 RTP.

CHAPTER 2

SUMMARY OF EMISSIONS

Baseline Emission Inventories

- **Base Year Emission Data**
- **Future Year Emission Data**
- **Future Year Emission Inventories**
  - **Growth Surrogate**
  - **Growth Factors**
- **Emission Trend Analysis**
- **Impact of Growth**
- **Mobile and Area Source Credit Programs**

Controlled Emission Inventories

- **Emission Impacts of SCAQMD Programs**
- **Proposed Control Measures**
- **CEPA Emission Calculations**
- **CARB Emission Data Reports System**

BASELINE EMISSION INVENTORIES

Base Year Emissions

The 2008 emission inventory is used as the base year inventory to project future year emissions. It represents the most recent and comprehensive inventory development. Attachment C lists SCAB top VOC and NOx producers which emitted equal to or greater than ten (10) tons per year in 2008. The total VOC emissions from these facilities represent 70% of the total point sources VOC emissions and 8% of the total stationary VOC emissions. The total NOx emissions from these facilities represent 84% of the total point sources NOx emissions and 29% of the total stationary sources NOx emissions. The stationary sources emissions result primarily from the combustion of fuels, evaporation of solvents or fuels, and processing of materials. Hence, stationary sources are grouped under fuel combustion; waste disposal; cleaning and surface coatings; petroleum production and marketing; industrial processes; solvent evaporation; and other miscellaneous processes.

Mobile sources are divided into two source categories: 1) on-road, and 2) other (off-road) mobile sources. On-road mobile sources include light-duty passenger vehicles; light-, medium-, and heavy- heavy duty trucks; motorcycles; urban buses; school buses and motor homes. Other mobile sources include aircraft; trains; ships and commercial boats; off-road recreational vehicles; off-road equipment; farm equipment; and fuel storage and cargo handling equipment.

Table III-2-1A compares the annual average emissions between the 2008 base year in the Final 2012 AQMP and the projected 2008 emissions in the 2007 AQMP by major source category for VOC and NOx, while Table III-2-1B compares the annual average emissions between the 2008 base year in the Final 2012 AQMP and the projected 2008 emissions in the 2007 AQMP for SOx and PM2.5. Due to the economic recession which began in 2007, it is expected that the 2008 base year emissions should be lower than the projected 2008 emissions. Yet, several categories show higher emissions in the 2008 base year in the 2012 AQMP, such as fuel consumption, waste disposal, petroleum production and marketing for VOC; fuel consumption for NOx; off-road emissions for SOx; and industrial processes for PM2.5. As mentioned earlier the differences are due to the methodology updates, implementation delays and inclusion of overlooked emissions.

TABLE III-2-1A

Comparison of VOC and NOx Emissions By Major Source Category of
2008 Base Year in 2012 AQMP and Projected 2008 in 2007 AQMP
Annual Average Inventory (tpd[1])

	2007 AQMP	**2012 AQMP**	**% Change**	**2007 AQMP**	**2012 AQMP**	**% Change**
SOURCE CATEGORY	**VOC**			**NOx**		
Stationary Sources						
Fuel Combustion	7	14	+100%	30	41	+36%
Waste Disposal	8	12	+50%	2	2	0%
Cleaning and Surface Coatings	37	37	0%	0	0	0%
Petroleum Production and Marketing	32	41	+28%	0	0	0%
Industrial Processes	19	16	-16%	0	0	0%
Solvent Evaporation						
Consumer Products	97	98	+1%	0	0	0%
Architectural Coatings	23	22	-5%	0	0	0%
Others	3	2	-33%	0	0	0%
Misc. Processes	15	15	0%	26	26	0%
RECLAIM SOURCES	0	0	0%	29	23	-21%
Total Stationary Sources	**241**	**257**	**+7%**	**87**	**92**	**+6%**
Mobile Sources						
On-Road Vehicles	207	209	+1%	447	462	+3%
Off-Road Vehicles	150	127	-15%	325	204	-37%
Total Mobile Sources	**357**	**336**	**-6%**	**772**	**666**	**-14%**
TOTAL	**598**	**593**	**-1%**	**859**	**758**	**-12%**

[1] Values are rounded to nearest integer.

TABLE III-2-1B

Comparison of SOx and PM2.5 Emissions By Major Source Category of
2008 Base Year in 2012 AQMP and Projected 2008 in 2007 AQMP
Annual Average (tpd[1])

	2007 AQMP	2012 AQMP	% Change	2007 AQMP	2012 AQMP	% Change
SOURCE CATEGORY	**SOx**			**PM2.5**		
Stationary Sources						
Fuel Combustion	2	2	0%	6	6	0%
Waste Disposal	0	0	0%	0	0	0%
Cleaning and Surface Coatings	0	0	0%	1	1	0%
Petroleum Production and Marketing	1	1	0%	1	2	+100%
Industrial Processes	0	0	0%	5	7	+40%
Solvent Evaporation						
Consumer Products	0	0	0%	0	0	0%
Architectural Coatings	0	0	0%	0	0	0%
Others	0	0	0%	0	0	0%
Misc. Processes *	1	1	0%	52	32	-39%
RECLAIM SOURCES	12	10	-17%	0	0	0%
Total Stationary Sources	**16**	**14**	**-12%**	**65**	**48**	**-26%**
Mobile Sources						
On-Road Vehicles	2	2	0%	18	19	6%
Off-Road Vehicles	14	38	+171%	18	13	-28%
Total Mobile Sources	**16**	**40**	**+150%**	**36**	**32**	**-11%**
TOTAL	**32**	**54**	**+69%**	**101**	**80**	**-21%**

[1] Values are rounded to nearest integer.

*Includes residential fuel combustion, farming operations, construction, road dust, waste burning and disposal.

Future Year Emissions

Future baseline emissions, assuming no additional air quality regulations are introduced, are given in this appendix for the years 2014, 2017, 2019, 2023, and 2030. These emissions are forecast from the 2008 base year by incorporating the controls implemented under SCAQMD rules adopted as of June 2012, and CARB adopted by August 2011, and a specific set of growth rates from SCAG for population, industry, and motor vehicle activity. Growth projections from SCAG were replaced for certain categories where more specific information is available to improve emission forecasts.

For example, 2011 California Gas Fuel Report's energy demand forecasts for natural gas, including the energy efficiency, are used to forecast the emissions of those source categories. Several external adjustments are made to include CARB's rules adopted after August 2011, and emission reductions are not included in the EMFAC2011 or In-Use Off-Road Fleet Inventory models. These external adjustments in the Final 2012 AQMP include large spark ignition engines, non-agricultural internal combustion engines, advanced clean vehicles (LEVIII), Smog Check improvement, pleasure craft, and locomotives.

The impact of New Source Review and emissions budgeted for several District programs are addressed in the Controlled Emission Data section. Due to the adoption of the Regional Clean Air Incentive Market (RECLAIM) program in October 1993, emissions are divided into two categories, RECLAIM and non-RECLAIM. Future emissions from RECLAIM sources are estimated based on their allocations specified by District Rule 2002. The methodology used to forecast emissions for non-RECLAIM sources is described in the following sections. Baseline emissions for future years are obtained using the following equation:

$$\mathbf{(F.Y.)_i = (B.Y.)_i(C.F.)_i(G.F.)_i}$$

where (F.Y.)i is the forecast emissions of an air pollutant in the South Coast Air Basin for a future year. (B.Y.)i refers to the base year emissions of the air pollutant (i.e., 2008). The control factor, (C.F.)i, is an indicator of the level of control on a specific source category as a result of adopted state and local air quality regulations. (G.F.)i is a growth factor determined for different categories of industry and socioeconomic data.

Control Factors

The impact of SCAQMD rules adopted or amended with compliance dates after 2008 are included in the baseline emission forecasts by means of control factors. Control factors were developed in reference to 2008 and applied to source categories and/or specific industries affected by the adopted rules/amendments. For industry, the standard industrial codes (SIC) system is used, and for equipment, U.S. EPA's SCC system is used. A control factor $(C.F.)_i$ is calculated by the following equation for an individual source category:

$$\mathbf{(C.F.)_i = 1 - Control\ Efficiency}$$

Control efficiency is mostly based on estimates projected during rulemaking. Control factors represent the remaining emissions after a rule or regulation is implemented after

2008. Table III-2-2 lists control factors for the years 2014 and 2023 for District rules with post-2008 compliance dates.

Growth Factors

For growth purposes, facility business type is assigned to the facilities based on North American Industry Classification System (NAICS) Code according to their primary activity. Growth projections by NAICS were developed by SCAG. The Final 2012 AQMP growth data is based on SCAG's 2012 RTP. The data was adjusted with the most recent data from Bureau of Labor Statistics (BLS), California Department of Finance (DOF), California Employment Development Department and U.S. Census Bureau (Census). The SCAG's 2012 RTP growth estimates are lower than SCAG's 2008 RTP for the following reasons: (1) Recent population projections from BLS, DOF and Census indicate that SCAG region will face significant slow growth, which will affect long-term employment growth in SCAG region. This is due to the aging trend of the baby-boomer population and the recessionary impacts; (2) The Final 2012 AQMP employment growth is adjusted by both the economic recession and globalization. Since the employment forecast is based on a historical trend, sluggish job growth in recent years translates into slower short-term and long-term employment growth for the SCAG region.

Each emission inventory source grows based on its growth surrogate. Growth surrogates include industry output growth, employment growth, demographic growth and others. The selection of the surrogate by which emission growth is projected depends on the type of activity. For instance, manufacturing sectors use output growth as surrogate. Output growth is the product of employment and productivity. Employment growth is chosen for labor intensive sectors, such as construction and laundering. Certain emission sources use demographic data as their surrogate, such as architectural coatings (housing units as surrogate) and composting (population as surrogate). Some growth projections are from CARB's special studies or Southern California Gas Company 2011 Gas Fuel Report for natural gas combustion related categories.

TABLE III-2-2A

Control Factors by District Rules with Post-2008 Compliance Dates

		2014				2023			
RULES*	**DESCRIPTION**	**VOC**	**NOx**	**SOx**	**PM**	**VOC**	**NOx**	**SOx**	**PM**
1105.1	Fluid Catalytic Cracking Units (FCCUs)	-	-	-	0.83	-	-	-	0.83
1110.2**	Gaseous & Liquid Fuel Engines	0.93	0.26	-	-	0.93	0.26	-	-
1111	Natural-Gas-Fired, Fan-Type Central Furnaces	-	0.99	-	-	0.73	-	-	-
1113	Architectural Coatings	0.90	-	-	-	0.90	-	-	-
1118	Refinery Flares	0.68	0.59	0.50	0.54	0.68	0.59	0.50	0.54
1121	Residential - Natural-Gas-Fired Water Heaters	-	0.59	-	-	-	0.34	-	-
1133.2	Co-Composting & Related Operations	0.93	-	-	-	0.93	-	-	-
1133.3	Greenwaste Composting Operations	0.67	-	-	-	0.67	-	-	-
1143	Consumer Paint Thinners & Multi-Purpose Solvents	0.04	-	-	-	0.04	-	-	-
1144	Metalworking Fluids & Direct-contact Lubricant	0.33	-	-	-	0.33	-	-	-
1146	Large Ind/Comm Boilers, Steam Generator, & Process Heaters	-	0.50	-	-	-	0.36	-	-
1146.1	Small Ind/Comm Boilers, Steam Generators & Process Heaters	-	0.40	-	-	-	0.31	-	-
1146.2	Large Water Heaters & Small Boilers	-	0.67	-	-	-	0.60	-	-
1147	Nox Reductions from Miscellaneous Sources	-	0.44	-	-	-	0.39	-	-
1149	Storage Tank & Pipeline Cleaning & Degassing	0.11	-	-	-	0.11	-	-	-
1151	Motor Vehicle & Equip. Non-Assembly Line Coating	0.96	-	-	-	0.96	-	-	-
1156	Cement Manufacturing Facilities	-	-	-	0.97	-	-	-	0.97
1177	LPG Transfer and Dispensing	0.65	-	-	-	0.29	-	-	-
1178	Storage Tanks at Petroleum Facilities	0.88	-	-	-	0.88	-	-	-
445	Wood Burning Devices	-	-	-	0.89	-	-	-	0.89

*Current as of June 2012. Only rules with emissions impact after 2008 are listed.

** Emission reductions from biogas are adjusted in Section of “SIP Set Aside Account”.

TABLE III-2-2B

Emission Reductions (Tons per Day) in the Baseline by District Rules

		2014				2023			
RULES*	**DESCRIPTION**	**VOC**	**NOx**	**SOx**	**PM2.5**	**VOC**	**NOx**	**SOx**	**PM2.5**
1105.1	Fluid Catalytic Cracking Units (FCCUs)	-	-	-	0.07	-	-	-	0.07
1110.2**	Gaseous & Liquid Fuel Engines	0.47	5.61	-	-	0.44	5.43	-	-
1111	Natural-Gas-Fired, Fan-Type Central Furnaces	-	0.09	-	-		2.44	-	-
1113	Architectural Coatings	1.66	-	-	-	1.80	-	-	-
1118	Refinery Flares	0.03	0.13	0.11	0.06	0.04	0.13	0.11	0.07
1121	Residential - Natural-Gas-Fired Water Heaters	-	2.78	-	-	-	4.32	-	-
1133.2	Co-Composting & Related Operations	0.16	-	-	-	0.16	-	-	-
1133.3	Greenwaste Composting Operations	0.77	-	-	-	0.77	-	-	-
1143	Consumer Paint Thinners & Multi-Purpose Solvents	9.90	-	-	-	10.60	-	-	-
1144	Metalworking Fluids & Direct-contact Lubricant	3.72	-	-	-	3.96	-	-	-
1146	Large Ind/Comm Boilers, Steam Generator, & Process Heaters	-	1.11	-	-	-	1.71	-	-
1146.1	Small Ind/Comm Boilers, Steam Generators & Process Heaters	-	0.67	-	-	-	0.66	-	-
1146.2	Large Water Heaters & Small Boilers	-	3.17	-	-	-	3.48	-	-
1147	Nox Reductions from Miscellaneous Sources	-	1.57	-	-	-	2.20	-	-
1149	Storage Tank & Pipeline Cleaning & Degassing	1.45	-	-		1.53	-	-	-
1151	Motor Vehicle & Equip. Non-Assembly Line Coating	0.32	-	-	-	0.39	-	-	
1156	Cement Manufacturing Facilities	-	-	-	0.01	-	-	-	0.01
1177	LPG Transfer and Dispensing	3.07	-	-	-	6.68	-	-	-
1178	Storage Tanks at Petroleum Facilities	0.12	-	-	-	0.13	-	-	-
445	Wood Burning Devices	-	-	-	0.63	-	-	-	0.63
TOTAL		**21.68**	**15.13**	**0.11**	**0.76**	**26.49**	**20.38**	**0.11**	**0.77**

*Adopted or amended as of June 2012. Only rules with emissions impact after 2008 are listed.

** Emission reductions from biogas are adjusted in Section of "SIP Set Aside Account".

*** Emission reductions are annual average emissions presented in sequence.

The demographic forecasts from the year 2008 to the years 2023, and 2030 for population, housing, employment, and motor vehicle activity are shown in Table III-2-3.

TABLE III-2-3

Baseline Demographic Forecasts in the Final 2012 AQMP

CATEGORY	2008	2023 (% GROWTH)		2030 (% GROWTH)	
Population (Millions)	15.6	17.3	11%	18.1	16%
Housing Units (Millions)	5.1	5.7	12%	6.0	18%
Total Employment (Millions)	7.0	7.7	10%	8.1	16%
Daily VMT (Millions)	379	396	4%	421	11%

Current forecasts indicate that this region will experience a population growth of 11 percent by the year 2023 with a 4 percent increase in vehicle miles traveled (VMT); and a population growth of 16% by the year 2030 with a 11% increase in VMT.

As compared to the projection from the 2007 AQMP, the current projection for the Final 2012 AQMP for the year 2030 shows about a 1.5 million (7.6%) decrease in population, 900,000 (10%) decrease in total employment and 32 million miles (7.1%) decrease in the daily VMT forecast.

Table III-2-4 shows the relative distribution of population by county in the Basin for the years 1997, 2002, 2008, 2014, 2023, and 2030. By 2030 the population in Los Angeles County is projected to increase by 12 percent from 2008 levels, compared with increases for Orange, San Bernardino, and Riverside counties of 14 percent, 39 percent, and 24 percent respectively.

TABLE III-2-4

Population Distribution by County in SCAB (in Thousands)*

YEAR	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO	BASIN TOTAL
1997	8,881	2,750	1,072	1,250	13,954
2002	9,486	2,931	1,278	1,410	15,105
2008	9,398	2,989	1,683	1,510	15,580
2014	9,648	3,119	1,842	1,592	16,201
2023	10,107	3,316	2,114	1,745	17,282
2030	10,509	3,408	2,335	1,878	18,130

* Source – SCAG socio-economic data (11/11)

Growth factors for specified ranges of NAICS categories were projected by SCAG, and are based on predictions of growth for different industrial sectors per county. SCAG has provided growth factors for the years 2005, 2011, 2012, 2015, 2018, 2020, 2023, 2025, and 2030. The growth factors for other years are interpolated. Table III-2-5 lists the point sources growth surrogate by NAICs. Table III-2-6 has the area sources growth surrogate by source category. Tables III-2-7 to III-2-10 illustrates the growth factors for point sources by NAICS for years of 2014, 2019, 2023 and 2030 in the Final 2012 AQMP. Tables III-2-11 to III-2-14 contains the growth factors for years of 2014, 2019, 2023, and 2030 in the Final 2012 AQMP for the area sources by source category.

TABLE III-2-5

Point Sources Growth Surrogate by Source Category

NAICS	SOURCE DESCRIPTION	GROWTH SURROGATE
111	Crop Production	111-115 Output
112	Animal Production	111-115 Output
113	Forestry and Logging	111-115 Output
114	Fishing Hunting and Trapping	111-115 Output
115	Support Activities for Agriculture and Forestry	111-115 Output
211	Oil and Gas Extraction	211 Output
212	Mining (except Oil and Gas)	212-213 Output
213	Support Activities for Mining	212-213 Output
221111	Hydroelectric Power Generation	SCG-Electricity Power
221112	Fossil Fuel Electric Generation	SCG-Electricity Power
221113	Nuclear Electric Generation	SCG-Electricity Power
221119	Other Electric Generation	SCG-Electricity Power
221121	Electric Bulk Transmission and Control	SCG-Electricity Power
221122	Electric Power Distribution	SCG-Electricity Power
221	Utilities - Except Electricity	Total Employment
236	Construction of Buildings	236-238 Employment
237	Heavy and Civil Engineering Construction	236-238 Employment
238	Specialty Trade Contractors	236-238 Employment
311	Food Manufacturing	311 Output
312	Beverage and Tobacco Product Manufacturing	312 Output
313	Textile Mills	313 Output
314	Textile Product Mills	314 Output
315	Apparel Manufacturing	315 Output
316	Leather and Allied Product Manufacturing	316 Output
321	Wood Product Manufacturing	321 Output
322	Paper Manufacturing	322 Output
323	Printing and Related Support Activities	323 Output
324	Petroleum and Coal Products Manufacturing	No Growth

TABLE III-2-5 (continued)

Point Sources Growth Surrogate by Source Category

NAICS	SOURCE DESCRIPTION	GROWTH SURROGATE
325	Chemical Manufacturing	325 Output
326	Plastics and Rubber Products Manufacturing	326 Output
327	Nonmetallic Mineral Product Manufacturing	327 Output
331	Primary Metal Manufacturing	331 Output
332	Fabricated Metal Product Manufacturing	332 Output
333	Machinery Manufacturing	333 Output
334	Computer and Electronic Product Manufacturing	334 Output
335	Electrical Equipment -Appliance-Component Manufacturing	335 Output
336	Transportation Equipment Manufacturing	336 Output
337	Furniture and Related Product Manufacturing	337 Output
339	Miscellaneous Manufacturing	339 Output
423	Merchant Wholesalers-Durable Goods	423 Employment
424	Merchant Wholesalers - Nondurable Goods	424 Employment
425	Wholesale Electronic Markets and Agents and Brokers	425 Employment
441	Motor Vehicle and Parts Dealers	441 Employment
442	Furniture and Home Furniture Stores	442 Employment
443	Electronics and Appliance Stores	443 Employment
444	Building Material-Garden Equipment-Supplies Dealers	444 Employment
445	Food and Beverage Stores	445-6 Employment
446	Health and Personal Care Stores	445-6 Employment
447	Gasoline Stations	447 Output
448	Clothing and Clothing Accessories Stores	448 Output
451	Sporting Goods-Hobby-Book- Music Stores	451-454 Output
452	General Merchandise Stores	451-454 Output
453	Miscellaneous Store Retailers	451-454 Output
454	Nonstore Retailers	451-454 Output
481	Air Transportation	481 Output

TABLE III-2-5 (continued)

Point Sources Growth Surrogate by Source Category

NAICS	SOURCE DESCRIPTION	GROWTH SURROGATE
482	Rail Transportation	482 Output
483	Water Transportation	483 Output
484	Truck Transportation	484 Output
485	Transit and Ground Passenger Transportation	485 Output
486	Pipeline Transportation	486 Output
487	Scenic and Sightseeing Transportation	487 Output
488	Support Activities for Transportation	488 Output
491	Postal Service	491-493 Employment
492	Couriers and Messengers	491-493 Employment
493	Warehousing and Storage	491-493 Output
511	Publishing Industries (except Internet)	511-519 Output
512	Motion Picture and Sound Recording Industries	511-519 Output
515	Broadcasting (except Internet)	511-519 Output
517	Telecommunications	511-519 Output
518	Data Processing- Hosting and Related Services	511-519 Output
519	Other Information Services	511-519 Output
521	Monetary Authorities-Central Bank	521-525 Employment
522	Credit Intermediation and Related Activities	521-525 Employment
523	Securities-Commodity-Other Financial Investments	521-525 Employment
524	Insurance Carriers and Related Activities	521-525 Employment
525	Funds-Trusts-and Other Financial Vehicles	521-525 Employment
531	Real Estate	531-533 Employment
532	Rental and Leasing Services	531-533 Employment
533	Lessors of Nonfinancial Intangible Assets (no Copyright)	531-533 Employment
541	Professional-Scientific-and Technical Services	541 Employment
551	Management of Companies and Enterprises	551 Employment
561	Administrative and Support Services	561-562 Employment
562	Waste Management and Remediation Services	561-562 Employment

TABLE III-2-5 (concluded)

Point Sources Growth Surrogate by Source Category

NAICS	SOURCE DESCRIPTION	GROWTH SURROGATE
611	Educational Services	Pop 5 to 24
621	Ambulatory Health Care Services	Population
622	Hospitals	Pop 0 to 4 and 65 up
623	Nursing and Residential Care Facilities	Pop 65 up
624	Social Assistance	621-624 Employment
711	Performing Arts-Spectator Sports-and Related Industries	711-713 Output
712	Museums-Historical Sites-and Similar Institutions	711-713 Output
713	Amusement-Gambling-and Recreation Industries	711-713 Output
721	Accommodation	Total Employment
722	Food Services and Drinking Places	Total Employment
811	Repair and Maintenance	Total Employment
812	Personal and Laundry Services	Total Employment
813	Religious-Grant-Civic-Professional-and Similar Org	811-814 Employment
814	Private Households	811-814 Employment
921	Executive-Legislative-and Other General Govt Support	921-928 Employment
922	Justice-Public Order-and Safety Activities	921-928 Employment
923	Administration of Human Resource Programs	921-928 Employment
924	Administration of Environmental Quality Programs	921-928 Employment
925	Admin of Housing Pgms-Urban-Community Development	921-928 Employment
926	Administration of Economic Programs	921-928 Employment
927	Space Research and Technology	921-928 Employment
928	National Security and International Affairs	921-928 Employment

TABLE III-2-6

Area Sources Growth Surrogate by Source Category

SOURCE DESCRIPTION	SURROGATE
Cogen	SCG- Cogen *
Gaseous Fuel	No Growth
Industrial Natural Gas (Unspecified)	SCG - Industrial Combustion *
Ind. Stationary IC Engines - Natural Gas	SCG - Industrial Combustion *
Industrial LPG Combustion	Manufacturing Output
Industrial Distillate Oil Combustion	Manufacturing Output
Ag Irrigation IC Engines-Stationary	CARB Data from San Joaquin Study
Ag Irrigation IC Engines-Portable	CARB Data from San Joaquin Study
Commercial Natural Gas Comb. (Other)	SCG - Commercial Combustion *
Commercial LPG Combustion	Service Output
Commercial Space Heating	SCG- Commercial Space *
Commercial Water Heating	SCG - Commercial Water *
Resource Recovery	SCG – Cogen *
Stationary Engines - Diesel	CARB Growth Data
Municipal Waste Disposal	CARB Growth Data
Biological Waste - Composting	Population
Laundering	Total Employment
Degreasing	Manufacturing Output
Auto Refinishing	Misc. Services Employment
Marine Coating	Water Transportation Output
Paper Coating	Paper Manufacturing Output
Metal Part and Products Coatings	Fabricated Metal Output
Wood and Fabricated Furniture Coatings	Furniture Output
Plastic Parts Coatings	Plastic Output
Semiconductor Coatings	Computer Output
Aircraft and Aerospace Coatings	Air Transportation Output
Printing	Printing Output
Adhesive and Sealants (Solvent Based)	Manufacturing Output
Adhesive and Sealants (Water Based)	Manufacturing Output

TABLE III-2-6 (continued)

Area Sources Growth Surrogate by Source Category

SOURCE DESCRIPTION	SURROGATE
Miscellaneous Industrial Solvents	Manufacturing Output
Oil Production Fugitive	NAICS 211 Output
Gasoline Dispersing Tank-Working Losses	Gasoline Consumption
Vehicle Refueling-Vapor Displacement Losses	Gasoline Consumption
Gasoline Dispensing Tank-Breathing Losses	Gasoline Consumption
Vehicle Refueling-Spillage	Gasoline Consumption
Natural Gas Transmission Losses	Natural Gas
Bulk Gasoline Storage and Transfer (Unspec)	Crude Oil
Tank Cargo-Pressure Related Fug. Losses	Gasoline Consumption
Tank Cargo-Vapor Hose Fugitive Losses	Gasoline Consumption
Tank Cargo-Product Hose Fugitive Losses	Gasoline Consumption
Storage Tank and Pipeline Cleaning	Gasoline Consumption
LPG Transfer and Dispensing - Fugitive Losses	Households
Rubber and Rubber Products	Plastic Output
Plastic and Plastic Products	Plastic Output
Fiberglass and Fiberglass Products	Plastic Output
Wine Fermentation	CARB Growth Data
Ag Crop Processing Losses	Agriculture Output
Bakeries	Food Output
Wine Aging	CARB Growth Data
Other Mineral Processes	Mineral Product Output
Sand and Gravel Excavation	Mineral Product Output
Asphaltic Concrete Production	No Growth
Grinding/Crushing of Aggregates	Mineral Product Output
Surface Blasting	Mining Extraction Output
Cement Concrete Manufacturing and Fabrication	Mineral Product Output

TABLE III-2-6 (continued)

Area Sources Growth Surrogate by Source Category

SOURCE DESCRIPTION	SURROGATE
Open Pile Storage	No Growth
Secondary Metal Production	Primary Metal Output
Industrial Lubricant	Population
Wood Product Losses	Furniture Output
Consumer Products	Population
Architectural Coatings	Households
Ag Pesticides Methyl Bromide	CARB Data from San Joaquin Study
Ag Pesticides non-Methyl Bromide	CARB Data from San Joaquin Study
non-Ag Pesticides-Methyl Bromide	CARB Growth Surrogate
non-Ag Pesticides-non-Methyl Bromide	CARB Growth Surrogate
Asphalt Paving	Construction Employment
Residential Natural Gas Comb -Other	SCG - Residential Comb.*
Residential Distillate Oil Combustion	Households
Residential LPG Combustion	Households
Residential Natural Gas Space Heating	SCG - Residential Space *
Residential Natural Gas Water Heating	SCG - Residential Water *
Residential Natural Gas Cooking	SCG - Residential Cooking *
Residential Wood Stoves	No Growth
Residential Wood Fireplaces	No Growth
Farming Operations	CARB Growth Data
Residential Building Construction - Dust	Construction Employment
Commercial Building Construction - Dust	Construction Employment
Industrial Building Construction - Dust	Construction Employment
Road Construction - Dust	Construction Employment
Institutional Building Construction - Dust	Construction Employment
Paved Road Travel (Unspecified)	No Growth
Paved Road Travel-Freeways	Center Line (freeway)
Paved Road Travel-Major	Center Line (major)
Paved Road Travel-Local	Center Line (other)

TABLE III-2-6 (concluded)

Area Sources Growth Surrogate by Source Category

SOURCE DESCRIPTION	SURROGATE
Paved Road Travel-Local	Center Line (other)
Unpaved Road Travel -City and County Roads	No Growth
Unpaved Road Travel - US Forest and Park Roads	No Growth
Unpaved Road Travel -BLM Roads	No Growth
Unpaved Road Travel -Farm Roads	CARB Data from San Joaquin Study
Unpaved Roads (Unspecified)	No Growth
Ag Land (Non-Pasture) - Wind Dust	CARB Data from San Joaquin Study
Unpaved Roads - Wind Dust	No Growth
Ag Land (Pasture) - Wind Dust	CARB Data from San Joaquin Study
Fires	No Growth
Ag Burning - Pruning	CARB Data from San Joaquin Study
Weed Abatement	No Growth
Forest Management	Forest
Range Improvement	Agriculture Employment
Cooking	Total Employment

* These projections by SCG incorporate the energy efficiency programs/standards.

TABLE III-2-7

NAIC Emission Growth Factors by County in the SCAB for the Year 2014

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Agriculture, Forestry, Animal, Fishing and Hunting	11	1.061	0.985	1.265	0.892
Oil and Gas Extraction	211	1.073	0.997	1.281	0.903
Mining (except Oil and Gas)	212	1.070	0.993	1.276	0.900
Support Activities for Mining	213	1.070	0.993	1.276	0.900
Utilities - Except Electricity	221	1.005	0.945	1.160	1.048
Utilities – Electricity *	221	0.882	0.882	0.882	0.882
Construction	23	0.862	0.875	1.099	1.019
Food Manufacturing	311	1.026	0.981	1.068	1.059
Beverage and Tobacco Product Manufacturing	312	0.942	0.901	0.981	0.973
Textile Mills	313	1.304	1.247	1.357	1.346
Textile Product Mills	314	1.250	1.196	1.301	1.291
Apparel Manufacturing	315	1.182	1.130	1.230	1.220
Leather and Allied Product Manufacturing	316	1.108	1.060	1.153	1.144
Wood Product Manufacturing	321	0.976	0.933	1.016	1.008
Paper Manufacturing	322	1.009	0.965	1.050	1.042
Printing and Related Support Activities	323	0.927	0.886	0.964	0.957
Petroleum and Coal Products Manufacturing	324	1.000	1.000	1.000	1.000
Chemical Manufacturing	325	1.115	1.067	1.161	1.152
Plastics and Rubber Products Manufacturing	326	1.171	1.120	1.219	1.209
Nonmetallic Mineral Product Manufacturing	327	1.007	0.963	1.048	1.040
Primary Metal Manufacturing	331	0.932	0.892	0.970	0.963
Fabricated Metal Product Manufacturing	332	1.035	0.990	1.077	1.069
Machinery Manufacturing	333	1.057	1.011	1.100	1.091

* These factors incorporate SCAG's employment growth projections (1.0053) and SCG's efficiency improvement and renewable portfolio standards of 0.877.

TABLE III-2-7 (continued)

NAIC Emission Growth Factors by County in the SCAB for the Year 2014

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Computer and Electronic Product Manufacturing	334	1.485	1.421	1.546	1.534
Electrical Equipment -Appliance-Component Manufacturing	335	1.065	1.019	1.109	1.100
Transportation Equipment Manufacturing	336	1.122	1.073	1.168	1.159
Furniture and Related Product Manufacturing	337	1.117	1.068	1.162	1.153
Miscellaneous Manufacturing	339	1.099	1.052	1.144	1.135
Wholesale Trade	42	0.983	0.924	1.098	0.985
Motor Vehicle and Parts Dealers	441	0.994	0.919	1.158	1.022
Furniture and Home Furniture Stores	442	0.994	0.919	1.158	1.022
Electronics and Appliance Stores	443	0.994	0.919	1.158	1.022
Building Material-Garden Equipment-Supplies Dealers	444	0.994	0.919	1.158	1.022
Food and Beverage Stores	445	0.994	0.919	1.158	1.022
Health and Personal Care Stores	446	0.994	0.919	1.158	1.022
Gasoline Stations	447	1.243	1.149	1.447	1.277
Clothing and Clothing Accessories Stores	448	1.243	1.149	1.447	1.277
Sporting Goods-Hobby-Book-Music Stores	451	1.243	1.149	1.447	1.277
General Merchandise Stores	452	1.243	1.149	1.447	1.277
Miscellaneous Store Retailers	453	1.243	1.149	1.447	1.277
Nonstore Retailers	454	1.243	1.149	1.447	1.277
Air Transportation	481	1.212	1.131	1.584	1.314
Rail Transportation	482	1.066	0.995	1.000	1.156
Water Transportation	483	1.255	1.171	1.640	1.361
Truck Transportation	484	1.130	1.054	1.477	1.225
Transit and Ground Passenger Transportation	485	1.051	0.980	1.373	1.139

TABLE III-2-7 (concluded)

NAIC Emission Growth Factors by County in the SCAB for the Year 2014

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Pipeline Transportation	486	1.047	0.977	1.368	1.135
Scenic and Sightseeing Transportation	487	1.039	0.969	1.357	1.126
Support Activities for Transportation	488	1.039	0.969	1.357	1.126
Postal Service	491	0.997	0.930	1.302	1.080
Couriers and Messengers	492	0.997	0.930	1.302	1.080
Warehousing and Storage	493	1.130	1.054	1.477	1.225
Information	51	1.325	1.173	1.857	1.576
Finance and Insurance	52	0.979	0.943	1.124	0.989
Real Estate and Rental and Leasing	53	0.979	0.943	1.124	0.989
Professional-Scientific-and Technical Services	541	1.017	0.975	1.098	1.049
Management of Companies and Enterprises	551	1.017	0.975	1.098	1.049
Administrative and Support Services	561	1.017	0.975	1.098	1.049
Waste Management and Remediation Services	562	1.017	0.975	1.098	1.049
Educational Services	611	0.997	1.020	1.074	1.032
Ambulatory Health Care Services	621	1.027	1.043	1.095	1.054
Hospitals	622	1.095	1.121	1.149	1.112
Nursing and Residential Care Facilities	623	1.137	1.163	1.198	1.176
Social Assistance	624	1.070	1.006	1.186	1.051
Arts, Entertainment, Museums, and Recreation	71	1.053	0.981	1.201	1.066
Accommodation and Food Services	72	1.005	0.945	1.160	1.048
Repair and Maintenance	811	1.005	0.945	1.160	1.048
Personal and Laundry Services	812	1.005	0.945	1.160	1.048
Religious-Grant-Civic-Professional-and Similar Org	813	0.998	0.930	1.257	1.131
Private Households	814	0.998	0.930	1.257	1.131
Public Administration	92	1.087	1.034	1.653	1.524

Base year is 2008.

TABLE III-2-8

NAIC Emission Growth Factors by County in the SCAB for the Year 2019

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Agriculture, Forestry, Animal, Fishing and Hunting	11	1.099	1.197	1.524	1.149
Oil and Gas Extraction	211	1.118	1.217	1.551	1.169
Mining (except Oil and Gas)	212	1.112	1.210	1.542	1.162
Support Activities for Mining	213	1.112	1.210	1.542	1.162
Utilities - Except Electricity	221	1.042	0.991	1.388	1.143
Utilities – Electricity *	221	0.865	0.865	0.865	0.865
Construction	23	0.996	1.064	1.751	1.393
Food Manufacturing	311	1.114	1.078	1.429	1.267
Beverage and Tobacco Product Manufacturing	312	0.961	0.930	1.232	1.092
Textile Mills	313	1.697	1.641	2.177	1.930
Textile Product Mills	314	1.572	1.521	2.017	1.787
Apparel Manufacturing	315	1.428	1.382	1.832	1.624
Leather and Allied Product Manufacturing	316	1.275	1.234	1.635	1.450
Wood Product Manufacturing	321	1.024	0.990	1.313	1.164
Paper Manufacturing	322	1.083	1.048	1.389	1.232
Printing and Related Support Activities	323	0.936	0.905	1.200	1.064
Petroleum and Coal Products Manufacturing	324	1.000	1.000	1.000	1.000
Chemical Manufacturing	325	1.290	1.248	1.655	1.467
Plastics and Rubber Products Manufacturing	326	1.403	1.358	1.800	1.596
Nonmetallic Mineral Product Manufacturing	327	1.078	1.043	1.382	1.226
Primary Metal Manufacturing	331	0.947	0.916	1.213	1.076
Fabricated Metal Product Manufacturing	332	1.132	1.095	1.452	1.287
Machinery Manufacturing	333	1.175	1.137	1.507	1.336

* These factors incorporate SCAG's employment growth projections (1.0634) and SCG's efficiency improvement and renewable portfolio standards of 0.813.

TABLE III-2-8 (continued)

NAIC Emission Growth Factors by County in the SCAB for the Year 2019

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Computer and Electronic Product Manufacturing	334	2.139	2.070	2.747	2.433
Electrical Equipment -Appliance-Component Manufacturing	335	1.191	1.152	1.527	1.354
Transportation Equipment Manufacturing	336	1.302	1.260	1.670	1.480
Furniture and Related Product Manufacturing	337	1.292	1.249	1.656	1.468
Miscellaneous Manufacturing	339	1.259	1.218	1.615	1.432
Wholesale Trade	42	1.023	0.955	1.237	1.088
Motor Vehicle and Parts Dealers	441	1.019	0.944	1.284	1.079
Furniture and Home Furniture Stores	442	1.019	0.944	1.284	1.079
Electronics and Appliance Stores	443	1.019	0.944	1.284	1.079
Building Material-Garden Equipment-Supplies Dealers	444	1.019	0.944	1.284	1.079
Food and Beverage Stores	445	1.019	0.944	1.284	1.079
Health and Personal Care Stores	446	1.019	0.944	1.284	1.079
Gasoline Stations	447	1.502	1.392	1.892	1.590
Clothing and Clothing Accessories Stores	448	1.502	1.392	1.892	1.590
Sporting Goods-Hobby-Book- Music Stores	451	1.502	1.392	1.892	1.590
General Merchandise Stores	452	1.502	1.392	1.892	1.590
Miscellaneous Store Retailers	453	1.502	1.392	1.892	1.590
Nonstore Retailers	454	1.502	1.392	1.892	1.590
Air Transportation	481	1.416	1.325	2.001	1.687
Rail Transportation	482	1.136	1.063	1.000	1.353
Water Transportation	483	1.499	1.403	2.119	1.787
Truck Transportation	484	1.258	1.177	1.778	1.499
Transit and Ground Passenger Transportation	485	1.107	1.036	1.564	1.319

TABLE III-2-8 (concluded)

NAIC Emission Growth Factors by County in the SCAB for the Year 2019

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Pipeline Transportation	486	1.100	1.029	1.555	1.311
Scenic and Sightseeing Transportation	487	1.084	1.015	1.532	1.292
Support Activities for Transportation	488	1.084	1.015	1.532	1.292
Postal Service	491	1.010	0.945	1.427	1.204
Couriers and Messengers	492	1.010	0.945	1.427	1.204
Warehousing and Storage	493	1.256	1.175	1.775	1.496
Information	51	1.711	1.562	2.425	1.837
Finance and Insurance	52	1.033	0.985	1.253	1.080
Real Estate and Rental and Leasing	53	1.033	0.985	1.253	1.080
Professional-Scientific-and Technical Services	541	1.106	1.067	1.306	1.138
Management of Companies and Enterprises	551	1.106	1.067	1.306	1.138
Administrative and Support Services	561	1.106	1.067	1.306	1.138
Waste Management and Remediation Services	562	1.106	1.067	1.306	1.138
Educational Services	611	0.982	1.029	1.134	1.060
Ambulatory Health Care Services	621	1.052	1.084	1.178	1.107
Hospitals	622	1.199	1.246	1.298	1.223
Nursing and Residential Care Facilities	623	1.302	1.347	1.431	1.387
Social Assistance	624	1.101	1.035	1.456	1.180
Arts, Entertainment, Museums, and Recreation	71	1.089	1.002	1.330	1.095
Accommodation and Food Services	72	1.042	0.991	1.388	1.143
Repair and Maintenance	811	1.042	0.991	1.388	1.143
Personal and Laundry Services	812	1.042	0.991	1.388	1.143
Religious-Grant-Civic-Professional-and Similar Org	813	1.019	0.993	1.617	1.301
Private Households	814	1.019	0.993	1.617	1.301
Public Administration	92	1.077	0.973	1.533	1.145

Base year is 2008.

TABLE III-2-9

NAIC Emission Growth Factors by County in the SCAB for the Year 2023

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Agriculture, Forestry, Animal, Fishing and Hunting	11	1.120	1.271	1.629	1.307
Oil and Gas Extraction	211	1.128	1.279	1.639	1.315
Mining (except Oil and Gas)	212	1.122	1.273	1.631	1.309
Support Activities for Mining	213	1.122	1.273	1.631	1.309
Utilities - Except Electricity	221	1.063	1.023	1.550	1.239
Utilities – Electricity *	221	0.859	0.859	0.859	0.859
Construction	23	1.033	1.137	2.085	1.597
Food Manufacturing	311	1.141	1.102	1.600	1.373
Beverage and Tobacco Product Manufacturing	312	0.960	0.927	1.346	1.155
Textile Mills	313	1.884	1.820	2.643	2.267
Textile Product Mills	314	1.701	1.644	2.387	2.047
Apparel Manufacturing	315	1.535	1.483	2.153	1.847
Leather and Allied Product Manufacturing	316	1.337	1.291	1.875	1.608
Wood Product Manufacturing	321	1.041	1.006	1.461	1.253
Paper Manufacturing	322	1.108	1.070	1.554	1.333
Printing and Related Support Activities	323	0.938	0.907	1.317	1.129
Petroleum and Coal Products Manufacturing	324	1.000	1.000	1.000	1.000
Chemical Manufacturing	325	1.356	1.310	1.902	1.631
Plastics and Rubber Products Manufacturing	326	1.494	1.444	2.096	1.798
Nonmetallic Mineral Product Manufacturing	327	1.097	1.060	1.539	1.320
Primary Metal Manufacturing	331	0.954	0.922	1.339	1.148
Fabricated Metal Product Manufacturing	332	1.162	1.123	1.631	1.399
Machinery Manufacturing	333	1.219	1.178	1.710	1.467

* These factors incorporate SCAG's employment growth projections (1.1035) and SCG's efficiency improvement and renewable portfolio standards of 0.778.

TABLE III-2-9 (continued)

NAIC Emission Growth Factors by County in the SCAB for the Year 2023

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Computer and Electronic Product Manufacturing	334	2.511	2.426	3.522	3.021
Electrical Equipment -Appliance-Component Manufacturing	335	1.235	1.193	1.733	1.486
Transportation Equipment Manufacturing	336	1.367	1.321	1.918	1.645
Furniture and Related Product Manufacturing	337	1.355	1.309	1.901	1.630
Miscellaneous Manufacturing	339	1.326	1.281	1.861	1.596
Wholesale Trade	42	1.043	0.975	1.352	1.185
Motor Vehicle and Parts Dealers	441	1.031	0.962	1.393	1.151
Furniture and Home Furniture Stores	442	1.031	0.962	1.393	1.151
Electronics and Appliance Stores	443	1.031	0.962	1.393	1.151
Building Material-Garden Equipment-Supplies Dealers	444	1.031	0.962	1.393	1.151
Food and Beverage Stores	445	1.031	0.962	1.393	1.151
Health and Personal Care Stores	446	1.031	0.962	1.393	1.151
Gasoline Stations	447	1.620	1.511	2.187	1.807
Clothing and Clothing Accessories Stores	448	1.620	1.511	2.187	1.807
Sporting Goods-Hobby-Book-Music Stores	451	1.620	1.511	2.187	1.807
General Merchandise Stores	452	1.620	1.511	2.187	1.807
Miscellaneous Store Retailers	453	1.620	1.511	2.187	1.807
Nonstore Retailers	454	1.620	1.511	2.187	1.807
Air Transportation	481	1.495	1.409	2.271	1.924
Rail Transportation	482	1.168	1.101	1.000	1.503
Water Transportation	483	1.577	1.487	2.396	2.030
Truck Transportation	484	1.319	1.243	2.004	1.698
Transit and Ground Passenger Transportation	485	1.132	1.066	1.719	1.456

TABLE III-2-9 (concluded)

NAIC Emission Growth Factors by County in the SCAB for the Year 2023

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Pipeline Transportation	486	1.122	1.057	1.704	1.443
Scenic and Sightseeing Transportation	487	1.105	1.041	1.679	1.422
Support Activities for Transportation	488	1.105	1.041	1.679	1.422
Postal Service	491	1.020	0.961	1.550	1.313
Couriers and Messengers	492	1.020	0.961	1.550	1.313
Warehousing and Storage	493	1.307	1.232	1.985	1.682
Information	51	1.899	1.757	2.882	2.089
Finance and Insurance	52	1.055	1.012	1.374	1.163
Real Estate and Rental and Leasing	53	1.055	1.012	1.374	1.163
Professional-Scientific-and Technical Services	541	1.148	1.122	1.463	1.237
Management of Companies and Enterprises	551	1.148	1.122	1.463	1.237
Administrative and Support Services	561	1.148	1.122	1.463	1.237
Waste Management and Remediation Services	562	1.148	1.122	1.463	1.237
Educational Services	611	0.990	1.044	1.200	1.097
Ambulatory Health Care Services	621	1.075	1.109	1.257	1.156
Hospitals	622	1.295	1.351	1.464	1.332
Nursing and Residential Care Facilities	623	1.459	1.507	1.661	1.589
Social Assistance	624	1.129	1.074	1.650	1.298
Arts, Entertainment, Museums, and Recreation	71	1.116	1.031	1.466	1.172
Accommodation and Food Services	72	1.063	1.023	1.550	1.239
Repair and Maintenance	811	1.063	1.023	1.550	1.239
Personal and Laundry Services	812	1.063	1.023	1.550	1.239
Religious-Grant-Civic-Professional-and Similar Org	813	1.033	1.028	1.851	1.437
Private Households	814	1.033	1.028	1.851	1.437
Public Administration	92	1.087	0.976	1.612	1.126

Base year is 2008.

TABLE III-2-10

NAIC Emission Growth Factors by County in the SCAB for the Year 2030

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Agriculture, Forestry, Animal, Fishing and Hunting	11	1.167	1.348	1.899	1.497
Oil and Gas Extraction	211	1.153	1.331	1.876	1.478
Mining (except Oil and Gas)	212	1.149	1.326	1.869	1.473
Support Activities for Mining	213	1.149	1.326	1.869	1.473
Utilities - Except Electricity	221	1.093	1.070	1.792	1.411
Utilities – Electricity *	221	0.861	0.861	0.861	0.861
Construction	23	1.054	1.214	2.517	1.898
Food Manufacturing	311	1.186	1.128	1.779	1.521
Beverage and Tobacco Product Manufacturing	312	0.955	0.909	1.434	1.226
Textile Mills	313	2.259	2.150	3.390	2.899
Textile Product Mills	314	1.950	1.855	2.926	2.502
Apparel Manufacturing	315	1.738	1.653	2.607	2.229
Leather and Allied Product Manufacturing	316	1.449	1.378	2.174	1.859
Wood Product Manufacturing	321	1.071	1.019	1.606	1.374
Paper Manufacturing	322	1.149	1.093	1.724	1.475
Printing and Related Support Activities	323	0.941	0.896	1.412	1.208
Petroleum and Coal Products Manufacturing	324	1.000	1.000	1.000	1.000
Chemical Manufacturing	325	1.476	1.404	2.215	1.894
Plastics and Rubber Products Manufacturing	326	1.664	1.583	2.497	2.135
Nonmetallic Mineral Product Manufacturing	327	1.128	1.073	1.692	1.447
Primary Metal Manufacturing	331	0.966	0.919	1.450	1.240
Fabricated Metal Product Manufacturing	332	1.215	1.156	1.823	1.559
Machinery Manufacturing	333	1.297	1.234	1.946	1.664

* These factors incorporate SCAG's employment growth projections (1.1648) and SCG's efficiency improvement and renewable portfolio standards of 0.739.

TABLE III-2-10 (continued)

NAIC Emission Growth Factors by County in the SCAB for the Year 2030

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Computer and Electronic Product Manufacturing	334	3.320	3.159	4.982	4.260
Electrical Equipment -Appliance-Component Manufacturing	335	1.313	1.250	1.971	1.685
Transportation Equipment Manufacturing	336	1.486	1.414	2.230	1.906
Furniture and Related Product Manufacturing	337	1.471	1.399	2.207	1.887
Miscellaneous Manufacturing	339	1.449	1.379	2.175	1.860
Wholesale Trade	42	1.061	1.001	1.497	1.312
Motor Vehicle and Parts Dealers	441	1.050	0.986	1.571	1.285
Furniture and Home Furniture Stores	442	1.050	0.986	1.571	1.285
Electronics and Appliance Stores	443	1.050	0.986	1.571	1.285
Building Material-Garden Equipment-Supplies Dealers	444	1.050	0.986	1.571	1.285
Food and Beverage Stores	445	1.050	0.986	1.571	1.285
Health and Personal Care Stores	446	1.050	0.986	1.571	1.285
Gasoline Stations	447	1.842	1.731	2.756	2.255
Clothing and Clothing Accessories Stores	448	1.842	1.731	2.756	2.255
Sporting Goods-Hobby-Book-Music Stores	451	1.842	1.731	2.756	2.255
General Merchandise Stores	452	1.842	1.731	2.756	2.255
Miscellaneous Store Retailers	453	1.842	1.731	2.756	2.255
Nonstore Retailers	454	1.842	1.731	2.756	2.255
Air Transportation	481	1.639	1.565	2.783	2.373
Rail Transportation	482	1.223	1.168	1.000	1.771
Water Transportation	483	1.719	1.641	2.918	2.488
Truck Transportation	484	1.430	1.365	2.428	2.070
Transit and Ground Passenger Transportation	485	1.173	1.120	1.992	1.698

TABLE III-2-10 (concluded)

NAIC Emission Growth Factors by County in the SCAB for the Year 2030

NAIC SECTOR	NAIC	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
Pipeline Transportation	486	1.157	1.104	1.965	1.675
Scenic and Sightseeing Transportation	487	1.138	1.086	1.932	1.647
Support Activities for Transportation	488	1.138	1.086	1.932	1.647
Postal Service	491	1.035	0.988	1.757	1.498
Couriers and Messengers	492	1.035	0.988	1.757	1.498
Warehousing and Storage	493	1.397	1.333	2.372	2.022
Information	51	2.254	2.112	3.794	2.767
Finance and Insurance	52	1.081	1.054	1.555	1.302
Real Estate and Rental and Leasing	53	1.081	1.054	1.555	1.302
Professional-Scientific-and Technical Services	541	1.203	1.206	1.706	1.421
Management of Companies and Enterprises	551	1.203	1.206	1.706	1.421
Administrative and Support Services	561	1.203	1.206	1.706	1.421
Waste Management and Remediation Services	562	1.203	1.206	1.706	1.421
Educational Services	611	1.020	1.065	1.324	1.170
Ambulatory Health Care Services	621	1.118	1.140	1.388	1.244
Hospitals	622	1.460	1.517	1.704	1.532
Nursing and Residential Care Facilities	623	1.720	1.763	2.039	1.952
Social Assistance	624	1.182	1.148	1.954	1.513
Arts, Entertainment, Museums, and Recreation	71	1.164	1.091	1.719	1.347
Accommodation and Food Services	72	1.093	1.070	1.792	1.411
Repair and Maintenance	811	1.093	1.070	1.792	1.411
Personal and Laundry Services	812	1.093	1.070	1.792	1.411
Religious-Grant-Civic-Professional-and Similar Org	813	1.055	1.072	2.177	1.669
Private Households	814	1.055	1.072	2.177	1.669
Public Administration	92	1.118	1.009	1.839	1.263

Base year is 2008.

TABLE III-2-11

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2014

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
020	Cogeneration	0.882	0.882	0.882	0.882
030	Petroleum Production Fuel Combustion - Gaseous Fuel	1.073	0.997	1.289	0.903
050	Industrial Combustion And Stationary Ice- Natural Gas	0.865	0.825	0.860	0.860
050	Industrial Combustion - L.P.G./Distillate Oil/Other Fuel	1.105	1.082	1.140	1.110
060	Commercial Natural Gas Combustion - Space Heating	0.942	0.902	0.940	0.940
060	Commercial Natural Gas Combustion - Water Heating	0.993	0.950	0.991	0.991
060	Commercial Natural Gas Combustion - Other	0.973	0.945	0.985	0.985
060	Commercial L.P.G. Combustion	1.211	1.146	1.316	1.232
099	Resource Recovery	0.882	0.882	0.882	0.882
110	Sewage Treatment Plants-Potws - Ammonia	1.000	1.000	1.000	1.000
120	Landfills - Municipal Solid Waste Disposal (Biodegradation)	1.102	1.106	1.104	1.112
199	Composting - Ammonia	1.000	1.000	1.000	1.000
199	Composting Waste Disposal	1.027	1.043	1.095	1.054
210	Dry Cleaning	1.005	0.945	1.160	1.048
220	Degreasing	1.105	1.082	1.140	1.110
230	Auto Refinishing - Coatings	0.998	0.930	1.257	1.131
230	Marine Coatings	1.255	1.171	1.640	1.361
230	Paper Coatings	1.009	0.965	1.050	1.042
230	Fabric Coatings	1.250	1.196	1.301	1.291
230	Can And Coil, Metal Parts And Products Coatings	1.035	0.990	1.077	1.069
230	Wood Furniture And Fabricated Products Coatings	1.117	1.068	1.162	1.153
230	Plastic Parts	1.171	1.120	1.219	1.209

TABLE III-2-11 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2014

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
230	Semiconductor Coatings	1.485	1.421	1.546	1.534
230	Aircraft And Aerospace Coatings	1.212	1.131	1.584	1.314
240	Printing	0.927	0.886	0.964	0.957
250	Adhesives And Sealants	1.105	1.082	1.140	1.110
299	Miscellaneous Industrial Solvent Uses	1.105	1.082	1.140	1.110
310	Oil And Gas Production	1.073	0.997	1.289	0.903
330	Petroleum Marketing - Natural Gas Transmission Losses	0.910	0.910	0.910	0.910
330	LPG Transfer And Dispensing - Fugitive Losses	1.032	1.031	1.077	1.058
330	Gasoline Dispensing & Transfers/Storage/Cargo Tanks	1.017	1.042	1.135	1.107
330	Bulk Gasoline Storage & Transfer (Unspecified)	0.910	0.910	0.910	0.910
410	Chemical	1.171	1.120	1.219	1.209
420	Wine Fermentation & Aging	1.101	1.101	1.107	1.113
420	Bakeries	1.026	0.981	1.068	1.059
420	Agricultural Products Processing Losses	1.101	1.101	1.107	1.113
420	Agricultural Crop Processing Losses	1.061	0.985	1.265	0.892
430	Mineral Processes - Sand/Gravel/Cement Concrete	1.007	0.963	1.048	1.040
430	Asphaltic Concrete Production	1.000	1.000	1.000	1.000
430	Surface Blasting	1.070	0.993	1.276	0.900
440	Secondary Metal Production	0.932	0.892	0.970	0.963
450	Wood Processing Losses	1.117	1.068	1.162	1.153
499	Industrial Lubricant	1.027	1.043	1.095	1.054
499	Industrial Process Losses (Unspecified Material)	1.000	1.000	1.000	1.000
510	Consumer Products	1.027	1.043	1.095	1.054
520	Architectural Coatings	1.032	1.031	1.077	1.058

TABLE III-2-11 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2014

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
540	Asphalt Paving	0.862	0.875	1.099	1.019
610	Residential Wood Combustion	1.000	1.000	1.000	1.000
610	Residential Natural Gas Combustion - Space Heating	0.924	0.927	0.943	0.943
610	Residential Distillate Oil Combustion - Space Heating	1.032	1.031	1.077	1.058
610	Residential Natural Gas Combustion - Water Heating	0.914	0.918	0.933	0.933
610	Residential Natural Gas Combustion - Cooking	0.929	0.933	0.949	0.949
610	Residential Natural Gas Combustion - Other	0.933	0.930	0.945	0.945
610	Residential L.P.G. Combustion (Unspecified)	1.032	1.031	1.077	1.058
620	Tilling & Harvest Operations - Dust	1.041	1.065	0.713	0.993
620	Livestock Husbandry - Dairy Cattle	1.000	1.000	0.904	0.873
620	Livestock Husbandry - Others	1.000	1.000	1.000	1.000
630	Building And Road Construction - Dust	0.862	0.875	1.099	1.019
640	Paved Road Travel - Freeways - Dust	1.000	1.040	1.000	1.031
640	Paved Road Travel - (Unspecified) Dust	1.000	1.000	1.000	1.000
640	Paved Road Travel - Major Streets - Dust	1.002	1.002	1.005	1.017
640	Paved Road Travel - Local/Collector Streets – Dust	1.002	1.003	1.015	1.007
645	Unpaved Road Travel - Farm Roads - Dust	1.041	1.065	0.713	0.993
645	Unpaved Road Travel - Others - Dust	1.000	1.000	1.000	1.000
650	Agricultural Lands - Windblown Dust	0.742	0.735	0.870	0.778
650	Unpaved Roads And Associated Areas - Windblown Dust	1.000	1.000	1.000	1.000
660	Structural/Automobile Fires	1.000	1.000	1.000	1.000
670	Agricultural Burning - Pruning & Field Crops	1.041	1.065	0.713	0.993

TABLE III-2-11 (concluded)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2014

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
670	Agricultural Burning - Range Improvement	0.985	0.914	1.175	0.828
670	Wildland Fire Use And Waste Burning (Unspecified)	1.000	1.000	1.031	1.030
670	Agricultural Burning - Weed Abatement	1.000	1.000	1.000	1.000
690	Cooking	1.005	0.945	1.160	1.048

Base year is 2008.

TABLE III-2-12

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2019

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
020	Cogeneration	0.865	0.865	0.865	0.865
030	Petroleum Production Fuel Combustion - Gaseous Fuel=Lower(A1)	1.118	1.217	1.551	1.169
050	Industrial Combustion And Stationary Ice- Natural Gas	0.816	0.776	0.809	0.809
050	Industrial Combustion - L.P.G./Distillate Oil/Other Fuels	1.281	1.296	1.620	1.383
060	Commercial Natural Gas Combustion - Space Heating	0.915	0.876	0.913	0.913
060	Commercial Natural Gas Combustion - Water Heating	0.982	0.939	0.980	0.980
060	Commercial Natural Gas Combustion - Other	0.939	0.911	0.950	0.950
060	Commercial L.P.G. Combustion	1.517	1.440	1.745	1.530
099	Resource Recovery	0.865	0.865	0.865	0.865
110	Sewage Treatment Plants-Potws - Ammonia	1.000	1.000	1.000	1.000
120	Landfills - Municipal Solid Waste Disposal (Biodegradation)	1.177	1.187	1.183	1.197
199	Composting - Ammonia	1.000	1.000	1.000	1.000
199	Composting Waste Disposal	1.052	1.084	1.178	1.107
210	Dry Cleaning	1.042	0.991	1.388	1.143

TABLE III-2-12 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2019

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
220	Degreasing	1.281	1.296	1.620	1.383
230	Auto Refinishing - Coatings	1.019	0.993	1.617	1.301
230	Marine Coatings	1.499	1.403	2.119	1.787
230	Paper Coatings	1.083	1.048	1.389	1.232
230	Fabric Coatings	1.572	1.521	2.017	1.787
230	Can And Coil, Metal Parts And Products Coatings	1.132	1.095	1.452	1.287
230	Wood Furniture And Fabricated Products Coatings	1.292	1.249	1.656	1.468
230	Plastic Parts	1.403	1.358	1.800	1.596
230	Semiconductor Coatings	2.139	2.070	2.747	2.433
230	Aircraft And Aerospace Coatings	1.416	1.325	2.001	1.687
240	Printing	0.936	0.905	1.200	1.064
250	Adhesives And Sealants	1.281	1.296	1.620	1.383
299	Miscellaneous Industrial Solvent Uses	1.281	1.296	1.620	1.383
310	Oil And Gas Production	1.118	1.217	1.551	1.169
330	Petroleum Marketing - Natural Gas Transmission Losses	0.835	0.835	0.835	0.835
330	LPG Transfer And Dispensing - Fugitive Losses	1.074	1.057	1.176	1.132
330	Gasoline Dispensing & Transfers/Storage/Cargo Tanks	1.037	1.083	1.264	1.203
330	Bulk Gasoline Storage & Transfer (Unspecified)	0.835	0.835	0.835	0.835
410	Chemical	1.403	1.358	1.800	1.596
420	Wine Fermentation & Aging	1.211	1.209	1.217	1.232
420	Bakeries	1.114	1.078	1.429	1.267
420	Agricultural Products Processing Losses	1.211	1.209	1.217	1.232
420	Agricultural Crop Processing Losses	1.099	1.197	1.524	1.008
430	Mineral Processes - Sand/Gravel/Cement Concrete	1.078	1.043	1.382	1.226

TABLE III-2-12 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2019

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
430	Asphaltic Concrete Production	1.000	1.000	1.000	1.000
430	Surface Blasting	1.112	1.210	1.542	1.162
440	Secondary Metal Production	0.947	0.916	1.213	1.076
450	Wood Processing Losses	1.292	1.249	1.656	1.468
499	Industrial Lubricant	1.052	1.084	1.178	1.107
499	Industrial Process Losses (Unspecified Material)	1.000	1.000	1.000	1.000
510	Consumer Products	1.052	1.084	1.178	1.107
520	Architectural Coatings	1.074	1.057	1.176	1.132
540	Asphalt Paving	0.996	1.064	1.751	1.393
610	Residential Wood Combustion	1.000	1.000	1.000	1.000
610	Residential Natural Gas Combustion - Space Heating	0.914	0.917	0.933	0.933
610	Residential Distillate Oil Combustion - Space Heating	1.074	1.057	1.176	1.132
610	Residential Natural Gas Combustion - Water Heating	0.898	0.902	0.917	0.917
610	Residential Natural Gas Combustion - Cooking	0.926	0.930	0.945	0.945
610	Residential Natural Gas Combustion - Other	0.941	0.938	0.953	0.953
610	Residential L.P.G. Combustion (Unspecified)	1.074	1.057	1.176	1.132
620	Tilling & Harvest Operations - Dust	1.041	1.065	0.600	0.993
620	Livestock Husbandry - Dairy Cattle	1.000	1.000	0.663	0.642
620	Livestock Husbandry - Others	1.000	1.000	1.000	1.000
630	Building And Road Construction - Dust	0.996	1.064	1.751	1.393
640	Paved Road Travel - Freeways - Dust	1.005	1.061	1.112	1.041
640	Paved Road Travel - (Unspecified) - Dust	1.000	1.000	1.000	1.000
640	Paved Road Travel - Major Streets - Dust	1.002	1.002	1.033	1.021
640	Paved Road Travel - Local/Collector Streets - Dust	1.002	1.009	1.037	1.017

TABLE III-2-12 (concluded)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2019

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
645	Unpaved Road Travel - Farm Roads - Dust	1.041	1.065	0.600	0.993
645	Unpaved Road Travel - Others - Dust	1.000	1.000	1.000	1.000
650	Agricultural Lands - Windblown Dust	0.577	0.566	0.775	0.630
650	Unpaved Roads And Associated Areas - Windblown Dust	1.000	1.000	1.000	1.000
660	Structural/Automobile Fires	1.000	1.000	1.000	1.000
670	Agricultural Burning - Pruning & Field Crops	1.041	1.065	0.600	0.993
670	Agricultural Burning - Range Improvement	0.965	1.050	1.338	1.008
670	Wildland Fire Use And Waste Burning (Unspecified)	1.000	1.000	1.075	1.075
670	Agricultural Burning - Weed Abatement	1.000	1.000	1.000	1.000
690	Cooking	1.042	0.991	1.388	1.143

Base year is 2008.

TABLE III-2-13

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2023

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
020	Cogeneration	0.859	0.859	0.859	0.859
030	Petroleum Production Fuel Combustion - Gaseous Fuel	1.128	1.279	1.639	1.315
050	Industrial Combustion And Stationary Ice-Natural Gas	0.739	0.698	0.896	0.896
050	Industrial Combustion - L.P.G./Distillate Oil/Other Fuels	1.358	1.387	1.872	1.532
060	Commercial Natural Gas Combustion - Space Heating	0.860	0.819	1.052	1.052
060	Commercial Natural Gas Combustion - Water Heating	0.933	0.889	1.141	1.141

TABLE III-2-13 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2023

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
060	Commercial Natural Gas Combustion - Other	0.879	0.847	1.087	1.087
060	Commercial L.P.G. Combustion	1.685	1.621	2.073	1.775
099	Resource Recovery	0.859	0.859	0.859	0.859
110	SEWAGE TREATMENT PLANTS-Potws - AMMONIA	1.000	1.000	1.000	1.000
120	Landfills - Municipal Solid Waste Disposal (Biodegradation)	1.239	1.249	1.249	1.266
199	Composting - Ammonia	1.000	1.000	1.000	1.000
199	Composting Waste Disposal	1.075	1.109	1.257	1.156
210	Dry Cleaning	1.063	1.023	1.550	1.239
220	Degreasing	1.358	1.387	1.872	1.532
230	Auto Refinishing - Coatings	1.033	1.028	1.851	1.437
230	Marine Coatings	1.577	1.487	2.396	2.030
230	Paper Coatings	1.108	1.070	1.554	1.333
230	Fabric Coatings	1.701	1.644	2.387	2.047
230	Can And Coil, Metal Parts And Products Coatings	1.162	1.123	1.631	1.399
230	Wood Furniture And Fabricated Products Coatings	1.355	1.309	1.901	1.630
230	Plastic Parts	1.494	1.444	2.096	1.798
230	Semiconductor Coatings	2.511	2.426	3.522	3.021
230	Aircraft And Aerospace Coatings	1.495	1.409	2.271	1.924
240	Printing	0.938	0.907	1.317	1.129
250	Adhesives And Sealants	1.358	1.387	1.872	1.532
299	Miscellaneous Industrial Solvent Uses	1.358	1.387	1.872	1.532
310	Oil And Gas Production	1.128	1.279	1.639	1.315
330	Petroleum Marketing - Natural Gas Transmission Losses	0.775	0.775	0.775	0.775
330	LPG Transfer And Dispensing - Fugitive Losses	1.102	1.084	1.264	1.187

TABLE III-2-13 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2023

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
330	Gasoline Dispensing & Transfers/Storage/Cargo Tanks	1.055	1.101	1.368	1.282
330	Bulk Gasoline Storage & Transfer (Unspecified)	0.775	0.775	0.775	0.775
410	Chemical	1.494	1.444	2.096	1.798
420	Wine Fermentation & Aging	1.281	1.276	1.293	1.306
420	Bakeries	1.141	1.102	1.600	1.373
420	Agricultural Products Processing Losses	1.281	1.276	1.293	1.306
420	Agricultural Crop Processing Losses	1.120	1.271	1.629	1.119
430	Mineral Processes - Sand/Gravel/Cement Concrete	1.097	1.060	1.539	1.320
430	Asphaltic Concrete Production	1.000	1.000	1.000	1.000
430	Surface Blasting	1.122	1.273	1.631	1.309
440	Secondary Metal Production	0.954	0.922	1.339	1.148
450	Wood Processing Losses	1.355	1.309	1.901	1.630
499	Industrial Lubricant	1.075	1.109	1.257	1.156
499	Industrial Process Losses (Unspecified Material)	1.000	1.000	1.000	1.000
510	Consumer Products	1.075	1.109	1.257	1.156
520	Architectural Coatings	1.102	1.084	1.264	1.187
540	Asphalt Paving	1.033	1.137	2.085	1.597
610	Residential Wood Combustion	1.000	1.000	1.000	1.000
610	Residential Natural Gas Combustion - Space Heating	0.894	0.873	0.983	0.983
610	Residential Distillate Oil Combustion - Space Heating	1.102	1.084	1.264	1.187
610	Residential Natural Gas Combustion - Water Heating	0.876	0.856	0.964	0.964
610	Residential Natural Gas Combustion - Cooking	0.911	0.890	1.002	1.002

TABLE III-2-13 (concluded)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2023

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
610	Residential Natural Gas Combustion - Other	0.952	0.910	1.025	1.025
610	Residential L.P.G. Combustion (Unspecified)	1.102	1.084	1.264	1.187
620	Tilling & Harvest Operations - Dust	1.041	1.065	0.552	0.993
620	Livestock Husbandry - Dairy Cattle	1.000	1.000	0.470	0.458
620	Livestock Husbandry - Others	1.000	1.000	1.000	1.000
630	Building And Road Construction - Dust	1.033	1.137	2.085	1.597
640	Paved Road Travel - Freeways - Dust	1.011	1.080	1.224	1.051
640	Paved Road Travel - (Unspecified) - Dust	1.000	1.000	1.000	1.000
640	Paved Road Travel - Major Streets - Dust	1.002	1.002	1.061	1.025
640	Paved Road Travel - Local/Collector Streets - Dust	1.001	1.010	1.042	1.020
645	Unpaved Road Travel - Farm Roads - Dust	1.041	1.065	0.552	0.993
645	Unpaved Road Travel - Others - Dust	1.000	1.000	1.000	1.000
650	Agricultural Lands - Windblown Dust	0.472	0.461	0.706	0.532
650	Unpaved Roads And Associated Areas - Windblown Dust	1.000	1.000	1.000	1.000
660	Structural/Automobile Fires	1.000	1.000	1.000	1.000
670	Agricultural Burning - Pruning & Field Crops	1.041	1.065	0.552	0.993
670	Agricultural Burning - Range Improvement	0.959	1.088	1.394	1.119
670	Wildland Fire Use And Waste Burning (Unspecified)	1.000	1.000	1.131	1.130
670	Agricultural Burning - Weed Abatement	1.000	1.000	1.000	1.000
690	Cooking	1.063	1.023	1.550	1.239

Base year is 2008.

TABLE III-2-14

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2030

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
020	Cogeneration	0.861	0.861	0.861	0.861
030	Petroleum Production Fuel Combustion - Gaseous Fuel	1.153	1.331	1.876	1.478
050	Industrial Combustion And Stationary Ice- Natural Gas	0.673	0.646	0.973	0.973
050	Industrial Combustion - L.P.G./Distillate Oil/Other Fuels	1.507	1.549	2.212	1.769
060	Commercial Natural Gas Combustion - Space Heating	0.818	0.795	0.883	0.883
060	Commercial Natural Gas Combustion - Water Heating	0.890	0.864	1.302	1.302
060	Commercial Natural Gas Combustion - Other	0.857	0.840	1.266	1.266
060	Commercial L.P.G. Combustion	2.014	1.989	2.716	2.310
099	Resource Recovery	0.861	0.861	0.861	0.861
110	Sewage Treatment Plants-POTWS - Ammonia	1.000	1.000	1.000	1.000
120	Landfills - Municipal Solid Waste Disposal (Biodegradation)	1.352	1.368	1.384	1.402
199	Composting - Ammonia	1.000	1.000	1.000	1.000
199	Composting Waste Disposal	1.118	1.140	1.388	1.244
210	Dry Cleaning	1.093	1.070	1.792	1.411
220	Degreasing	1.507	1.549	2.212	1.769
230	Auto Refinishing - Coatings	1.055	1.072	2.177	1.669
230	Marine Coatings	1.719	1.641	2.918	2.488
230	Paper Coatings	1.149	1.093	1.724	1.475
230	Fabric Coatings	1.950	1.855	2.926	2.502
230	Can And Coil, Metal Parts And Products Coatings	1.215	1.156	1.823	1.559
230	Wood Furniture And Fabricated Products Coatings	1.471	1.399	2.207	1.887
230	Plastic Parts	1.664	1.583	2.497	2.135

TABLE III-2-14 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2030

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
230	Semiconductor Coatings	3.320	3.159	4.982	4.260
230	Aircraft And Aerospace Coatings	1.639	1.565	2.783	2.373
240	Printing	0.941	0.896	1.412	1.208
250	Adhesives And Sealants	1.507	1.549	2.212	1.769
299	Miscellaneous Industrial Solvent Uses	1.507	1.549	2.212	1.769
310	Oil And Gas Production	1.153	1.331	1.876	1.478
330	Petroleum Marketing - Natural Gas Transmission Losses	0.670	0.670	0.670	0.670
330	LPG Transfer And Dispensing - Fugitive Losses	1.149	1.117	1.411	1.28
330	Gasoline Dispensing & Transfers/Storage/Cargo Tanks	1.091	1.145	1.540	1.413
330	Bulk Gasoline Storage & Transfer (Unspecified)	0.670	0.670	0.670	0.670
410	Chemical	1.664	1.583	2.497	2.135
420	Wine Fermentation & Aging	1.411	1.400	1.428	1.438
420	Bakeries	1.186	1.128	1.779	1.521
420	Agricultural Products Processing Losses	1.411	1.400	1.428	1.438
420	Agricultural Crop Processing Losses	1.167	1.348	1.899	1.226
430	Mineral Processes - Sand/Gravel/Cement Concrete	1.128	1.073	1.692	1.447
430	Asphaltic Concrete Production	1.000	1.000	1.000	1.000
430	Surface Blasting	1.149	1.326	1.869	1.473
440	Secondary Metal Production	0.966	0.919	1.450	1.240
450	Wood Processing Losses	1.471	1.399	2.207	1.887
499	Industrial Lubricant	1.118	1.140	1.388	1.244
499	Industrial Process Losses (Unspecified Material)	1.000	1.000	1.000	1.000
510	Consumer Products	1.118	1.140	1.388	1.244
520	Architectural Coatings	1.149	1.117	1.411	1.280

TABLE III-2-14 (continued)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2030

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
540	Asphalt Paving	1.054	1.214	2.517	1.898
610	Residential Wood Combustion	1.000	1.000	1.000	1.000
610	Residential Natural Gas Combustion - Space Heating	0.857	0.827	1.041	1.041
610	Residential Distillate Oil Combustion - Space Heating	1.149	1.117	1.411	1.280
610	Residential Natural Gas Combustion - Water Heating	0.844	0.814	1.025	1.025
610	Residential Natural Gas Combustion - Cooking	0.884	0.853	1.074	1.074
610	Residential Natural Gas Combustion - Other	0.949	0.874	1.100	1.100
610	Residential L.P.G. Combustion (Unspecified)	1.149	1.117	1.411	1.280
620	Tilling & Harvest Operations - Dust	1.041	1.065	0.490	0.993
620	Livestock Husbandry - Dairy Cattle	1.000	1.000	0.470	0.458
620	Livestock Husbandry - Others	1.000	1.000	1.000	1.000
630	Building And Road Construction - Dust	1.054	1.214	2.517	1.898
640	Paved Road Travel - Freeways - Dust	1.014	1.080	1.224	1.051
640	Paved Road Travel - (Unspecified)- Dust	1.000	1.000	1.000	1.000
640	Paved Road Travel - Major Streets - Dust	1.003	1.002	1.399	1.025
640	Paved Road Travel - Local/Collector Streets - Dust	1.003	1.010	1.066	1.029
645	Unpaved Road Travel - Farm Roads - Dust	1.041	1.065	0.490	0.993
645	Unpaved Road Travel - Others - Dust	1.000	1.000	1.000	1.000
650	Agricultural Lands - Windblown Dust	0.329	0.317	0.599	0.394
650	Unpaved Roads And Associated Areas - Windblown Dust	1.000	1.000	1.000	1.000
660	Structural/Automobile Fires	1.000	1.000	1.000	1.000
670	Agricultural Burning - Pruning & Field Crops	1.041	1.065	0.490	0.993

TABLE III-2-14 (concluded)

Stationary Area Source Emission Growth Factors in the SCAB for the Year 2030

EIC3	CATEGORY DESCRIPTION	LOS ANGELES	ORANGE	RIVERSIDE	SAN BERNARDINO
670	Agricultural Burning - Range Improvement	0.956	1.104	1.556	1.226
670	Wildland Fire Use And Waste Burning (Unspecified)	1.000	1.000	1.259	1.259
670	Agricultural Burning - Weed Abatement	1.000	1.000	1.000	1.000
690	Cooking	1.093	1.070	1.792	1.411

Base year is 2008.

Emission Trend Analysis

Figures 2-1 through 2-4 present the relative contributions by source categories (i.e., point, area, on-road, and off-road) to total emission levels in 2008 annual average (VOC, NOx, CO, SOx and PM2.5), 2008 summer planning (VOC and NOx), 2023 annual average (VOC, NOx, CO, SOx and PM2.5) and 2023 summer planning (VOC and NOx), respectively. As seen in the figures, in 2008 (average annual day) on-road and off-road mobile sources are major contributors of CO (95 percent), NOx (88 percent), SOx (75 percent) and VOC (57 percent) emissions. Top fine particulate matter (PM2.5) producers include cooking (14%); residential fuel consumption (10%); and entrained road dust (10%). For 2023 (average annual day), mobile sources continue to be major contributors to total CO and NOx emissions by approximately 90 percent, 78 percept, respectively. However, contribution to VOC and SOx by mobile sources is reduced due to CARB regulations over time. Area sources become major contributors to VOC emissions (from 38 percent in 2008 to 53 percent in 2023). Figures 2-5 through 2-8 illustrate the emission trends by pollutant (VOC, NOx, PM2.5, and SOx) for 2008, 2014, 2019, and 2023 respectively.

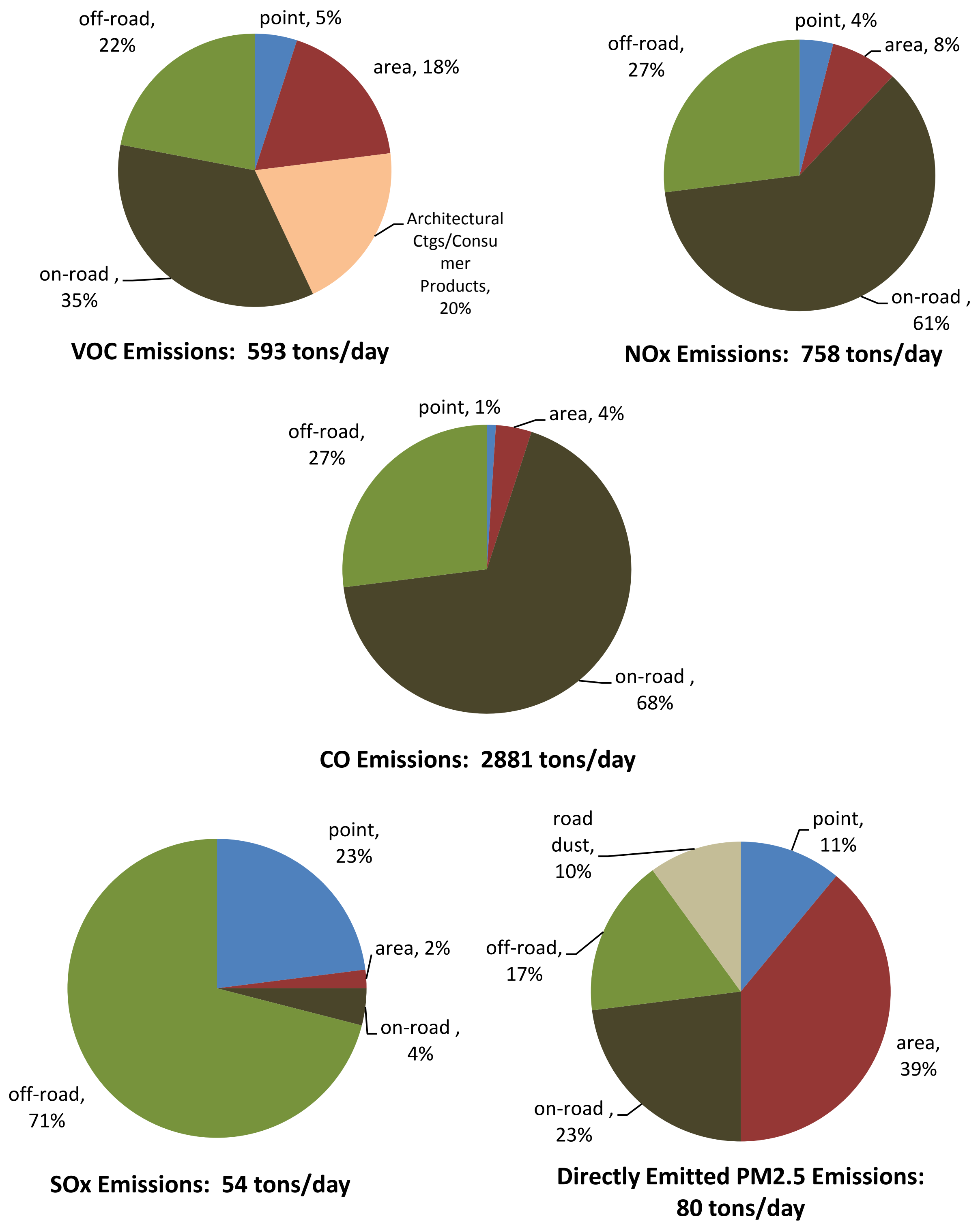
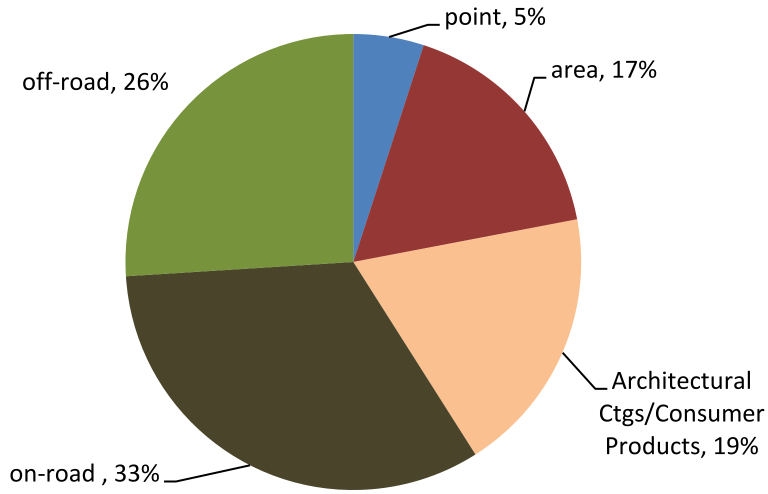


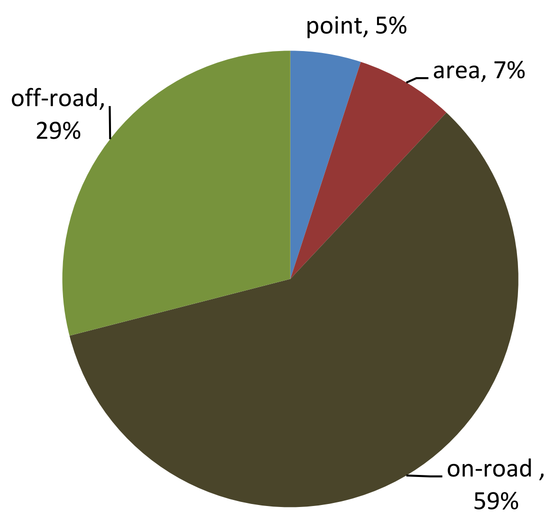
FIGURE III-2-1

Relative Contribution by Source Category to 2008 Emission Inventory – Average Annual Day

SUMMER



VOC Emissions: 639 tons/day



NOx Emissions: 721 tons/day

FIGURE III-2-2

Relative Contribution by Source Category to 2008 Emissions Inventory – Summer Planning

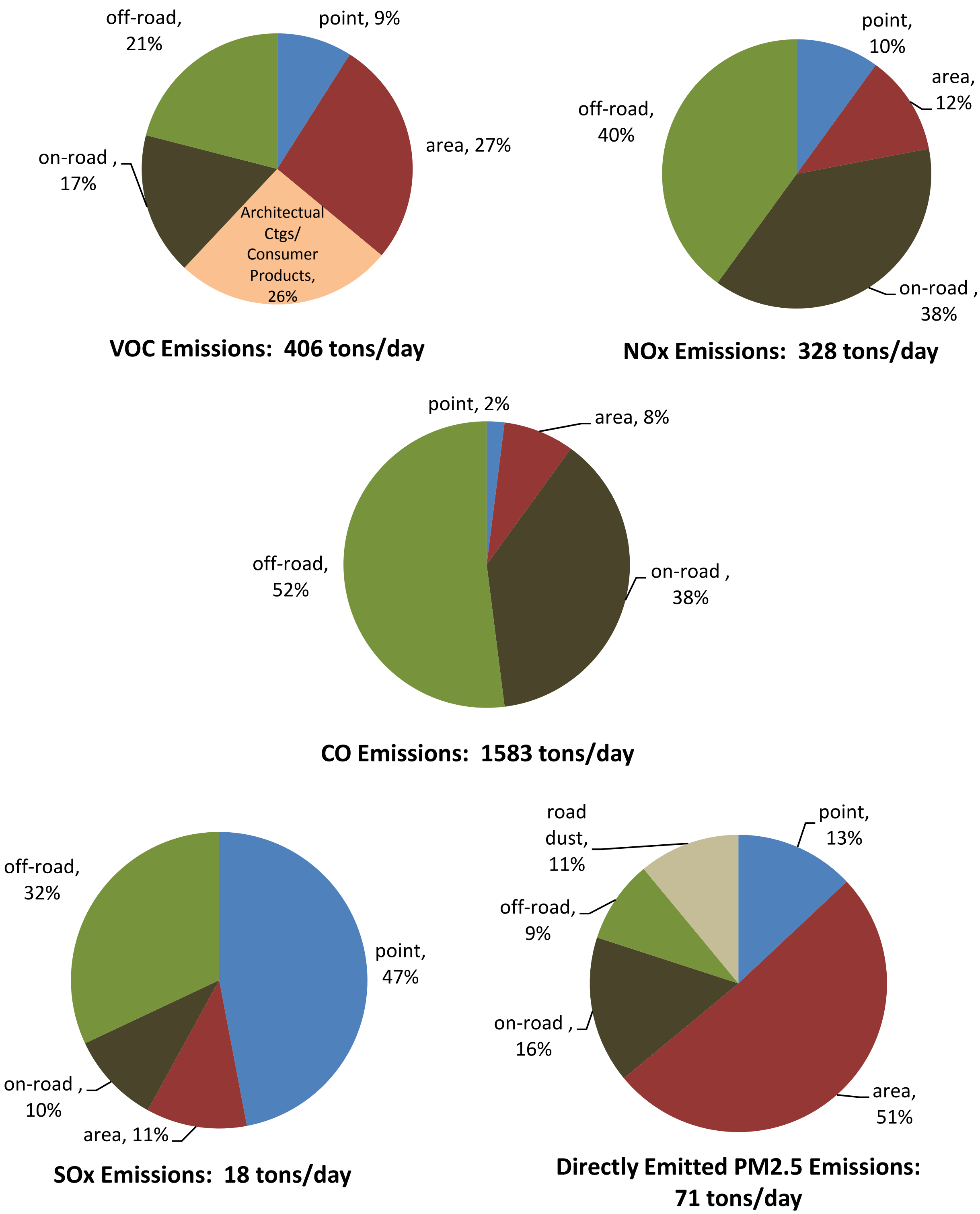
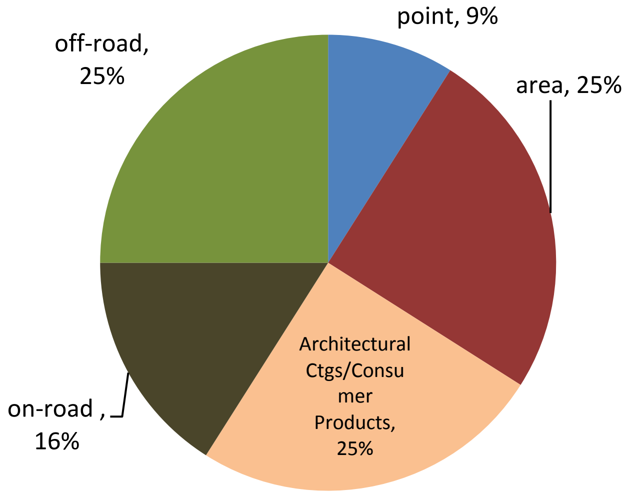


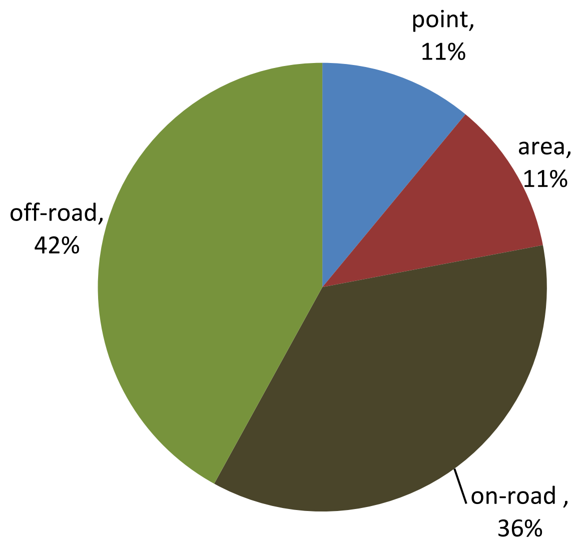
FIGURE III-2-3

Relative Contribution by Source Category to 2023 Emission Inventory – Average Annual Day

SUMMER



VOC Emissions: 438 tons/day



NOx Emissions: 319 tons/day

FIGURE III-2-4

Relative Contribution by Source Category to 2023 Emissions Inventory – Summer Planning

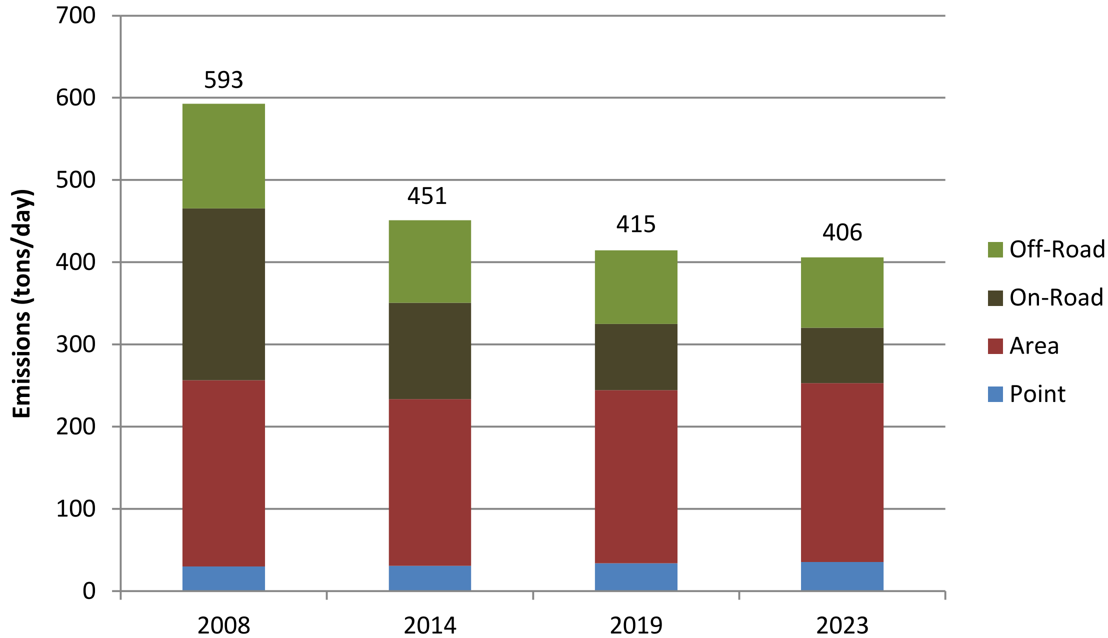


FIGURE III-2-5A

VOC Emission Trend by Source Category – Average Annual Day

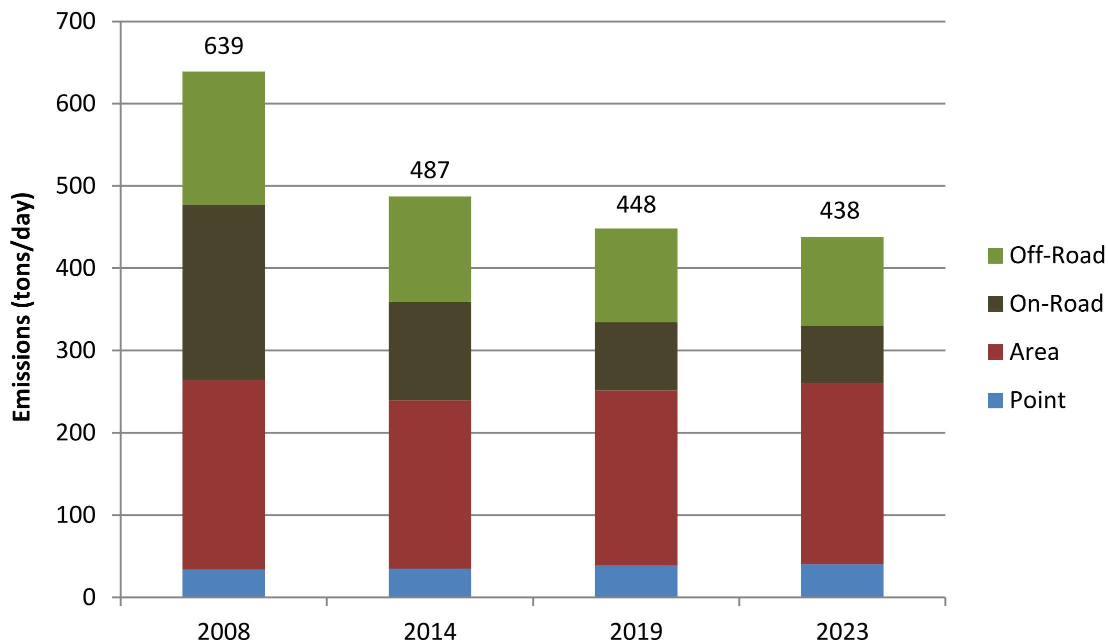


FIGURE III-2-5B

VOC Emission Trend by Source Category – Summer Planning

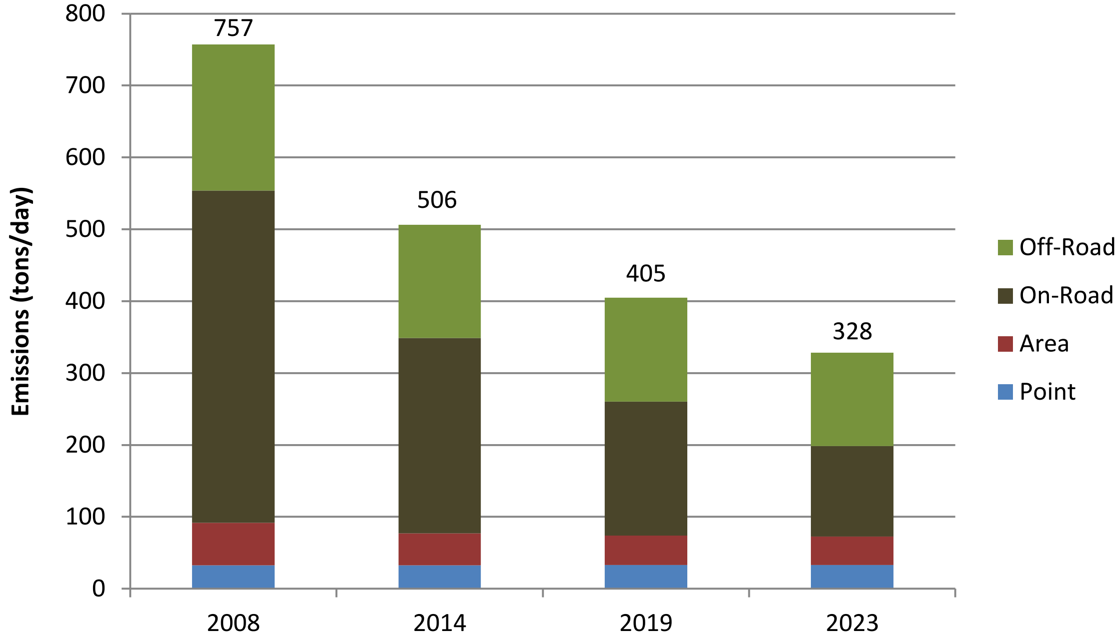


FIGURE III-2-6A
NOx Emission Trend by Source Category – Average Annual Day

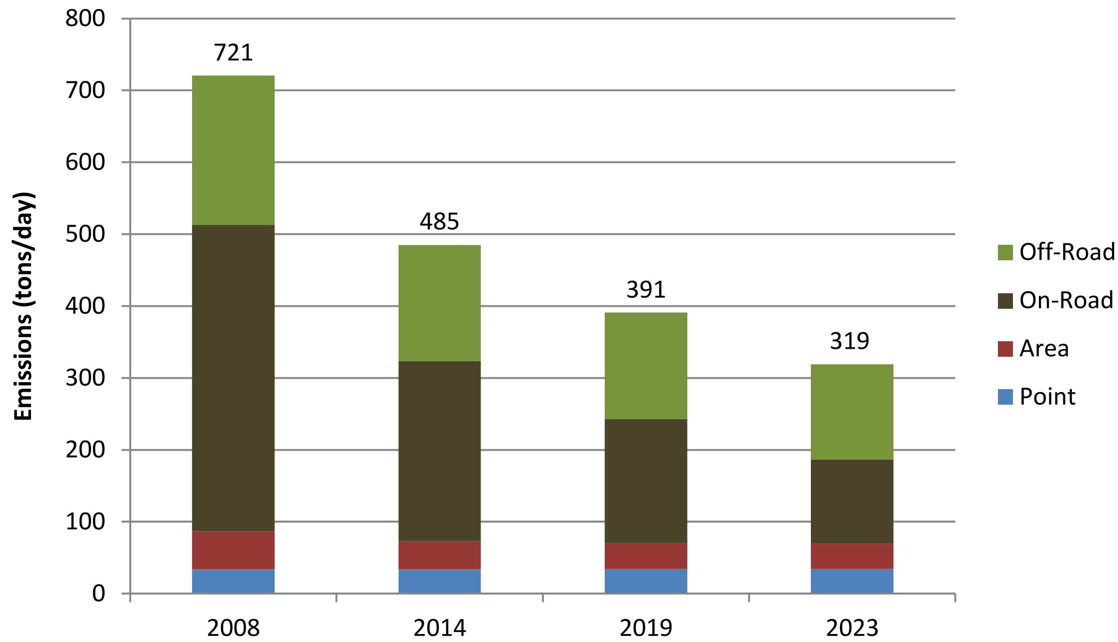


FIGURE III-2-6B
NOx Emission Trend by Source Category – Summer Planning

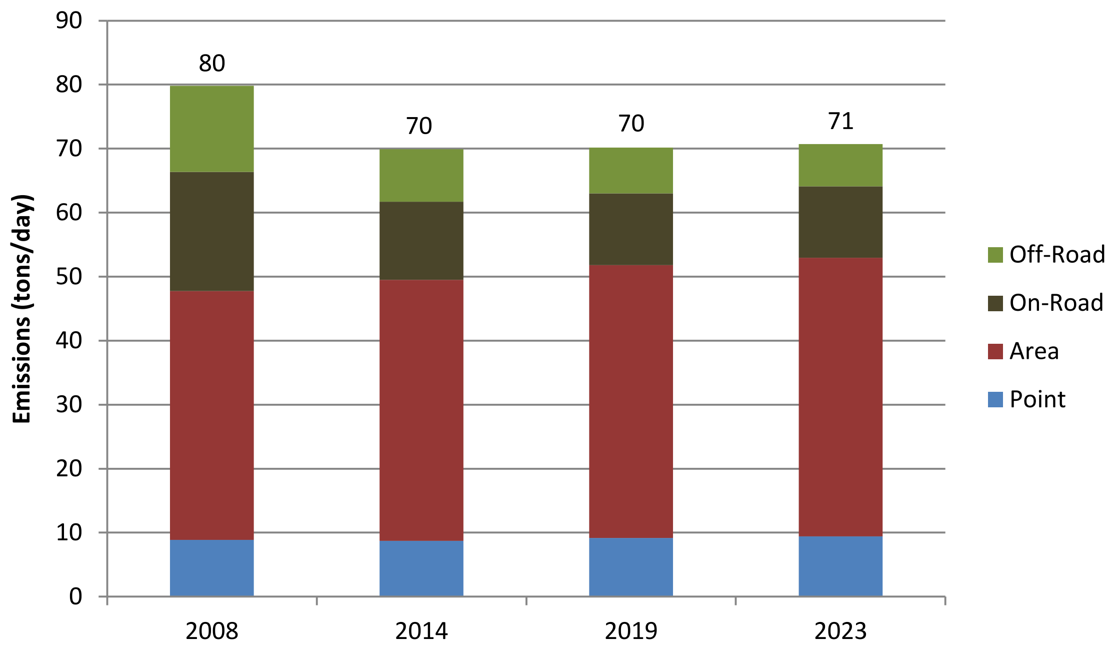


FIGURE III-2-7

PM2.5 Emission Trend by Source Category – Average Annual Day

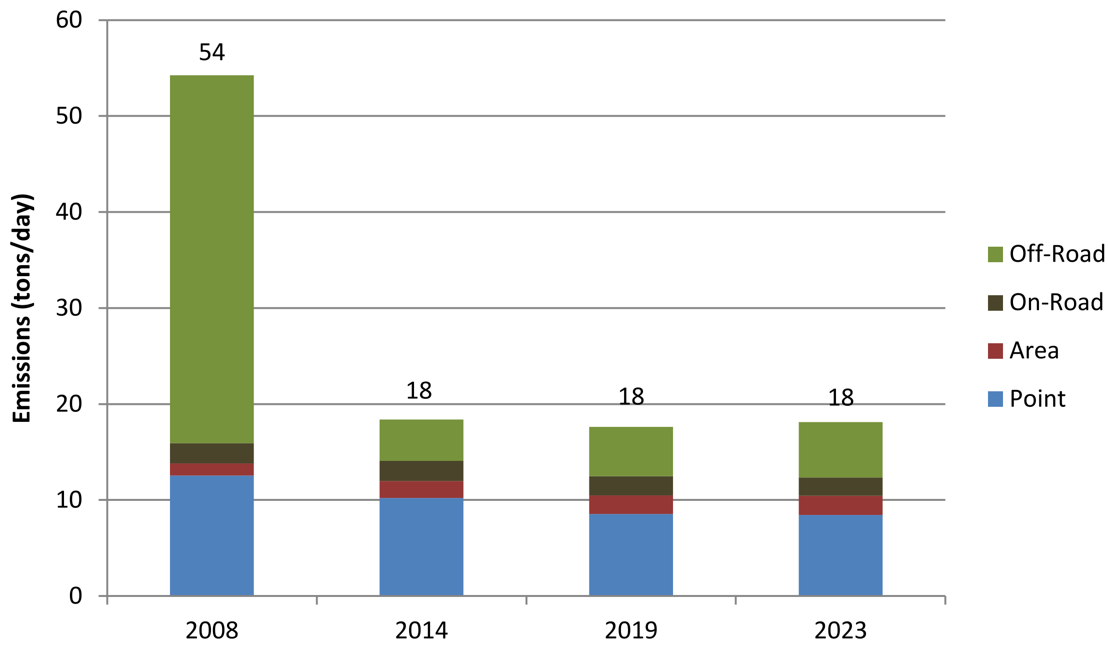


FIGURE III-2-8

SOx Emission Trend by Source Category – Average Annual Day

VOC Emissions

As presented in Figure III-2-5, emissions from area sources, off-road mobile sources and on-road mobile sources all show a significant decrease over time. Between 2008 and 2023, summer planning VOC emissions from off-road mobile sources are expected to fall from 162 tons per day to 108 tons per day, while on-road emissions should fall from 213 tons per day to 70 tons per day. Area source reductions are derived mainly from the SCAQMD's adopted rules for architectural coatings (Rule 1113), refinery flares (Rule 1118), greenwaste composting operations (Rule 1133.3), consumer paint thinners and multi-purpose solvents (Rule 1143) and metalworking fluids and direct-contact lubricants (Rule 1144). Off-road reductions result primarily from turnover to cleaner off-road equipment, pleasure craft and off-road recreational vehicles. Since its adoption in 1990, California's Low Emission Vehicle I (LEV I) program has produced significant emission reductions from on-road passenger vehicles by relying on a systems-wide approach to achieve reductions from fuels and mobile source exhaust and evaporative emissions. Both LEV I and LEV II, adopted in 1998, include four primary elements: (1) increasingly stringent exhaust emission standards, (2) an increasingly stringent annual fleet average standard for Non-Methane Organic Gas (NMOG), (3) banking and trading provisions, and (4) a requirement that a specific percentage of vehicles be Zero Emission Vehicles (ZEVs), vehicles with no emissions. Under LEV II, sport utility vehicles, pick-up trucks, and mini-vans must achieve the same emission standards as cars, beginning in 2004-2007. Additional VOC emission reductions are from the adoption of the LEV III program.

NOx Emissions

Figure III-2-6 illustrates the NOx emissions by major source category. Summer planning NOx emissions are projected to decrease from both off-road mobile (208 tons per day to 133 tons per day) and on-road mobile (426 tons per day to 117 tons per day) sources from 2008 to 2023. The on-road reductions largely reflect the cleaner in-use heavy-duty trucks and buses. Reductions from on-road emissions are also projected for light- and medium-duty vehicles through the adoption of the LEVIII program with more stringent tail-pipe and greenhouse gas standards for light- and medium-duty vehicles. Off-road NOx emission reductions result primarily from cleaner in-use off-road equipment (over 25 horse power); ship auxiliary engine cold ironing & clean technology; cleaner main ship engines.

PM2.5 Emissions

Figure III-2-7 shows the PM2.5 emission trend. A good portion of the emissions are from dust. The projected dust inventories in 2008 and 2023 for paved and unpaved roads are both 8 tons per day (annual average inventory).

SOx Emissions

Figure III-2-8 illustrate the SOx emissions trend. The significant decrease in SOx emissions between 2008 and 2014 (from 54 tons per day to 18 tons per day) is due to the full implementation of the SOx RECLAIM and implementation of the cleaner sulfur content marine fuels.

Impact of Growth

The Final 2012 AQMP forecasts the 2030 emissions inventories ‘‘with growth’’ through a detailed consultation process with the Southern California Association of Governments (SCAG). The region is likely to see a 16% growth in population, 18% growth in housing units, 16% growth in employment, and 11% growth in vehicle miles traveled between 2008 and 2030. To illustrate the impact of demographic growth on emissions, year 2030 no-growth emissions were estimated by removing the growth factors from the 2030 baseline emissions. Table III-2-15 presents the comparison of the projected 2030 emissions with and without growth. It should be noted that in this analysis, the benefit of potential applications of BACT under New Source Review (NSR) is not included. The growth impacts to year 2030 for VOC, NOx, CO, SOx and PM2.5 are 77, 76, 311, 5 and 11 tons per day respectively.

General Conformity Budget

U.S. EPA’s General Conformity rule (40 CFR part 93, subpart B, and 40 CFR Part 51, Subpart W, as adopted by reference in SCAQMD Rule 1901, September 1994) establishes an applicability test for determining which Federal actions are subject to the conformity requirement for the nonattainment or maintenance areas. If a proposed action results in emissions increases which are less than the de minimis thresholds for the relevant pollutants or precursors, then no conformity determination needs to be made. If the emissions from a proposed action exceed the de minimis threshold for any given pollutant (or precursor) for which the area is designated as maintenance or in nonattainment, then the Federal agency must make a positive conformity determination for that pollutant(s) on the basis of one of the criteria listed in 40 CFR 93.158 before the project can proceed. The conformity determination must demonstrate that the emissions from the proposed project are accounted for in the most recently approved SIP. The

South Coast Air Basin is designated as an extreme nonattainment area for ozone and as a nonattainment area for PM2.5. The general conformity de minimis threshold is 10 tons per year of VOC and 10 tons per year of NOx for the extreme ozone nonattainment areas; and 100 tons per year of PM2.5 for the PM2.5 nonattainment areas.

Based on historical records none of the projects requiring general conformity determinations received by the District exceeded the PM2.5 threshold. Rather, NOx is the main pollutant of concern, with emissions occurring primarily during the two to three year construction phase of projects. To streamline the review process and to facilitate the conformity determination, two separate VOC and NOx general conformity budgets are established: 1 tpd of NOx and 0.2 tpd of VOC are set aside for this purpose every year, starting in 2013 until 2030, from the projected emission growth in the Final 2012 AQMP. This set aside account will be re-evaluated in the next AQMP for need and adequacy based on the data gathered at that time. These set-aside emissions in the Final 2012 AQMP represent less than 1% and 2% of projected mobile source growth in emissions shown in Table 2-15 for VOC and NOx, respectively.

The District will set up a tracking system for projects requiring conformity determinations on a first come first serve basis. The District will debit the project emissions from the applicable set aside accounts until it is depleted. The unused portion cannot be carried forward to the following year. For those projects that come in after the conformity budget is exhausted, the corresponding federal agency will have to go through the regular general conformity determination process to demonstrate that these emissions are accounted for in the SIP. The set aside accounts will be revised and updated via AQMP/SIP revisions.

Southern California Edison (SCE) is currently in the process of, or has plans to construct six linear transmission line projects which would traverse federal lands within the jurisdiction of the District. The projects are: (1) Devers-Palo Verde NO. 2 Transmission Project (DPV2); (2) Tehachapi Renewable Transmission Project (TRTP); (3) Falcon Ridge Substation Project (Falcon Ridge); (4) Path 42 Upgrade Project (Path 42); (5) West of Devers Interim Project (WOD Interim); and (6) West of Devers Upgrade Project (WOD Upgrade). SCE submitted to the District the NOx emissions estimates expected to be generated during the construction of these transmission lines from 2012 and 2022. The total estimated NOx emissions from these six projects within the South Coast Air Basin are 95 tons per year for 2012; 55 tons per year for year 2013; 10 tons per year for year 2014; 20 tons per year for 2015; 50 tons per year for 2016 and 2017; and 20 tons per year for 2018 through 2022. These emissions have been accounted for in the general conformity set aside account for NOx.

Pre-Base-Year Offsets

The District's growth projections include pre-base year emissions, consistent with the requirements of 40 CFR § 51.165(a)(3)(i)(C)(*1*). To the extent offsets are required under NSR for permitted facilities to be sited or expanded in this region, pre-2008 emission credits authorized under District's Reg XIII can be used and are explicitly identified and accounted for in the Final 2012 AQMP through growth projections, up to the amounts shown in Table III-2-15. While Table III-2-15 includes projected growth in certain sources not subject to NSR, the AQMP does not limit growth to individual source categories. Therefore, Table III-2-15 explicitly identifies pre-base-year offsets in the amounts up to the difference between the growth and no-growth projections for the point and area source categories that are potentially subject to NSR and could potentially require the use of pre-base-year offsets. *See* 57 Fed. Reg. 13,498.

This growth presents a formidable challenge to our air quality improvement efforts, because the projected growth will offset the impressive progress made in reducing VOC and NOx and PM2.5 emissions through adopted regulations. Meeting U.S. EPA's current and future more stringent air quality standards will require the continuation of aggressive emissions reductions efforts from all levels of government.

It should be noted that the AQMP is designed to accommodate growth. Therefore, the proposed control measures are sufficient to reduce emissions while allowing growth. For permitted stationary sources, offsets are required under the federal and state new source review programs. To the extent offsets are required, either via the open market trades or accessing the District's R1315 bank, pre-2008 emission credits can be used and these emissions are accounted for in the SIP through growth projections as shown in Table III-2-15. However, It needs to be emphasized that AQMP emissions reflect projected actual emissions for the source category, not potential to emit or allowable emissions and do not include offset ratio greater than one for certain pollutants.

TABLE III-2-15

Growth Impact to 2030 Emissions* in Tons per Day

WITH GROWTH	VOC	NOx	CO	SOx	PM2.5
Point	38	33	38	9	10
Area	230	39	131	2	37
Road Dust	0	0	0	0	8
On-Road	55	101	446	2	12
Off-Road	84	116	886	7	6
Total	407	289	1501	20	73
NO GROWTH	**VOC**	**NOx**	**CO**	**SOx**	**PM2.5**
Point	29	32	33	8	8
Area	188	28	117	1	32
Road Dust	0	0	0	0	8
On-Road	49	82	398	2	10
Off-Road	64	71	642	4	4
Total	330	213	1190	15	62
IMPACT OF GROWTH	**VOC**	**NOx**	**CO**	**SOx**	**PM2.5**
Point	9	1	5	1	2
Area	42	11	14	1	5
Road Dust	0	0	0	0	0
On-Road	6	19	47	0	2
Off-Road	20	45	245	3	2
Total	77	76	311	5	11

*Annual Average Inventory

UNCERTAINTY IN THE INVENTORY

An effective AQMP relies on an adequate emission inventory. Over the years, significant improvements have been made to quantify emission sources for which control measures are developed. Increased use of continuous monitoring and source tests has contributed to the improvement in point source inventories. Technical assistance to facilities and auditing of reported emissions by the District also have improved the accuracy of the emissions inventory. Area source inventories that rely on average emission factors and regional activities have inherent uncertainty. Industry-specific surveys and source-specific studies during rule development have provided much-needed refinement to the emissions estimates.

Mobile source inventories remain the greatest challenge due to the constantly new collected information from the large number and types of equipment and engines. Every AQMP revision provides an opportunity to further improve the current knowledge of mobile source inventories. The Final 2012 AQMP is not an exception. As described earlier, many improvements were made to EMFAC2011 and such work is still ongoing. However, it should be acknowledged that there are still areas that could be significantly improved if better data were available. Technology change and improvement in the area of electric, hybrid, flexible fuel, and fuel cell vehicles, or the change in future gasoline prices, all add uncertainty to the on-road emissions inventory.

Additionally, the latest recession started in 2007. The recession was unforeseen and was not considered in the 2007 AQMP. As we prepare the Final 2012 AQMP, we are still in the midst of economic recovery. The impact of this recession is deep and thus adds to the uncertainty in the emissions provided here. Relative to future growth, there are many challenges with making accurate projections, such as where vehicle trips will occur, the distribution between various modes of transportation (such as trucks and trains), as well as estimates for population growth and changes to the number and type of jobs. Forecasts are made with the best information available; nevertheless, they contribute to the overall uncertainty in emission projections. Fortunately, AQMP updates are generally performed every three to four years; thereby allowing for frequent improvements to the inventories.

CONTROLLED EMISSION INVENTORIES

This section describes the methodology used to estimate the controlled and remaining emissions after the proposed control measures in the Final 2012 AQMP are implemented for the years 2014 and 2023. Emission reductions are derived by applying the control efficiency of a control measure to the projected baseline inventories. In addition to the proposed control measures, the impacts of phase-out VOC and SIP Reserve set aside tracking and other budgeted emissions for various District programs are also discussed in this section.

To project emission reductions and remaining emissions from the implementation of the proposed control measures, a mathematical algorithm called Controlled Emissions Projection Algorithm (CEPA) is used. CEPA is developed to calculate projected remaining emissions and/or emission reductions for specified control scenarios. CEPA is briefly discussed in this section. A more comprehensive and extensive discussion of CEPA is presented in Technical Report III-A of the 1991 AQMP.

Since 1998, the District has been implementing several funding incentive programs for the replacement or retrofit of heavy duty diesel vehicles, including the Carl Moyer and Lower Emission School Bus programs, Proposition 1B Goods Movement program, and the SOON off-road equipment program. Over the years, thousands of diesel engines in the on-road and off-road sectors have been converted to natural gas, repowered, or retrofitted with particulate traps to achieve significant emissions reductions.

Based contracts awarded and executed since the 2007 AQMP under the Proposition 1B and Carl Moyer programs, the typical useful life of the vehicles, and the expected emissions benefits in 2014 beyond the benefits included in the future-year baseline inventory, an additional 16 tons/day of NOx emissions reductions, 0.28 tons/day of VOC emissions reductions, and 0.46 tons/day of direct PM2.5 emissions reductions will be achieved in 2014. These contracts continue to be closely tracked and the resulting level of emission reductions will be confirmed once achieved. The District has dedicated staff performing field audits to ensure that the agreed upon protocols are followed. Based on past contract performance, emission reductions from these awarded contracts were discounted by 30 percent to reflect the fact that occasionally, contract awards are not completed and monies are returned.

Table III-2-16 summarizes emission reductions in 2014 from the mobile source incentive programs. It should be noted that these surplus reductions, attributable to accelerated fleet turnover or early compliance with state regulations, will diminish over time given that the baseline emissions inventory already incorporates normal fleet turnover and rule compliance.

TABLE III-2-16

Summary of Emissions Reductions from Mobile Source Incentive Programs
(2014 Tons per Day)

	VOC	**NOx**	**PM2.5**
Carl Moyer Programs	0.28	8.0	0.20
Proposition 1B Incentive Funding	--	7.6	0.26
Total	0.28	15.6	0.46

Emission Impacts of SCAQMD Programs

There are several District regulatory programs that have specific impacts on future emissions through certain "set-aside" or exemption provisions. As a result, special emission accounts were created for the Final 2012 AQMP to track these emissions. For air quality modeling purposes, these emissions (except RECLAIM allocations) are distributed across the entire non-RECLAIM point source.

SIP Set Aside Accounts

Background

The Final 2012 AQMP includes a few accounts to track growth from emission trade-offs from regulatory programs, and a SIP Reserve for potential technology assessments (Table III-2-17). The methodology and assumptions used to develop these tracking accounts for the Final 2012 AQMP are discussed in detail below. It should be noted that emission increases or decreases discussed herein are in reference to the projected AQMP baseline.

VOC Emissions from Phase-Out of Toxics

Due to increasing focus on air toxic controls certain amount of conversion from toxics to VOCs may be inevitable in the future. Therefore, three tons per day are included for potential VOC emission increases to reduce toxics, such as controlling of methylene chloride in coating stripping applications may increase VOC emissions.

SIP Reserve for Potential Technology Assessments

To achieve air quality goals, adopted and amended rules and regulations that rely on technology forcing emission limits are often needed. Technology forcing emission limits are designed to provide ample time for the development and implementation of new air pollution technologies. In the event, however, that the new air pollution control technology does not come to fruition by the implementation date of the adopted or amended rule there may be a need to delay or relax the future emission limits. The SIP Reserve is designed to ensure that delaying or relaxing future emission limits for technology forcing rules will not interfere with the Basin's attainment demonstration. In addition, the SIP Reserve allows the District to adopt and amend rules with technology forcing limits, while maintaining SIP approvability if a rule relaxation or delay is needed.

The potential delay of R1110.2 biogas engine reductions beyond 2014 was included in the estimates for 2011.

TABLE III-2-17

Summary of SIP Set-Aside Accounts for the Final 2012 AQMP
(2014/2023 Tons per Day)

	VOC	NOx
VOC Emissions from Phase-out of ODC or Toxics	1/3	N/A
SIP Reserve (Technology Assessment)	0/2	1/2
Total Addition to Controlled SIP Inventories	1/5	1/2

Proposed Control Measures

In order to assess emission reduction potential and remaining emissions from proposed control measures, a control factor profile needs to be developed identifying source category targeted by a measure, its control efficiency, and implementation schedule.

Control Efficiency/Control Factor

One factor that determines the effectiveness of a control measure is its control efficiency (CE), expressed in percentage. Control efficiency is dependent on the specific control technologies proposed, and each control measure may have one or more technology options available. If there is only one feasible control technology in a control measure, its control efficiency is primarily based on an engineering evaluation of the proposed technology. However, if several control technologies are available to control an emission source, the average control efficiency is used. If multiple control technologies are proposed to reduce emissions from various steps of an operation, a weighted average control efficiency is developed to represent an overall control of the emission sources. Once the control efficiency of a control measure is determined, it is used to estimate emission reductions of the proposed measure. Control efficiencies for the proposed control measures are identified and discussed in detail in Appendix IV of the Final 2012 AQMP.

The control factor (CF) is used to estimate remaining emissions once a proposed control measure is implemented. A control factor equal to 0 indicates complete emission control or 100 percent efficiency. A control factor equal to 1 indicates no emission control or emissions remain unchanged. A high control factor value indicates a low control efficiency. As the control efficiency goes up, the control factor value goes down. The equation to calculate a control factor follows:

$$\mathbf{CF = 1 - (CE/100)}$$

And, the remaining emissions can be calculated as:

$$\mathbf{REM = BE * CF}$$

Where REM is Remaining Emissions, and BE is Baseline Emissions

The Final 2012 AQMP has many milestones for which emission reduction progress needs to be projected. As a result, control factors for each milestone year were developed. The control factor profile for each measure is developed considering the following factors:

- proposed adoption date;
- implementation lead time; and
- phase-in period, if any.

The adoption date as proposed in the Final 2012 AQMP is the date the District or other agency is expected to adopt the control measure as a rule. The implementation lead time reflects the time allowed for the emission sources to install controls. When a rule is implemented, it is not unusual that it may have multiple interim implementation dates prior to full implementation. This is because the requirements in a rule may require two or three phases to reach the final emission target (e.g., a technology-forcing regulation). Or, a rule may regulate such a large population of equipment that it is impractical to implement it all at once, and it becomes administratively necessary to phase in its implementation. In either case, a control profile would indicate an initial implementation date and an ending implementation date. The adoption and implementation schedule of the proposed control measures is presented in Chapter 4 of the Final 2012 AQMP.

Impact Factors

Each proposed control measure describes specific emission sources subject to potential controls. Based on the description of these sources, corresponding sources as tracked in the emission inventory are identified. In general, emission sources are grouped by major source category, which can be further subcategorized into point sources denoted by Source Classification Codes (SCC) and area sources denoted by Category Emission Source (CES) Codes. To track emission reductions more accurately, the control factors at the SCC/CES level become necessary.

An SCC, an 8-digit EPA code, is used to identify emissions from a point source at the equipment level. A CES, a 5-digit CARB code, is used to describe an area source for which emissions are distributed across the region with no specific locations.

For some measures the controls apply not only to the type of equipment, but also to the industries engaged in a particular activity. In those cases, control factors will be developed by pairing SCCs and Standard Industrial Classification (SIC) Codes to clearly and specifically point out the emission sources in the inventory that the measure is designed to reduce. Such SCC/SIC pairs significantly enhance the ability to quantify emissions closely following the intent of a proposed control measure.

There are instances where an SCC or CES category is not fully impacted by a control measure. As a result, an impact factor (IF) is developed as a weighing factor for such an adjustment. The following equation illustrates how the impact factor (IF) is included in the CF calculation.

$$\mathbf{CF = 1 - ((CE /100) \times IF)}$$

Impact factors will accurately track the measure's baseline emissions, and calculate more accurate reductions from the proposed control measures.

CEPA Emission Calculations

The District uses the CEPA program to calculate emission projections for the proposed AQMP control measures. Based on the control factor profile and projected baseline emissions, CEPA estimates emission reductions and remaining emissions for future years by pollutant (i.e., summer VOC and NOx; winter CO and NO_2; and average annual day for VOC, NOx, CO, SOx and PM10).

CEPA allows interaction of multiple control measures affecting a specific emission source, avoiding double counting of emission reductions from additional measures. It also provides flexibility in analyzing various scenarios and improves accuracy by standardizing calculation methodologies.

To run CEPA, the program requires four data input files. These input files are as follows:

1. Master Measure File - This file contains all the measures proposed in the AQMP. There is one master measure file in the CEPA program.

2. Scenario File - This file is a listing of selected measures to characterize emission reductions, and is a subset of the master measure file. For example, it can contain a group of control measures for mobile sources only, or a group of measures to be implemented by U.S. EPA.

3. Control Factor File - This file shows control factor by pollutant by SCC/SIC (or CES/CES) pairs for each control measure in a specified year.

4. Baseline Emission File - This file contains projected emission data (tons per day) for future years based on the 2008 emissions inventory. There are different types of baseline emission data available for CEPA runs. These are the average annual day emissions inventory with pollutants VOC, NOx, CO, SOx, PM10; and PM2.5; and the planning inventory with pollutants VOC and NOx during summer, and CO and NO_2 during winter.

CEPA calculates the remaining emissions at the SCC/SIC level. It can generate many types of emission summary reports or electronic files. For example, the program can provide composite control factors for on-road mobile sources in sixteen categories used in the air quality modeling analysis or composite control factors from all the proposed control measures in the scenario file. It can also provide remaining emissions by SCC/S1C or CES/CES pairs; by major source category; or by SIC. It can present emission reductions by each control measure in the absence of other competing measures; or reductions for each control measure following a pre-determined implementation sequence. The result of CEPA runs will be presented in Appendix V of the Final 2012 AQMP.

CARB Emission Data Reports System

As mentioned in Chapter 1, of this appendix the entire emission inventories are compiled and maintained by CARB in its statewide emission related information databases named California Emission Inventory Development and Reporting System (CEIDARS), and California Emission Forecasting and Planning Inventory System (CEFIS).

In both systems, emissions are tracked by CARB's coding method called Emission Inventory Codes (EIC code). The EIC code is a 14-digit number arranged into four fields: major category, source category, material description and emission sub-category. For example, EIC 210-200-3300-0000 is for dry cleaning using perchloroethylene. 210 indicate that this source is under laundering group. 200 means the source category is dry cleaning. 3300 refers to the material perchloroethylene. 0000 implies there is no sub-category for this particular source. EIC separates emission sources into four major divisions: stationary, area, non-anthropogenic, and mobile source. This coding system allows flexibility in how sources are selected, sorted and grouped to fit users' needs. EIC links area sources and point sources together to allow a computer program to automatically reconcile point and area source emissions. In the Final 2012 AQMP, all the emission summary reports are based on CARB's EIC codes. Because only the anthropogenic sources are included in this document, all summary reports in appendices include three major divisions. They are stationary, area, and mobile source.

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REFERENCES

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ATTACHMENT A

FINAL 2012 AQMP APPENDIX III

ANNUAL AVERAGE EMISSIONS

BY MAJOR SOURCE CATEGORY

Table A-1

2008 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
	Fuel Combustion									
10	Electric Utilities	5.54	1.01	9.91	0.50	0.31	1.18	1.18	1.17	1.32
20	Cogeneration	0.33	0.05	0.40	0.02	0.01	0.06	0.05	0.05	0.29
30	Oil and Gas Production (combustion)	0.90	0.10	0.56	0.73	0.02	0.10	0.10	0.10	0.24
40	Petroleum Refining (Combustion)	4.65	1.30	5.09	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	30.15	6.08	18.91	19.28	0.49	1.35	1.34	1.34	2.21
52	Food and Agricultural Processing	0.20	0.06	1.07	0.29	0.00	0.06	0.06	0.06	0.10
60	Service and Commercial	15.34	4.80	17.61	15.48	0.87	1.36	1.36	1.35	3.21
99	Other (Fuel Combustion)	1.76	0.40	3.38	4.16	0.25	0.38	0.29	0.21	0.01
Total Fuel Combustion		**58.87**	**13.81**	**56.94**	**40.46**	**1.95**	**6.11**	**5.95**	**5.82**	**8.35**
	Waste Disposal									
110	Sewage Treatment	0.09	0.05	0.01	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	556.59	7.90	0.51	0.51	0.32	0.13	0.13	0.13	3.54
130	Incineration	0.39	0.07	0.37	1.00	0.08	0.17	0.08	0.06	0.14
140	Soil Remediation	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.80	4.05	0.01	0.00	0.03	0.60	0.29	0.03	22.97
Total Waste Disposal		**561.88**	**12.07**	**0.89**	**1.53**	**0.42**	**0.92**	**0.51**	**0.24**	**26.81**
	Cleaning and Surface Coatings									
210	Laundering	3.20	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	54.28	10.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	21.43	20.49	0.01	0.01	0.00	1.64	1.57	1.52	0.14
240	Printing	2.03	2.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	4.07	3.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.52	0.52	0.04	0.06	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**85.53**	**37.02**	**0.04**	**0.07**	**0.00**	**1.65**	**1.58**	**1.53**	**0.20**
	Petroleum Production and Marketing									
310	Oil and Gas Production	2.39	1.35	0.07	0.08	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.17	4.12	5.38	0.32	0.67	2.99	1.92	1.68	0.20
330	Petroleum Marketing	125.26	35.35	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**133.84**	**40.83**	**5.45**	**0.41**	**0.68**	**3.00**	**1.93**	**1.68**	**0.20**
	Industrial Processes									
410	Chemical	7.58	6.18	0.16	0.00	0.00	0.63	0.49	0.41	0.06
420	Food and Agriculture	1.54	1.52	0.00	0.00	0.00	0.47	0.24	0.10	0.00
430	Mineral Processes	0.45	0.40	0.84	0.03	0.01	8.61	5.68	3.11	0.07
440	Metal Processes	0.16	0.13	0.22	0.03	0.01	0.58	0.40	0.27	0.00
450	Wood and Paper	0.14	0.14	0.00	0.00	0.00	5.52	3.85	2.32	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.11	0.10	0.09	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
499	Other (Industrial Processes)	8.21	7.40	0.34	0.03	0.00	1.31	0.91	0.58	9.32
Total Industrial Processes		**18.09**	**15.76**	**1.57**	**0.09**	**0.03**	**17.26**	**11.68**	**6.87**	**9.45**
	Solvent Evaporation									
510	Consumer Products	123.26	97.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	23.55	21.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.17	1.17	0.00	0.00	0.00	0.00	0.00	0.00	1.53
540	Asphalt Paving/Roofing	0.96	0.88	0.00	0.00	0.00	0.02	0.02	0.02	0.00
Total Solvent Evaporation		**148.95**	**121.70**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**1.53**

Table A-1 (Continued)
2008 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	19.96	8.71	49.17	24.35	0.50	8.59	8.17	7.94	0.11
620	Farming Operations	36.61	2.93	0.00	0.00	0.00	2.70	1.38	0.34	15.51
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	43.19	21.12	2.12	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	101.97	46.60	7.04	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.93	5.90	0.59	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	4.09	2.03	0.29	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	3.28	1.87	19.75	1.44	0.04	2.44	2.35	2.11	0.04
690	Cooking	2.57	1.80	0.00	0.00	0.00	10.79	10.79	10.79	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				23.23	10.20				
Total Miscellaneous Processes		**62.76**	**15.54**	**71.95**	**49.10**	**10.74**	**184.15**	**98.77**	**31.62**	**40.69**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	102.31	94.99	830.87	72.33	0.80	11.18	10.95	5.02	8.95
722	Light Duty Trucks 1 (T1)	24.96	23.08	218.99	18.92	0.11	1.45	1.41	0.70	1.22
723	Light Duty Trucks 2 (T2)	33.15	30.60	328.65	41.81	0.39	3.90	3.82	1.70	4.56
724	Medium Duty Trucks (T3)	25.46	23.18	286.54	37.77	0.42	3.23	3.17	1.39	4.96
732	Light Heavy Duty Gas Trucks 1 (T4)	9.30	8.50	87.71	18.62	0.08	0.62	0.61	0.26	0.93
733	Light Heavy Duty Gas Trucks 2 (T5)	1.24	1.13	11.94	2.08	0.01	0.07	0.06	0.03	0.10
734	Medium Heavy Duty Gas Trucks (T6)	2.89	2.67	29.01	4.35	0.01	0.05	0.05	0.02	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.74	0.68	12.78	1.27	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.76	0.64	3.24	24.57	0.02	0.53	0.52	0.30	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.26	0.22	1.10	8.13	0.01	0.20	0.20	0.11	0.00
744	Medium Heavy Duty Diesel Truck (T6)	2.01	1.68	6.33	41.76	0.05	2.22	2.21	1.69	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	10.70	8.95	37.97	160.61	0.16	7.44	7.43	6.32	0.26
750	Motorcycles (MCY)	10.89	9.71	78.09	2.42	0.00	0.08	0.08	0.04	0.01
760	Diesel Urban Buses (UB)	0.62	0.52	2.52	14.05	0.02	0.93	0.92	0.51	0.02
762	Gas Urban Buses (UB)	0.47	0.40	4.58	0.78	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.19	0.17	2.65	0.18	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.23	0.19	0.67	2.78	0.00	0.28	0.28	0.19	0.01
777	Gas Other Buses (OB)	0.63	0.58	6.98	1.27	0.00	0.02	0.02	0.01	0.02
779	Diesel Other Buses (OB)	0.36	0.30	1.28	6.13	0.01	0.28	0.28	0.23	0.01
780	Motor Homes (MH)	0.54	0.46	13.62	2.20	0.01	0.08	0.08	0.05	0.03
Total On-Road Motor Vehicles		**227.71**	**208.64**	**1965.51**	**462.05**	**2.10**	**32.59**	**32.10**	**18.57**	**21.27**
Other Mobile Sources										
810	Aircraft	2.92	2.84	33.48	12.82	1.32	0.81	0.76	0.37	0.00
820	Trains	2.57	2.15	6.12	26.07	0.12	0.75	0.75	0.69	0.00
833	Ocean Going Vessels	2.16	1.93	3.74	40.73	36.77	4.12	4.01	3.87	0.03
835	Commercial Habor Crafts	1.52	1.27	5.50	18.54	0.01	0.86	0.86	0.79	0.00
840	Recreational Boats	38.51	36.24	107.81	6.36	0.00	2.28	2.19	2.09	0.00
850	Off-Road Recreational Vehicles	7.73	7.39	9.22	0.13	0.01	0.04	0.04	0.03	0.00
860	Off-Road Equipment	70.62	63.85	605.13	92.24	0.08	5.74	5.67	5.28	0.06
870	Farm Equipment	1.56	1.35	7.16	6.66	0.01	0.40	0.40	0.37	0.00
890	Fuel Storage and Handling	10.37	10.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**137.95**	**127.35**	**778.17**	**203.55**	**38.32**	**15.00**	**14.68**	**13.48**	**0.09**
Total Stationary and Area Sources		1069.91	256.73	136.84	91.65	13.82	213.11	120.44	47.77	87.23
Total On-Road Vehicles		227.71	208.64	1965.51	462.05	2.10	32.59	32.10	18.57	21.27
Total Other Mobile		137.95	127.35	778.17	203.55	38.32	15.00	14.68	13.48	0.09
Total		**1435.57**	**592.72**	**2880.53**	**757.26**	**54.24**	**260.69**	**167.22**	**79.83**	**108.60**

Table A-2
2014 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
	Fuel Combustion									
10	Electric Utilities	4.87	0.89	8.71	0.20	0.28	1.04	1.04	1.04	1.17
20	Cogeneration	0.33	0.05	0.39	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	0.93	0.10	0.57	0.66	0.02	0.10	0.10	0.10	0.25
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	25.87	5.93	18.23	13.20	0.52	1.31	1.30	1.29	2.01
52	Food and Agricultural Processing	0.19	0.06	1.06	0.09	0.00	0.06	0.06	0.06	0.10
60	Service and Commercial	14.47	4.47	16.78	9.53	0.93	1.38	1.37	1.37	3.17
99	Other (Fuel Combustion)	1.56	0.36	3.05	3.80	0.22	0.36	0.28	0.20	0.01
Total Fuel Combustion		**52.65**	**13.15**	**53.85**	**27.49**	**1.99**	**5.93**	**5.77**	**5.64**	**7.94**
	Waste Disposal									
110	Sewage Treatment	0.09	0.05	0.01	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	614.57	8.71	0.51	0.51	0.32	0.14	0.14	0.14	3.90
130	Incineration	0.43	0.07	0.38	0.90	0.08	0.18	0.08	0.06	0.14
140	Soil Remediation	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.21	3.41	0.01	0.00	0.03	0.62	0.30	0.03	23.40
Total Waste Disposal		**619.30**	**12.24**	**0.92**	**1.43**	**0.43**	**0.95**	**0.53**	**0.24**	**27.61**
	Cleaning and Surface Coatings									
210	Laundering	3.24	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	59.63	11.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	22.48	21.52	0.01	0.00	0.00	1.72	1.65	1.59	0.14
240	Printing	1.82	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.04
250	Adhesives and Sealants	4.49	3.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.58	0.58	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**92.24**	**39.28**	**0.05**	**0.03**	**0.00**	**1.74**	**1.66**	**1.60**	**0.20**
	Petroleum Production and Marketing									
310	Oil and Gas Production	2.51	1.42	0.07	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	112.98	31.99	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**121.66**	**37.54**	**5.05**	**0.29**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
	Industrial Processes									
410	Chemical	8.48	6.90	0.18	0.00	0.00	0.71	0.55	0.46	0.06
420	Food and Agriculture	1.52	1.49	0.00	0.00	0.00	0.48	0.24	0.10	0.00
430	Mineral Processes	0.45	0.40	0.86	0.02	0.01	8.72	5.73	3.11	0.08
440	Metal Processes	0.16	0.13	0.21	0.03	0.01	0.58	0.39	0.26	0.00
450	Wood and Paper	0.15	0.15	0.00	0.00	0.00	6.12	4.27	2.57	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.11	0.10	0.09	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00
499	Other (Industrial Processes)	4.44	3.88	0.25	0.03	0.00	1.26	0.87	0.54	9.32
Total Industrial Processes		**15.21**	**12.95**	**1.50**	**0.08**	**0.03**	**18.00**	**12.17**	**7.14**	**9.45**
	Solvent Evaporation									
510	Consumer Products	103.24	84.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	16.49	15.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.99	0.99	0.00	0.00	0.00	0.00	0.00	0.00	1.05
540	Asphalt Paving/Roofing	0.91	0.84	0.00	0.00	0.00	0.02	0.02	0.02	0.00
Total Solvent Evaporation		**121.64**	**102.01**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**1.05**

Table A-2 (continued)
2014 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
	Miscellaneous Processes									
610	Residential Fuel Combustion	19.73	8.61	48.36	19.79	0.49	7.73	7.36	7.15	0.11
620	Farming Operations	34.11	2.73	0.00	0.00	0.00	2.29	1.18	0.30	13.93
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	39.59	19.36	1.94	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	102.76	46.96	7.09	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.85	5.85	0.58	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.51	1.76	0.25	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	5.66	3.23	50.65	1.52	0.47	5.37	5.17	4.60	0.04
690	Cooking	2.60	1.82	0.00	0.00	0.00	10.89	10.89	10.89	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				26.51	7.99				
Total Miscellaneous Processes		**62.44**	**16.62**	**102.03**	**47.90**	**8.95**	**182.45**	**98.97**	**33.23**	**39.11**
	On-Road Motor Vehicles									
710	Light Duty Passenger Auto (LDA)	46.70	42.86	421.38	34.77	0.83	10.76	10.56	4.52	6.51
722	Light Duty Trucks 1 (T1)	14.22	13.12	120.88	10.23	0.11	1.37	1.34	0.62	0.97
723	Light Duty Trucks 2 (T2)	20.46	18.79	202.78	22.85	0.39	3.75	3.69	1.58	3.49
724	Medium Duty Trucks (T3)	21.35	19.39	218.73	26.78	0.39	2.96	2.91	1.25	4.07
732	Light Heavy Duty Gas Trucks 1 (T4)	7.53	6.86	62.75	16.32	0.09	0.63	0.62	0.26	0.79
733	Light Heavy Duty Gas Trucks 2 (T5)	0.75	0.69	6.16	1.61	0.01	0.07	0.06	0.03	0.08
734	Medium Heavy Duty Gas Trucks (T6)	1.40	1.27	16.86	2.69	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.24	0.20	8.45	1.14	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.67	0.56	3.29	18.44	0.02	0.50	0.50	0.27	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.23	0.19	1.12	5.99	0.01	0.19	0.19	0.10	0.00
744	Medium Heavy Duty Diesel Truck (T6)	1.13	0.94	3.82	24.55	0.05	1.39	1.38	0.94	0.12
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.97	3.33	17.84	80.39	0.16	2.55	2.54	1.84	0.24
750	Motorcycles (MCY)	8.42	7.04	61.89	2.35	0.00	0.09	0.09	0.04	0.02
760	Diesel Urban Buses (UB)	0.60	0.50	2.41	13.40	0.02	0.95	0.94	0.51	0.02
762	Gas Urban Buses (UB)	0.41	0.32	3.98	0.76	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.10	0.09	1.50	0.13	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.05	0.04	0.16	2.25	0.00	0.17	0.16	0.08	0.01
777	Gas Other Buses (OB)	0.43	0.40	5.20	0.93	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.16	0.13	0.59	4.42	0.01	0.15	0.15	0.10	0.01
780	Motor Homes (MH)	0.22	0.18	5.35	1.61	0.01	0.08	0.08	0.04	0.03
Total On-Road Motor Vehicles		**129.05**	**116.91**	**1165.13**	**271.62**	**2.10**	**25.70**	**25.29**	**12.23**	**16.46**
	Other Mobile Sources									
810	Aircraft	3.59	3.51	37.02	13.94	1.50	0.88	0.83	0.42	0.00
820	Trains	2.00	1.68	6.59	21.73	0.02	0.62	0.62	0.57	0.00
833	Ocean Going Vessels	2.33	2.08	3.86	35.13	2.70	0.85	0.85	0.82	0.03
835	Commercial Habor Crafts	1.28	1.08	6.27	11.89	0.01	0.53	0.53	0.49	0.00
840	Recreational Boats	30.94	29.30	104.40	5.91	0.00	1.84	1.77	1.69	0.00
850	Off-Road Recreational Vehicles	6.79	6.54	7.87	0.13	0.01	0.03	0.03	0.02	0.00
860	Off-Road Equipment	53.11	48.72	593.53	64.03	0.08	4.27	4.20	3.93	0.06
870	Farm Equipment	1.03	0.89	6.53	4.62	0.01	0.27	0.26	0.24	0.00
890	Fuel Storage and Handling	6.63	6.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**107.71**	**100.41**	**766.07**	**157.38**	**4.33**	**9.28**	**9.09**	**8.18**	**0.10**
Total Stationary and Area Sources		1085.13	233.80	163.40	77.22	11.97	211.94	120.95	49.47	85.57
Total On-Road Vehicles		129.05	116.91	1165.13	271.62	2.10	25.70	25.29	12.23	16.46
Total Other Mobile		107.71	100.41	766.07	157.38	4.33	9.28	9.09	8.18	0.10
Total		**1321.90**	**451.12**	**2094.59**	**506.22**	**18.40**	**246.92**	**155.33**	**69.89**	**102.13**

Table A-3
2017 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.85	0.89	8.67	0.20	0.28	1.04	1.04	1.03	1.16
20	Cogeneration	0.34	0.05	0.40	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.00	0.11	0.61	0.73	0.02	0.11	0.11	0.11	0.26
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	26.09	6.37	19.45	13.49	0.58	1.37	1.36	1.35	2.02
52	Food and Agricultural Processing	0.21	0.06	1.12	0.07	0.00	0.07	0.07	0.07	0.10
60	Service and Commercial	14.61	4.47	16.90	9.29	1.02	1.39	1.39	1.38	3.15
99	Other (Fuel Combustion)	1.53	0.32	2.91	3.30	0.22	0.35	0.27	0.20	0.01
Total Fuel Combustion		**53.05**	**13.55**	**55.13**	**27.09**	**2.13**	**6.00**	**5.84**	**5.72**	**7.95**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	640.92	9.09	0.53	0.54	0.34	0.14	0.14	0.14	4.07
130	Incineration	0.47	0.08	0.41	0.96	0.08	0.19	0.09	0.07	0.16
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.57	3.66	0.01	0.00	0.03	0.72	0.35	0.04	24.23
Total Waste Disposal		**646.07**	**12.89**	**0.97**	**1.52**	**0.45**	**1.07**	**0.60**	**0.26**	**28.62**
Cleaning and Surface Coatings										
210	Laundering	3.38	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	67.03	12.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	24.59	23.54	0.01	0.00	0.00	1.88	1.81	1.74	0.15
240	Printing	1.91	1.91	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	5.16	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.65	0.65	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**102.72**	**43.44**	**0.05**	**0.03**	**0.00**	**1.90**	**1.82**	**1.75**	**0.21**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.67	1.51	0.07	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	108.41	29.57	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.24**	**35.21**	**5.06**	**0.29**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	9.64	7.85	0.19	0.00	0.00	0.79	0.62	0.52	0.06
420	Food and Agriculture	1.60	1.57	0.00	0.00	0.00	0.53	0.26	0.11	0.00
430	Mineral Processes	0.46	0.41	0.90	0.02	0.01	9.08	5.95	3.21	0.08
440	Metal Processes	0.17	0.14	0.23	0.03	0.01	0.61	0.42	0.28	0.00
450	Wood and Paper	0.16	0.16	0.00	0.00	0.00	6.89	4.81	2.90	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00
499	Other (Industrial Processes)	4.58	3.98	0.28	0.03	0.00	1.31	0.90	0.56	9.33
Total Industrial Processes		**16.63**	**14.12**	**1.60**	**0.09**	**0.03**	**19.36**	**13.09**	**7.67**	**9.47**
Solvent Evaporation										
510	Consumer Products	104.93	86.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	16.94	15.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.96	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.87
540	Asphalt Paving/Roofing	1.09	1.00	0.00	0.00	0.00	0.03	0.02	0.02	0.00
Total Solvent Evaporation		**123.93**	**103.94**	**0.00**	**0.00**	**0.00**	**0.03**	**0.02**	**0.02**	**0.87**

Table A-3 (continued)
2017 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
	Miscellaneous Processes									
610	Residential Fuel Combustion	19.71	8.61	48.29	17.31	0.50	7.72	7.34	7.14	0.11
620	Farming Operations	31.27	2.50	0.00	0.00	0.00	2.05	1.06	0.29	11.93
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	46.17	22.58	2.26	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	103.04	47.09	7.11	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.83	5.84	0.58	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.28	1.66	0.24	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	5.67	3.23	50.66	1.52	0.47	5.37	5.17	4.60	0.04
690	Cooking	2.70	1.89	0.00	0.00	0.00	11.31	11.31	11.31	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				26.51	6.99				
Total Miscellaneous Processes		**59.69**	**16.46**	**101.97**	**45.42**	**7.96**	**189.21**	**102.49**	**33.95**	**37.11**
	On-Road Motor Vehicles									
710	Light Duty Passenger Auto (LDA)	33.97	31.21	312.91	25.85	0.80	10.71	10.52	4.47	5.89
722	Light Duty Trucks 1 (T1)	11.46	10.63	93.85	8.28	0.11	1.34	1.31	0.59	0.88
723	Light Duty Trucks 2 (T2)	16.18	14.91	154.20	16.66	0.38	3.77	3.70	1.57	3.16
724	Medium Duty Trucks (T3)	19.04	17.38	181.16	21.67	0.38	2.95	2.90	1.24	3.75
732	Light Heavy Duty Gas Trucks 1 (T4)	6.74	6.17	52.88	14.96	0.09	0.65	0.64	0.27	0.74
733	Light Heavy Duty Gas Trucks 2 (T5)	0.62	0.57	4.55	1.40	0.01	0.07	0.07	0.03	0.08
734	Medium Heavy Duty Gas Trucks (T6)	1.05	0.96	12.89	2.08	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.18	0.15	7.91	1.07	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.60	0.50	3.16	15.66	0.02	0.50	0.49	0.26	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.20	0.17	1.14	5.12	0.01	0.19	0.19	0.10	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.83	0.69	3.04	17.35	0.05	1.20	1.19	0.75	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.87	3.24	18.65	67.67	0.18	2.33	2.32	1.59	0.27
750	Motorcycles (MCY)	8.10	6.64	58.07	2.35	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.56	0.47	2.24	12.32	0.02	0.95	0.94	0.50	0.02
762	Gas Urban Buses (UB)	0.40	0.31	3.65	0.73	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.09	0.07	1.14	0.12	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.04	0.14	2.09	0.00	0.16	0.16	0.08	0.01
777	Gas Other Buses (OB)	0.39	0.36	4.47	0.79	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.13	0.11	0.52	3.25	0.01	0.13	0.13	0.08	0.01
780	Motor Homes (MH)	0.15	0.12	3.29	1.38	0.01	0.08	0.08	0.04	0.03
Total On-Road Motor Vehicles		**104.61**	**94.69**	**919.87**	**220.79**	**2.08**	**25.19**	**24.78**	**11.63**	**15.07**
	Other Mobile Sources									
810	Aircraft	3.94	3.86	38.79	14.51	1.59	0.91	0.86	0.45	0.00
820	Trains	1.81	1.51	7.43	23.52	0.02	0.58	0.58	0.54	0.00
833	Ocean Going Vessels	2.76	2.47	4.48	39.87	3.11	0.98	0.98	0.94	0.04
835	Commercial Habor Crafts	1.26	1.06	6.65	10.66	0.01	0.45	0.45	0.42	0.00
840	Recreational Boats	27.58	26.19	108.09	5.87	0.00	1.65	1.58	1.51	0.00
850	Off-Road Recreational Vehicles	6.84	6.62	8.35	0.15	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	49.19	45.07	602.32	58.21	0.09	3.92	3.85	3.60	0.07
870	Farm Equipment	0.78	0.68	6.31	3.61	0.01	0.20	0.20	0.18	0.00
890	Fuel Storage and Handling	5.70	5.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**99.87**	**93.14**	**782.41**	**156.40**	**4.83**	**8.72**	**8.53**	**7.66**	**0.11**
Total Stationary and Area Sources		1119.33	239.61	164.79	74.44	11.14	220.42	125.68	50.97	84.44
Total On-Road Vehicles		104.61	94.69	919.87	220.79	2.08	25.19	24.78	11.63	15.07
Total Other Mobile		99.87	93.14	782.41	156.40	4.83	8.72	8.53	7.66	0.11
Total		**1323.80**	**427.43**	**1867.06**	**451.63**	**18.05**	**254.32**	**158.99**	**70.26**	**99.62**

Table A-4
2019 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.77	0.88	8.54	0.19	0.27	1.02	1.02	1.02	1.14
20	Cogeneration	0.34	0.05	0.40	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.03	0.11	0.63	0.78	0.02	0.11	0.11	0.11	0.27
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	26.03	6.57	20.02	13.70	0.62	1.39	1.38	1.37	2.01
52	Food and Agricultural Processing	0.22	0.06	1.16	0.07	0.00	0.07	0.07	0.07	0.11
60	Service and Commercial	14.65	4.45	16.92	9.22	1.07	1.39	1.39	1.38	3.13
99	Other (Fuel Combustion)	1.55	0.33	2.93	3.30	0.22	0.35	0.27	0.20	0.01
Total Fuel Combustion		**53.02**	**13.73**	**55.67**	**27.27**	**2.21**	**6.02**	**5.86**	**5.73**	**7.91**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	658.26	9.33	0.54	0.56	0.35	0.15	0.15	0.15	4.17
130	Incineration	0.50	0.08	0.43	0.99	0.08	0.20	0.09	0.07	0.16
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.76	3.80	0.01	0.00	0.03	0.78	0.38	0.04	24.65
Total Waste Disposal		**663.63**	**13.27**	**1.00**	**1.56**	**0.46**	**1.13**	**0.63**	**0.27**	**29.15**
Cleaning and Surface Coatings										
210	Laundering	3.45	0.15	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	70.75	13.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	25.68	24.59	0.01	0.00	0.00	1.96	1.88	1.82	0.15
240	Printing	1.96	1.96	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	5.53	4.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.69	0.69	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**108.07**	**45.60**	**0.05**	**0.03**	**0.00**	**1.98**	**1.90**	**1.83**	**0.21**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.73	1.55	0.08	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	108.23	29.97	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.14**	**35.65**	**5.06**	**0.29**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	10.24	8.35	0.20	0.00	0.00	0.83	0.65	0.55	0.06
420	Food and Agriculture	1.63	1.61	0.00	0.00	0.00	0.55	0.27	0.11	0.00
430	Mineral Processes	0.47	0.41	0.91	0.03	0.01	9.26	6.07	3.26	0.09
440	Metal Processes	0.18	0.14	0.23	0.03	0.01	0.64	0.43	0.29	0.00
450	Wood and Paper	0.17	0.17	0.00	0.00	0.00	7.27	5.08	3.06	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00
499	Other (Industrial Processes)	4.66	4.04	0.29	0.03	0.00	1.33	0.92	0.57	9.34
Total Industrial Processes		**17.37**	**14.74**	**1.64**	**0.09**	**0.03**	**20.03**	**13.54**	**7.94**	**9.49**
Solvent Evaporation										
510	Consumer Products	106.21	87.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	17.25	16.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.94	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.76
540	Asphalt Paving/Roofing	1.20	1.10	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**125.60**	**105.38**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.76**

Table A-4 (continued)
2019 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
	Miscellaneous Processes									
610	Residential Fuel Combustion	19.70	8.60	48.26	16.74	0.50	7.71	7.34	7.14	0.11
620	Farming Operations	29.37	2.35	0.00	0.00	0.00	1.88	0.99	0.28	10.60
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	50.38	24.63	2.47	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	104.00	47.53	7.18	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.83	5.84	0.58	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.13	1.59	0.23	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	5.67	3.23	50.67	1.53	0.47	5.37	5.17	4.61	0.04
690	Cooking	2.75	1.92	0.00	0.00	0.00	11.53	11.53	11.53	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				26.51	6.23				
Total Miscellaneous Processes		**57.83**	**16.34**	**101.95**	**44.85**	**7.20**	**194.27**	**105.05**	**34.42**	**35.78**
	On-Road Motor Vehicles									
710	Light Duty Passenger Auto (LDA)	25.37	23.43	239.48	19.65	0.76	10.66	10.47	4.42	5.47
722	Light Duty Trucks 1 (T1)	9.71	9.07	75.26	6.80	0.11	1.31	1.29	0.57	0.81
723	Light Duty Trucks 2 (T2)	13.42	12.45	121.27	12.48	0.37	3.78	3.71	1.57	2.93
724	Medium Duty Trucks (T3)	17.65	16.20	156.39	18.24	0.37	2.95	2.89	1.23	3.54
732	Light Heavy Duty Gas Trucks 1 (T4)	6.23	5.73	46.28	13.87	0.09	0.66	0.65	0.27	0.70
733	Light Heavy Duty Gas Trucks 2 (T5)	0.53	0.49	3.49	1.25	0.01	0.07	0.07	0.03	0.07
734	Medium Heavy Duty Gas Trucks (T6)	0.82	0.75	10.24	1.67	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.15	0.12	7.55	1.03	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.55	0.46	3.20	13.71	0.02	0.49	0.48	0.25	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.19	0.16	1.22	4.50	0.01	0.18	0.18	0.09	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.63	0.53	2.51	12.55	0.05	1.07	1.06	0.61	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.80	3.18	19.19	59.19	0.19	2.19	2.18	1.42	0.29
750	Motorcycles (MCY)	7.91	6.40	55.53	2.35	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.54	0.45	2.13	11.59	0.02	0.95	0.94	0.50	0.02
762	Gas Urban Buses (UB)	0.39	0.30	3.43	0.71	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.07	0.06	0.90	0.11	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.03	0.13	1.99	0.00	0.16	0.16	0.07	0.01
777	Gas Other Buses (OB)	0.36	0.34	3.98	0.69	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.11	0.09	0.48	2.47	0.01	0.11	0.11	0.07	0.01
780	Motor Homes (MH)	0.11	0.09	1.92	1.22	0.01	0.08	0.07	0.04	0.04
Total On-Road Motor Vehicles		**88.58**	**80.32**	**754.59**	**186.08**	**2.03**	**24.84**	**24.43**	**11.21**	**14.15**
	Other Mobile Sources									
810	Aircraft	4.16	4.08	39.96	14.88	1.65	0.93	0.88	0.47	0.00
820	Trains	1.67	1.40	7.80	23.04	0.02	0.55	0.55	0.51	0.00
833	Ocean Going Vessels	3.00	2.69	4.82	36.09	3.32	1.04	1.04	1.00	0.04
835	Commercial Habor Crafts	1.24	1.04	7.08	9.69	0.01	0.38	0.38	0.35	0.00
840	Recreational Boats	25.55	24.31	110.29	5.84	0.00	1.53	1.47	1.40	0.00
850	Off-Road Recreational Vehicles	6.93	6.72	8.65	0.17	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	47.61	43.61	610.71	52.03	0.09	3.55	3.48	3.27	0.07
870	Farm Equipment	0.65	0.56	6.24	3.01	0.01	0.16	0.16	0.14	0.00
890	Fuel Storage and Handling	5.28	5.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**96.10**	**89.67**	**795.56**	**144.74**	**5.12**	**8.17**	**7.98**	**7.16**	**0.11**
Total Stationary and Area Sources		1142.65	244.71	165.39	74.10	10.47	226.32	128.83	51.81	83.51
Total On-Road Vehicles		88.58	80.32	754.59	186.08	2.03	24.84	24.43	11.21	14.15
Total Other Mobile		96.10	89.67	795.56	144.74	5.12	8.17	7.98	7.16	0.11
Total		**1327.32**	**414.70**	**1715.53**	**404.93**	**17.62**	**259.32**	**161.24**	**70.17**	**97.77**

Table A-5
2023 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.75	0.87	8.49	0.19	0.27	1.02	1.01	1.01	1.14
20	Cogeneration	0.35	0.05	0.41	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.05	0.12	0.64	0.81	0.02	0.12	0.12	0.12	0.27
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	25.29	6.78	20.60	13.82	0.66	1.41	1.40	1.39	2.01
52	Food and Agricultural Processing	0.23	0.06	1.22	0.07	0.00	0.07	0.07	0.07	0.11
60	Service and Commercial	14.75	4.42	17.02	9.17	1.14	1.40	1.40	1.39	3.05
99	Other (Fuel Combustion)	1.55	0.30	2.87	2.94	0.22	0.34	0.26	0.19	0.01
Total Fuel Combustion		**52.39**	**13.89**	**56.30**	**27.01**	**2.33**	**6.03**	**5.87**	**5.75**	**7.84**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	693.45	9.83	0.56	0.58	0.36	0.15	0.15	0.15	4.40
130	Incineration	0.53	0.09	0.45	1.03	0.09	0.21	0.09	0.08	0.17
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	5.06	4.00	0.01	0.00	0.03	0.86	0.42	0.04	25.27
Total Waste Disposal		**699.15**	**13.99**	**1.05**	**1.62**	**0.48**	**1.23**	**0.68**	**0.29**	**30.01**
Cleaning and Surface Coatings										
210	Laundering	3.59	0.15	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	75.79	14.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	27.29	26.13	0.01	0.01	0.00	2.07	1.99	1.92	0.16
240	Printing	2.03	2.02	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	6.04	5.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.75	0.75	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**115.47**	**48.65**	**0.06**	**0.03**	**0.00**	**2.09**	**2.00**	**1.93**	**0.22**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.79	1.58	0.08	0.10	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	107.80	30.78	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**116.76**	**36.49**	**5.07**	**0.30**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	11.03	9.01	0.21	0.00	0.00	0.89	0.70	0.58	0.06
420	Food and Agriculture	1.68	1.65	0.00	0.00	0.00	0.58	0.28	0.11	0.00
430	Mineral Processes	0.47	0.42	0.94	0.03	0.02	9.50	6.22	3.33	0.09
440	Metal Processes	0.19	0.15	0.25	0.03	0.01	0.66	0.45	0.30	0.00
450	Wood and Paper	0.18	0.18	0.00	0.00	0.00	7.73	5.40	3.25	0.00
460	Glass and Related Products	0.02	0.01	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00
499	Other (Industrial Processes)	4.78	4.15	0.30	0.04	0.00	1.37	0.95	0.59	9.35
Total Industrial Processes		**18.35**	**15.56**	**1.71**	**0.09**	**0.03**	**20.89**	**14.12**	**8.27**	**9.50**
Solvent Evaporation										
510	Consumer Products	108.99	89.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	17.82	16.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.91	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.59
540	Asphalt Paving/Roofing	1.34	1.23	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**129.06**	**108.33**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.59**

Table A-5 (continued)
2023 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	19.68	8.59	48.17	15.58	0.50	7.70	7.32	7.12	0.11
620	Farming Operations	26.74	2.14	0.00	0.00	0.00	1.67	0.89	0.27	8.68
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	54.99	26.89	2.69	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	104.87	47.93	7.24	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.81	5.83	0.58	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	2.87	1.47	0.21	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	5.67	3.23	50.70	1.53	0.47	5.38	5.17	4.61	0.04
690	Cooking	2.86	2.00	0.00	0.00	0.00	11.97	11.97	11.97	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				26.51	6.08				
Total Miscellaneous Processes		**55.29**	**16.20**	**101.90**	**43.69**	**7.05**	**199.71**	**107.91**	**35.10**	**33.86**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	18.92	17.47	181.50	13.83	0.66	10.62	10.43	4.40	5.17
722	Light Duty Trucks 1 (T1)	7.94	7.46	54.81	4.86	0.10	1.30	1.28	0.55	0.73
723	Light Duty Trucks 2 (T2)	11.20	10.45	92.58	8.57	0.34	3.85	3.78	1.59	2.76
724	Medium Duty Trucks (T3)	15.46	14.38	119.86	13.38	0.35	3.00	2.95	1.25	3.33
732	Light Heavy Duty Gas Trucks 1 (T4)	5.32	4.96	36.80	11.72	0.09	0.69	0.68	0.27	0.66
733	Light Heavy Duty Gas Trucks 2 (T5)	0.43	0.41	2.57	1.06	0.01	0.07	0.07	0.03	0.07
734	Medium Heavy Duty Gas Trucks (T6)	0.63	0.58	7.29	1.17	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.12	0.09	7.08	0.96	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.46	0.39	3.36	10.24	0.02	0.48	0.48	0.23	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.17	0.14	1.44	3.36	0.01	0.18	0.18	0.09	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.48	0.40	2.05	5.24	0.05	0.95	0.93	0.49	0.14
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.73	3.12	19.30	32.63	0.20	2.31	2.30	1.49	0.31
750	Motorcycles (MCY)	7.69	6.19	51.71	2.31	0.00	0.09	0.08	0.03	0.02
760	Diesel Urban Buses (UB)	0.52	0.43	2.09	11.03	0.02	0.97	0.96	0.50	0.02
762	Gas Urban Buses (UB)	0.39	0.29	3.02	0.70	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.05	0.04	0.58	0.08	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.04	0.14	1.81	0.00	0.15	0.15	0.07	0.00
777	Gas Other Buses (OB)	0.32	0.30	3.21	0.53	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.12	0.10	0.54	0.98	0.01	0.12	0.11	0.07	0.02
780	Motor Homes (MH)	0.08	0.06	0.89	1.05	0.01	0.08	0.08	0.04	0.04
Total On-Road Motor Vehicles		**74.07**	**67.31**	**590.80**	**125.51**	**1.88**	**24.94**	**24.53**	**11.14**	**13.37**
Other Mobile Sources										
810	Aircraft	4.61	4.52	42.32	15.62	1.77	0.98	0.93	0.51	0.00
820	Trains	1.54	1.29	8.60	22.23	0.02	0.51	0.51	0.47	0.00
833	Ocean Going Vessels	3.64	3.26	5.76	32.04	3.85	1.23	1.23	1.18	0.05
835	Commercial Habor Crafts	1.25	1.05	7.39	9.20	0.01	0.35	0.35	0.32	0.00
840	Recreational Boats	21.84	20.85	114.79	5.83	0.01	1.32	1.27	1.21	0.00
850	Off-Road Recreational Vehicles	7.13	6.93	9.12	0.19	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	46.38	42.50	632.13	42.67	0.11	3.03	2.96	2.79	0.08
870	Farm Equipment	0.50	0.43	6.22	2.11	0.01	0.10	0.10	0.09	0.00
890	Fuel Storage and Handling	4.62	4.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**91.51**	**85.43**	**826.33**	**129.89**	**5.78**	**7.54**	**7.36**	**6.59**	**0.13**
Total Stationary and Area Sources		1186.49	253.11	166.08	72.75	10.46	232.83	132.45	52.97	82.23
Total On-Road Vehicles		74.07	67.31	590.80	125.51	1.88	24.94	24.53	11.14	13.37
Total Other Mobile		91.51	85.43	826.33	129.89	5.78	7.54	7.36	6.59	0.13
Total		**1352.07**	**405.85**	**1583.21**	**328.14**	**18.12**	**265.32**	**164.34**	**70.69**	**95.72**

Table A-6

2030 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.77	0.87	8.52	0.19	0.27	1.02	1.02	1.01	1.14
20	Cogeneration	0.36	0.05	0.42	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.08	0.12	0.66	0.84	0.02	0.12	0.12	0.12	0.28
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	25.17	7.27	21.95	14.52	0.73	1.47	1.45	1.44	2.05
52	Food and Agricultural Processing	0.24	0.07	1.32	0.07	0.00	0.07	0.07	0.07	0.12
60	Service and Commercial	15.44	4.60	17.84	9.60	1.28	1.46	1.46	1.45	3.09
99	Other (Fuel Combustion)	1.61	0.31	2.94	2.97	0.22	0.34	0.27	0.20	0.01
Total Fuel Combustion		**53.10**	**14.57**	**58.71**	**28.21**	**2.54**	**6.16**	**6.00**	**5.88**	**7.94**
Waste Disposal										
110	Sewage Treatment	0.11	0.06	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	760.70	10.79	0.59	0.60	0.38	0.16	0.16	0.16	4.81
130	Incineration	0.59	0.10	0.49	1.09	0.09	0.22	0.10	0.08	0.18
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	5.58	4.36	0.02	0.00	0.03	0.99	0.48	0.05	26.39
Total Waste Disposal		**766.98**	**15.31**	**1.11**	**1.71**	**0.50**	**1.39**	**0.76**	**0.31**	**31.55**
Cleaning and Surface Coatings										
210	Laundering	3.82	0.16	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	84.74	16.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	29.72	28.46	0.01	0.01	0.00	2.23	2.14	2.06	0.16
240	Printing	2.10	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	6.85	5.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.84	0.84	0.05	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**128.06**	**53.56**	**0.06**	**0.03**	**0.00**	**2.25**	**2.16**	**2.08**	**0.22**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.87	1.63	0.08	0.10	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	108.50	32.26	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.55**	**38.02**	**5.07**	**0.30**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	12.30	10.06	0.23	0.00	0.00	0.98	0.77	0.65	0.07
420	Food and Agriculture	1.73	1.70	0.00	0.00	0.00	0.62	0.29	0.11	0.00
430	Mineral Processes	0.48	0.42	0.97	0.03	0.02	9.83	6.43	3.41	0.10
440	Metal Processes	0.21	0.17	0.27	0.03	0.01	0.71	0.48	0.32	0.00
450	Wood and Paper	0.20	0.20	0.00	0.00	0.00	8.48	5.92	3.56	0.00
460	Glass and Related Products	0.02	0.01	0.00	0.00	0.00	0.13	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.02	0.00
499	Other (Industrial Processes)	4.98	4.31	0.33	0.04	0.00	1.45	1.00	0.62	9.36
Total Industrial Processes		**19.92**	**16.87**	**1.81**	**0.10**	**0.03**	**22.23**	**15.03**	**8.80**	**9.52**
Solvent Evaporation										
510	Consumer Products	113.73	93.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	18.75	17.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.89	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.38
540	Asphalt Paving/Roofing	1.50	1.39	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**134.88**	**113.29**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.38**

Table A-6 (continued)
2030 Annual Average Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	19.63	8.57	48.02	13.45	0.51	7.67	7.29	7.09	0.11
620	Farming Operations	26.74	2.14	0.00	0.00	0.00	1.62	0.86	0.26	8.68
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	60.31	29.49	2.96	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	107.73	49.23	7.43	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	9.80	5.82	0.58	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	2.50	1.30	0.18	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	5.68	3.24	50.77	1.53	0.47	5.38	5.18	4.62	0.04
690	Cooking	3.02	2.11	0.00	0.00	0.00	12.65	12.65	12.65	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				26.51	6.08				
Total Miscellaneous Processes		**55.42**	**16.30**	**101.81**	**41.57**	**7.06**	**208.10**	**112.27**	**36.18**	**33.86**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	11.50	10.57	123.73	8.46	0.64	11.16	10.96	4.67	5.22
722	Light Duty Trucks 1 (T1)	5.68	5.35	33.18	2.70	0.11	1.39	1.37	0.59	0.69
723	Light Duty Trucks 2 (T2)	9.39	8.78	71.48	5.50	0.35	4.19	4.11	1.74	2.83
724	Medium Duty Trucks (T3)	13.48	12.66	87.98	8.70	0.32	3.25	3.20	1.36	3.28
732	Light Heavy Duty Gas Trucks 1 (T4)	4.39	4.14	27.86	8.95	0.08	0.74	0.72	0.29	0.64
733	Light Heavy Duty Gas Trucks 2 (T5)	0.36	0.34	2.02	0.86	0.01	0.08	0.08	0.03	0.06
734	Medium Heavy Duty Gas Trucks (T6)	0.55	0.51	5.25	0.80	0.01	0.06	0.06	0.02	0.06
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.12	0.10	7.46	1.05	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.36	0.30	3.88	5.80	0.02	0.50	0.49	0.22	0.02
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.15	0.12	1.88	1.90	0.01	0.19	0.19	0.08	0.01
744	Medium Heavy Duty Diesel Truck (T6)	0.54	0.45	2.26	5.65	0.06	1.03	1.01	0.53	0.15
746	Heavy Heavy Duty Diesel Trucks (HHD)	4.34	3.63	21.90	35.83	0.24	2.63	2.61	1.66	0.37
750	Motorcycles (MCY)	8.14	6.56	49.84	2.42	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.43	0.36	1.69	8.47	0.02	0.99	0.97	0.49	0.03
762	Gas Urban Buses (UB)	0.17	0.14	1.94	0.59	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.04	0.03	0.34	0.06	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.06	0.05	0.19	1.27	0.00	0.15	0.15	0.07	0.00
777	Gas Other Buses (OB)	0.29	0.28	2.52	0.40	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.14	0.12	0.62	1.15	0.01	0.13	0.13	0.08	0.02
780	Motor Homes (MH)	0.06	0.05	0.37	0.92	0.01	0.09	0.09	0.04	0.05
Total On-Road Motor Vehicles		**60.18**	**54.54**	**446.40**	**101.48**	**1.91**	**26.68**	**26.24**	**11.92**	**13.47**
Other Mobile Sources										
810	Aircraft	5.40	5.31	46.45	16.94	1.98	1.06	1.01	0.58	0.00
820	Trains	1.27	1.07	10.39	19.03	0.03	0.41	0.41	0.37	0.00
833	Ocean Going Vessels	5.30	4.74	8.24	28.55	5.23	1.73	1.73	1.66	0.07
835	Commercial Habor Crafts	1.26	1.06	7.49	8.99	0.01	0.34	0.34	0.32	0.00
840	Recreational Boats	17.41	16.64	123.77	5.90	0.01	1.05	1.01	0.96	0.00
850	Off-Road Recreational Vehicles	7.51	7.33	9.91	0.22	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	47.74	43.84	673.74	34.99	0.12	2.66	2.58	2.45	0.09
870	Farm Equipment	0.36	0.32	6.29	1.25	0.01	0.04	0.04	0.04	0.00
890	Fuel Storage and Handling	3.96	3.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**90.22**	**84.25**	**886.27**	**115.87**	**7.39**	**7.32**	**7.15**	**6.40**	**0.16**
Total Stationary and Area Sources		1275.90	267.92	168.58	71.92	10.70	243.01	138.08	54.87	83.68
Total On-Road Vehicles		60.18	54.54	446.40	101.48	1.91	26.68	26.24	11.92	13.47
Total Other Mobile		90.22	84.25	886.27	115.87	7.39	7.32	7.15	6.40	0.16
Total		**1426.30**	**406.71**	**1501.25**	**289.27**	**20.00**	**277.02**	**171.47**	**73.19**	**97.31**

ATTACHMENT B

FINAL 2012 AQMP APPENDIX III

SUMMER PLANNING EMISSIONS

BY MAJOR SOURCE CATEGORY

Table B-1
2008 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	5.58	1.03	9.94	0.54	0.31	1.19	1.18	1.18	1.34
20	Cogeneration	0.33	0.05	0.40	0.02	0.01	0.06	0.05	0.05	0.29
30	Oil and Gas Production (combustion)	0.90	0.10	0.56	0.73	0.02	0.10	0.10	0.10	0.24
40	Petroleum Refining (Combustion)	4.65	1.30	5.09	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	30.38	6.15	19.54	19.63	0.50	1.42	1.41	1.40	2.32
52	Food and Agricultural Processing	0.22	0.06	1.14	0.33	0.00	0.07	0.07	0.07	0.10
60	Service and Commercial	15.42	4.82	17.99	15.69	0.87	1.38	1.38	1.37	3.23
99	Other (Fuel Combustion)	1.77	0.41	3.42	4.30	0.26	0.39	0.30	0.22	0.01
Total Fuel Combustion		**59.26**	**13.92**	**58.07**	**41.25**	**1.97**	**6.22**	**6.05**	**5.92**	**8.50**
Waste Disposal										
110	Sewage Treatment	0.09	0.05	0.01	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	556.95	7.91	0.56	0.59	0.37	0.16	0.16	0.16	3.54
130	Incineration	0.41	0.07	0.38	1.05	0.08	0.18	0.08	0.07	0.15
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.82	4.06	0.01	0.00	0.03	0.60	0.29	0.03	23.05
Total Waste Disposal		**562.28**	**12.10**	**0.97**	**1.65**	**0.48**	**0.95**	**0.54**	**0.27**	**26.90**
Cleaning and Surface Coatings										
210	Laundering	3.22	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	56.42	10.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	26.63	25.49	0.01	0.01	0.00	2.20	2.11	2.04	0.17
240	Printing	2.27	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	4.13	3.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.53	0.53	0.04	0.06	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**93.19**	**42.95**	**0.05**	**0.07**	**0.00**	**2.22**	**2.13**	**2.05**	**0.23**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.39	1.35	0.07	0.08	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.17	4.12	5.38	0.32	0.67	2.99	1.92	1.68	0.20
330	Petroleum Marketing	125.33	35.42	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**133.91**	**40.90**	**5.45**	**0.41**	**0.69**	**3.00**	**1.93**	**1.68**	**0.20**
Industrial Processes										
410	Chemical	8.39	6.84	0.16	0.00	0.00	0.69	0.53	0.44	0.06
420	Food and Agriculture	1.60	1.57	0.00	0.00	0.00	0.55	0.26	0.10	0.00
430	Mineral Processes	0.51	0.45	0.95	0.04	0.02	9.55	6.22	3.35	0.08
440	Metal Processes	0.19	0.15	0.23	0.04	0.02	0.73	0.50	0.33	0.00
450	Wood and Paper	0.15	0.15	0.00	0.00	0.00	5.55	3.87	2.33	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.11	0.10	0.09	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00
499	Other (Industrial Processes)	10.70	9.69	0.34	0.04	0.00	1.42	0.98	0.62	9.32
Total Industrial Processes		**21.55**	**18.87**	**1.68**	**0.11**	**0.04**	**18.62**	**12.48**	**7.27**	**9.46**
Solvent Evaporation										
510	Consumer Products	125.63	99.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	26.51	24.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.31	1.31	0.00	0.00	0.00	0.00	0.00	0.00	1.87
540	Asphalt Paving/Roofing	1.18	1.09	0.00	0.00	0.00	0.03	0.03	0.02	0.00
Total Solvent Evaporation		**154.63**	**126.79**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.02**	**1.87**

Table B-1 (continued)
2008 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.50	2.38	15.74	18.05	0.31	2.85	2.77	2.73	0.02
620	Farming Operations	36.61	2.93	0.00	0.00	0.00	2.50	1.29	0.33	15.51
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	64.82	31.70	3.18	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	102.22	46.72	7.05	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.25	6.09	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	6.08	2.94	0.43	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	2.70	1.54	16.46	1.17	0.04	2.02	1.95	1.74	0.04
690	Cooking	2.57	1.80	0.00	0.00	0.00	10.79	10.79	10.79	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				23.86	10.24				
Total Miscellaneous Processes		**47.72**	**8.88**	**35.22**	**43.16**	**10.59**	**201.98**	**104.67**	**27.26**	**40.60**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	105.47	98.25	831.84	64.40	0.84	11.18	10.95	5.02	8.95
722	Light Duty Trucks 1 (T1)	25.47	23.61	218.69	16.67	0.11	1.45	1.41	0.70	1.22
723	Light Duty Trucks 2 (T2)	33.59	31.05	331.36	37.14	0.41	3.90	3.82	1.70	4.56
724	Medium Duty Trucks (T3)	25.65	23.38	288.51	33.57	0.44	3.23	3.17	1.39	4.96
732	Light Heavy Duty Gas Trucks 1 (T4)	8.96	8.18	80.93	16.98	0.08	0.62	0.61	0.26	0.93
733	Light Heavy Duty Gas Trucks 2 (T5)	1.18	1.08	11.04	1.90	0.01	0.07	0.07	0.03	0.10
734	Medium Heavy Duty Gas Trucks (T6)	2.68	2.48	26.47	3.93	0.01	0.05	0.05	0.03	0.04
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.69	0.63	12.35	1.12	0.00	0.01	0.01	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.76	0.64	3.24	23.30	0.02	0.53	0.53	0.30	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.26	0.22	1.10	7.71	0.01	0.20	0.20	0.11	0.00
744	Medium Heavy Duty Diesel Truck (T6)	2.01	1.68	6.26	39.49	0.05	2.22	2.21	1.69	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	10.66	8.92	37.32	152.39	0.16	7.43	7.41	6.31	0.26
750	Motorcycles (MCY)	11.02	9.91	73.24	2.12	0.00	0.08	0.08	0.04	0.01
760	Diesel Urban Buses (UB)	0.62	0.52	2.52	13.28	0.02	0.93	0.92	0.51	0.02
762	Gas Urban Buses (UB)	0.47	0.40	4.52	0.69	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.18	0.16	2.55	0.16	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.23	0.19	0.64	2.65	0.00	0.28	0.28	0.19	0.01
777	Gas Other Buses (OB)	0.58	0.54	6.10	1.16	0.00	0.02	0.02	0.01	0.02
779	Diesel Other Buses (OB)	0.36	0.30	1.24	5.83	0.01	0.28	0.28	0.23	0.01
780	Motor Homes (MH)	0.54	0.46	13.37	1.98	0.01	0.08	0.08	0.05	0.03
Total On-Road Motor Vehicles		**231.38**	**212.58**	**1953.27**	**426.48**	**2.18**	**32.57**	**32.08**	**18.56**	**21.27**
Other Mobile Sources										
810	Aircraft	2.92	2.84	33.50	12.82	1.32	0.81	0.76	0.37	0.00
820	Trains	2.57	2.15	6.12	26.07	0.12	0.75	0.75	0.69	0.00
833	Ocean Going Vessels	2.16	1.93	3.75	40.74	36.78	4.12	4.01	3.87	0.03
835	Commercial Habor Crafts	1.52	1.27	5.50	18.55	0.01	0.86	0.86	0.79	0.00
840	Recreational Boats	61.58	57.73	153.00	8.88	0.01	3.72	3.58	3.41	0.00
850	Off-Road Recreational Vehicles	9.76	9.42	8.90	0.12	0.01	0.04	0.04	0.03	0.00
860	Off-Road Equipment	76.67	69.66	644.09	92.37	0.08	5.97	5.89	5.49	0.06
870	Farm Equipment	1.90	1.65	9.23	8.10	0.01	0.49	0.49	0.45	0.01
890	Fuel Storage and Handling	15.39	15.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**174.47**	**161.98**	**864.09**	**207.65**	**38.34**	**16.75**	**16.37**	**15.10**	**0.10**
Total Stationary and Area Sources		1072.54	264.41	101.44	86.65	13.77	233.01	127.83	44.48	87.76
Total On-Road Vehicles		231.38	212.58	1953.27	426.48	2.18	32.57	32.08	18.56	21.27
Total Other Mobile		174.47	162.98	864.09	207.65	38.34	16.75	16.37	15.10	0.10
Total		**1478.39**	**638.97**	**2918.80**	**720.78**	**54.29**	**282.34**	**176.29**	**78.13**	**109.13**

Table B-2

2014 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.90	0.90	8.74	0.23	0.28	1.05	1.04	1.04	1.18
20	Cogeneration	0.33	0.05	0.39	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	0.93	0.10	0.57	0.66	0.02	0.10	0.10	0.10	0.25
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	26.09	6.00	18.89	13.34	0.53	1.38	1.37	1.36	2.12
52	Food and Agricultural Processing	0.22	0.06	1.13	0.10	0.00	0.07	0.07	0.07	0.10
60	Service and Commercial	14.56	4.49	17.14	9.61	0.94	1.39	1.39	1.38	3.19
99	Other (Fuel Combustion)	1.57	0.37	3.08	3.94	0.23	0.37	0.29	0.21	0.01
Total Fuel Combustion		**53.02**	**13.26**	**55.00**	**27.91**	**2.01**	**6.04**	**5.87**	**5.75**	**8.10**
Waste Disposal										
110	Sewage Treatment	0.09	0.05	0.01	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	614.93	8.73	0.56	0.59	0.38	0.16	0.16	0.16	3.90
130	Incineration	0.45	0.08	0.40	0.93	0.08	0.18	0.08	0.07	0.15
140	Soil Remediation	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.22	3.42	0.01	0.00	0.03	0.63	0.31	0.03	23.47
Total Waste Disposal		**619.70**	**12.28**	**0.99**	**1.53**	**0.48**	**0.98**	**0.56**	**0.27**	**27.70**
Cleaning and Surface Coatings										
210	Laundering	3.26	0.16	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	61.97	11.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	27.88	26.71	0.01	0.01	0.00	2.31	2.22	2.14	0.16
240	Printing	2.03	2.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	4.56	3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.59	0.59	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**100.28**	**45.44**	**0.05**	**0.03**	**0.00**	**2.33**	**2.23**	**2.15**	**0.22**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.51	1.42	0.07	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	113.05	32.07	0.00	0.01	0.01	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**121.73**	**37.61**	**5.05**	**0.29**	**0.57**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	9.39	7.65	0.18	0.00	0.00	0.77	0.60	0.49	0.06
420	Food and Agriculture	1.57	1.54	0.00	0.00	0.00	0.57	0.27	0.10	0.00
430	Mineral Processes	0.51	0.46	0.97	0.03	0.02	9.69	6.29	3.36	0.08
440	Metal Processes	0.19	0.16	0.22	0.04	0.01	0.73	0.49	0.33	0.00
450	Wood and Paper	0.16	0.16	0.00	0.00	0.00	6.15	4.29	2.59	0.00
460	Glass and Related Products	0.01	0.01	0.00	0.00	0.00	0.11	0.10	0.09	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00
499	Other (Industrial Processes)	5.46	4.77	0.25	0.04	0.00	1.37	0.93	0.58	9.32
Total Industrial Processes		**17.29**	**14.74**	**1.62**	**0.11**	**0.04**	**19.41**	**12.99**	**7.55**	**9.46**
Solvent Evaporation										
510	Consumer Products	104.63	86.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	19.29	18.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.10	1.10	0.00	0.00	0.00	0.00	0.00	0.00	1.28
540	Asphalt Paving/Roofing	1.12	1.03	0.00	0.00	0.00	0.02	0.02	0.02	0.00
Total Solvent Evaporation		**126.14**	**106.29**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**1.28**

Table B-2 (continued)

2014 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.32	2.30	15.10	13.97	0.31	2.60	2.53	2.49	0.02
620	Farming Operations	34.11	2.73	0.00	0.00	0.00	2.13	1.11	0.29	13.93
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	59.42	29.06	2.91	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	103.01	47.07	7.11	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.17	6.04	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	5.12	2.50	0.36	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	4.61	2.63	41.19	1.24	0.38	4.37	4.20	3.74	0.04
690	Cooking	2.60	1.82	0.00	0.00	0.00	10.89	10.89	10.89	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				27.23	8.02				
Total Miscellaneous Processes		**46.98**	**9.71**	**59.32**	**42.52**	**8.71**	**198.16**	**103.85**	**28.81**	**39.02**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	48.46	44.63	424.91	31.00	0.87	10.76	10.56	4.52	6.51
722	Light Duty Trucks 1 (T1)	14.71	13.61	121.57	9.02	0.12	1.37	1.34	0.62	0.97
723	Light Duty Trucks 2 (T2)	20.93	19.24	205.12	20.33	0.41	3.75	3.69	1.58	3.49
724	Medium Duty Trucks (T3)	21.70	19.71	220.13	23.84	0.41	2.96	2.91	1.25	4.07
732	Light Heavy Duty Gas Trucks 1 (T4)	7.23	6.58	57.18	15.01	0.09	0.63	0.62	0.26	0.79
733	Light Heavy Duty Gas Trucks 2 (T5)	0.72	0.66	5.60	1.49	0.01	0.07	0.06	0.03	0.08
734	Medium Heavy Duty Gas Trucks (T6)	1.31	1.18	15.01	2.43	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.23	0.19	8.23	1.02	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.67	0.56	3.29	17.48	0.02	0.50	0.50	0.27	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.23	0.19	1.12	5.69	0.01	0.19	0.19	0.10	0.00
744	Medium Heavy Duty Diesel Truck (T6)	1.13	0.94	3.77	23.30	0.05	1.39	1.38	0.94	0.12
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.94	3.29	16.93	76.43	0.16	2.55	2.54	1.84	0.24
750	Motorcycles (MCY)	8.62	7.29	58.21	2.06	0.00	0.09	0.09	0.04	0.02
760	Diesel Urban Buses (UB)	0.60	0.50	2.41	12.67	0.02	0.95	0.94	0.51	0.02
762	Gas Urban Buses (UB)	0.41	0.32	3.94	0.67	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.10	0.08	1.45	0.12	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.05	0.04	0.15	2.15	0.00	0.17	0.16	0.08	0.01
777	Gas Other Buses (OB)	0.40	0.36	4.45	0.86	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.16	0.13	0.56	4.21	0.01	0.15	0.14	0.10	0.01
780	Motor Homes (MH)	0.23	0.19	5.36	1.47	0.01	0.08	0.08	0.04	0.03
Total On-Road Motor Vehicles		**131.81**	**119.73**	**1159.39**	**251.27**	**2.19**	**25.69**	**25.28**	**12.23**	**16.46**
Other Mobile Sources										
810	Aircraft	3.59	3.51	37.04	13.94	1.50	0.88	0.83	0.42	0.00
820	Trains	2.00	1.68	6.59	21.73	0.02	0.62	0.62	0.57	0.00
833	Ocean Going Vessels	2.33	2.08	3.86	35.14	2.70	0.85	0.85	0.82	0.03
835	Commercial Habor Crafts	1.28	1.08	6.27	11.89	0.01	0.53	0.53	0.49	0.00
840	Recreational Boats	49.95	47.09	147.84	8.28	0.01	3.00	2.89	2.75	0.00
850	Off-Road Recreational Vehicles	8.70	8.46	7.47	0.12	0.01	0.03	0.03	0.02	0.00
860	Off-Road Equipment	57.91	53.29	632.12	64.40	0.09	4.48	4.40	4.12	0.07
870	Farm Equipment	1.25	1.08	8.43	5.62	0.01	0.32	0.32	0.30	0.01
890	Fuel Storage and Handling	10.19	10.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**137.21**	**128.42**	**849.63**	**161.12**	**4.34**	**10.71**	**10.46**	**9.49**	**0.10**
Total Stationary and Area Sources		1085.16	239.34	122.03	72.39	11.82	229.79	127.36	46.15	85.99
Total On-Road Vehicles		131.81	119.73	1159.39	251.27	2.19	25.69	25.28	12.23	16.46
Total Other Mobile		137.21	128.42	849.63	161.12	4.34	10.71	10.46	9.49	0.10
Total		**1354.18**	**487.49**	**2131.06**	**484.78**	**18.35**	**266.20**	**163.11**	**67.87**	**102.56**

Table B-3

2017 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.88	0.90	8.70	0.23	0.28	1.04	1.04	1.03	1.18
20	Cogeneration	0.34	0.05	0.40	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.00	0.11	0.61	0.73	0.02	0.11	0.11	0.11	0.26
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	26.34	6.44	20.17	13.63	0.59	1.45	1.43	1.42	2.14
52	Food and Agricultural Processing	0.23	0.07	1.20	0.08	0.00	0.07	0.07	0.07	0.11
60	Service and Commercial	14.70	4.49	17.28	9.37	1.02	1.41	1.40	1.40	3.17
99	Other (Fuel Combustion)	1.54	0.33	2.94	3.44	0.24	0.36	0.28	0.21	0.01
Total Fuel Combustion		**53.46**	**13.67**	**56.36**	**27.50**	**2.16**	**6.12**	**5.95**	**5.83**	**8.12**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	641.29	9.10	0.59	0.62	0.40	0.17	0.17	0.17	4.07
130	Incineration	0.50	0.08	0.43	0.98	0.08	0.19	0.09	0.07	0.16
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.59	3.68	0.01	0.00	0.03	0.73	0.36	0.04	24.31
Total Waste Disposal		**646.49**	**12.92**	**1.05**	**1.62**	**0.51**	**1.10**	**0.63**	**0.29**	**28.71**
Cleaning and Surface Coatings										
210	Laundering	3.40	0.17	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	69.66	13.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	30.48	29.21	0.01	0.01	0.00	2.53	2.43	2.34	0.17
240	Printing	2.13	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	5.24	4.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.66	0.66	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**111.57**	**50.19**	**0.05**	**0.03**	**0.00**	**2.55**	**2.44**	**2.35**	**0.23**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.67	1.51	0.07	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	108.49	29.65	0.00	0.01	0.02	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.32**	**35.29**	**5.06**	**0.29**	**0.58**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	10.68	8.70	0.19	0.00	0.00	0.86	0.67	0.56	0.07
420	Food and Agriculture	1.66	1.62	0.00	0.00	0.00	0.63	0.29	0.11	0.00
430	Mineral Processes	0.52	0.47	1.01	0.03	0.02	10.13	6.56	3.47	0.09
440	Metal Processes	0.21	0.17	0.23	0.04	0.02	0.78	0.52	0.35	0.00
450	Wood and Paper	0.18	0.18	0.00	0.00	0.00	6.93	4.83	2.91	0.00
460	Glass and Related Products	0.02	0.01	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00
499	Other (Industrial Processes)	5.62	4.90	0.28	0.04	0.00	1.43	0.97	0.60	9.34
Total Industrial Processes		**18.88**	**16.05**	**1.72**	**0.11**	**0.04**	**20.90**	**13.98**	**8.11**	**9.49**
Solvent Evaporation										
510	Consumer Products	106.36	87.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	19.82	18.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.05	1.05	0.00	0.00	0.00	0.00	0.00	0.00	1.06
540	Asphalt Paving/Roofing	1.33	1.24	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**128.57**	**108.35**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**1.06**

Table B-3 (continued)

2017 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.31	2.30	15.06	12.02	0.31	2.59	2.52	2.49	0.02
620	Farming Operations	31.27	2.50	0.00	0.00	0.00	1.89	0.99	0.28	11.93
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	69.30	33.89	3.40	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	103.28	47.20	7.13	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.16	6.04	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	4.72	2.32	0.33	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	4.62	2.63	41.22	1.24	0.38	4.37	4.20	3.74	0.04
690	Cooking	2.70	1.89	0.00	0.00	0.00	11.31	11.31	11.31	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				27.23	7.01				
Total Miscellaneous Processes		**44.23**	**9.55**	**59.29**	**40.56**	**7.71**	**208.07**	**108.91**	**29.69**	**37.02**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	35.40	32.60	317.59	23.02	0.84	10.71	10.52	4.47	5.89
722	Light Duty Trucks 1 (T1)	11.93	11.08	94.77	7.30	0.12	1.34	1.31	0.59	0.88
723	Light Duty Trucks 2 (T2)	16.65	15.36	156.69	14.83	0.40	3.77	3.70	1.57	3.16
724	Medium Duty Trucks (T3)	19.46	17.77	182.54	19.28	0.40	2.95	2.90	1.24	3.75
732	Light Heavy Duty Gas Trucks 1 (T4)	6.48	5.92	47.82	13.84	0.09	0.65	0.64	0.27	0.74
733	Light Heavy Duty Gas Trucks 2 (T5)	0.59	0.54	4.09	1.30	0.01	0.07	0.07	0.03	0.08
734	Medium Heavy Duty Gas Trucks (T6)	0.98	0.89	11.29	1.89	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.18	0.14	7.72	0.95	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.60	0.50	3.16	14.85	0.02	0.50	0.49	0.26	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.20	0.17	1.14	4.85	0.01	0.19	0.19	0.10	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.83	0.69	2.99	16.44	0.05	1.20	1.19	0.75	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.82	3.19	17.44	64.46	0.18	2.33	2.32	1.58	0.27
750	Motorcycles (MCY)	8.37	6.96	54.57	2.07	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.56	0.47	2.24	11.64	0.02	0.95	0.94	0.50	0.02
762	Gas Urban Buses (UB)	0.40	0.31	3.62	0.65	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.08	0.07	1.11	0.10	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.04	0.13	2.00	0.00	0.16	0.16	0.08	0.01
777	Gas Other Buses (OB)	0.36	0.33	3.79	0.73	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.13	0.11	0.50	3.10	0.01	0.13	0.12	0.08	0.01
780	Motor Homes (MH)	0.16	0.13	3.31	1.26	0.01	0.08	0.08	0.04	0.03
Total On-Road Motor Vehicles		**107.22**	**97.28**	**916.51**	**204.57**	**2.16**	**25.19**	**24.78**	**11.63**	**15.07**
Other Mobile Sources										
810	Aircraft	3.93	3.85	38.81	14.51	1.59	0.91	0.86	0.45	0.00
820	Trains	1.81	1.51	7.43	23.52	0.02	0.58	0.58	0.54	0.00
833	Ocean Going Vessels	2.76	2.47	4.48	39.88	3.11	0.98	0.98	0.94	0.04
835	Commercial Habor Crafts	1.26	1.06	6.65	10.66	0.01	0.45	0.45	0.42	0.00
840	Recreational Boats	44.70	42.25	152.44	8.24	0.01	2.69	2.58	2.46	0.00
850	Off-Road Recreational Vehicles	8.83	8.62	7.93	0.14	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	53.68	49.33	641.78	58.49	0.09	4.11	4.03	3.78	0.07
870	Farm Equipment	0.95	0.82	8.16	4.38	0.01	0.24	0.24	0.22	0.01
890	Fuel Storage and Handling	8.82	8.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**126.74**	**118.70**	**867.69**	**159.83**	**4.84**	**9.99**	**9.76**	**8.83**	**0.11**
Total Stationary and Area Sources		1120.53	246.02	123.54	70.13	11.00	241.63	133.78	47.90	84.85
Total On-Road Vehicles		107.22	97.28	916.51	204.57	2.16	25.19	24.78	11.63	15.07
Total Other Mobile		126.74	118.70	867.69	159.83	4.84	9.99	9.76	8.83	0.11
Total		**1354.48**	**462.00**	**1907.74**	**434.53**	**18.00**	**276.80**	**168.31**	**68.36**	**100.03**

Table B-4

2019 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.81	0.89	8.57	0.23	0.27	1.03	1.02	1.02	1.16
20	Cogeneration	0.34	0.05	0.40	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.03	0.11	0.63	0.78	0.02	0.11	0.11	0.11	0.27
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	26.29	6.65	20.77	13.84	0.62	1.47	1.46	1.45	2.14
52	Food and Agricultural Processing	0.24	0.07	1.23	0.08	0.00	0.08	0.07	0.07	0.12
60	Service and Commercial	14.75	4.48	17.31	9.30	1.07	1.41	1.41	1.40	3.15
99	Other (Fuel Combustion)	1.57	0.33	2.97	3.45	0.24	0.36	0.28	0.21	0.01
Total Fuel Combustion		**53.44**	**13.86**	**56.94**	**27.70**	**2.24**	**6.14**	**5.97**	**5.85**	**8.09**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	658.64	9.35	0.60	0.64	0.41	0.18	0.18	0.18	4.17
130	Incineration	0.52	0.09	0.45	1.01	0.08	0.20	0.09	0.08	0.17
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	4.78	3.81	0.01	0.00	0.03	0.78	0.38	0.04	24.74
Total Waste Disposal		**664.06**	**13.31**	**1.08**	**1.67**	**0.53**	**1.17**	**0.67**	**0.31**	**29.25**
Cleaning and Surface Coatings										
210	Laundering	3.47	0.17	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	73.51	14.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	31.83	30.51	0.02	0.01	0.00	2.64	2.53	2.44	0.18
240	Printing	2.18	2.18	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	5.62	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.70	0.70	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**117.32**	**52.65**	**0.06**	**0.03**	**0.00**	**2.66**	**2.55**	**2.46**	**0.24**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.73	1.55	0.08	0.09	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	108.32	30.06	0.00	0.01	0.02	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.22**	**35.73**	**5.06**	**0.29**	**0.58**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	11.35	9.26	0.20	0.00	0.00	0.91	0.71	0.59	0.07
420	Food and Agriculture	1.70	1.66	0.00	0.00	0.00	0.66	0.30	0.11	0.00
430	Mineral Processes	0.53	0.47	1.03	0.03	0.02	10.36	6.71	3.54	0.09
440	Metal Processes	0.21	0.18	0.24	0.04	0.02	0.80	0.54	0.36	0.00
450	Wood and Paper	0.18	0.18	0.00	0.00	0.00	7.31	5.10	3.07	0.00
460	Glass and Related Products	0.02	0.01	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.01	0.00
499	Other (Industrial Processes)	5.72	4.98	0.29	0.04	0.00	1.45	0.99	0.61	9.34
Total Industrial Processes		**19.71**	**16.74**	**1.77**	**0.12**	**0.04**	**21.64**	**14.48**	**8.39**	**9.50**
Solvent Evaporation										
510	Consumer Products	107.66	88.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	20.17	18.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	1.03	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.93
540	Asphalt Paving/Roofing	1.47	1.36	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**130.34**	**109.87**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.93**

Table B-4 (continued)

2019 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.30	2.29	15.04	11.83	0.32	2.59	2.52	2.48	0.02
620	Farming Operations	29.37	2.35	0.00	0.00	0.00	1.74	0.92	0.27	10.60
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	75.62	36.98	3.71	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	104.24	47.64	7.19	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.15	6.03	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	4.47	2.21	0.32	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	4.62	2.63	41.24	1.24	0.38	4.37	4.21	3.74	0.04
690	Cooking	2.75	1.92	0.00	0.00	0.00	11.53	11.53	11.53	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				27.23	6.25				
Total Miscellaneous Processes		**42.38**	**9.44**	**59.30**	**40.38**	**6.95**	**215.16**	**112.47**	**30.26**	**35.68**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	26.57	24.56	244.89	17.48	0.79	10.66	10.47	4.42	5.47
722	Light Duty Trucks 1 (T1)	10.15	9.49	76.32	5.98	0.11	1.31	1.29	0.57	0.81
723	Light Duty Trucks 2 (T2)	13.91	12.90	123.86	11.12	0.39	3.78	3.71	1.57	2.93
724	Medium Duty Trucks (T3)	18.13	16.65	157.77	16.22	0.39	2.95	2.89	1.23	3.54
732	Light Heavy Duty Gas Trucks 1 (T4)	5.98	5.50	41.57	12.90	0.09	0.66	0.65	0.27	0.70
733	Light Heavy Duty Gas Trucks 2 (T5)	0.51	0.47	3.09	1.17	0.01	0.07	0.07	0.03	0.07
734	Medium Heavy Duty Gas Trucks (T6)	0.77	0.70	8.81	1.54	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.14	0.11	7.38	0.90	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.55	0.46	3.20	13.01	0.02	0.49	0.48	0.25	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.19	0.16	1.22	4.26	0.01	0.18	0.18	0.09	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.63	0.53	2.47	11.87	0.05	1.07	1.06	0.61	0.13
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.74	3.13	17.78	56.47	0.19	2.19	2.17	1.41	0.29
750	Motorcycles (MCY)	8.23	6.76	52.14	2.07	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.54	0.45	2.13	10.96	0.02	0.95	0.94	0.50	0.02
762	Gas Urban Buses (UB)	0.40	0.30	3.41	0.63	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.07	0.06	0.89	0.10	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.03	0.12	1.90	0.00	0.16	0.16	0.07	0.01
777	Gas Other Buses (OB)	0.34	0.31	3.35	0.64	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.11	0.09	0.45	2.36	0.01	0.11	0.11	0.07	0.01
780	Motor Homes (MH)	0.11	0.09	1.95	1.12	0.01	0.08	0.07	0.04	0.04
Total On-Road Motor Vehicles		**91.09**	**82.77**	**752.79**	**172.70**	**2.11**	**24.83**	**24.43**	**11.20**	**14.15**
Other Mobile Sources										
810	Aircraft	4.16	4.08	40.01	14.88	1.65	0.93	0.88	0.47	0.00
820	Trains	1.67	1.40	7.80	23.04	0.02	0.55	0.55	0.51	0.00
833	Ocean Going Vessels	3.01	2.69	4.82	36.10	3.33	1.04	1.04	1.00	0.04
835	Commercial Habor Crafts	1.24	1.04	7.08	9.69	0.01	0.38	0.38	0.35	0.00
840	Recreational Boats	41.48	39.28	155.34	8.22	0.01	2.49	2.39	2.28	0.00
850	Off-Road Recreational Vehicles	8.99	8.78	8.23	0.16	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	52.04	47.82	651.01	52.25	0.10	3.73	3.66	3.44	0.07
870	Farm Equipment	0.79	0.68	8.08	3.66	0.01	0.19	0.19	0.18	0.01
890	Fuel Storage and Handling	8.17	8.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**121.54**	**113.91**	**882.37**	**147.99**	**5.13**	**9.35**	**9.12**	**8.25**	**0.12**
Total Stationary and Area Sources		1144.47	251.60	124.21	70.19	10.33	249.65	138.00	48.88	83.91
Total On-Road Vehicles		91.09	82.77	752.79	172.70	2.11	24.83	24.43	11.20	14.15
Total Other Mobile		121.54	113.91	882.37	147.99	5.13	9.35	9.12	8.25	0.12
Total		**1357.10**	**448.27**	**1759.37**	**390.89**	**17.56**	**283.83**	**171.55**	**68.33**	**98.18**

Table B-5

2023 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.78	0.88	8.51	0.23	0.27	1.02	1.02	1.01	1.15
20	Cogeneration	0.35	0.05	0.41	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.05	0.12	0.64	0.81	0.02	0.12	0.12	0.12	0.27
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	25.57	6.86	21.38	13.97	0.67	1.49	1.48	1.47	2.15
52	Food and Agricultural Processing	0.25	0.07	1.30	0.08	0.01	0.08	0.08	0.08	0.12
60	Service and Commercial	14.85	4.45	17.42	9.26	1.15	1.42	1.42	1.41	3.07
99	Other (Fuel Combustion)	1.57	0.31	2.91	3.09	0.24	0.36	0.28	0.20	0.01
Total Fuel Combustion		**52.84**	**14.02**	**57.63**	**27.45**	**2.35**	**6.16**	**6.00**	**5.88**	**8.03**
Waste Disposal										
110	Sewage Treatment	0.10	0.05	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	693.85	9.85	0.62	0.66	0.43	0.18	0.18	0.18	4.40
130	Incineration	0.56	0.09	0.48	1.05	0.09	0.21	0.10	0.08	0.18
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	5.08	4.02	0.01	0.00	0.03	0.86	0.42	0.04	25.38
Total Waste Disposal		**699.59**	**14.03**	**1.13**	**1.73**	**0.54**	**1.27**	**0.72**	**0.32**	**30.12**
Cleaning and Surface Coatings										
210	Laundering	3.62	0.18	0.00	0.00	0.00	0.01	0.00	0.00	0.00
220	Degreasing	78.73	15.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	33.78	32.37	0.02	0.01	0.00	2.79	2.67	2.58	0.18
240	Printing	2.25	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	6.13	5.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.76	0.75	0.04	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**125.26**	**56.10**	**0.06**	**0.03**	**0.00**	**2.81**	**2.69**	**2.59**	**0.25**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.79	1.58	0.08	0.10	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.58	0.20
330	Petroleum Marketing	107.88	30.86	0.00	0.01	0.02	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.03	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**116.85**	**36.57**	**5.07**	**0.30**	**0.58**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	12.22	9.98	0.21	0.00	0.00	0.96	0.75	0.63	0.07
420	Food and Agriculture	1.74	1.70	0.00	0.00	0.00	0.70	0.32	0.12	0.00
430	Mineral Processes	0.54	0.48	1.05	0.03	0.02	10.66	6.90	3.62	0.10
440	Metal Processes	0.23	0.19	0.26	0.04	0.02	0.84	0.57	0.37	0.00
450	Wood and Paper	0.20	0.20	0.00	0.00	0.00	7.77	5.42	3.27	0.00
460	Glass and Related Products	0.02	0.02	0.00	0.00	0.00	0.12	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.01	0.00
499	Other (Industrial Processes)	5.87	5.11	0.30	0.04	0.00	1.50	1.02	0.63	9.35
Total Industrial Processes		**20.82**	**17.66**	**1.83**	**0.12**	**0.04**	**22.59**	**15.11**	**8.75**	**9.52**
Solvent Evaporation										
510	Consumer Products	110.48	90.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	20.85	19.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.99	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.73
540	Asphalt Paving/Roofing	1.64	1.52	0.00	0.00	0.00	0.03	0.03	0.03	0.00
Total Solvent Evaporation		**133.96**	**112.98**	**0.00**	**0.00**	**0.00**	**0.03**	**0.03**	**0.03**	**0.73**

Table B-5 (continued)
2023 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.29	2.29	14.99	11.46	0.32	2.58	2.51	2.47	0.02
620	Farming Operations	26.74	2.14	0.00	0.00	0.00	1.53	0.82	0.26	8.68
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	82.55	40.36	4.04	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	105.11	48.04	7.25	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.14	6.03	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	4.04	2.01	0.29	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	4.63	2.64	41.30	1.24	0.38	4.38	4.21	3.75	0.04
690	Cooking	2.86	2.00	0.00	0.00	0.00	11.97	11.97	11.97	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				27.23	6.10				
Total Miscellaneous Processes		**39.86**	**9.30**	**59.31**	**40.01**	**6.80**	**222.75**	**116.40**	**31.05**	**33.76**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	19.75	18.24	186.96	12.34	0.69	10.62	10.43	4.40	5.17
722	Light Duty Trucks 1 (T1)	8.33	7.83	55.92	4.33	0.10	1.30	1.28	0.55	0.73
723	Light Duty Trucks 2 (T2)	11.68	10.91	95.27	7.66	0.36	3.85	3.78	1.59	2.76
724	Medium Duty Trucks (T3)	16.03	14.93	121.63	11.92	0.36	3.00	2.95	1.25	3.33
732	Light Heavy Duty Gas Trucks 1 (T4)	5.11	4.76	32.58	10.93	0.09	0.69	0.68	0.27	0.66
733	Light Heavy Duty Gas Trucks 2 (T5)	0.41	0.39	2.24	1.00	0.01	0.07	0.07	0.03	0.07
734	Medium Heavy Duty Gas Trucks (T6)	0.59	0.54	6.16	1.08	0.01	0.05	0.05	0.02	0.05
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.12	0.09	6.91	0.86	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.46	0.39	3.36	9.74	0.02	0.48	0.48	0.23	0.01
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.17	0.14	1.44	3.19	0.01	0.18	0.18	0.09	0.00
744	Medium Heavy Duty Diesel Truck (T6)	0.48	0.40	2.00	4.99	0.05	0.95	0.93	0.49	0.14
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.66	3.06	17.58	31.39	0.20	2.31	2.30	1.49	0.31
750	Motorcycles (MCY)	8.04	6.58	48.63	2.03	0.00	0.09	0.08	0.03	0.02
760	Diesel Urban Buses (UB)	0.52	0.43	2.09	10.43	0.02	0.97	0.96	0.50	0.02
762	Gas Urban Buses (UB)	0.39	0.30	3.02	0.61	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.05	0.04	0.57	0.07	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.04	0.04	0.13	1.73	0.00	0.15	0.15	0.07	0.00
777	Gas Other Buses (OB)	0.30	0.28	2.68	0.50	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.12	0.10	0.50	0.94	0.01	0.12	0.11	0.07	0.02
780	Motor Homes (MH)	0.08	0.07	0.90	0.97	0.01	0.08	0.08	0.04	0.04
Total On-Road Motor Vehicles		**76.33**	**69.51**	**590.55**	**116.72**	**1.95**	**24.94**	**24.53**	**11.14**	**13.37**
Other Mobile Sources										
810	Aircraft	4.61	4.52	42.34	15.62	1.77	0.98	0.93	0.51	0.00
820	Trains	1.54	1.29	8.60	22.23	0.02	0.51	0.51	0.47	0.00
833	Ocean Going Vessels	3.64	3.26	5.76	32.05	3.85	1.23	1.23	1.18	0.05
835	Commercial Habor Crafts	1.25	1.05	7.39	9.21	0.01	0.35	0.35	0.32	0.00
840	Recreational Boats	35.74	33.95	161.28	8.23	0.01	2.15	2.06	1.97	0.00
850	Off-Road Recreational Vehicles	9.31	9.12	8.68	0.17	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	50.90	46.80	674.37	42.78	0.11	3.21	3.12	2.95	0.08
870	Farm Equipment	0.60	0.53	8.07	2.57	0.01	0.12	0.12	0.11	0.01
890	Fuel Storage and Handling	7.17	7.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**114.77**	**107.65**	**916.49**	**132.86**	**5.79**	**8.57**	**8.35**	**7.53**	**0.13**
Total Stationary and Area Sources		1189.18	260.66	125.03	69.64	10.32	258.47	142.77	50.21	82.61
Total On-Road Vehicles		76.33	69.51	590.55	116.72	1.95	24.94	24.53	11.14	13.37
Total Other Mobile		114.77	107.65	916.49	132.86	5.79	8.57	8.35	7.53	0.13
Total		**1380.28**	**437.82**	**1632.07**	**319.22**	**18.07**	**291.97**	**175.66**	**68.88**	**96.11**

Table B-6

2030 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Fuel Combustion										
10	Electric Utilities	4.80	0.88	8.55	0.23	0.27	1.02	1.02	1.02	1.15
20	Cogeneration	0.36	0.05	0.42	0.01	0.01	0.06	0.05	0.05	0.27
30	Oil and Gas Production (combustion)	1.08	0.12	0.66	0.84	0.02	0.12	0.12	0.12	0.28
40	Petroleum Refining (Combustion)	4.42	1.28	5.06	0.00	0.00	1.62	1.56	1.54	0.97
50	Manufacturing and Industrial	25.47	7.35	22.80	14.68	0.74	1.56	1.54	1.53	2.20
52	Food and Agricultural Processing	0.27	0.07	1.40	0.08	0.01	0.08	0.08	0.08	0.13
60	Service and Commercial	15.54	4.62	18.26	9.69	1.29	1.48	1.48	1.47	3.12
99	Other (Fuel Combustion)	1.63	0.32	2.98	3.13	0.24	0.36	0.28	0.21	0.01
Total Fuel Combustion		**53.57**	**14.70**	**60.14**	**28.67**	**2.57**	**6.30**	**6.13**	**6.01**	**8.14**
Waste Disposal										
110	Sewage Treatment	0.11	0.06	0.02	0.01	0.00	0.01	0.01	0.01	0.17
120	Landfills	761.10	10.81	0.65	0.69	0.45	0.19	0.19	0.19	4.81
130	Incineration	0.62	0.10	0.51	1.12	0.09	0.22	0.11	0.09	0.19
140	Soil Remediation	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	5.60	4.38	0.02	0.00	0.03	1.00	0.49	0.05	26.52
Total Waste Disposal		**767.43**	**15.36**	**1.20**	**1.83**	**0.57**	**1.43**	**0.80**	**0.35**	**31.69**
Cleaning and Surface Coatings										
210	Laundering	3.84	0.18	0.00	0.00	0.00	0.01	0.01	0.00	0.00
220	Degreasing	87.99	16.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	36.73	35.20	0.02	0.01	0.00	3.00	2.88	2.77	0.19
240	Printing	2.34	2.34	0.00	0.00	0.00	0.00	0.00	0.00	0.05
250	Adhesives and Sealants	6.97	6.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.85	0.85	0.05	0.03	0.00	0.01	0.01	0.01	0.01
Total Cleaning and Surface Coatings		**138.71**	**61.62**	**0.07**	**0.03**	**0.00**	**3.02**	**2.89**	**2.79**	**0.25**
Petroleum Production and Marketing										
310	Oil and Gas Production	2.87	1.63	0.08	0.10	0.00	0.01	0.01	0.01	0.00
320	Petroleum Refining	6.15	4.11	4.98	0.19	0.56	2.84	1.82	1.59	0.20
330	Petroleum Marketing	108.59	32.35	0.00	0.01	0.02	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Total Petroleum Production and Marketing		**117.64**	**38.11**	**5.07**	**0.30**	**0.58**	**2.85**	**1.83**	**1.59**	**0.20**
Industrial Processes										
410	Chemical	13.62	11.13	0.23	0.00	0.00	1.06	0.83	0.70	0.07
420	Food and Agriculture	1.80	1.76	0.00	0.00	0.00	0.75	0.33	0.12	0.00
430	Mineral Processes	0.55	0.48	1.09	0.03	0.02	11.09	7.16	3.72	0.10
440	Metal Processes	0.25	0.20	0.28	0.05	0.02	0.89	0.60	0.40	0.00
450	Wood and Paper	0.21	0.21	0.00	0.00	0.00	8.52	5.94	3.58	0.00
460	Glass and Related Products	0.03	0.02	0.00	0.00	0.00	0.13	0.11	0.10	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.02	0.00
499	Other (Industrial Processes)	6.12	5.32	0.33	0.04	0.00	1.58	1.08	0.67	9.36
Total Industrial Processes		**22.57**	**19.13**	**1.93**	**0.13**	**0.04**	**24.06**	**16.09**	**9.30**	**9.54**
Solvent Evaporation										
510	Consumer Products	115.29	94.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	21.93	20.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.95	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.46
540	Asphalt Paving/Roofing	1.85	1.72	0.00	0.00	0.00	0.04	0.03	0.03	0.00
Total Solvent Evaporation		**140.02**	**118.17**	**0.00**	**0.00**	**0.00**	**0.04**	**0.03**	**0.03**	**0.46**

Table B-6 (continued)

2030 Summer Planning Emissions by Source Category in South Coast Air Basin (Tons/Day)

CODE	Source Category	TOG	VOC	CO	NOx	SOx	TSP	PM10	PM2.5	NH3
Miscellaneous Processes										
610	Residential Fuel Combustion	5.26	2.28	14.89	10.73	0.33	2.56	2.49	2.45	0.02
620	Farming Operations	26.74	2.14	0.00	0.00	0.00	1.49	0.80	0.25	8.68
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	90.53	44.27	4.44	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	107.98	49.34	7.45	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	10.13	6.02	0.60	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	3.42	1.73	0.25	0.00
660	Fires	0.34	0.24	3.02	0.08	0.00	0.45	0.44	0.41	0.00
670	Waste Burning and Disposal	4.65	2.65	41.44	1.25	0.38	4.39	4.23	3.76	0.04
690	Cooking	3.02	2.11	0.00	0.00	0.00	12.65	12.65	12.65	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.03
	RECLAIM				27.23	6.10				
Total Miscellaneous Processes		**40.01**	**9.42**	**59.36**	**39.28**	**6.81**	**233.60**	**121.98**	**32.27**	**33.77**
On-Road Motor Vehicles										
710	Light Duty Passenger Auto (LDA)	11.93	10.96	128.79	7.56	0.68	11.16	10.96	4.67	5.22
722	Light Duty Trucks 1 (T1)	5.96	5.62	34.26	2.41	0.11	1.39	1.37	0.59	0.69
723	Light Duty Trucks 2 (T2)	9.87	9.24	74.39	4.87	0.37	4.19	4.11	1.74	2.83
724	Medium Duty Trucks (T3)	14.18	13.33	90.46	7.75	0.34	3.25	3.20	1.36	3.28
732	Light Heavy Duty Gas Trucks 1 (T4)	4.21	3.98	24.09	8.40	0.08	0.74	0.72	0.29	0.64
733	Light Heavy Duty Gas Trucks 2 (T5)	0.34	0.32	1.73	0.81	0.01	0.08	0.08	0.03	0.06
734	Medium Heavy Duty Gas Trucks (T6)	0.51	0.48	4.36	0.75	0.01	0.06	0.06	0.02	0.06
736	Heavy Heavy Duty Gas Trucks ((HHD)	0.12	0.09	7.30	0.92	0.00	0.01	0.01	0.00	0.01
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.36	0.30	3.88	5.50	0.02	0.50	0.49	0.22	0.02
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.15	0.12	1.88	1.81	0.01	0.19	0.19	0.08	0.01
744	Medium Heavy Duty Diesel Truck (T6)	0.54	0.45	2.20	5.39	0.06	1.03	1.01	0.53	0.15
746	Heavy Heavy Duty Diesel Trucks (HHD)	4.25	3.56	19.86	34.53	0.24	2.63	2.61	1.66	0.37
750	Motorcycles (MCY)	8.54	6.99	47.02	2.08	0.00	0.09	0.09	0.03	0.02
760	Diesel Urban Buses (UB)	0.43	0.36	1.69	8.01	0.02	0.99	0.97	0.49	0.03
762	Gas Urban Buses (UB)	0.17	0.14	1.92	0.52	0.00	0.01	0.01	0.00	0.01
771	Gas School Buses (SB)	0.04	0.03	0.33	0.05	0.00	0.00	0.00	0.00	0.00
772	Diesel School Buses (SB)	0.06	0.05	0.17	1.22	0.00	0.15	0.15	0.07	0.00
777	Gas Other Buses (OB)	0.28	0.26	2.09	0.37	0.00	0.01	0.01	0.01	0.01
779	Diesel Other Buses (OB)	0.14	0.12	0.57	1.11	0.01	0.13	0.13	0.08	0.02
780	Motor Homes (MH)	0.06	0.05	0.36	0.85	0.01	0.09	0.09	0.04	0.05
Total On-Road Motor Vehicles		**62.13**	**56.45**	**447.35**	**94.93**	**1.99**	**26.68**	**26.24**	**11.92**	**13.47**
Other Mobile Sources										
810	Aircraft	5.40	5.31	46.47	16.94	1.98	1.06	1.01	0.58	0.00
820	Trains	1.27	1.07	10.39	19.03	0.03	0.41	0.41	0.37	0.00
833	Ocean Going Vessels	5.30	4.74	8.24	28.56	5.23	1.73	1.73	1.66	0.07
835	Commercial Habor Crafts	1.26	1.06	7.49	9.00	0.01	0.34	0.34	0.32	0.00
840	Recreational Boats	28.81	27.39	173.39	8.37	0.01	1.71	1.65	1.57	0.00
850	Off-Road Recreational Vehicles	9.90	9.72	9.39	0.20	0.00	0.03	0.03	0.02	0.00
860	Off-Road Equipment	52.65	48.52	719.90	35.04	0.13	2.83	2.75	2.61	0.09
870	Farm Equipment	0.44	0.39	8.17	1.51	0.01	0.05	0.05	0.05	0.01
890	Fuel Storage and Handling	6.19	6.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Other Mobile Sources		**111.22**	**104.36**	**983.44**	**118.65**	**7.40**	**8.17**	**7.97**	**7.18**	**0.17**
Total Stationary and Area Sources		1279.96	276.51	127.77	70.24	10.58	271.29	149.76	52.34	84.05
Total On-Road Vehicles		62.13	56.45	447.35	94.93	1.99	26.68	26.24	11.92	13.47
Total Other Mobile		111.22	104.36	983.44	118.65	7.40	8.17	7.97	7.18	0.17
Total		**1453.32**	**437.31**	**1558.56**	**283.82**	**19.95**	**306.14**	**183.96**	**71.44**	**97.69**

ATTACHMENT C

FINAL 2012 AQMP APPENDIX III

TOP VOC AND NOX

POINT SOURCES PRODUCERS IN 2008

VOC and NOx Stationary Sources in 2008 Emitting 10 Tons/Year and Higher

SCAB VOC EMISSION PRODUCERS

	FACID	FNAME	FCITY	ROG
1	800089	EXXONMOBIL OIL CORPORATION	TORRANCE	630
2	800030	CHEVRON PRODUCTS CO.	EL SEGUNDO	567
3	131003	BP WEST COAST PROD.LLC BP CARSON REF.	CARSON	515
4	800363	CONOCOPHILLIPS COMPANY	WILMINGTON	267
5	800436	TESORO REFINING AND MARKETING CO	WILMINGTON	252
6	3721	DART CONTAINER CORP OF CALIFORNIA	CORONA	194
7	16642	ANHEUSER-BUSCH INC., (LA BREWERY)	VAN NUYS	191
8	800372	EQUILON ENTER. LLC, SHELL OIL PROD. US	CARSON	147
9	52517	REXAM BEVERAGE CAN COMPANY	CHATSWORTH	129
10	155877	MILLERCOORS, LLC	IRWINDALE	123
11	800183	PARAMOUNT PETR CORP (EIS USE)	PARAMOUNT	121
12	800026	ULTRAMAR INC (NSR USE ONLY)	WILMINGTON	116
13	800362	CONOCOPHILLIPS COMPANY	CARSON	112
14	117785	BALL METAL BEVERAGE CONTAINER CORP.	TORRANCE	110
15	70021	XERXES CORP (A DELAWARE CORP)	ANAHEIM	106
16	151843	INSULFOAM LLC	CHINO	88
17	2825	MCP FOODS INC	ANAHEIM	88
18	94872	METAL CONTAINER CORP	MIRA LOMA	87
19	119907	BERRY PETROLEUM COMPANY	SANTA CLARITA	84
20	800057	KINDER MORGAN LIQUIDS TERMINALS, LLC	CARSON	83
21	800129	SFPP, L.P.	BLOOMINGTON	81
22	800128	SO CAL GAS CO (EIS USE)	NORTHRIDGE	71
23	37881	VERTIS, INC.	POMONA	63
24	121737	MOUNTAINVIEW GENERATING STATION	REDLANDS	60
25	5973	SO CAL GAS CO	VALENCIA	56
26	800074	LA CITY, DWP HAYNES GENERATING STATION	LONG BEACH	56
27	800171	EXXONMOBIL OIL CORPORATION	VERNON	55
28	29110	ORANGE COUNTY SANITATION DISTRICT	HUNTINGTON BEACH	51
29	2044	G B MFG INC/CALIF ACRYLIC, DBA CAL SPAS	POMONA	50
30	152330	KIK AEROSOL SOCAL LLC	CITY OF INDUSTRY	49
31	82657	QUEST DIAGNOSTICS INC	SAN JUAN CAPISTRANO	48
32	800278	SFPP, L.P. (NSR USE)	CARSON	48
33	800240	TIN, INC. TEMPLE-INLAND, DBA	ONTARIO	47
34	800330	THUMS LONG BEACH	LONG BEACH	47
35	7949	CUSTOM FIBERGLASS MFG CO/CUSTOM HARDTOP	LONG BEACH	46
36	4477	SO CAL EDISON CO	AVALON	46
37	115130	VERTIS, INC	RIVERSIDE	43
38	800075	LA CITY, DWP SCATTERGOOD GENERATING STN	PLAYA DEL REY	42
39	153095	SA RECYCLING LLC, ADAMS STEEL DBA	ANAHEIM	41
40	11640	ARLON ADHESIVE SYSTEM/DECORATIVE FILMS	SANTA ANA	40
41	4571	NATVAR, A TEKNI PLEX COMPANY INC	CITY OF INDUSTRY	38
42	119940	BUILDING MATERIALS MANUFACTURING CORP	FONTANA	38
43	800264	EDGINGTON OIL COMPANY	LONG BEACH	36
44	144455	LIFOAM INDUSTRIES, LLC	VERNON	35
45	800198	ULTRAMAR INC (NSR USE ONLY)	WILMINGTON	35
46	152952	SA RECYCLING LLC DBA SA RECYCLING OF LA	TERMINAL ISLAND	34

SCAB NOX EMISSION PRODUCERS

	FACID	FNAME	FCITY	NOX
1	800030	CHEVRON PRODUCTS CO.	EL SEGUNDO	850
2	800436	TESORO REFINING AND MARKETING CO	WILMINGTON	844
3	800089	EXXONMOBIL OIL CORPORATION	TORRANCE	760
4	131003	BP WEST COAST PROD.LLC BP CARSON REF.	CARSON	711
5	800363	CONOCOPHILLIPS COMPANY	WILMINGTON	702
6	800181	CALIFORNIA PORTLAND CEMENT CO (NSR USE)	COLTON	607
7	800362	CONOCOPHILLIPS COMPANY	CARSON	330
8	44577	LONG BEACH CITY, SERRF PROJECT	LONG BEACH	262
9	800026	ULTRAMAR INC (NSR USE ONLY)	WILMINGTON	246
10	800128	SO CAL GAS CO (EIS USE)	NORTHRIDGE	226
11	100154	COLMAC ENERGY INC	MECCA	195
12	151178	PACIFIC ENERGY RESOURCES, LTD.	HUNTINGTON BEACH	190
13	131249	BP WEST COAST PRODUCTS LLC,BP WILMINGTON	WILMINGTON	185
14	46268	CALIFORNIA STEEL INDUSTRIES INC	FONTANA	141
15	800263	U.S. GOVT, DEPT OF NAVY	SAN CLEMENTE	124
16	121737	MOUNTAINVIEW GENERATING STATION	REDLANDS	116
17	800074	LA CITY, DWP HAYNES GENERATING STATION	LONG BEACH	104
18	37336	COMMERCE REFUSE TO ENERGY FACILITY	COMMERCE	102
19	800240	TIN, INC. TEMPLE-INLAND, DBA	ONTARIO	99
20	25070	LA CNTY SANITATION DISTRICT-PUENTE HILLS	CITY OF INDUSTRY	97
21	4477	SO CAL EDISON CO	AVALON	89
22	800236	LA CO. SANITATION DIST	CARSON	79
23	151798	TESORO REFINING AND MARKETING CO	CARSON	76
24	115394	AES ALAMITOS, LLC	LONG BEACH	73
25	800193	LA CITY, DWP VALLEY GENERATING STATION	SUN VALLEY	73
26	18931	TAMCO	RANCHO CUCAMONGA	72
27	800183	PARAMOUNT PETR CORP (EIS USE)	PARAMOUNT	71
28	7427	OWENS-BROCKWAY GLASS CONTAINER INC	VERNON	69
29	119907	BERRY PETROLEUM COMPANY	SANTA CLARITA	65
30	20604	RALPHS GROCERY CO	COMPTON	64
31	124838	EXIDE TECHNOLOGIES	VERNON	49
32	800335	LA CITY, DEPT OF AIRPORTS	LOS ANGELES	48
33	107652	RALPHS GROCERY CO	RIVERSIDE	46
34	11435	THE PQ CORP	SOUTH GATE	43
35	5973	SO CAL GAS CO	VALENCIA	42
36	115389	AES HUNTINGTON BEACH, LLC	HUNTINGTON BEACH	41
37	800170	LA CITY, DWP HARBOR GENERATING STATION	WILMINGTON	39
38	800234	LOMA LINDA UNIV	LOMA LINDA	39
39	50310	WASTE MGMT DISP &RECY SERVS INC (BRADLEY	SUN VALLEY	38
40	69646	OC WASTE & RECYCLING, FRB	IRVINE	38
41	800075	LA CITY, DWP SCATTERGOOD GENERATING STN	PLAYA DEL REY	37
42	800327	GLENDALE CITY, GLENDALE WATER & POWER	GLENDALE	37
43	51620	WHEELABRATOR NORWALK ENERGY CO INC	NORWALK	36
44	29110	ORANGE COUNTY SANITATION DISTRICT	HUNTINGTON BEACH	36
45	115315	RRI ENERGY WEST, INC.	ETIWANDA	33
46	117297	MM PRIMA DESHECHA ENERGY, LLC	SAN JUAN CAPISTRAN	33

VOC and NOx Stationary Sources in 2008 Emitting 10 Tons/Year and Higher

SCAB VOC EMISSION PRODUCERS

47	115394	AES ALAMITOS, LLC	LONG BEACH	34
48	53729	TREND OFFSET PRINTING SERVICES, INC	LOS ALAMITOS	34
49	139808	INLAND EMPIRE REGIONAL COMPOSTING AUTHOR	RANCHO CUCAMONGA	32
50	149814	SIERRACIN/SYLMAR CORP	SYLMAR	31
51	18294	NORTHROP GRUMMAN CORP, AIRCRAFT DIV	EL SEGUNDO	31
52	800080	LUNDAY-THAGARD COMPANY	SOUTH GATE	30
53	151798	TESORO REFINING AND MARKETING CO	CARSON	30
54	8547	QUEMETCO INC	CITY OF INDUSTRY	30
55	800367	IPS CORPORATION	GARDENA	29
56	84273	TEVA PARENTERAL MEDICINES, INC	IRVINE	28
57	139799	LITHOGRAPHIX INC	HAWTHORNE	27
58	17301	ORANGE COUNTY SANITATION DISTRICT	FOUNTAIN VALLEY	27
59	101656	AIR PRODUCTS AND CHEMICALS, INC.	WILMINGTON	26
60	126964	EDWARDS LIFESCIENCES LLC	IRVINE	26
61	800236	LA CO. SANITATION DIST	CARSON	26
62	145215	RAMONA FARMS	SAN JACINTO	25
63	144345	ENTENMANN'S, INC	PLACENTIA	25
64	124723	GREKA OIL & GAS, INC	PLACENTIA	24
65	124619	IMPRESS USA INC	TERMINAL ISLAND	23
66	25501	FABRI-COTE,DIV A & S GLASS FABRICS CO IN	LOS ANGELES	23
67	21887	KIMBERLY-CLARK WORLDWIDE INC.-FULT. MILL	FULLERTON	22
68	800038	THE BOEING COMPANY - C17 PROGRAM	LONG BEACH	22
69	7713	DELUXE PACKAGES	SANTA FE SPRINGS	22
70	800052	ARCO TERMINAL SERVICES CORP., TERMINAL 2	LONG BEACH	22
71	43605	FREE FLOW PACKAGING INTERNATIONAL, INC.	COMMERCE	21
72	800214	LA CITY, SANITATION BUREAU (HTP)	PLAYA DEL REY	21
73	14492	JOHNSON LAMINATING & COATING INC	CARSON	21
74	157259	GRAPHIC PACKAGING INTERNATIONAL, INC	IRVINE	21
75	800393	VALERO WILMINGTON ASPHALT PLANT	WILMINGTON	21
76	104017	AERA ENERGY LLC	HUNTINGTON BEACH	21
77	103609	ST. JUDE MEDICAL CRMD	SYLMAR	20
78	3417	AIR PROD & CHEM INC	CARSON	20
79	800365	CONOCOPHILLIPS CO. L A TERMINAL	LOS ANGELES	20
80	115962	BEST CONTRACTING SERVICES INC	GARDENA	20
81	800397	BP WEST COAST PROD.,ARCO COLTON	BLOOMINGTON	20
82	76915	ST. JAMES OIL CORP.	LOS ANGELES	20
83	101977	SIGNAL HILL PETROLEUM INC	SIGNAL HILL	19
84	8309	CAMBRO MANUFACTURING CO	HUNTINGTON BEACH	19
85	58563	MERCURY PLASTICS INC	CITY OF INDUSTRY	18
86	123141	J TALLEY CORP, TALLEY & OCHOA METAL FAB.	SAN JACINTO	17
87	800022	CALNEV PIPE LINE, LLC	BLOOMINGTON	17
88	88228	VORTEX WHIRLPOOL SYSTEMS, INC	PERRIS	17
89	800113	ROHR, INC.	RIVERSIDE	17
90	142686	L. A. SPAS, INC	ANAHEIM	17
91	124725	FORTUNE FASHIONS IND	VERNON	17
92	3525	P.B. FASTENERS	GARDENA	17
93	61536	SPECIALTY FINISHES CO	FONTANA	17

SCAB NOX EMISSION PRODUCERS

47	800386	LA CO., SHERIFF DEPT	SAUGUS	33
48	50418	O C WASTE & RECYCLING, OLINDA ALPHA	BREA	31
49	128243	BURBANK CITY,BURBANK WATER & POWER,SCPPA	BURBANK	31
50	142408	PENROSE LANDFILL GAS CONVERSION, LLC	SUN VALLEY	30
51	129497	THUMS LONG BEACH CO	LONG BEACH	30
52	104806	MM LOPEZ ENERGY LLC	SYLMAR	30
53	8547	QUEMETCO INC	CITY OF INDUSTRY	30
54	113873	MM WEST COVINA LLC	WEST COVINA	29
55	114801	RHODIA INC.	CARSON	28
56	550	LA CO., INTERNAL SERVICE DEPT	LOS ANGELES	28
57	101656	AIR PRODUCTS AND CHEMICALS, INC.	WILMINGTON	27
58	17301	ORANGE COUNTY SANITATION DISTRICT	FOUNTAIN VALLEY	27
59	49111	SUNSHINE CANYON LANDFILL	SYLMAR	27
60	129816	INLAND EMPIRE ENERGY CENTER, LLC	ROMOLAND	27
61	8582	SO CAL GAS CO/PLAYA DEL REY STORAGE FACI	PLAYA DEL REY	26
62	119133	EOP - 10960 WILSHIRE LLC	LOS ANGELES	26
63	13854	EAST LOS ANGELES COLLEGE	MONTEREY PARK	26
64	14502	VERNON CITY, LIGHT & POWER DEPT	VERNON	26
65	18452	UNIVERSITY OF CALIFORNIA, LOS ANGELES	LOS ANGELES	26
66	16978	CLOUGHERTY PACKING LLC/HORMEL FOODS CORP	VERNON	26
67	126498	STEELSCAPE, INC	RANCHO CUCAMONG	26
68	800080	LUNDAY-THAGARD COMPANY	SOUTH GATE	24
69	15504	SCHLOSSER FORGE COMPANY	RANCHO CUCAMONG	22
70	68466	CR TRANSFER, INC.	STANTON	22
71	4242	SAN DIEGO GAS & ELECTRIC	MORENO VALLEY	22
72	115663	EL SEGUNDO POWER, LLC	EL SEGUNDO	21
73	14966	U S GOV'T, V A MEDICAL CENTER, WEST L A	LOS ANGELES	21
74	22911	CARLTON FORGE WORKS	PARAMOUNT	20
75	23194	CITY OF HOPE MEDICAL CENTER	DUARTE	20
76	142517	CRIMSON RESOURCE MANAGEMENT	CASTAIC	20
77	800189	DISNEYLAND RESORT	ANAHEIM	19
78	94872	METAL CONTAINER CORP	MIRA LOMA	19
79	42514	LA COUNTY SANITATION DIST (CALABASAS)	AGOURA	19
80	105903	PRIME WHEEL	CARSON	19
81	16642	ANHEUSER-BUSCH INC., (LA BREWERY)	VAN NUYS	17
82	800265	UNIV OF SO CAL (EIS & NSR USE ONLY)	LOS ANGELES	17
83	43436	TST, INC.	FONTANA	17
84	71380	VEOLIA ES INDUSTRIAL SERVICES, INC	GARDENA	17
85	141555	CASTAIC CLAY PRODUCTS, LLC	CASTAIC	17
86	113518	RIDGEWOOD POWER MANAGEMENT,LLC	BREA	17
87	16389	CEDARS-SINAI MEDICAL CTR	LOS ANGELES	16
88	9755	UNITED AIRLINES INC	LOS ANGELES	16
89	68042	CORONA ENERGY PARTNERS, LTD	CORONA	16
90	800264	EDGINGTON OIL COMPANY	LONG BEACH	16
91	9163	INLAND EMPIRE UTL AGEN, A MUN WATER DIS	ONTARIO	16
92	2083	SUPERIOR INDUSTRIES INTERNATIONAL INC	VAN NUYS	16
93	113674	U S A WASTE OF CAL(EL SOBRANTE LANDFILL)	CORONA	15

VOC and NOx Stationary Sources in 2008 Emitting 10 Tons/Year and Higher

SCAB VOC EMISSION PRODUCERS

94	14146	MAC GREGOR YACHT CORP	COSTA MESA	17
95	45086	SIGNAL HILL PETROLEUM INC	LONG BEACH	17
96	16389	CEDARS-SINAI MEDICAL CTR	LOS ANGELES	17
97	18931	TAMCO	RANCHO CUCAMONGA	16
98	145100	P & D DAIRY	CHINO	16
99	132368	WORLD COLOR PRINTING	RIVERSIDE	16
100	145211	R & J HARINGA DAIRY	SAN JACINTO	16
101	118733	MEDTRONIC INC., HEART VALVES DIV.	SANTA ANA	16
102	151984	TESORO REF & MKTG. CO., WILMINGTON	WILMINGTON	16
103	800051	ARCO TERMINAL SERVICES CORPORATION	LONG BEACH	16
104	133987	PLAINS EXPLORATION & PRODUCTION CO, LP	LOS ANGELES	16
105	800279	SFPP, L.P. (NSR USE ONLY)	ORANGE	16
106	115563	METAL COATERS OF CALIFORNIA	RANCHO CUCAMONGA	16
107	23401	HOOD MFG INC	SANTA ANA	16
108	116931	EQUILON ENT LLC, SHELL OIL PROD. U S	SIGNAL HILL	15
109	123970	SUNDANCE SPAS INC	CHINO	15
110	8582	SO CAL GAS CO/PLAYA DEL REY STORAGE FACI	PLAYA DEL REY	15
111	115663	EL SEGUNDO POWER, LLC	EL SEGUNDO	15
112	111814	CONOCOPHILLIPS/TORRANCE TANK FARM CO	TORRANCE	15
113	144826	PASTIME LAKES DAIRY	LAKEVIEW	15
114	800286	ARCO TERMINAL SERVICES CORP	SIGNAL HILL	15
115	52742	STOROPACK INC	DOWNEY	15
116	110924	WESTWAY TERMINAL COMPANY, LLC	SAN PEDRO	15
117	128243	BURBANK CITY,BURBANK WATER & POWER,SCPPA	BURBANK	15
118	800056	KINDER MORGAN LIQUIDS TERMINALS, LLC	WILMINGTON	14
119	18452	UNIVERSITY OF CALIFORNIA, LOS ANGELES	LOS ANGELES	14
120	800272	CHEMOIL TERMINALS CORPORATION	CARSON	14
121	144948	NORCO RANCH INC	FONTANA	14
122	73513	BJ SERVICES CO U S A	SANTA FE SPRINGS	14
123	149235	AMF ANAHEIM LLC	ANAHEIM	14
124	800263	U.S. GOVT, DEPT OF NAVY	SAN CLEMENTE	14
125	113674	U S A WASTE OF CAL(EL SOBRANTE LANDFILL)	CORONA	14
126	13011	M.C. GILL CORP	EL MONTE	14
127	145258	SYANN DAIRY, MARK VANDER DUSSEN DBA	CORONA	14
128	115389	AES HUNTINGTON BEACH, LLC	HUNTINGTON BEACH	14
129	110986	CALIFORNIA SPEEDWAY	FONTANA	14
130	800091	EXXONMOBIL OIL CORP	ANAHEIM	13
131	800092	EXXONMOBIL OIL CORP	TERMINAL ISLAND	13
132	119741	JENSEN PRECAST	FONTANA	13
133	126498	STEELSCAPE, INC	RANCHO CUCAMONGA	13
134	118314	ANTHONY, INC.	SAN FERNANDO	13
135	40806	NEW BASIS	RIVERSIDE	13
136	143523	ROBINSON CALF RANCH	ONTARIO	13
137	50310	WASTE MGMT DISP &RECY SERVS INC (BRADLEY	SUN VALLEY	13
138	72351	CAJOLEBEN, INC., GALASSO'S BAKERY, DBA	MIRA LOMA	13
139	47708	HELLMAN PROPERTIES LLC	SEAL BEACH	13
140	9163	INLAND EMPIRE UTL AGEN, A MUN WATER DIS	ONTARIO	13

SCAB NOX EMISSION PRODUCERS

94	123087	INDALEX WEST INC	CITY OF INDUSTRY	15
95	139010	RIPON COGENERATION LLC	POMONA	15
96	109914	THERMAL REMEDIATION SOLUTIONS, LLC	AZUSA	15
97	800168	PASADENA CITY, DWP (EIS USE)	PASADENA	15
98	12185	US GYPSUM CO	SOUTH GATE	14
99	35302	OWENS CORNING ROOFING AND ASPHALT, LLC	COMPTON	14
100	117785	BALL METAL BEVERAGE CONTAINER CORP.	TORRANCE	14
101	3417	AIR PROD & CHEM INC	CARSON	14
102	17953	PACIFIC CLAY PRODUCTS INC	LAKE ELSINORE	13
103	116403	CR TRANSFER INC	STANTON	13
104	52517	REXAM BEVERAGE CAN COMPANY	CHATSWORTH	12
105	142417	TOYON LANDFILL GAS CONVERSION LLC	LOS ANGELES	12
106	800288	UNIV CAL IRVINE (NSR USE ONLY)	IRVINE	12
107	155877	MILLERCOORS, LLC	IRWINDALE	12
108	136	PRESS FORGE CO	PARAMOUNT	12
109	148236	AIR LIQUIDE LARGE INDUSTRIES U.S., LP	EL SEGUNDO	12
110	14495	VISTA METALS CORPORATION	FONTANA	12
111	47781	OLS ENERGY-CHINO	CHINO	12
112	145829	HOLLYWOOD PARK LAND COMPANY LLC	INGLEWOOD	12
113	95567	DOTY BROS EQUIPMENT CO	NORWALK	12
114	118406	CARSON COGENERATION COMPANY	CARSON	11
115	150351	SAMUEL P LEWIS DBA CHINO WELDING & ASSEM	MIRA LOMA	11
116	129660	NM MID VALLEY GENCO LLC	RIALTO	11
117	113303	CAITAC GARMENT PROCESSING INC	GARDENA	11
118	800129	SFPP, L.P.	BLOOMINGTON	11
119	800182	RIVERSIDE CEMENT CO (EIS USE)	RIVERSIDE	11
120	12428	NEW NGC, INC.	LONG BEACH	11
121	11245	HOAG MEM HOSP PRESBYTERIAN	NEWPORT BEACH	11
122	150783	FAIRPLEX	POMONA	11
123	346	FRITO-LAY, INC.	RANCHO CUCAMONG	11
124	18960	PASADENA CITY COLLEGE	PASADENA	11
125	115536	AES REDONDO BEACH, LLC	REDONDO BEACH	11
126	42633	LA COUNTY SANITATION DISTRICTS (SPADRA)	POMONA	11
127	10966	WEBER METALS INC	PARAMOUNT	11
128	115241	BOEING SATELLITE SYSTEMS INC	EL SEGUNDO	11
129	148468	DRI COMMERCIAL	IRVINE	11
130	16338	KAISER ALUMINUM FABRICATED PRODUCTS, LLC	LOS ANGELES	10
131	49805	LA CITY, BUREAU OF SANIT(LOPEZ CANYON)	LAKE VIEW TERRACE	10

VOC and NOx Stationary Sources in 2008 Emitting 10 Tons/Year and Higher

SCAB VOC EMISSION PRODUCERS

141	100154	COLMAC ENERGY INC	MECCA	13
142	800202	UNIVERSAL CITY STUDIOS, LLC.	UNIVERSAL CITY	13
143	800409	NORTHROP GRUMMAN SYSTEMS CORPORATION	REDONDO BEACH	13
144	148236	AIR LIQUIDE LARGE INDUSTRIES U.S., LP	EL SEGUNDO	13
145	152033	TESORO REF & MKTG CO., LONG BEACH	LONG BEACH	13
146	800327	GLENDALE CITY, GLENDALE WATER & POWER	GLENDALE	13
147	57094	GS ROOFING PRODUCTS CO, INC/CERTAINTEED	WILMINGTON	13
148	800398	MASK-OFF COMPANY, INC	MONROVIA	13
149	800267	TRIUMPH PROCESSING, INC.	LYNWOOD	13
150	3585	R. R. DONNELLEY & SONS CO, LA MFG DIV	TORRANCE	12
151	10656	NEWPORT LAMINATES	SANTA ANA	12
152	800193	LA CITY, DWP VALLEY GENERATING STATION	SUN VALLEY	12
153	124808	INEOS POLYPROPYLENE LLC	CARSON	12
154	111415	VAN CAN COMPANY	FONTANA	12
155	11362	HR TEXTRON INC	VALENCIA	12
156	145351	LEGEND DAIRY FARMS	ONTARIO	12
157	800417	PLAINS WEST COAST TERMINALS LLC	COMPTON	12
158	108742	REMO INC	VALENCIA	12
159	75770	ROSS-DOYLE INC	RIALTO	12
160	117882	NELSON NAMEPLATE COMPANY	LOS ANGELES	12
161	25070	LA CNTY SANITATION DISTRICT-PUENTE HILLS	CITY OF INDUSTRY	12
162	62851	PENN INDUSTRIES, INC.	CERRITOS	12
163	145095	CBJ DAIRY	SAN JACINTO	12
164	134590	FLEISCHMANN'S VINEGAR CO, INC	MONTEBELLO	12
165	151178	PACIFIC ENERGY RESOURCES, LTD.	HUNTINGTON BEACH	12
166	143973	MARVO HOLSTEINS	LAKEVIEW	11
167	6886	MARVIN ENGINEERING CO INC	INGLEWOOD	11
168	800369	EQUILON ENTER.LLC , SHELL OIL PROD. U S	VAN NUYS	11
169	12155	ARMSTRONG WORLD INDUSTRIES INC	SOUTH GATE	11
170	772	DEFT INC	IRVINE	11
171	800289	ALLERGAN INC	IRVINE	11
172	800003	HONEYWELL INTERNATIONAL INC	TORRANCE	11
173	100145	HARBOR FUMIGATION INC	SAN PEDRO	11
174	8936	FLEETWOOD MOTOR HOMES OF CAL INC	RIVERSIDE	11
175	1744	KIRKHILL - TA COMPANY	BREA	11
176	106897	AG-FUME SERVICES INC	SAN PEDRO	11
177	122858	SEKISUI TA INDUSTRIES, LLC	BREA	11
178	117290	B BRAUN MEDICAL, INC	IRVINE	11
179	10245	LA CITY, TERMINAL ISLAND TREATMENT PLANT	SAN PEDRO	11
180	117225	EQUILON ENTER. LLC, SHELL OIL PROD. U S	BLOOMINGTON	11
181	100806	ROBINSON HELICOPTER CO INC	TORRANCE	11
182	89248	OLD COUNTRY MILLWORK INC	LOS ANGELES	11
183	12876	FOAM FABRICATORS	COMPTON	11
184	39855	MIZKAN AMERICAS, INC	RANCHO CUCAMONGA	11
185	111238	RIBOST TERMINAL, LLC.	LONG BEACH	11
186	1703	EASTERN MUNICIPAL WATER DISTRICT	TEMECULA	11
187	132124	BP WEST COAST PRODUCTS, LLC/CARSON TERMI	CARSON	11

VOC and NOx Stationary Sources in 2008 Emitting 10 Tons/Year and Higher

SCAB VOC EMISSION PRODUCERS

188	144951	NORCO RANCH INC	MENIFEE	11
189	144144	JIM BOOTSMA, JR., DAIRY	LAKEVIEW	10
190	13397	JOHN BOYD DESIGNS	LOS ANGELES	10
191	146947	EAGLE LIVESTOCK INC	ONTARIO	10
192	75024	AAA FLAG & BANNER MFG CO INC	LOS ANGELES	10
193	69081	BAXTER HEALTHCARE CORP., HYLAND DIV	LOS ANGELES	10
194	44916	HEAD WEST INC	COMPTON	10
195	143870	ABACHERLI DAIRY, RONALD ABACHERLI	MENIFEE	10
196	7417	EASTERN MUNICIPAL WATER DIST	PERRIS	10

ATTACHMENT D

FINAL 2012 AQMP APPENDIX III

ON-ROAD EMISSIONS
BY VEHICLE CATEGORY

Table D-1

2008 Annual Average Emissions (tons per day) in the South Coast Air Basin

	Light and Medium		Light Heavy		Medium Heavy		Heavy Heavy		Other Buses		Urban Buses		School Buses		Motor Homes		All Vehicles		Grand
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Total
vehicles	9925979	23158	268847	101395	20991	69513	1443	61760	7127	4701	1718	6819	1426	4831	55663	9182	10283194	281359	10564553
VMT/1000	344813	514	12703	4904	915	4259	107	8571	346	394	182	729	50	184	599	109	359715	19664	379379
Reactive Organic Gas Emissions																			
Run Exh	53.99	0.11	2.92	0.88	0.56	1.73	0.25	8.54	0.07	0.29	0.38	0.54	0.12	0.18	0.42	0.02	58.71	12.29	71.00
Idle Exh	0.00	0.00	0.17	0.01	0.03	0.03	0.00	0.86	0.02	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.22	0.96	1.18
Start Ex	39.83	0.00	3.68	0.00	1.32	0.00	0.28	0.00	0.37	0.00	0.03	0.00	0.03	0.00	0.01	0.00	45.53	0.00	45.53
Total Ex	93.82	0.11	6.78	0.89	1.90	1.76	0.53	9.40	0.46	0.32	0.41	0.54	0.15	0.20	0.43	0.02	104.46	13.25	117.70
Diurnal	9.79	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	9.81	0.01	9.82
Hot Soak	15.90	0.00	0.46	0.00	0.15	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.55	0.00	16.55
Running	53.00	0.00	2.52	0.00	0.64	0.00	0.15	0.00	0.12	0.00	0.02	0.00	0.03	0.00	0.02	0.00	56.49	0.00	56.49
Resting	6.34	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	6.36	0.00	6.36
Total	178.85	0.11	9.77	0.90	2.69	1.77	0.70	9.40	0.59	0.32	0.44	0.54	0.18	0.20	0.46	0.02	193.67	13.26	206.93
Carbon Monoxide Emissions																			
Run Exh	1321.12	0.48	54.10	4.24	12.68	6.07	8.25	35.16	1.60	1.14	4.13	2.52	2.32	0.54	13.41	0.07	1417.61	50.23	1467.84
Idle Exh	0.00	0.00	1.04	0.10	0.31	0.26	0.00	2.81	0.10	0.14	0.00	0.00	0.00	0.13	0.00	0.00	1.44	3.44	4.88
Start Ex	421.55	0.00	44.51	0.00	16.02	0.00	4.53	0.00	5.28	0.00	0.45	0.00	0.33	0.00	0.13	0.00	492.80	0.00	492.80
Total Ex	1742.67	0.48	99.64	4.34	29.01	6.33	12.78	37.97	6.98	1.28	4.58	2.52	2.64	0.67	13.55	0.07	1911.85	53.67	1965.52
Oxides of Nitrogen Emissions																			
Run Exh	139.59	0.80	12.18	32.41	3.00	40.93	1.11	155.22	0.62	5.84	0.73	14.05	0.16	2.48	1.24	0.95	158.64	252.68	411.32
Idle Exh	0.00	0.00	0.01	0.29	0.00	0.83	0.00	5.39	0.00	0.29	0.00	0.00	0.00	0.31	0.00	0.00	0.01	7.10	7.12
Start Ex	32.87	0.00	8.51	0.00	1.36	0.00	0.16	0.00	0.64	0.00	0.04	0.00	0.02	0.00	0.01	0.00	43.61	0.00	43.61
Total Ex	172.46	0.80	20.70	32.70	4.35	41.76	1.27	160.61	1.26	6.13	0.78	14.05	0.18	2.78	1.25	0.95	202.27	259.79	462.05
PM2.5 Emissions																			
Run Exh	1.75	0.08	0.03	0.21	0.00	1.40	0.00	5.85	0.00	0.19	0.00	0.21	0.00	0.11	0.00	0.02	1.79	8.07	9.86
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.14	0.14
Start Ex	0.35	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.36
Total Ex	2.10	0.08	0.05	0.21	0.01	1.40	0.00	5.98	0.00	0.20	0.00	0.21	0.00	0.11	0.00	0.02	2.16	8.21	10.37
TireWear	0.76	0.00	0.03	0.02	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.12	0.90
BrakeWear	5.98	0.01	0.22	0.18	0.02	0.26	0.00	0.25	0.01	0.02	0.00	0.29	0.00	0.07	0.01	0.01	6.24	1.09	7.33
Total	8.84	0.09	0.29	0.41	0.02	1.67	0.00	6.31	0.01	0.22	0.00	0.50	0.00	0.18	0.02	0.03	9.19	9.42	18.61
Fuel Consumption (1000 gallons) and SO2																			
Fuel	18356.18	18.80	961.98	257.80	75.16	481.75	10.53	1549.98	28.02	58.29	17.17	189.73	5.06	25.59	44.44	12.28	19498.55	2594.23	22092.78
SOx	1.72	0.00	0.09	0.03	0.01	0.05	0.00	0.16	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.83	0.27	2.10

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-2

2008 Summer Planning Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	9925979	23158	268847	101395	20991	69513	1443	61760	7127	4701	1718	6819	1426	4831	55663	9182	10283194	281359	10564553
VMT/1000	344813	514	12703	4904	915	4259	107	8571	346	394	182	729	50	184	599	109	359715	19664	379379
Reactive Organic Gas Emissions																			
Run Exh	54.54	0.11	2.99	0.88	0.56	1.73	0.25	8.54	0.07	0.29	0.38	0.54	0.12	0.18	0.40	0.02	59.32	12.29	71.61
Idle Exh	0.00	0.00	0.17	0.01	0.03	0.03	0.00	0.83	0.02	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.21	0.92	1.14
Start Ex	33.93	0.00	3.23	0.00	1.12	0.00	0.23	0.00	0.32	0.00	0.03	0.00	0.02	0.00	0.01	0.00	38.89	0.00	38.89
Total Ex	88.47	0.11	6.39	0.89	1.71	1.76	0.48	9.37	0.41	0.32	0.41	0.54	0.14	0.20	0.41	0.02	98.43	13.21	111.64
Diurnal	16.15	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	16.18	0.01	16.19
Hot Soak	17.55	0.00	0.50	0.00	0.16	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.26	0.00	18.26
Running	50.13	0.00	2.47	0.00	0.63	0.00	0.14	0.00	0.11	0.00	0.02	0.00	0.02	0.00	0.02	0.00	53.55	0.00	53.55
Resting	10.87	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	10.90	0.00	10.90
Total	183.17	0.11	9.39	0.90	2.50	1.77	0.65	9.37	0.54	0.32	0.44	0.54	0.17	0.20	0.46	0.02	197.31	13.22	210.53
Carbon Monoxide Emissions																			
Run Exh	1406.08	0.48	54.76	4.24	12.57	6.07	8.02	35.16	1.62	1.14	4.14	2.52	2.26	0.54	13.19	0.07	1502.64	50.23	1552.86
Idle Exh	0.00	0.00	1.04	0.10	0.22	0.19	0.00	2.16	0.10	0.10	0.00	0.00	0.00	0.09	0.00	0.00	1.36	2.64	4.00
Start Ex	337.07	0.00	36.18	0.00	13.67	0.00	4.32	0.00	4.38	0.00	0.38	0.00	0.28	0.00	0.11	0.00	396.40	0.00	396.40
Total Ex	1743.15	0.48	91.97	4.34	26.47	6.26	12.34	37.32	6.10	1.24	4.52	2.52	2.55	0.63	13.30	0.07	1900.40	52.87	1953.27
Oxides of Nitrogen Emissions																			
Run Exh	122.59	0.75	10.68	30.72	2.63	38.64	0.96	146.86	0.55	5.53	0.64	13.28	0.14	2.34	1.07	0.90	139.27	239.02	378.29
Idle Exh	0.00	0.00	0.01	0.29	0.00	0.85	0.00	5.53	0.00	0.30	0.00	0.00	0.00	0.31	0.00	0.00	0.01	7.29	7.31
Start Ex	30.56	0.00	8.19	0.00	1.30	0.00	0.16	0.00	0.61	0.00	0.04	0.00	0.02	0.00	0.01	0.00	40.88	0.00	40.88
Total Ex	153.15	0.75	18.88	31.01	3.93	39.49	1.12	152.39	1.16	5.83	0.69	13.28	0.16	2.65	1.08	0.90	180.17	246.31	426.48
PM2.5 Emissions																			
Run Exh	1.75	0.08	0.03	0.21	0.00	1.40	0.00	5.85	0.00	0.19	0.00	0.21	0.00	0.11	0.00	0.02	1.79	8.07	9.86
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.13
Start Ex	0.35	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.36
Total Ex	2.10	0.08	0.05	0.21	0.01	1.40	0.00	5.97	0.00	0.20	0.00	0.21	0.00	0.11	0.00	0.02	2.16	8.20	10.36
TireWear	0.76	0.00	0.03	0.02	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.12	0.90
BrakeWear	5.98	0.01	0.22	0.18	0.02	0.26	0.00	0.25	0.01	0.02	0.00	0.29	0.00	0.07	0.01	0.01	6.24	1.09	7.33
Total	8.84	0.09	0.29	0.41	0.02	1.67	0.00	6.30	0.01	0.22	0.00	0.50	0.00	0.18	0.02	0.03	9.19	9.41	18.59
Fuel Consumption (1000 gallons) and SO2																			
Fuel	19242.75	18.80	960.58	257.80	74.73	482.03	10.44	1551.77	27.86	58.40	17.16	189.73	5.05	25.69	44.40	12.28	20382.97	2596.51	22979.47
SOx	1.80	0.00	0.09	0.03	0.01	0.05	0.00	0.16	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.91	0.27	2.18

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-3

2014 Annual Average Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	10346834	23777	303628	115774	20592	71326	1286	59736	7022	5497	1784	7111	1507	4641	59982	10459	10742635	298321	11040956
VMT/1000	350324	752	13250	4911	960	4101	186	8216	288	432	190	761	53	171	664	114	365915	19458	385373
Reactive Organic Gas Emissions																			
Run Exh	27.84	0.04	1.74	0.83	0.27	0.98	0.12	2.79	0.05	0.12	0.35	0.53	0.07	0.04	0.15	0.02	30.58	5.35	35.93
Idle Exh	0.00	0.00	0.18	0.02	0.03	0.02	0.00	0.66	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.22	0.72	0.94
Start Ex	21.65	0.00	3.20	0.00	0.74	0.00	0.08	0.00	0.26	0.00	0.03	0.00	0.02	0.00	0.01	0.00	25.98	0.00	25.98
Total Ex	49.49	0.04	5.11	0.84	1.03	0.99	0.20	3.45	0.32	0.14	0.38	0.53	0.09	0.05	0.15	0.02	56.78	6.07	62.85
Diurnal	6.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	6.58	0.01	6.59
Hot Soak	12.82	0.00	0.49	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.41	0.00	13.41
Running	35.91	0.00	2.83	0.00	0.31	0.00	0.02	0.00	0.10	0.00	0.03	0.00	0.02	0.00	0.02	0.00	39.24	0.00	39.24
Resting	5.13	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	5.14	0.00	5.14
Total	109.91	0.04	8.44	0.84	1.42	1.00	0.23	3.45	0.44	0.14	0.41	0.53	0.10	0.05	0.19	0.02	121.15	6.07	127.22
Carbon Monoxide Emissions																			
Run Exh	773.14	0.24	32.34	4.39	6.03	3.64	6.47	14.45	0.97	0.50	3.55	2.41	1.26	0.12	5.20	0.07	828.96	25.82	854.77
Idle Exh	0.00	0.00	1.11	0.12	0.29	0.18	0.00	3.40	0.09	0.09	0.00	0.00	0.00	0.03	0.00	0.00	1.49	3.82	5.31
Start Ex	254.44	0.00	35.11	0.00	10.55	0.00	1.98	0.00	4.14	0.00	0.43	0.00	0.24	0.00	0.08	0.00	306.97	0.00	306.97
Total Ex	1027.58	0.24	68.56	4.50	16.86	3.82	8.45	17.84	5.20	0.59	3.98	2.41	1.50	0.16	5.28	0.07	1137.42	29.64	1167.05
Oxides of Nitrogen Emissions																			
Run Exh	78.42	0.48	8.73	24.77	1.68	23.89	1.04	75.58	0.39	4.14	0.73	13.40	0.12	1.99	0.73	0.88	91.83	145.13	236.96
Idle Exh	0.00	0.00	0.01	0.33	0.00	0.66	0.00	4.81	0.00	0.28	0.00	0.00	0.00	0.27	0.00	0.00	0.01	6.35	6.36
Start Ex	20.16	0.00	9.38	0.00	1.05	0.00	0.12	0.00	0.56	0.00	0.05	0.00	0.02	0.00	0.01	0.00	31.34	0.00	31.34
Total Ex	98.58	0.48	18.11	25.10	2.74	24.55	1.16	80.39	0.95	4.42	0.78	13.40	0.13	2.25	0.74	0.88	123.18	151.48	274.66
PM2.5 Emissions																			
Run Exh	0.91	0.03	0.02	0.18	0.00	0.68	0.00	1.47	0.00	0.07	0.00	0.20	0.00	0.02	0.00	0.02	0.93	2.67	3.60
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Start Ex	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.21
Total Ex	1.11	0.03	0.03	0.18	0.00	0.68	0.00	1.50	0.00	0.07	0.00	0.20	0.00	0.02	0.00	0.02	1.14	2.70	3.85
TireWear	0.77	0.00	0.03	0.02	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.11	0.92
BrakeWear	6.08	0.01	0.23	0.19	0.02	0.25	0.00	0.24	0.00	0.03	0.00	0.30	0.00	0.06	0.01	0.01	6.35	1.09	7.44
Total	7.97	0.04	0.29	0.38	0.02	0.94	0.00	1.82	0.00	0.10	0.00	0.51	0.00	0.08	0.01	0.03	8.30	3.90	12.20
Fuel Consumption (1000 gallons) and SO2																			
Fuel	18419.87	25.07	996.83	256.75	74.89	462.53	14.96	1503.88	23.37	64.46	17.68	194.62	5.11	24.03	47.48	12.83	19600.18	2544.17	22144.35
SOx	1.73	0.00	0.09	0.03	0.01	0.05	0.00	0.16	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.84	0.27	2.11

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-4

2014 Summer Planning Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	10346834	23777	303628	115774	20592	71326	1286	59736	7022	5497	1784	7111	1507	4641	59982	10459	10742635	298321	11040956
VMT/1000	350324	752	13250	4911	960	4101	186	8216	288	432	190	761	53	171	664	114	365915	19458	385373
Reactive Organic Gas Emissions																			
Run Exh	28.36	0.04	1.78	0.83	0.27	0.98	0.12	2.79	0.05	0.12	0.36	0.53	0.07	0.04	0.15	0.02	31.16	5.35	36.51
Idle Exh	0.00	0.00	0.18	0.02	0.02	0.02	0.00	0.63	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.68	0.90
Start Ex	18.43	0.00	2.82	0.00	0.64	0.00	0.07	0.00	0.23	0.00	0.03	0.00	0.02	0.00	0.01	0.00	22.23	0.00	22.23
Total Ex	46.78	0.04	4.78	0.84	0.93	0.99	0.19	3.42	0.29	0.14	0.39	0.53	0.09	0.05	0.15	0.02	53.61	6.03	59.64
Diurnal	10.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	10.73	0.01	10.74
Hot Soak	13.77	0.00	0.53	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.40	0.00	14.40
Running	34.00	0.00	2.77	0.00	0.31	0.00	0.02	0.00	0.10	0.00	0.03	0.00	0.01	0.00	0.02	0.00	37.25	0.00	37.25
Resting	8.16	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	8.18	0.00	8.18
Total	113.43	0.04	8.10	0.84	1.32	1.00	0.22	3.42	0.40	0.14	0.42	0.53	0.10	0.05	0.19	0.02	124.18	6.04	130.22
Carbon Monoxide Emissions																			
Run Exh	829.78	0.24	32.88	4.39	6.05	3.64	6.54	14.45	0.98	0.50	3.57	2.41	1.25	0.12	5.23	0.07	886.29	25.82	912.10
Idle Exh	0.00	0.00	1.11	0.12	0.21	0.13	0.00	2.49	0.09	0.07	0.00	0.00	0.00	0.02	0.00	0.00	1.41	2.83	4.24
Start Ex	202.09	0.00	28.47	0.00	8.74	0.00	1.69	0.00	3.38	0.00	0.36	0.00	0.20	0.00	0.06	0.00	245.01	0.00	245.01
Total Ex	1031.88	0.24	62.46	4.50	15.01	3.77	8.23	16.93	4.45	0.56	3.94	2.41	1.45	0.15	5.29	0.07	1132.71	28.64	1161.35
Oxides of Nitrogen Emissions																			
Run Exh	68.91	0.45	7.64	23.47	1.46	22.62	0.93	71.48	0.34	3.91	0.64	12.68	0.10	1.88	0.64	0.84	80.66	137.32	217.98
Idle Exh	0.00	0.00	0.01	0.33	0.00	0.68	0.00	4.95	0.00	0.30	0.00	0.00	0.00	0.28	0.00	0.00	0.01	6.54	6.55
Start Ex	18.74	0.00	9.02	0.00	1.01	0.00	0.11	0.00	0.54	0.00	0.05	0.00	0.02	0.00	0.01	0.00	29.49	0.00	29.49
Total Ex	87.65	0.45	16.67	23.80	2.48	23.30	1.04	76.43	0.88	4.21	0.69	12.68	0.12	2.15	0.64	0.84	110.16	143.86	254.02
PM2.5 Emissions																			
Run Exh	0.91	0.03	0.02	0.18	0.00	0.68	0.00	1.47	0.00	0.07	0.00	0.20	0.00	0.02	0.00	0.02	0.93	2.67	3.60
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Start Ex	0.20	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.21
Total Ex	1.11	0.03	0.03	0.18	0.00	0.68	0.00	1.50	0.00	0.07	0.00	0.20	0.00	0.02	0.00	0.02	1.14	2.70	3.84
TireWear	0.77	0.00	0.03	0.02	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.11	0.92
BrakeWear	6.08	0.01	0.23	0.19	0.02	0.25	0.00	0.24	0.00	0.03	0.00	0.30	0.00	0.06	0.01	0.01	6.35	1.09	7.44
Total	7.97	0.04	0.29	0.38	0.02	0.94	0.00	1.82	0.00	0.10	0.00	0.51	0.00	0.08	0.01	0.03	8.30	3.90	12.20
Fuel Consumption (1000 gallons) and SO2																			
Fuel	19330.50	25.07	995.70	256.75	74.58	462.83	14.92	1507.17	23.23	64.58	17.68	194.62	5.10	24.13	47.49	12.83	20509.18	2547.99	23057.18
SOx	1.81	0.00	0.09	0.03	0.01	0.05	0.00	0.16	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.92	0.27	2.19

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-5

2019 Annual Average Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	10417656	23816	327623	126383	21360	75969	1310	67365	7206	6196	1870	7344	1595	4763	64061	11228	10842681	323064	11165745
VMT/1000	352644	768	14113	5237	1023	4503	181	9794	273	491	199	785	55	172	719	119	369207	21869	391076
Reactive Organic Gas Emissions																			
Run Exh	15.60	0.02	0.98	0.68	0.12	0.54	0.08	2.42	0.03	0.08	0.34	0.47	0.05	0.03	0.05	0.02	17.25	4.26	21.51
Idle Exh	0.00	0.00	0.19	0.02	0.03	0.02	0.00	0.93	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.98	1.21
Start Ex	12.79	0.00	2.62	0.00	0.44	0.00	0.04	0.00	0.21	0.00	0.03	0.00	0.01	0.00	0.00	0.00	16.15	0.00	16.15
Total Ex	28.40	0.02	3.79	0.70	0.59	0.55	0.13	3.35	0.25	0.10	0.37	0.47	0.06	0.03	0.05	0.02	33.63	5.25	38.88
Diurnal	4.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	4.94	0.00	4.95
Hot Soak	9.97	0.00	0.49	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.52	0.00	10.52
Running	27.34	0.00	2.84	0.00	0.21	0.00	0.01	0.00	0.12	0.00	0.03	0.00	0.02	0.00	0.02	0.00	30.58	0.00	30.58
Resting	4.30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.31	0.00	4.31
Total	74.94	0.02	7.12	0.70	0.84	0.56	0.14	3.35	0.38	0.10	0.40	0.47	0.08	0.03	0.08	0.02	83.98	5.25	89.23
Carbon Monoxide Emissions																			
Run Exh	489.87	0.13	19.19	4.15	2.63	2.33	5.96	14.02	0.53	0.37	3.02	2.13	0.70	0.09	1.79	0.07	523.70	23.30	547.00
Idle Exh	0.00	0.00	1.17	0.13	0.29	0.18	0.00	5.17	0.09	0.11	0.00	0.00	0.00	0.04	0.00	0.00	1.55	5.63	7.18
Start Ex	161.46	0.00	28.67	0.00	7.32	0.00	1.58	0.00	3.37	0.00	0.41	0.00	0.20	0.00	0.05	0.00	203.06	0.00	203.06
Total Ex	651.33	0.13	49.03	4.28	10.24	2.51	7.55	19.19	3.98	0.48	3.43	2.13	0.90	0.13	1.84	0.07	728.31	28.93	757.23
Oxides of Nitrogen Emissions																			
Run Exh	49.57	0.32	6.18	18.91	0.89	12.03	0.95	53.26	0.23	2.24	0.68	11.59	0.10	1.73	0.43	0.80	59.02	100.89	159.91
Idle Exh	0.00	0.00	0.01	0.36	0.00	0.51	0.00	5.93	0.00	0.23	0.00	0.00	0.00	0.25	0.00	0.00	0.01	7.29	7.31
Start Ex	12.08	0.00	9.11	0.00	0.81	0.00	0.10	0.00	0.47	0.00	0.05	0.00	0.02	0.00	0.01	0.00	22.65	0.00	22.65
Total Ex	61.66	0.32	15.30	19.27	1.70	12.55	1.05	59.19	0.70	2.47	0.73	11.59	0.11	1.99	0.43	0.80	81.68	108.18	189.86
PM2.5 Emissions																			
Run Exh	0.77	0.01	0.01	0.14	0.00	0.32	0.00	1.02	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	0.79	1.75	2.54
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Start Ex	0.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.22
Total Ex	0.99	0.01	0.02	0.14	0.00	0.32	0.00	1.04	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	1.01	1.77	2.77
TireWear	0.78	0.00	0.03	0.02	0.00	0.02	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.13	0.95
BrakeWear	6.12	0.01	0.24	0.20	0.02	0.28	0.00	0.29	0.00	0.03	0.00	0.31	0.00	0.06	0.01	0.01	6.41	1.19	7.59
Total	7.89	0.03	0.30	0.36	0.02	0.62	0.00	1.42	0.00	0.06	0.00	0.50	0.00	0.07	0.01	0.03	8.23	3.09	11.31
Fuel Consumption (1000 gallons) and SO2																			
Fuel	18486.09	25.20	1053.94	272.78	77.53	502.63	14.26	1785.52	21.95	72.07	18.38	195.12	5.27	24.02	50.40	13.54	19727.82	2890.87	22618.69
SOx	1.73	0.00	0.10	0.03	0.01	0.05	0.00	0.19	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.85	0.31	2.15

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-6

2019 Summer Planning Emissions (tons per day) in the South Coast Air Basin

	Light and Medium		Light Heavy		Medium Heavy		Heavy Heavy		Other Buses		Urban Buses		School Buses		Motor Homes		All Vehicles		Grand
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Total
vehicles	10417656	23816	327623	126383	21360	75969	1310	67365	7206	6196	1870	7344	1595	4763	64061	11228	10842681	323064	11165745
VMT/1000	352644	768	14113	5237	1023	4503	181	9794	273	491	199	785	55	172	719	119	369207	21869	391076
Reactive Organic Gas Emissions																			
Run Exh	16.10	0.02	1.00	0.68	0.12	0.54	0.09	2.42	0.03	0.08	0.35	0.47	0.05	0.03	0.05	0.02	17.78	4.26	22.05
Idle Exh	0.00	0.00	0.19	0.02	0.02	0.02	0.00	0.88	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.93	1.16
Start Ex	10.89	0.00	2.32	0.00	0.39	0.00	0.04	0.00	0.18	0.00	0.03	0.00	0.01	0.00	0.00	0.00	13.86	0.00	13.86
Total Ex	26.98	0.02	3.51	0.70	0.54	0.55	0.13	3.30	0.22	0.10	0.37	0.47	0.06	0.03	0.06	0.02	31.87	5.19	37.06
Diurnal	7.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	8.00	0.00	8.01
Hot Soak	10.56	0.00	0.52	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.15	0.00	11.15
Running	25.86	0.00	2.77	0.00	0.20	0.00	0.01	0.00	0.12	0.00	0.03	0.00	0.01	0.00	0.02	0.00	29.02	0.00	29.02
Resting	6.58	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	6.60	0.00	6.60
Total	77.97	0.02	6.83	0.70	0.79	0.55	0.14	3.30	0.35	0.10	0.41	0.47	0.07	0.03	0.09	0.02	86.64	5.20	91.83
Carbon Monoxide Emissions																			
Run Exh	531.12	0.13	19.57	4.15	2.68	2.33	6.10	14.02	0.54	0.37	3.07	2.13	0.72	0.09	1.83	0.07	565.61	23.30	588.91
Idle Exh	0.00	0.00	1.17	0.13	0.21	0.13	0.00	3.76	0.09	0.08	0.00	0.00	0.00	0.02	0.00	0.00	1.47	4.13	5.60
Start Ex	127.31	0.00	23.26	0.00	5.92	0.00	1.28	0.00	2.72	0.00	0.34	0.00	0.17	0.00	0.04	0.00	161.04	0.00	161.04
Total Ex	658.42	0.13	43.99	4.28	8.81	2.46	7.38	17.78	3.35	0.45	3.41	2.13	0.88	0.12	1.87	0.07	728.12	27.43	755.54
Oxides of Nitrogen Emissions																			
Run Exh	43.52	0.30	5.45	17.92	0.79	11.33	0.82	50.35	0.20	2.12	0.60	10.96	0.08	1.64	0.37	0.75	51.83	95.37	147.20
Idle Exh	0.00	0.00	0.01	0.36	0.00	0.53	0.00	6.12	0.00	0.24	0.00	0.00	0.00	0.26	0.00	0.00	0.01	7.52	7.53
Start Ex	11.23	0.00	8.77	0.00	0.78	0.00	0.10	0.00	0.46	0.00	0.05	0.00	0.01	0.00	0.01	0.00	21.40	0.00	21.40
Total Ex	54.75	0.30	14.23	18.28	1.57	11.87	0.92	56.47	0.65	2.36	0.64	10.96	0.10	1.90	0.38	0.75	73.24	102.89	176.13
PM2.5 Emissions																			
Run Exh	0.77	0.01	0.01	0.14	0.00	0.32	0.00	1.02	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	0.79	1.75	2.54
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Start Ex	0.22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.22
Total Ex	0.99	0.01	0.02	0.14	0.00	0.32	0.00	1.03	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	1.01	1.76	2.77
TireWear	0.78	0.00	0.03	0.02	0.00	0.02	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.13	0.95
BrakeWear	6.12	0.01	0.24	0.20	0.02	0.28	0.00	0.29	0.00	0.03	0.00	0.31	0.00	0.06	0.01	0.01	6.41	1.19	7.59
Total	7.89	0.03	0.30	0.36	0.02	0.62	0.00	1.42	0.00	0.06	0.00	0.50	0.00	0.07	0.01	0.03	8.23	3.08	11.31
Fuel Consumption (1000 gallons) and SO2																			
Fuel	19417.93	25.20	1053.01	272.78	77.31	502.96	14.22	1790.49	21.84	72.21	18.38	195.12	5.27	24.13	50.40	13.54	20658.36	2896.42	23554.78
SOx	1.82	0.00	0.10	0.03	0.01	0.05	0.00	0.19	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	1.94	0.31	2.24

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-7

2023 Annual Average Emissions (tons per day) in the South Coast Air Basin

	Light and Medium		Light Heavy		Medium Heavy		Heavy Heavy		Other Buses		Urban Buses		School Buses		Motor Homes		All Vehicles		Grand
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Total
vehicles	10526763	23898	344981	134099	22021	76214	1343	69530	7415	6442	1956	7611	1680	4769	71139	12504	10977298	335067	11312365
VMT/1000	355446	749	14808	5511	1046	4609	173	10412	275	527	209	814	59	168	809	135	372825	22925	395750
							Reactive Organic Gas Emissions												
Run Exh	12.49	0.01	0.56	0.58	0.06	0.40	0.07	2.17	0.02	0.08	0.32	0.45	0.03	0.03	0.03	0.02	13.57	3.74	17.32
Idle Exh	0.00	0.00	0.19	0.02	0.03	0.02	0.00	1.11	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.17	1.40
Start Ex	9.54	0.00	2.13	0.00	0.33	0.00	0.03	0.00	0.17	0.00	0.03	0.00	0.01	0.00	0.00	0.00	12.25	0.00	12.25
Total Ex	22.03	0.01	2.89	0.59	0.42	0.42	0.10	3.27	0.20	0.11	0.35	0.45	0.04	0.04	0.03	0.02	26.05	4.91	30.96
Diurnal	4.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	4.34	0.00	4.34
Hot Soak	8.60	0.00	0.48	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.14	0.00	9.14
Running	24.32	0.00	2.76	0.00	0.19	0.00	0.01	0.00	0.12	0.00	0.04	0.00	0.01	0.00	0.01	0.00	27.46	0.00	27.46
Resting	3.91	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.92	0.00	3.92
Total	63.19	0.01	6.14	0.59	0.64	0.42	0.11	3.27	0.33	0.11	0.39	0.45	0.05	0.04	0.05	0.02	70.91	4.92	75.82
							Carbon Monoxide Emissions												
Run Exh	390.69	0.09	12.02	3.95	1.35	1.85	5.57	13.05	0.30	0.38	2.62	2.09	0.43	0.10	0.77	0.08	413.74	21.59	435.33
Idle Exh	0.00	0.00	1.20	0.13	0.29	0.20	0.00	6.25	0.09	0.15	0.00	0.00	0.00	0.04	0.00	0.00	1.58	6.77	8.35
Start Ex	122.51	0.00	24.75	0.00	5.65	0.00	1.51	0.00	2.82	0.00	0.40	0.00	0.16	0.00	0.05	0.00	157.85	0.00	157.85
Total Ex	513.20	0.09	37.96	4.09	7.29	2.05	7.08	19.30	3.21	0.54	3.02	2.09	0.58	0.14	0.81	0.08	573.16	28.36	601.53
							Oxides of Nitrogen Emissions												
Run Exh	38.88	0.26	4.72	14.75	0.53	4.91	0.87	26.38	0.14	0.84	0.66	11.03	0.07	1.57	0.30	0.75	46.16	60.48	106.65
Idle Exh	0.00	0.00	0.01	0.38	0.00	0.33	0.00	6.25	0.00	0.15	0.00	0.00	0.00	0.24	0.00	0.00	0.01	7.36	7.37
Start Ex	8.76	0.00	8.63	0.00	0.66	0.00	0.10	0.00	0.40	0.00	0.05	0.00	0.01	0.00	0.01	0.00	18.61	0.00	18.61
Total Ex	47.64	0.26	13.37	15.13	1.19	5.24	0.97	32.63	0.54	0.99	0.71	11.03	0.08	1.81	0.30	0.75	64.79	67.84	132.63
							PM2.5 Emissions												
Run Exh	0.78	0.01	0.01	0.12	0.00	0.19	0.00	1.06	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	0.79	1.62	2.41
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Start Ex	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27
Total Ex	1.04	0.01	0.01	0.12	0.00	0.19	0.00	1.08	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	1.06	1.63	2.69
TireWear	0.78	0.00	0.03	0.02	0.00	0.02	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.14	0.96
BrakeWear	6.17	0.01	0.26	0.21	0.02	0.28	0.00	0.31	0.00	0.03	0.00	0.32	0.00	0.06	0.01	0.01	6.47	1.23	7.70
Total	8.00	0.02	0.30	0.35	0.02	0.49	0.00	1.49	0.00	0.06	0.00	0.50	0.00	0.07	0.01	0.03	8.34	3.01	11.35
							Fuel Consumption (1000 gallons) and SO2												
Fuel	18701.17	24.37	1106.75	286.49	78.85	511.62	13.69	1884.65	22.11	76.51	19.13	199.75	5.48	23.58	56.64	15.32	20003.82	3022.29	23026.10
SOx	1.75	0.00	0.10	0.03	0.01	0.05	0.00	0.20	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	1.88	0.32	2.19

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-8

2023 Summer Planning Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	10526763	23898	344981	134099	22021	76214	1343	69530	7415	6442	1956	7611	1680	4769	71139	12504	10977298	335067	11312365
VMT/1000	355446	749	14808	5511	1046	4609	173	10412	275	527	209	814	59	168	809	135	372825	22925	395750
Reactive Organic Gas Emissions																			
Run Exh	12.88	0.01	0.58	0.58	0.06	0.40	0.07	2.17	0.02	0.08	0.33	0.45	0.03	0.03	0.03	0.02	13.99	3.74	17.73
Idle Exh	0.00	0.00	0.19	0.02	0.02	0.02	0.00	1.04	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.10	1.33
Start Ex	8.14	0.00	1.90	0.00	0.29	0.00	0.03	0.00	0.15	0.00	0.03	0.00	0.01	0.00	0.00	0.00	10.54	0.00	10.54
Total Ex	21.02	0.01	2.67	0.59	0.38	0.42	0.10	3.21	0.18	0.10	0.36	0.45	0.04	0.04	0.03	0.02	24.76	4.85	29.61
Diurnal	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	7.01	0.00	7.02
Hot Soak	9.06	0.00	0.51	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.63	0.00	9.63
Running	22.97	0.00	2.70	0.00	0.18	0.00	0.01	0.00	0.12	0.00	0.03	0.00	0.01	0.00	0.01	0.00	26.03	0.00	26.03
Resting	5.91	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	5.94	0.00	5.94
Total	65.96	0.01	5.89	0.59	0.60	0.42	0.11	3.21	0.31	0.10	0.40	0.45	0.05	0.04	0.05	0.02	73.37	4.85	78.22
Carbon Monoxide Emissions																			
Run Exh	424.89	0.09	12.27	3.95	1.38	1.85	5.69	13.05	0.31	0.38	2.69	2.09	0.44	0.10	0.79	0.08	448.44	21.59	470.03
Idle Exh	0.00	0.00	1.20	0.13	0.21	0.15	0.00	4.54	0.09	0.11	0.00	0.00	0.00	0.03	0.00	0.00	1.50	4.96	6.46
Start Ex	96.64	0.00	20.10	0.00	4.56	0.00	1.22	0.00	2.28	0.00	0.33	0.00	0.13	0.00	0.04	0.00	125.31	0.00	125.31
Total Ex	521.53	0.09	33.57	4.09	6.16	2.00	6.91	17.59	2.68	0.50	3.02	2.09	0.57	0.13	0.82	0.08	575.25	26.55	601.80
Oxides of Nitrogen Emissions																			
Run Exh	34.29	0.25	4.16	14.01	0.47	4.65	0.78	24.94	0.12	0.79	0.58	10.43	0.06	1.48	0.26	0.71	40.72	57.26	97.98
Idle Exh	0.00	0.00	0.01	0.38	0.00	0.34	0.00	6.45	0.00	0.15	0.00	0.00	0.00	0.25	0.00	0.00	0.01	7.58	7.59
Start Ex	8.14	0.00	8.30	0.00	0.63	0.00	0.09	0.00	0.39	0.00	0.05	0.00	0.01	0.00	0.01	0.00	17.62	0.00	17.62
Total Ex	42.44	0.25	12.48	14.40	1.10	4.99	0.87	31.39	0.51	0.94	0.62	10.43	0.08	1.73	0.26	0.71	58.35	64.84	123.19
PM2.5 Emissions																			
Run Exh	0.78	0.01	0.01	0.12	0.00	0.19	0.00	1.06	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	0.79	1.62	2.41
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Start Ex	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27
Total Ex	1.04	0.01	0.01	0.12	0.00	0.19	0.00	1.07	0.00	0.03	0.00	0.18	0.00	0.01	0.00	0.02	1.06	1.63	2.69
TireWear	0.78	0.00	0.03	0.02	0.00	0.02	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.14	0.96
BrakeWear	6.17	0.01	0.26	0.21	0.02	0.28	0.00	0.31	0.00	0.03	0.00	0.32	0.00	0.06	0.01	0.01	6.47	1.23	7.70
Total	8.00	0.02	0.30	0.35	0.02	0.49	0.00	1.48	0.00	0.06	0.00	0.50	0.00	0.07	0.01	0.03	8.34	3.01	11.35
Fuel Consumption (1000 gallons) and SO2																			
Fuel	19652.69	24.37	1105.94	286.49	78.68	511.95	13.66	1890.43	22.01	76.66	19.13	199.75	5.48	23.69	56.65	15.32	20954.24	3028.65	23982.89
SOx	1.84	0.00	0.10	0.03	0.01	0.05	0.00	0.20	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	1.96	0.32	2.28

*Emissions reflect SCAG's 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-9

2030 Annual Average Emissions (tons per day) in the South Coast Air Basin

	Light and Medium Gas	Light and Medium Diesel	Light Heavy Gas	Light Heavy Diesel	Medium Heavy Gas	Medium Heavy Diesel	Heavy Heavy Gas	Heavy Heavy Diesel	Other Buses Gas	Other Buses Diesel	Urban Buses Gas	Urban Buses Diesel	School Buses Gas	School Buses Diesel	Motor Homes Gas	Motor Homes Diesel	All Vehicles Gas	All Vehicles Diesel	Grand Total
vehicles	11173991	25023	375645	146558	24022	82513	1506	80008	7739	7111	2103	8074	1827	4781	86692	15275	11673525	369343	12042868
VMT/1000	376572	778	16084	6028	1128	4998	188	12278	288	595	224	864	64	164	988	168	395536	25873	421409
Reactive Organic Gas Emissions																			
Run Exh	11.07	0.01	0.23	0.46	0.02	0.46	0.06	2.47	0.01	0.09	0.11	0.38	0.01	0.04	0.01	0.02	11.52	3.92	15.45
Idle Exh	0.00	0.00	0.21	0.02	0.03	0.02	0.00	1.32	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.25	1.39	1.64
Start Ex	7.28	0.00	1.67	0.00	0.27	0.00	0.03	0.00	0.14	0.00	0.03	0.00	0.01	0.00	0.00	0.00	9.43	0.00	9.43
Total Ex	18.35	0.01	2.11	0.48	0.32	0.48	0.09	3.78	0.16	0.12	0.14	0.38	0.02	0.05	0.01	0.02	21.20	5.31	26.51
Diurnal	3.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	3.87	0.00	3.87
Hot Soak	7.49	0.00	0.46	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.99	0.00	7.99
Running	22.30	0.00	2.50	0.00	0.18	0.00	0.01	0.00	0.12	0.00	0.03	0.00	0.01	0.00	0.01	0.00	25.16	0.00	25.16
Resting	3.67	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.68	0.00	3.68
Total	55.67	0.01	5.07	0.49	0.54	0.48	0.10	3.78	0.29	0.12	0.17	0.38	0.04	0.05	0.03	0.02	61.90	5.32	67.22
Carbon Monoxide Emissions																			
Run Exh	343.43	0.06	5.39	3.93	0.54	2.03	5.85	14.46	0.13	0.44	1.60	1.68	0.22	0.13	0.24	0.08	357.40	22.84	380.24
Idle Exh	0.00	0.00	1.29	0.14	0.32	0.22	0.00	7.43	0.09	0.17	0.00	0.00	0.00	0.05	0.00	0.00	1.70	8.03	9.73
Start Ex	96.12	0.00	21.05	0.00	4.39	0.00	1.61	0.00	2.30	0.00	0.34	0.00	0.13	0.00	0.05	0.00	125.98	0.00	125.98
Total Ex	439.55	0.06	27.72	4.08	5.25	2.26	7.46	21.90	2.52	0.62	1.94	1.68	0.34	0.19	0.29	0.08	485.08	30.87	515.95
Oxides of Nitrogen Emissions																			
Run Exh	32.51	0.21	3.11	9.67	0.27	5.31	0.94	28.70	0.07	0.98	0.54	8.47	0.05	1.10	0.19	0.72	37.69	55.17	92.86
Idle Exh	0.00	0.00	0.01	0.42	0.00	0.35	0.00	7.13	0.00	0.17	0.00	0.00	0.00	0.18	0.00	0.00	0.02	8.24	8.26
Start Ex	6.48	0.00	8.13	0.00	0.53	0.00	0.11	0.00	0.33	0.00	0.05	0.00	0.01	0.00	0.01	0.00	15.64	0.00	15.64
Total Ex	39.00	0.21	11.26	10.09	0.80	5.65	1.05	35.83	0.40	1.15	0.59	8.47	0.06	1.28	0.19	0.72	53.35	63.41	116.76
PM2.5 Emissions																			
Run Exh	0.91	0.00	0.01	0.11	0.00	0.21	0.00	1.16	0.00	0.04	0.00	0.15	0.00	0.01	0.00	0.01	0.92	1.69	2.61
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Start Ex	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.34
Total Ex	1.26	0.00	0.01	0.11	0.00	0.21	0.00	1.18	0.00	0.04	0.00	0.15	0.00	0.01	0.00	0.01	1.26	1.71	2.97
TireWear	0.83	0.00	0.04	0.02	0.00	0.02	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.16	1.03
BrakeWear	6.54	0.01	0.28	0.23	0.02	0.31	0.00	0.36	0.01	0.04	0.01	0.34	0.00	0.06	0.02	0.01	6.87	1.36	8.23
Total	8.63	0.02	0.32	0.36	0.02	0.53	0.00	1.66	0.01	0.07	0.01	0.49	0.00	0.07	0.02	0.02	9.00	3.22	12.23
Fuel Consumption (1000 gallons) and SO2																			
Fuel	19965.07	25.14	1211.40	312.85	85.15	555.88	14.91	2221.78	23.08	86.53	20.26	203.27	5.89	23.11	69.59	19.14	21395.36	3447.68	24843.04
SOx	1.87	0.00	0.11	0.03	0.01	0.06	0.00	0.24	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	2.01	0.36	2.37

*Emissions reflect SCAG’s 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

Table D-10

2030 Summer Planning Emissions (tons per day) in the South Coast Air Basin

	Light and Medium		Light Heavy		Medium Heavy		Heavy Heavy		Other Buses		Urban Buses		School Buses		Motor Homes		All Vehicles		Grand
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel	Total
vehicles	11173991	25023	375645	146558	24022	82513	1506	80008	7739	7111	2103	8074	1827	4781	86692	15275	11673525	369343	12042868
VMT/1000	376572	778	16084	6028	1128	4998	188	12278	288	595	224	864	64	164	988	168	395536	25873	421409
Reactive Organic Gas Emissions																			
Run Exh	11.40	0.01	0.23	0.46	0.02	0.46	0.06	2.47	0.01	0.09	0.11	0.38	0.01	0.04	0.01	0.02	11.86	3.92	15.78
Idle Exh	0.00	0.00	0.21	0.02	0.03	0.02	0.00	1.24	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.25	1.31	1.56
Start Ex	6.22	0.00	1.49	0.00	0.24	0.00	0.03	0.00	0.13	0.00	0.02	0.00	0.01	0.00	0.00	0.00	8.14	0.00	8.14
Total Ex	17.62	0.01	1.93	0.48	0.29	0.47	0.09	3.71	0.15	0.12	0.14	0.38	0.02	0.05	0.01	0.02	20.24	5.23	25.48
Diurnal	6.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	6.27	0.00	6.28
Hot Soak	7.86	0.00	0.48	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.39	0.00	8.39
Running	21.03	0.00	2.43	0.00	0.18	0.00	0.01	0.00	0.12	0.00	0.03	0.00	0.01	0.00	0.01	0.00	23.81	0.00	23.81
Resting	5.52	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	5.54	0.00	5.54
Total	58.29	0.01	4.86	0.49	0.50	0.47	0.10	3.71	0.27	0.12	0.16	0.38	0.04	0.05	0.03	0.02	64.25	5.24	69.49
Carbon Monoxide Emissions																			
Run Exh	375.26	0.06	5.50	3.93	0.55	2.03	5.99	14.46	0.13	0.44	1.64	1.68	0.22	0.13	0.25	0.08	389.53	22.84	412.37
Idle Exh	0.00	0.00	1.29	0.14	0.23	0.16	0.00	5.40	0.09	0.13	0.00	0.00	0.00	0.04	0.00	0.00	1.61	5.87	7.49
Start Ex	75.87	0.00	17.16	0.00	3.57	0.00	1.31	0.00	1.87	0.00	0.29	0.00	0.11	0.00	0.04	0.00	100.20	0.00	100.20
Total Ex	451.13	0.06	23.94	4.08	4.36	2.20	7.30	19.86	2.09	0.57	1.92	1.68	0.33	0.17	0.28	0.08	491.34	28.71	520.05
Oxides of Nitrogen Emissions																			
Run Exh	28.65	0.20	2.74	9.16	0.24	5.03	0.82	27.18	0.06	0.93	0.48	8.01	0.04	1.03	0.17	0.68	33.19	52.22	85.41
Idle Exh	0.00	0.00	0.01	0.42	0.00	0.36	0.00	7.36	0.00	0.17	0.00	0.00	0.00	0.19	0.00	0.00	0.02	8.49	8.51
Start Ex	6.03	0.00	7.83	0.00	0.51	0.00	0.10	0.00	0.31	0.00	0.05	0.00	0.01	0.00	0.01	0.00	14.84	0.00	14.84
Total Ex	34.67	0.20	10.57	9.57	0.75	5.39	0.92	34.53	0.38	1.11	0.52	8.01	0.05	1.22	0.17	0.68	48.04	60.72	108.76
PM2.5 Emissions																			
Run Exh	0.91	0.00	0.01	0.11	0.00	0.21	0.00	1.16	0.00	0.04	0.00	0.15	0.00	0.01	0.00	0.01	0.92	1.69	2.61
Idle Exh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Start Ex	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.34
Total Ex	1.26	0.00	0.01	0.11	0.00	0.21	0.00	1.18	0.00	0.04	0.00	0.15	0.00	0.01	0.00	0.01	1.26	1.71	2.97
TireWear	0.83	0.00	0.04	0.02	0.00	0.02	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.16	1.03
BrakeWear	6.54	0.01	0.28	0.23	0.02	0.31	0.00	0.36	0.01	0.04	0.01	0.34	0.00	0.06	0.02	0.01	6.87	1.36	8.23
Total	8.63	0.02	0.32	0.36	0.02	0.53	0.00	1.66	0.01	0.07	0.01	0.49	0.00	0.07	0.02	0.02	9.00	3.22	12.22
Fuel Consumption (1000 gallons) and SO2																			
Fuel	20992.20	25.14	1210.70	312.85	85.03	556.24	14.88	2228.56	23.00	86.70	20.26	203.27	5.89	23.22	69.59	19.14	22421.56	3455.10	25876.66
SOx	1.97	0.00	0.11	0.03	0.01	0.06	0.00	0.24	0.00	0.01	0.00	0.02	0.00	0.00	0.01	0.00	2.10	0.37	2.47

*Emissions reflect SCAG’s 2012 RTP activities and EMFAC2011 emission factors. Emission adjustments beyond the EMFAC2011 are not included.

ATTACHMENT E

FINAL 2012 AQMP APPENDIX III

EMISSIONS FROM

DIESEL COMBUSTION

BY MAJOR SOURCE CATEGORY

TABLE E-1
2008 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC		Annual Average Inventory									Summer Planning	
Code	Major Source Category (MSC)	TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.150	0.125	0.001	0.342	0.024	0.112	0.112	0.108	0.010	0.125	0.001
030	Oil and Gas Production (Combustion)	0.011	0.010	0.007	0.027	0.000	0.014	0.014	0.013	0.000	0.010	0.007
050	Manufacturing and Industrial	0.081	0.068	0.279	0.184	0.005	0.059	0.059	0.057	0.002	0.071	0.322
052	Food and Agricultural Processing	0.006	0.004	0.044	0.015	0.000	0.002	0.002	0.002	0.004	0.005	0.058
060	Service and Commercial	0.149	0.125	1.328	0.351	0.027	0.113	0.113	0.109	0.009	0.130	1.371
099	Other (Fuel Combustion)	0.257	0.183	3.126	0.983	0.004	0.062	0.048	0.035	0.001	0.185	3.149
110	Sewage Treatment	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
130	Incinerators	0.067	0.011	0.050	0.025	0.005	0.001	0.001	0.001	0.000	0.011	0.050
310	Oil and Gas Production	0.007	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.011	0.010	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.011	0.001
610	Residential Fuel Combustion	0.000	0.000	0.080	0.011	0.001	0.009	0.009	0.008	0.000	0.000	0.080
710	Light Duty Passenger	0.105	0.088	0.688	0.414	0.002	0.071	0.071	0.065	0.002	0.088	0.647
722	Light Duty Trucks-1 (up to 3750 lb.)	0.006	0.005	0.036	0.024	0.000	0.004	0.004	0.004	0.000	0.005	0.035
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.005	0.004	0.041	0.023	0.000	0.004	0.004	0.004	0.000	0.004	0.038
724	Medium Duty Trucks (5751-8500 lb.)	0.004	0.003	0.035	0.023	0.000	0.003	0.003	0.003	0.000	0.003	0.033
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.761	0.637	24.570	3.242	0.020	0.170	0.170	0.156	0.012	0.637	23.300
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.260	0.218	8.133	1.101	0.007	0.060	0.060	0.055	0.004	0.218	7.707
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	2.011	1.683	41.761	6.329	0.051	1.538	1.538	1.415	0.127	1.682	39.493
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	10.696	8.953	160.606	37.971	0.164	6.504	6.504	5.984	0.255	8.922	152.392
760	Heavy Duty Diesel Urban Buses	0.618	0.517	14.047	2.519	0.020	0.232	0.232	0.213	0.022	0.517	13.281
772	School Buses - Diesel	0.229	0.192	2.783	0.671	0.003	0.127	0.126	0.121	0.006	0.191	2.655
779	All Other Buses - Diesel	0.361	0.302	6.135	1.278	0.006	0.216	0.215	0.206	0.012	0.301	5.830
780	Motor Homes	0.021	0.018	0.954	0.071	0.001	0.026	0.026	0.024	0.000	0.018	0.900
820	Trains	2.568	2.150	26.069	6.120	0.121	0.753	0.753	0.693	0.000	2.150	26.069
833	Ocean Going Vessels	2.161	1.928	40.727	3.745	36.772	4.121	4.011	3.869	0.030	1.930	40.741
835	Commercial Harbor Craft	1.517	1.275	18.543	5.501	0.010	0.856	0.856	0.791	0.000	1.275	18.546
840	Recreational Boats	0.304	0.255	0.543	0.210	0.000	0.019	0.019	0.018	0.000	0.439	0.782
860	Commercial/Industrial Mobile Equipment	10.028	8.411	67.174	36.064	0.051	3.930	3.930	3.616	0.023	8.632	68.449
870	Farm Equipment	1.206	1.009	6.530	3.164	0.006	0.390	0.390	0.358	0.004	1.231	7.962
	RECLAIM			0.989		0.114						1.016
	Total Diesel	**33.605**	**28.190**	**425.279**	**110.408**	**37.422**	**19.395**	**19.269**	**17.927**	**0.523**	**28.800**	**414.914**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

TABLE E-2
2014 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC		Annual Average Inventory									Summer Planning	
Code	Major Source Category (MSC)	TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.132	0.111	0.001	0.302	0.021	0.099	0.099	0.095	0.009	0.111	0.001
030	Oil and Gas Production (Combustion)	0.011	0.010	0.007	0.027	0.000	0.014	0.014	0.013	0.000	0.010	0.007
050	Manufacturing and Industrial	0.081	0.067	0.277	0.184	0.004	0.060	0.060	0.057	0.002	0.071	0.318
052	Food and Agricultural Processing	0.004	0.002	0.031	0.011	0.000	0.001	0.001	0.001	0.004	0.003	0.039
060	Service and Commercial	0.158	0.133	1.403	0.376	0.029	0.121	0.121	0.117	0.009	0.139	1.446
099	Other (Fuel Combustion)	0.236	0.168	2.935	0.903	0.004	0.055	0.043	0.032	0.001	0.169	2.956
110	Sewage Treatment	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
130	Incinerators	0.068	0.011	0.054	0.026	0.005	0.001	0.001	0.001	0.000	0.011	0.054
310	Oil and Gas Production	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.012	0.011	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.012	0.001
610	Residential Fuel Combustion	0.000	0.000	0.083	0.012	0.001	0.009	0.009	0.009	0.000	0.000	0.083
710	Light Duty Passenger	0.041	0.035	0.392	0.199	0.002	0.030	0.030	0.027	0.002	0.035	0.371
722	Light Duty Trucks-1 (up to 3750 lb.)	0.003	0.002	0.025	0.014	0.000	0.002	0.002	0.002	0.000	0.002	0.023
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.002	0.002	0.024	0.012	0.000	0.001	0.001	0.001	0.000	0.002	0.023
724	Medium Duty Trucks (5751-8500 lb.)	0.003	0.002	0.028	0.014	0.000	0.001	0.001	0.001	0.000	0.002	0.026
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.675	0.565	18.438	3.286	0.019	0.137	0.137	0.126	0.013	0.565	17.478
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.228	0.190	5.994	1.120	0.007	0.049	0.049	0.045	0.004	0.190	5.693
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	1.128	0.944	24.551	3.823	0.049	0.735	0.735	0.676	0.122	0.943	23.303
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	3.974	3.326	80.389	17.843	0.159	1.651	1.651	1.519	0.245	3.295	76.434
760	Heavy Duty Diesel Urban Buses	0.603	0.505	13.404	2.414	0.021	0.223	0.223	0.205	0.023	0.505	12.675
772	School Buses - Diesel	0.051	0.043	2.251	0.155	0.003	0.021	0.021	0.020	0.005	0.043	2.150
779	All Other Buses - Diesel	0.156	0.131	4.420	0.588	0.007	0.079	0.079	0.075	0.013	0.130	4.208
780	Motor Homes	0.022	0.018	0.885	0.073	0.001	0.024	0.024	0.022	0.000	0.018	0.836
820	Trains	2.004	1.677	21.734	6.591	0.017	0.617	0.617	0.568	0.000	1.677	21.734
833	Ocean Going Vessels	2.331	2.081	35.127	3.857	2.701	0.852	0.852	0.818	0.031	2.082	35.138
835	Commercial Harbor Craft	1.285	1.080	11.893	6.271	0.010	0.526	0.526	0.486	0.000	1.080	11.895
840	Recreational Boats	0.329	0.275	0.601	0.247	0.000	0.014	0.014	0.013	0.000	0.489	0.868
860	Commercial/Industrial Mobile Equipment	6.189	5.191	48.565	30.898	0.051	2.424	2.424	2.229	0.025	5.347	49.542
870	Farm Equipment	0.768	0.642	4.522	2.724	0.006	0.256	0.256	0.235	0.004	0.783	5.514
	RECLAIM			1.033		0.109						1.061
	Total Diesel	**20.503**	**17.230**	**279.067**	**81.968**	**3.234**	**8.001**	**7.988**	**7.394**	**0.512**	**17.720**	**273.875**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

TABLE E-3
2017 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC Code	Major Source Category (MSC)	Annual Average Inventory									Summer Planning	
		TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.131	0.110	0.001	0.300	0.021	0.098	0.098	0.095	0.009	0.110	0.001
030	Oil and Gas Production (Combustion)	0.013	0.011	0.008	0.031	0.000	0.016	0.015	0.015	0.000	0.011	0.008
050	Manufacturing and Industrial	0.083	0.070	0.297	0.190	0.005	0.061	0.061	0.059	0.002	0.073	0.343
052	Food and Agricultural Processing	0.004	0.003	0.022	0.011	0.000	0.002	0.002	0.002	0.004	0.003	0.027
060	Service and Commercial	0.164	0.137	1.453	0.389	0.030	0.125	0.125	0.121	0.010	0.144	1.499
099	Other (Fuel Combustion)	0.179	0.128	2.412	0.723	0.004	0.044	0.036	0.027	0.001	0.130	2.435
110	Sewage Treatment	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
130	Incinerators	0.071	0.012	0.058	0.027	0.005	0.002	0.001	0.001	0.000	0.012	0.058
310	Oil and Gas Production	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.013	0.012	0.001	0.000	0.010	0.000	0.000	0.000	0.000	0.013	0.001
610	Residential Fuel Combustion	0.000	0.000	0.086	0.012	0.001	0.009	0.009	0.009	0.000	0.000	0.086
710	Light Duty Passenger	0.027	0.023	0.310	0.143	0.002	0.018	0.018	0.017	0.002	0.023	0.293
722	Light Duty Trucks-1 (up to 3750 lb.)	0.002	0.001	0.020	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.019
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.001	0.001	0.018	0.009	0.000	0.000	0.000	0.000	0.000	0.001	0.018
724	Medium Duty Trucks (5751-8500 lb.)	0.002	0.001	0.024	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.021
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.597	0.500	15.655	3.162	0.019	0.115	0.115	0.105	0.013	0.500	14.849
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.204	0.171	5.123	1.136	0.008	0.043	0.043	0.040	0.004	0.171	4.855
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	0.829	0.694	17.350	3.038	0.051	0.504	0.504	0.464	0.129	0.692	16.441
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	3.867	3.236	67.672	18.652	0.177	1.334	1.334	1.227	0.273	3.194	64.456
760	Heavy Duty Diesel Urban Buses	0.564	0.472	12.315	2.245	0.021	0.209	0.209	0.193	0.023	0.472	11.645
772	School Buses - Diesel	0.044	0.037	2.094	0.138	0.003	0.016	0.016	0.015	0.005	0.037	2.002
779	All Other Buses - Diesel	0.128	0.108	3.250	0.524	0.007	0.053	0.052	0.050	0.014	0.107	3.097
780	Motor Homes	0.021	0.017	0.832	0.073	0.001	0.022	0.022	0.020	0.000	0.017	0.786
820	Trains	1.808	1.513	23.522	7.428	0.019	0.583	0.583	0.536	0.000	1.513	23.522
833	Ocean Going Vessels	2.759	2.466	39.869	4.480	3.105	0.978	0.978	0.938	0.037	2.467	39.880
835	Commercial Harbor Craft	1.259	1.058	10.662	6.653	0.010	0.450	0.450	0.415	0.000	1.059	10.664
840	Recreational Boats	0.328	0.274	0.638	0.273	0.000	0.012	0.012	0.011	0.000	0.494	0.922
860	Commercial/Industrial Mobile Equipment	5.616	4.712	44.066	32.920	0.058	2.044	2.044	1.882	0.028	4.834	44.879
870	Farm Equipment	0.583	0.487	3.526	2.583	0.006	0.188	0.188	0.172	0.004	0.594	4.298
	RECLAIM			1.033		0.095						1.061
	Total Diesel	**19.309**	**16.264**	**252.314**	**85.161**	**3.657**	**6.927**	**6.916**	**6.416**	**0.560**	**16.681**	**248.165**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

TABLE E-4
2019 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC		Annual Average Inventory									Summer Planning	
Code	Major Source Category (MSC)	TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.130	0.108	0.001	0.296	0.021	0.097	0.097	0.094	0.008	0.108	0.001
030	Oil and Gas Production (Combustion)	0.014	0.012	0.009	0.033	0.000	0.017	0.016	0.016	0.000	0.012	0.009
050	Manufacturing and Industrial	0.084	0.071	0.309	0.193	0.005	0.063	0.063	0.060	0.002	0.075	0.357
052	Food and Agricultural Processing	0.003	0.003	0.020	0.011	0.000	0.002	0.002	0.002	0.005	0.003	0.025
060	Service and Commercial	0.167	0.140	1.476	0.396	0.030	0.127	0.127	0.123	0.010	0.146	1.522
099	Other (Fuel Combustion)	0.179	0.128	2.418	0.725	0.004	0.045	0.036	0.027	0.001	0.130	2.443
110	Sewage Treatment	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
130	Incinerators	0.073	0.012	0.060	0.028	0.005	0.002	0.002	0.002	0.000	0.012	0.060
310	Oil and Gas Production	0.008	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.014	0.013	0.001	0.000	0.010	0.000	0.000	0.000	0.000	0.013	0.001
610	Residential Fuel Combustion	0.000	0.000	0.087	0.012	0.001	0.009	0.009	0.009	0.000	0.000	0.087
710	Light Duty Passenger	0.018	0.015	0.251	0.105	0.002	0.011	0.011	0.010	0.002	0.015	0.238
722	Light Duty Trucks-1 (up to 3750 lb.)	0.001	0.001	0.017	0.009	0.000	0.001	0.001	0.001	0.000	0.001	0.016
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.001	0.001	0.015	0.006	0.000	0.000	0.000	0.000	0.000	0.001	0.015
724	Medium Duty Trucks (5751-8500 lb.)	0.001	0.001	0.021	0.009	0.000	0.001	0.001	0.001	0.000	0.001	0.019
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.549	0.460	13.712	3.201	0.019	0.098	0.098	0.090	0.014	0.460	13.012
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.192	0.160	4.499	1.217	0.008	0.038	0.038	0.035	0.004	0.160	4.256
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	0.629	0.526	12.549	2.514	0.053	0.350	0.350	0.322	0.134	0.526	11.867
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	3.795	3.177	59.194	19.191	0.189	1.122	1.122	1.032	0.292	3.126	56.470
760	Heavy Duty Diesel Urban Buses	0.538	0.450	11.589	2.132	0.021	0.200	0.200	0.184	0.023	0.450	10.958
772	School Buses - Diesel	0.040	0.034	1.989	0.127	0.003	0.012	0.012	0.011	0.005	0.033	1.903
779	All Other Buses - Diesel	0.110	0.092	2.470	0.482	0.008	0.035	0.035	0.033	0.015	0.091	2.356
780	Motor Homes	0.020	0.017	0.796	0.073	0.001	0.020	0.020	0.018	0.000	0.017	0.752
820	Trains	1.667	1.395	23.040	7.803	0.020	0.549	0.549	0.505	0.000	1.395	23.040
833	Ocean Going Vessels	3.004	2.687	36.087	4.820	3.325	1.044	1.044	1.001	0.041	2.688	36.097
835	Commercial Harbor Craft	1.240	1.042	9.691	7.081	0.010	0.378	0.378	0.350	0.000	1.042	9.692
840	Recreational Boats	0.325	0.272	0.664	0.290	0.000	0.011	0.011	0.010	0.000	0.493	0.961
860	Commercial/Industrial Mobile Equipment	5.003	4.198	38.387	33.857	0.062	1.651	1.651	1.518	0.031	4.302	39.109
870	Farm Equipment	0.475	0.397	2.943	2.506	0.006	0.146	0.146	0.135	0.004	0.484	3.588
	RECLAIM			1.033		0.084						1.061
	Total Diesel	**18.284**	**15.419**	**223.326**	**87.116**	**3.887**	**6.028**	**6.018**	**5.589**	**0.592**	**15.793**	**219.916**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

TABLE E-5
2023 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC		Annual Average Inventory									Summer Planning	
Code	Major Source Category (MSC)	TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.129	0.108	0.001	0.294	0.020	0.096	0.096	0.093	0.008	0.108	0.001
030	Oil and Gas Production (Combustion)	0.015	0.012	0.009	0.035	0.000	0.018	0.017	0.017	0.000	0.012	0.009
050	Manufacturing and Industrial	0.086	0.072	0.321	0.197	0.005	0.064	0.064	0.062	0.002	0.077	0.374
052	Food and Agricultural Processing	0.003	0.002	0.019	0.010	0.000	0.002	0.002	0.002	0.005	0.003	0.023
060	Service and Commercial	0.174	0.146	1.540	0.412	0.031	0.132	0.132	0.127	0.010	0.152	1.587
099	Other (Fuel Combustion)	0.140	0.101	2.042	0.615	0.004	0.034	0.028	0.023	0.002	0.103	2.069
110	Sewage Treatment	0.003	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.001
130	Incinerators	0.076	0.012	0.064	0.030	0.005	0.002	0.002	0.002	0.000	0.012	0.064
310	Oil and Gas Production	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.015	0.014	0.001	0.000	0.011	0.000	0.000	0.000	0.000	0.014	0.001
610	Residential Fuel Combustion	0.000	0.000	0.091	0.013	0.001	0.010	0.010	0.009	0.000	0.000	0.091
710	Light Duty Passenger	0.010	0.009	0.173	0.069	0.002	0.006	0.006	0.005	0.002	0.009	0.164
722	Light Duty Trucks-1 (up to 3750 lb.)	0.001	0.001	0.015	0.007	0.000	0.001	0.001	0.001	0.000	0.001	0.015
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.000	0.000	0.013	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.012
724	Medium Duty Trucks (5751-8500 lb.)	0.001	0.001	0.017	0.007	0.000	0.000	0.000	0.000	0.000	0.001	0.017
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.465	0.389	10.236	3.359	0.021	0.072	0.072	0.066	0.014	0.389	9.741
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.169	0.141	3.356	1.435	0.010	0.027	0.027	0.025	0.005	0.141	3.192
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	0.477	0.399	5.239	2.052	0.054	0.211	0.211	0.194	0.137	0.398	4.993
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	3.731	3.123	32.631	19.295	0.199	1.176	1.176	1.082	0.310	3.060	31.387
760	Heavy Duty Diesel Urban Buses	0.516	0.432	11.028	2.085	0.021	0.192	0.192	0.177	0.024	0.432	10.427
772	School Buses - Diesel	0.042	0.035	1.812	0.138	0.003	0.011	0.011	0.011	0.005	0.035	1.734
779	All Other Buses - Diesel	0.120	0.101	0.985	0.537	0.008	0.034	0.034	0.032	0.016	0.099	0.944
780	Motor Homes	0.021	0.018	0.754	0.075	0.002	0.018	0.018	0.017	0.001	0.018	0.712
820	Trains	1.540	1.289	22.229	8.604	0.022	0.506	0.506	0.465	0.000	1.289	22.229
833	Ocean Going Vessels	3.642	3.258	32.037	5.758	3.855	1.231	1.231	1.180	0.049	3.259	32.045
835	Commercial Harbor Craft	1.254	1.054	9.205	7.392	0.009	0.351	0.351	0.324	0.000	1.054	9.206
840	Recreational Boats	0.309	0.259	0.733	0.322	0.000	0.009	0.009	0.008	0.000	0.477	1.063
860	Commercial/Industrial Mobile Equipment	4.267	3.578	29.505	36.665	0.071	1.073	1.073	0.986	0.035	3.662	30.099
870	Farm Equipment	0.346	0.289	2.049	2.401	0.006	0.087	0.087	0.080	0.004	0.353	2.499
	RECLAIM			1.033		0.082						1.061
	Total Diesel	**17.558**	**14.850**	**167.139**	**91.811**	**4.443**	**5.361**	**5.354**	**4.987**	**0.630**	**15.166**	**165.760**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

TABLE E-6
2030 Baseline Diesel Emissions (Tons/Day)
in South Coast Air Basin

MSC		Annual Average Inventory									Summer Planning	
Code	Major Source Category (MSC)	TOG	VOC	NOX	CO	SOX	TSP	PM10	PM2.5	NH3	VOC	NOX
010	Electric Utilities	0.129	0.108	0.001	0.294	0.020	0.096	0.096	0.093	0.008	0.108	0.001
030	Oil and Gas Production (Combustion)	0.015	0.013	0.009	0.036	0.000	0.018	0.018	0.018	0.000	0.013	0.009
050	Manufacturing and Industrial	0.088	0.074	0.341	0.203	0.006	0.066	0.066	0.064	0.002	0.079	0.396
052	Food and Agricultural Processing	0.003	0.002	0.017	0.010	0.000	0.002	0.002	0.002	0.006	0.003	0.020
060	Service and Commercial	0.188	0.157	1.658	0.443	0.033	0.142	0.142	0.137	0.011	0.164	1.707
099	Other (Fuel Combustion)	0.141	0.102	2.056	0.618	0.005	0.035	0.029	0.023	0.002	0.104	2.084
110	Sewage Treatment	0.004	0.001	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.002
130	Incinerators	0.080	0.013	0.072	0.032	0.005	0.002	0.002	0.002	0.000	0.013	0.072
310	Oil and Gas Production	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000
320	Petroleum Refining	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
330	Petroleum Marketing	0.016	0.015	0.001	0.000	0.012	0.000	0.000	0.000	0.000	0.016	0.001
610	Residential Fuel Combustion	0.000	0.000	0.096	0.013	0.001	0.010	0.010	0.010	0.000	0.000	0.096
710	Light Duty Passenger	0.004	0.004	0.095	0.037	0.002	0.003	0.003	0.002	0.002	0.004	0.090
722	Light Duty Trucks-1 (up to 3750 lb.)	0.000	0.000	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.008
723	Light Duty Trucks-2 (3751 to 5750 lb.)	0.000	0.000	0.008	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.008
724	Medium Duty Trucks (5751-8500 lb.)	0.000	0.000	0.014	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.013
742	Light Heavy Duty Diesel Trucks-1 (8501-10000 lb.)	0.364	0.304	5.803	3.879	0.024	0.045	0.045	0.042	0.016	0.304	5.502
743	Light Heavy Duty Diesel Trucks-2 (10001-14000 lb.)	0.148	0.124	1.898	1.884	0.013	0.018	0.018	0.016	0.005	0.124	1.807
744	Medium Heavy Duty Diesel Trucks (14001-33000 lb.)	0.540	0.452	5.653	2.258	0.059	0.229	0.229	0.211	0.149	0.451	5.389
746	Heavy Heavy Duty Diesel Trucks (>33001 lb.)	4.335	3.628	35.831	21.899	0.235	1.287	1.287	1.184	0.365	3.557	34.534
760	Heavy Duty Diesel Urban Buses	0.429	0.359	8.470	1.685	0.022	0.161	0.161	0.148	0.026	0.359	8.009
772	School Buses - Diesel	0.056	0.047	1.275	0.186	0.002	0.010	0.010	0.010	0.005	0.047	1.220
779	All Other Buses - Diesel	0.140	0.117	1.152	0.615	0.009	0.039	0.039	0.037	0.018	0.116	1.105
780	Motor Homes	0.022	0.018	0.724	0.081	0.002	0.013	0.013	0.012	0.001	0.018	0.683
820	Trains	1.275	1.067	19.031	10.391	0.027	0.405	0.405	0.373	0.000	1.067	19.031
833	Ocean Going Vessels	5.298	4.742	28.554	8.238	5.232	1.734	1.734	1.661	0.071	4.743	28.559
835	Commercial Harbor Craft	1.256	1.056	8.993	7.490	0.009	0.343	0.343	0.317	0.000	1.056	8.995
840	Recreational Boats	0.257	0.215	0.806	0.365	0.000	0.006	0.006	0.005	0.000	0.401	1.170
860	Commercial/Industrial Mobile Equipment	3.885	3.259	22.406	42.415	0.085	0.605	0.605	0.557	0.047	3.329	22.886
870	Farm Equipment	0.228	0.190	1.186	2.279	0.006	0.031	0.031	0.029	0.004	0.232	1.446
	RECLAIM			1.033		0.082						1.061
	Total Diesel	**18.909**	**16.075**	**147.193**	**105.362**	**5.891**	**5.300**	**5.293**	**4.952**	**0.738**	**16.316**	**145.903**

Note:
(1) Emission from line items (AQMP/Set-Aside) not included.
(2) Ships and Commercial Boats included Residual Oil.

ATTACHMENT F

FINAL 2012 AQMP APPENDIX III

2008 BASE YEAR

GREENHOUSE GAS EMISSION INVENTORY METHODOLOGY

AND

BY MAJOR SOURCE CATEGORY

Table F

2008 Baseline GHG Emissions for SCAB

		Emission (TPD)			Emission (TPY)			MMTONS
CODE	**Source Category**	**CO2**	**N2O**	**CH4**	**CO2**	**N2O**	**CH4**	**CO2e**
Fuel Combustion								
10	Electric Utilities	34,302.91	0.08	0.71	12,520,561.73	28.99	258.47	11.37
20	Cogeneration	872.16	0.00	0.02	318,340.22	0.60	6.00	0.29
30	Oil and Gas Production (combustion)	2,908.14	0.01	0.08	1,061,469.85	4.71	29.54	0.96
40	Petroleum Refining (Combustion)	44,654.15	0.06	0.57	16,298,765.74	20.71	207.09	14.80
50	Manufacturing and Industrial	22,181.91	0.06	0.48	8,096,396.32	20.91	174.29	7.35
52	Food and Agricultural Processing	927.44	0.00	0.02	338,516.28	0.84	7.16	0.31
60	Service and Commercial	21,888.81	0.08	0.59	7,989,416.32	30.76	214.96	7.26
99	Other (Fuel Combustion)	2,241.25	0.02	0.16	818,056.85	8.58	58.23	0.75
Total Fuel Combustion		**129,976.78**	**0.32**	**2.62**	**47,441,523.29**	**116.10**	**955.74**	**43.09**
Waste Disposal								
110	Sewage Treatment	26.45	0.00	0.00	9,653.42	0.12	1.50	0.01
120	Landfills	3,165.78	0.04	505.35	1,155,509.15	13.98	184,451.33	4.57
130	Incineration	580.02	0.00	0.02	211,707.66	0.81	5.48	0.19
199	Other (Waste Disposal)			2.25	0.00	0.00	820.00	0.02
Total Waste Disposal		**3,772.25**	**0.04**	**507.61**	**1,376,870.22**	**14.91**	**185,278.31**	**4.78**
Cleaning and Surface Coatings								
210	Laundering							
220	Degreasing							
230	Coatings and Related Processes	27.09	0.00	0.21	9,889.59	0.02	78.00	0.01
240	Printing			0.00	0.00	0.00	0.00	0.00
250	Adhesives and Sealants			0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	2,621.20	0.00	0.12	956,738.61	1.20	43.90	0.87
Total Cleaning and Surface Coatings		**2,648.30**	**0.00**	**0.33**	**966,628.19**	**1.22**	**121.90**	**0.88**
Petroleum Production and Marketing								
310	Oil and Gas Production	92.07	0.00	0.92	33,604.54	0.06	336.40	0.04
320	Petroleum Refining	769.68	0.00	1.65	280,931.54	0.36	602.70	0.27
330	Petroleum Marketing			83.83	0.00	0.00	30,598.00	0.58
399	Other (Petroleum Production and Marketing)			0.00	0.00	0.00	0.30	0.00
Total Petroleum Production and Marketing		**861.74**	**0.00**	**86.40**	**314,536.07**	**0.42**	**31,537.40**	**0.89**
Industrial Processes								
410	Chemical			0.92	0.00	0.00	336.50	0.01
420	Food and Agriculture			0.02	0.00	0.00	7.10	0.00
430	Mineral Processes	278.92	0.00	0.05	101,804.41	0.19	17.30	0.09
440	Metal Processes			0.02	0.00	0.00	9.10	0.00
450	Wood and Paper			0.00	0.00	0.00	0.00	0.00
460	Glass and Related Products			0.00	0.00	0.00	0.90	0.00
470	Electronics			0.00	0.00	0.00	0.00	0.00
499	Other (Industrial Processes)	0.08	0.00	0.47	27.70	0.00	171.60	0.00
Total Industrial Processes		**278.99**	**0.00**	**1.49**	**101,832.11**	**0.19**	**542.50**	**0.10**

Table F (Continued)

2008 Baseline GHG Emissions for SCAB

		Emission (TPD)			Emission (TPY)			MMTONS
CODE	**Source Category**	**CO2**	**N2O**	**CH4**	**CO2**	**N2O**	**CH4**	**CO2e**
Solvent Evaporation								
510	Consumer Products			0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent			0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers			0.00	0.00	0.00	0.00	0.00
540	Asphalt Paving/Roofing			0.07	0.00	0.00	24.20	0.00
Total Solvent Evaporation		**0.00**	**0.00**	**0.07**	**0.00**	**0.00**	**24.20**	**0.00**
Miscellaneous Processes								
610	Residential Fuel Combustion	38,850.21	0.12	0.95	14,180,326.28	45.28	347.02	12.88
620	Farming Operations			25.63	0.00	0.00	9,354.20	0.18
630	Construction and Demolition			0.00	0.00	0.00	0.00	0.00
640	Paved Road Dust			0.00	0.00	0.00	0.00	0.00
645	Unpaved Road Dust			0.00	0.00	0.00	0.00	0.00
650	Fugitive Windblown Dust			0.00	0.00	0.00	0.00	0.00
660	Fires			0.08	0.00	0.00	30.90	0.00
670	Waste Burning and Disposal			0.58	0.00	0.00	212.20	0.00
680	Utility Equipment				0.00	0.00		0.00
690	Cooking			0.64	0.00	0.00	234.80	0.00
699	Other (Miscellaneous Processes			0.00	0.00	0.00	0.00	0.00
Total Miscellaneous Processes		**38,850.21**	**0.12**	**27.89**	**14,180,326.28**	**45.28**	**10,179.12**	**13.07**
On-Road Motor Vehicles								
710	Light Duty Passenger Auto (LDA)	84,679.34	2.72	3.62	30,907,957.40	992.80	1,321.30	28.34
722	Light Duty Trucks 1 (T1 : up to 3750 lb.)	22,318.69	0.72	0.96	8,146,320.83	262.80	350.40	7.47
723	Light Duty Trucks 2 (T2 : 3751-5750 lb.)	33,494.85	1.08	1.43	12,225,619.17	392.38	523.05	11.21
724	Medium Duty Trucks (T3 : 5751-8500 lb.)	29,414.54	0.94	1.25	10,736,308.78	343.10	456.25	9.85
732	Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	8,194.68	0.16	0.21	2,991,059.41	57.31	76.65	2.73
733	Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	1,115.55	0.05	0.07	407,174.20	18.98	25.55	0.38
734	Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	727.41	0.02	0.20	265,505.77	5.48	73.00	0.24
736	Heavy Heavy Duty Gas Trucks ((HHDGT > 33000 lb.)	101.91	0.01	0.01	37,197.65	2.19	2.56	0.03
742	Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	2,166.03	0.02	0.02	790,599.63	6.94	7.30	0.72
743	Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	735.38	0.01	0.01	268,413.46	2.56	2.92	0.24
744	Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	5,421.85	0.02	0.02	1,978,974.22	8.40	8.76	1.80
746	Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	17,017.12	0.05	0.05	6,211,247.31	17.52	16.43	5.64
750	Motorcycles (MCY)	7,958.66	0.26	0.34	2,904,909.79	94.90	124.10	2.66
760	Diesel Urban Buses (UB)	2,135.31	0.00	0.00	779,389.27	1.46	1.46	0.71
762	Gas Urban Buses (UB)	166.17	0.02	0.02	60,653.73	8.40	6.94	0.06
770	School Buses (SB)	336.97	0.00	0.00	122,995.47	1.46	1.46	0.11
776	Other Buses (OB)	927.21	0.00	0.00	338,430.49	0.73	0.73	0.31
780	Motor Homes (MH)	568.30	0.03	0.04	207,430.96	10.95	14.60	0.19
Total On-Road Motor Vehicles		**217,479.97**	**6.11**	**8.26**	**79,380,187.52**	**155.49**	**187.25**	**72.70**

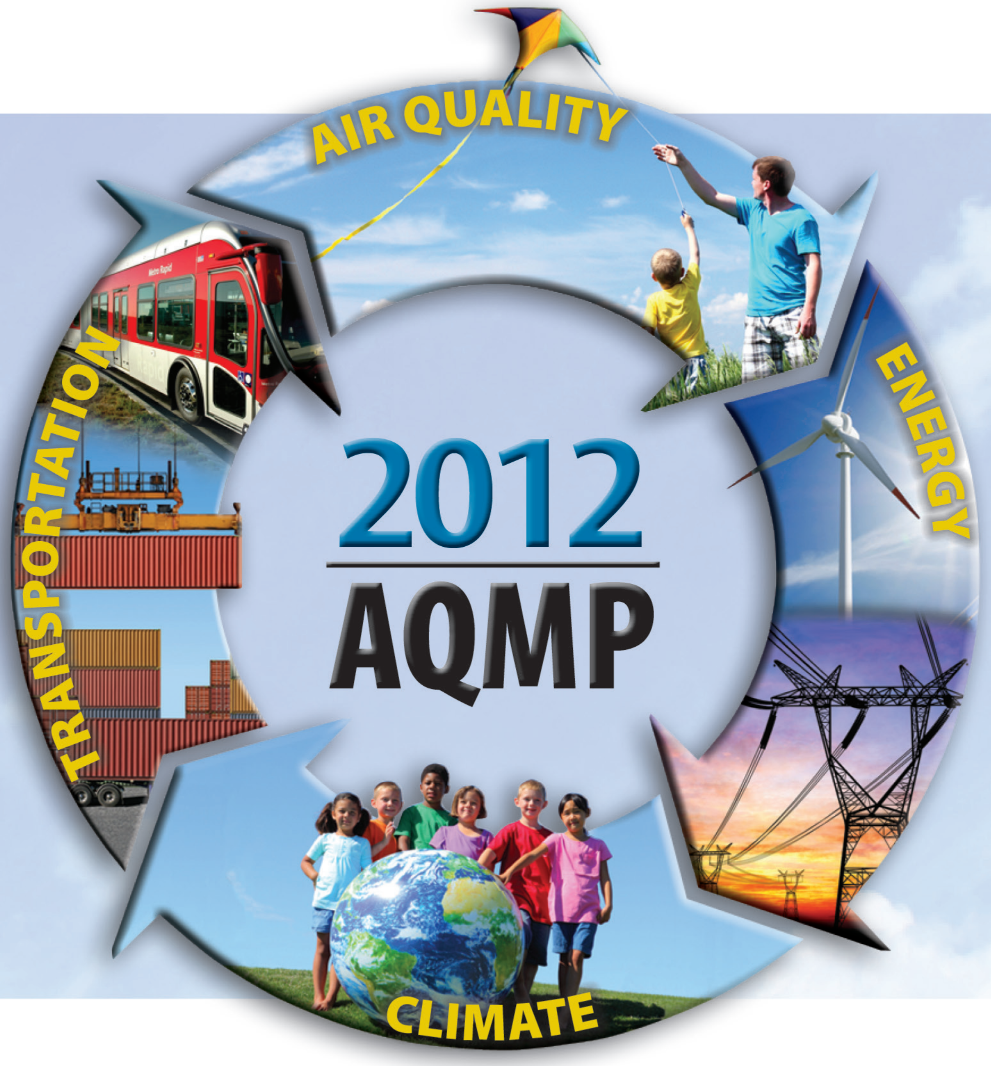
Table F (Concluded)

2008 Baseline GHG Emissions for SCAB

		Emission (TPD)			Emission (TPY)			MMTONS
CODE	**Source Category**	**CO2**	**N2O**	**CH4**	**CO2**	**N2O**	**CH4**	**CO2e**
Other Mobile Sources								
810	Aircraft	37,454.60	0.10	0.09	13,670,930.38	36.46	31.75	12.41
820	Trains	585.85	0.00	0.00	213,835.18	0.45	1.38	0.19
830	Ships and Commercial Boats	3,451.85	0.01	0.02	1,259,926.70	2.64	8.13	1.14
	Other Offroad Sources (construction equipment, airport equipment, oil and gas drilling equipment)	16,080	1.72	8.84	5,869,123.45	628.00	3,226.28	5.56
Total Other Mobile Sources		**57,572.10**	**1.83**	**8.95**	**21,013,815.71**	**667.55**	**3,267.55**	**19.31**
Total Stationary and Area Sources		**176,388.26**	**0.49**	**626.41**	**64,381,716.17**	**178.12**	**228,639.16**	**62.81**
Total On-Road Vehicles		**217,479.97**	**6.11**	**8.26**	**79,380,187.52**	**155.49**	**187.25**	**72.70**
Total Other Mobile*		**57,572.10**	**1.83**	**8.95**	**21,013,815.71**	**667.55**	**3,267.55**	**19.31**

Appendix IV-A

Air Quality Management Plan



District's Stationary Source Control Measures

February 2013

South Coast Air Quality Management District
Cleaning the air that we breathe...™

South Coast AQMD

FINAL 2012 AQMP
APPENDIX IV-A

DISTRICT'S STATIONARY SOURCE CONTROL MEASURES

FEBRUARY 2013

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT GOVERNING BOARD

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Section 1

Stationary Source Control Measures

INTRODUCTION

This Appendix describes the South Coast Air Quality Management District (District) staff's proposed stationary and indirect source control measures to be included in the Final 2012 AQMP. Control measures presented in this appendix are short-term PM2.5 control measures and 8-hour ozone measures designed to reduce the reliance on long-term CAA Section 182(e)(5) emissions reductions in the 2007 AQMP. The proposed 8-hour ozone measures are designed to further implement the 8-hour ozone plan, but also will help to reduce PM2.5 levels and aid attainment with current and future PM2.5 NAAQS. The measures are based on a variety of incentive programs and control strategies that are likely commercially available and/or technologically feasible in the next several years.

SHORT-TERM PM2.5 CONTROL MEASURES

The Final 2012 AQMP includes eight short-term control measures (including five stationary source, one indirect source, and one education and outreach measure) developed by the District staff that are to be adopted and implemented prior to 2014. Table IV-A-1 provides the expected adoption date, implementation date and expected emission reductions achieved. There are four measures that were carried over from the 2007 AQMP and denoted with "formerly" under the new control measure number. The remaining 4 control measures are newer ideas or strengthening of existing rules.

TABLE IV-A-1

Short-Term PM2.5 Control Measures

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
CMB-01	Further NOx Reductions from RECLAIM [NOx] –*Phase I*	2013	2014	2-3 [a]
BCM-01	Further Reductions from Residential Wood Burning Devices [PM2.5]	2013	2013-2014	7.1 [b]
BCM-02	Further Reductions from Open Burning [PM2.5]	2013	2013-2014	4.6 [c]
BCM-03 (*formerly BCM-05*)	Emission Reductions from Under-Fired Charbroilers [PM2.5]	Phase I – 2013 (*Tech Assessment*) Phase II - TBD	TBD	1 [d]
BCM-04	Further Ammonia Reductions from Livestock Waste [NH3]	Phase I – 2013-2014 (Tech Assessment) Phase II - TBD	TBD	TBD [e]

TABLE IV-A-1 (concluded)

Short-Term PM2.5 Control Measures

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
IND -01 (*formerly MOB-03*)	Backstop Measures for Indirect Sources of Emissions from Ports and Port-Related Facilities [NOx, SOx, PM2.5]	2013	12 months after trigger	N/A [f]
EDU-01 (*formerly MCS-02, MCS-03*)	Further Criteria Pollutant Reductions from Education, Outreach and Incentives [All Pollutants]	Ongoing	Ongoing	N/A [f]
MCS-01 *(formerly MCS-07)*	Application of All Feasible Measures Assessment [All Pollutants]	Ongoing	Ongoing	TBD [e]

a. Emission reductions are included in the SIP as a contingency measure.
b. Winter average day reductions based on episodic conditions and 75 percent compliance rate.
c. Reduction based on episodic day conditions.
d. Will submit into SIP once technically feasible and cost effective options are confirmed.
e. TBD are reductions to be determined once the technical assessment is complete, and inventory and control approach are identified.
f. N/A are reductions that cannot be quantified due to the nature of the measure (e.g., outreach, incentive programs) or if the measure is designed to ensure reductions that have been assumed to occur will in fact occur.

It should be noted that the emission reduction targets for the proposed control measures (those with quantified reductions) are established based on available or anticipated control methods or technologies. However, emission reductions associated with implementation of these and other control measures or rules in excess of the AQMP's projected reductions can be credited toward the overall emission reduction targets for the proposed control measures in this appendix.

Emission reductions associated with the District's SIP commitment to adopt and implement emission reductions from sources under the District's jurisdiction are being proposed. Once the SIP commitment is accepted, should there be emission reduction shortfalls in any given year, the District would identify and adopt other measures to make up the shortfall. Similarly, if excess emission reductions are achieved in a year, they can be used in that year or carried over to subsequent years if necessary to meet reduction goals. More detailed discussion on the District's SIP commitment is included in Chapter 4 of the Final 2012 AQMP.

The following sections provide a brief overview of the specific source category types targeted by short-term PM2.5 control measures.

Combustion Sources

This category includes one control measure that seeks further NOx emission reductions from RECLAIM sources.

PM Sources

This source category has four control measures being considered to reduce the PM2.5 emissions. The first two measures are designed to address those areas with high PM2.5 ambient concentrations by use of episodic controls to reduce emissions from residential wood combustion and open burning. One measure considers Basin-wide curtailment of wood burning devices (wood stoves and wood burning fireplaces) and the other open burning (i.e., prescribed or agricultural burning) when areas of historically high PM2.5 concentration are forecast to exceed the PM2.5 24-hour standard. One measure would seek further reductions from restaurant charbroiling operations and another measure would also reduce ammonia emissions from livestock waste, specifically dairies. These latter two measures require a phased approach with a technological feasibility assessment as the first phase.

Multiple Component Systems

The measure reduces emissions by applying all feasible control measures to the various source categories, should any new control measure become available prior to the next AQMP revision.

Indirect Sources

This measure will be designed to ensure emissions at the ports and port-related sources are meeting the targets projected in the 2012 AQMP for the PM2.5 attainment demonstration.

Educational Programs

A proposed educational control measure seeks to provide outreach and incentives for consumers to contribute to clean air efforts. Examples include the usage of energy efficient products, new lighting technology, "super compliant" coatings, tree planting, and the use of lighter colored roofing and paving materials which reduce energy demand by lowering the ambient temperature. In addition, this proposed measure intends to increase the effectiveness of energy conservation programs through public education and awareness as to the environmental effects and benefits from conservation. Finally, educational and incentive tools to be used include social comparison of energy usage and efficiency, social media, public/private partnerships. Detailed descriptions of each measure can be found in Section 2 of this appendix.

8-HOUR OZONE MEASURES

There are 15 stationary source 8-hour ozone measures with the majority anticipated to be adopted in the next 2 – 3 years and implemented after 2015, thus assisting in further implementation of the 8-hour ozone plan by 2024. These measures include two incentive programs and one educational measure. Section 182(e)(5) of the Clean Air Act allows "extreme" ozone areas to include measures in their Plan that rely on the development of new technology or advancement of existing technology. These are commonly referred to as "black box" measures. The 8-hour ozone measures in the 2012 AQMP specify current opportunities for emissions reductions and thus are designed to reduce the reliance on the "black box" commitments in the 2007 AQMP.

There are two measures that were continued from the 2007 AQMP. The remaining 13 control measures are new ideas or revised previous measures (e.g., further reductions from an existing rule). Table IV-A-2 provides the expected adoption date, implementation date and expected emission reduction achieved.

TABLE IV-A-2

8-hour Ozone Measures

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
CTS-01	Further VOC Reductions from Architectural Coatings (R1113) [VOC]	2015 – 2016	2018 - 2020	2-4
CTS-02	Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants [VOC]	2013 – 2016	2015 - 2018	1-2
CTS-03	Further VOC Reductions from Mold Release Products [VOC]	2014	2016	0.8 – 2
CMB-01	Further NOx Reductions from RECLAIM [NOx] – *Phase II*	2015	2020	1-2 [a]
CMB-02	NOx Reductions from Biogas Flares [NOx]	2015	Beginning 2017	TBD [b]
CMB-03	Reductions from Commercial Space Heating [NOx]	Phase I – 2014 (Tech Assessment) Phase II - 2016	Beginning 2018	0.18 by 2023 0.6 (total)
FUG-01	VOC Reductions from Vacuum Trucks [VOC]	2014	2016	1 [c]
FUG-02	Emission Reduction from LPG Transfer and Dispensing [VOC] – *Phase II*	2015	2017	1-2
FUG-03	Further Reductions from Fugitive VOC Emissions [VOC]	2015 -2016	2017-2018	1-2
MCS-01 *(formerly MCS-07)*	Application of All Feasible Measures Assessment [All Pollutants]	Ongoing	Ongoing	TBD [b]
MCS-02	Further Emission Reductions from Greenwaste Processing (Chipping and Grinding Operations not associated with composting) [VOC]	2015	2016	1 [c]

TABLE IV-A-2 (concluded)

8-hour Ozone Measures

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
MCS-03 (*formerly MCS-06*)	Improved Start-up, Shutdown and Turnaround Procedures [All Pollutants]	Phase I – 2012 (*Tech Assessment*) Phase II – TBD	Phase I – 2013 (*Tech Assessment*) Phase II - TBD	TBD [b]
INC-01	Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]	2014	Within 12 months after funding availability	TBD [b]
INC-02	Expedited Permitting and CEQA Preparation Facilitating the Manufacturing of Zero and Near-Zero Technologies [All Pollutants]	2014-2015	Beginning 2015	N/A [d]
EDU-01 (*formerly MCS-02, MCS-03*)	Further Criteria Pollutant Reductions from Education, Outreach and Incentives [All Pollutants]	Ongoing	Ongoing	N/A [d]

a. If Control Measure CMB-01, RECLAIM Phase I, contingency measure emission reductions are not triggered and implemented, Phase II will target a cumulative 3-5 TPD of NOx emission reductions.
b. TBD are reductions to be determined once the inventory and control approach are identified.
c. Reductions submitted in SIP once emission inventories are included in the SIP.
d. N/A are reductions that cannot be quantified due to the nature of the measure (e.g., outreach, incentive programs) or if the measure is designed to ensure reductions that have been assumed to occur will in fact occur.

The following sections provide a brief overview of the specific source category types for the 8-hour ozone measures. Detailed descriptions of each measure can be found in Section 3 of this appendix.

Coating and Solvents

The category of coatings and solvents is primarily targeted at reducing VOC emissions from VOC-containing products such as coatings and solvents. This category includes one control measure that seeks further VOC emission reductions from architectural coatings and another from mold release products. The third control measure would further reduce VOC emissions from a number of existing rules that regulate miscellaneous coatings, adhesives, solvents and lubricants.

Combustion Sources

This category includes three measures targeting stationary combustion equipment. There is one control measure that seeks further NOx emission reductions from RECLAIM sources. In addition, there is one new control measure that reduces NOx emissions from landfill and wastewater treatment flares. The last measure seeks to reduce NOx emissions from commercial space heaters.

Petroleum Operations and Fugitive VOC Emissions

This category pertains primarily to operations and materials associated with the petroleum, chemical, and other industries. Within this category, there is one control measure targeting fugitive VOC emissions with improved leak detection and repair. Other measures include reductions from vacuum truck venting and LPG transfer and dispensing.

Multiple Component Sources

There are a total of three 8-hour ozone measures in this category. One measure will achieve further VOC emission reductions from greenwaste processing such as chipping and grinding operations not associated with composting. Another control measure seeks to minimize emissions during equipment start up and shut down and the last measure reduces emissions by applying all feasible control measures to a variety of source categories.

Incentive Programs

This category includes two control measures that incentivize early reductions and advancement of zero and near-zero technologies. One measure promotes and encourages the installation of cleaner, more efficient combustion equipment through economic incentive programs, subject to the availability of public funding. Incentives may include grants for new purchases of equipment as well as loan programs in areas where long-term cost savings from increased efficiency are achieved. Another measure is aimed at providing incentives for companies to manufacture zero and near-zero emission technologies locally, thus populating the market, potentially lowering the purchase cost, and increasing demand. With availability and usage of such technologies, air quality benefits will be achieved. This proposed measure focuses on two elements: 1) process the required air permit(s) in an expedited manner; and 2) assistance in the preparation of the applicable CEQA document. A stakeholder process will be initiated to design the program and collaborate with other existing AQMD or local programs.

Educational Programs

A proposed educational control measure seeks to provide outreach and incentives for consumers to contribute to clean air efforts. Examples include the usage of energy efficient products, new lighting technology, "super compliant" coatings, tree planting, and the use of lighter colored roofing and paving materials which reduce energy demand by lowering the ambient temperature. In addition, this proposed measure intends to increase the effectiveness of energy conservation programs through public education and awareness as to the environmental effects and benefits from conservation. Finally, educational and incentive tools to be used include social comparison of energy usage and efficiency, social media, public/private partnerships.

District's Mobile Source Control Measures

The District is proposing control measures for mobile sources that can be found in Appendix IV (B).

RULE EFFECTIVENESS

The 1990 federal Clean Air Act requires that emissions inventories be adjusted to reflect the rule effectiveness. As defined by EPA, rule effectiveness reflects how emission reductions, due to implementation of a regulatory program, are estimated. It describes a method to account for the reality that not all facilities covered by a rule are in compliance with the rule 100 percent of the time. In 1992, EPA suggested a default value of 80 percent[1] if emission reductions are estimated based on projected control device efficiencies. If a higher rule effectiveness value is used, the District needs to demonstrate how these emission reductions will be achieved. In 2005, EPA revised its policy[2] in recognition that rule effectiveness can vary widely between different types of industry. So, instead of assuming a broad 80 percent default value for rule effectiveness, a list of factors should be considered that are most likely to affect rule effectiveness when developing emission inventories and attainment demonstrations. According to the EPA[3], it is not necessary to adjust the rule effectiveness when emissions can be calculated by means of a direct determination because the emissions estimate is not contingent on the effectiveness of controls. A direct determination is the one in which emissions are calculated directly (e.g., based on explicit records of coating or solvent types used) rather than from estimates of uncontrolled emissions and level of control. In a recent EPA response[4] to a comment on this issue, requiring stringent compliance monitoring and reporting requirements also supports the use of the highest range of rule effectiveness factors in projecting emissions.

As described below under Rule Compliance and Test Methods, the compliance demonstration for each proposed control measure, where the District accounted for emission reductions, identifies the compliance mechanisms such as recordkeeping, inspection and maintenance activities, etc., and test methods such as District, ARB, and EPA approved test methods. In some cases, such as emission reductions from architectural coatings, the emissions are calculated by means of direct determination. The District's ongoing source testing and on-site inspection programs also strengthen the status of compliance verification. In addition, the District conducts workshops, and compliance education programs to inform facility operators on rule requirements and assist them in performing recordkeeping and self inspections. These compliance tools are designed to ensure rule compliance would be achieved on a continued basis. As a result, the majority of control measures proposed in this appendix with quantifiable emission reductions are based on a rule effectiveness of 100 percent. With respect to implementation of existing rules, emissions reported through the District's AER program

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[1] "Guidelines for Estimating and Applying Rule Effectiveness for Ozone/CP State Implementation Plan Base Year Inventories." EPA-452/R-92-010, November 1992

[2] "Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations, " EPA-454/R-05-001, August 2005, Appendix B

3 "Rule Effectiveness Guidance: Integration of Inventory, Compliance and Assessment Applications," EPA 452/R-94-001, January 2004

[4] "Approval of Air Quality Implementation Plans; California; South Coast; Attainment Plan for 1997 8-Hour Ozone Standards," EPA-R09-OAR-2011-0622, Final Rule, March 1, 2012

are based on actual emissions, substantiated by source testing or manufactured data. Otherwise, more conservative default emission factors are used. Any upset conditions or emissions under variance were also included in the AER. Where there was known non-compliance, emissions were adjusted to reflect the conditions. For example, only 75 percent compliance rate is assumed for gas stations (Rule 461) and metal coating applications (Rule 1107).

FORMAT OF CONTROL MEASURES

Included in each control measure description is a title, summary table, description of source category (including background and regulatory history), proposed method of control, estimated emission reductions, rule compliance, test methods, cost effectiveness, and references. The type of information that can be found under each of these subheadings is described below.

Control Measure Number

Each control measure is identified by a control measure number such as "CM #CTS-01" located at the upper right hand corner of every page. "CM #" is the abbreviation for the "control measure number" and is immediately followed by the three-letter designation, "CTS" represents the abbreviation for a source category or specific programs. For example "CTS" is an abbreviation for "Coatings and Solvents." The following provides a description of the abbreviations for each of the measures.

- BCM Best Available Control Measures for Fugitive Dust Sources
- CMB Combustion Sources
- CTS Coatings and Solvents
- FUG Fugitive VOC Emissions
- MCS Multiple Component Sources
- IND Indirect Sources
- INC Incentive Programs
- EDU Educational Programs

If the measure is based on a control measure from the 2007 AQMP, the former control measure number appears in parentheses after the 2012 AQMP number. For example, 2012 AQMP Control Measure CM #BCM-03 – Emission Reductions from Under-Fired Charbroilers would also have the designation (*formerly BCM-05*).

Title

The title contains the control measure name and the major pollutant(s) controlled by the measure. Titles that state “Control of Emissions from...” indicate that the measure is regulating a new source category, not presently regulated by an existing source- specific District rule. Titles that state “Further Emission Reductions of” imply that the measure would result in an amendment to an existing District rule.

Summary Table

Each measure contains a table that summarizes the measure and is designed to identify the key components of the control measure. The table contains a brief explanation of the source category, control method, baseline emissions, emission reductions, control costs, and implementing agency.

Description of Source Category

This section provides an overall description of the source category and the intent of the control measure. The source category is presented in two sections, background and regulatory history. The background has basic information about the control measure such as the number of sources in the Basin, description of emission sources, and pollutants.

The regulatory history contains information regarding existing regulatory control of the source category such as applicable District rules or regulations and whether the source category was identified in prior AQMPs.

Proposed Method of Control

The purpose of this section is to identify potential control options an emission source can use to achieve emission reductions. If an expected performance level for a control option is provided, it is intended for informational purposes only and should not be interpreted as the targeted overall control efficiency for the proposed control measure. To the extent feasible, the overall control efficiency for a control measure should take into account achievable controls in the field by various subcategories within the control measure. A more detailed type of this analysis is typically conducted during rulemaking, not in the planning stage. It has been the District's long standing policy not to exclude any control technology and to intentionally identify as many control options as possible to spur further technology development.

In addition to the proposed control methods discussed in each control measure, affected sources may have the option of partially satisfying the emission reduction requirements of each control measure with incentive programs that will become available in the future from the implementation of control measure CM #INC-01. Examples of incentive programs currently available and future enhancements to those incentive programs would be described in this section.

Emissions Reduction

The emission reductions are estimates based on the baseline inventories prepared for the 2012 AQMP and are provided in the Control Measure Summary Table. For PM2.5 measures, the emissions data are based on the annual average inventory. For the ozone strategy, the summer planning inventory is used. The emissions section of the summary table includes the 2008, 2014, 2019 and 2023 inventory. The 2014, 2019 and 2023 emission projections reflect implementation of existing adopted rules. Based on the expected reductions associated with implementing the control measure, emission data are calculated for 2019 and 2023 assuming the implementation of the control measure in the absence of other competing control measures.

The emission reductions listed in the summary table represent the current best estimates, which are subject to change during rule development. As demonstrated in previous rulemaking, the District is always seeking maximum emission reductions when proven technically feasible and cost-effective. For emission accounting purposes, a weighted average control efficiency is calculated based on the targeted controls. The concept of weighted average acknowledges the fact that a control measure or rule may consist of several subcategories, and the emission reduction potential for each subcategory is a function of proposed emission limitation and the associated emission inventory. Therefore, the use of control efficiency to estimate emission reductions does not represent a commitment by the District to require emission reductions uniformly across source categories. In addition, due to the current structure of emission inventory reporting system, a control measure may partially affect an inventory source category (e.g., certain size of equipment or certain level material usage). In this case, an impact factor is incorporated into the calculation of a control efficiency to account for the fraction of inventory affected. During the rule development, the most current inventory will be used. However, for tracking rate-of-progress on the SIP emission reduction commitment, the approved AQMP inventory will be used. More specifically, emission reductions due to mandatory or voluntary, but enforceable, actions will be credited under SIP obligations.

Rule Compliance

This section was designed to satisfy requirements in the 1990 Clean Air Act in which EPA has indicated that it is necessary to have a discussion of rule compliance with each control measure. This section discusses the recordkeeping and monitoring requirements envisioned for the control measure. In general the District would continue to verify rule compliance through site inspections, recordkeeping, and submittal of compliance plans (when applicable).

Test Methods

In addition to requiring recordkeeping and monitoring requirements, EPA has stated that "An enforceable regulation must also contain test procedures in order to determine whether sources are in compliance." This section of the control measure write-up identifies appropriate approved District, ARB, and EPA source test methods.

Cost-Effectiveness

The Discounted Cash Flow (DCF) method is a Governing Board approved cost-effectiveness method used to calculate the cost-effectiveness of each control measure. This method was approved by the District and has been consistently used over the past decades. It provides an effective tool to compare with past regulatory actions. As control measures undergo the rule making process, more detailed control costs will be developed.

The cost effectiveness values contained herein represent the best available information at this time. As additional information on technology improvement over time, more accurate numbers of affected facilities, and existing processes become available, the cost effectiveness will be revised and analyzed during actual rulemaking.

Implementing Agency

This section identifies the agency(ies) responsible for implementing the control measure. Also included in this section is a description of any jurisdictional issues that may affect the control measure's implementation.

References

This section identifies directly cited references, or those references used for general background information.

Section 2

Short-Term PM2.5 Control Measures

CMB-01: FURTHER NO_X REDUCTIONS FROM RECLAIM - PHASE I [NO_X]

CONTROL MEASURE SUMMARY			
SOURCE CATEGORY:	VARIOUS RECLAIM NO_X SOURCES		
CONTROL METHODS:	VARIOUS CONTROL TECHNOLOGIES AND METHODS		
EMISSIONS (TONS/DAY):			
ANNUAL AVERAGE	**2008**	**2014**	**2023**
NO_X INVENTORY	23.05	26.48	26.48
NO_X REDUCTION – PHASE I		2*-3	2* - 3
NO_X REMAINING		24.48 – 23.48	24.48 – 23.48
CONTROL COST:	$7,950 PER TON NO_X REDUCED		
IMPLEMENTING AGENCY:	SCAQMD		

**The lower end of the emission reduction range will be committed in the SIP as a contingency measure.*

DESCRIPTION OF SOURCE CATEGORY

There were approximately 284 facilities in the Regional Clean Air Incentives Market (RECLAIM) program, as of July 1, 2010. The RECLAIM program includes facilities with NOx or SOx emissions greater than or equal to four tons per year in 1990 or any subsequent year. A wide range of equipment such as fluid catalytic cracking units, boilers, heaters, furnaces, ovens, kilns, coke calciner, internal combustion engines, and turbines are major sources of NOx or SOx emissions at the RECLAIM facilities. This control measure identifies a series of control approaches that can be implemented to further reduce NOx emissions at the RECLAIM facilities.

Background

The RECLAIM program was first adopted in 1993 to further reduce emissions from the largest NOx and SOx emitting stationary sources by providing an alternative regulatory mechanism to the command and control regulatory structure. Under this program, facilities are issued NOx and SOx allocations, also known as RECLAIM Trading Credits (RTCs) or facility emission caps, which are declined annually. To meet the declining annual facility caps, RECLAIM facilities have the option of installing pollution control equipment, changing operations, or purchasing RTCs from the RECLAIM market.

The RECLAIM program is subject to several legal mandates. The Health and Safety Code requires the District to monitor the advancement in Best Available Control Retrofit Technology (BARCT), and if BARCT advances, the District is required to periodically re-assess the overall facility caps, and reduce the RTC holdings, as if the equipment located at the facilities would be subject to applicable equivalent command-and-control BARCT levels. The emission reductions resulting from the programmatic RTC reductions will help the basin attain the National Ambient Air Quality Standards (NAAQS) for ozone and $PM_{2.5}$ as expeditiously as practicable. The BARCT evaluation must include an evaluation of the maximum degree of reduction achievable with advanced control technologies taking into account the environmental, energy, and economic impacts for each class or category of source.

A review of the emissions profile of the RECLAIM universe shows that the NOx emissions are not evenly distributed among the RECLAIM facilities: the top 10% of the universe (24 facilities) comprised mainly of refineries, power plants, cement, glass, and steel manufacturing, emitted about 80% of the NOx emissions.

Regulatory History

On October 15, 1993, the AQMD's Governing Board adopted Regulation XX – RECLAIM. The RECLAIM program at its inception included 392 NOx facilities. RECLAIM Regulation XX includes 11 rules that specify the applicability, definitions, allocations, trading and operational requirements, as well as monitoring, reporting, and recordkeeping requirements. The NOx RECLAIM regulation has been revised several times, and one significant amendment (2005) reflected a BARCT re-assessment. The January 2005 amendment resulted in a NOx RTC reduction of 7.7 tons per day (tpd), approximately 22.5% reduction of the RTC holdings, which was implemented in 5 phases: 4 tpd by 2007 and an additional 0.925 tpd in each of the following 4 years.

PROPOSED METHOD OF CONTROL

The proposed Phase I reductions are designed to serve as a contingency measure. It will be implemented if the Basin does not attain the 24-hr PM2.5 standard by 2014.Currently there are approximately 8 tpd of excess RTC in the market. A shave of 2 tpd of NOx RTCs should not cause a significant impact to the market. RTCs were traded on average of $4 a pound for compliance year 2011. In an effort to further minimize the impact on the majority of the RECLAIM universe, staff will work with stakeholders to evaluate various shaving methodologies (e.g., sector-specific or across-the-board).

EMISSIONS REDUCTION

Phase I reductions target a range of 2-3 TPD NOx. During the rule development phase, staff may refine the emission reductions to include growth and other unforeseen issues. Phase I is expected to be adopted in 2013 and the shave will be implemented/triggered for compliance year 2015, if the attainment of 24-hr PM2.5 standard is not met by 2014. If not triggered in 2015, these reductions will be a part of the 3 – 5 TPD of NOx reductions for Phase II of CMB-01 and will be incorporated into the 2015 AQMP. Note that the California Health and Safety Code requires the District to monitor the advancement in Best Available Control Retrofit Technology (BARCT), and if BARCT advances, the District is required to periodically re-assess the overall facility caps, and reduce the RTC holdings to applicable equivalent command-and-control BARCT levels.

According to the RECLAIM Annual Audit Reports, NOx emissions were reduced from 2008 to 2010, and the vast majority of the RECLAIM facilities complied with their RTC allocations. The audited annual NOx emissions for the entire RECLAIM universe were reported as 22.9, 20, and 19.5 tpd for compliance year 2008, 2009, and 2010, respectively. The NOx RTCs allocated for the universe were reported as 29.4, 28.4, and 27.5 tpd for compliance year 2008, 2009, and 2010, respectively. Data in the audit reports reflected an excess of 6.5, 8.4, and 8.0 tpd of RTCs holdings for compliance year 2008, 2009, and 2010, respectively, or approximately a 22–30% excess in RTC holdings in the most recent three years. Being cognizant that the 2008 emission profile may reflect a period of the economic downturn, the RTC reduction range of 2-3 tpd estimated by staff (approximately 25 - 38 percent of the unused RTC holdings) appears to be achievable.

RULE COMPLIANCE AND TEST METHODS

Compliance with the provisions of this control measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in either the RECLAIM program or existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

It is expected that the cost effectiveness for this control measure would be in the neighborhood of $7950 per ton for Phase I based on the most recent RTC trading prices.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from RECLAIM facilities.

REFERENCES

AQMD, 2008. Rule 1146 – Emissions of Oxides of Nitrogen from Industrial and Commercial Boilers, Steam Generators, and Process Heaters, Amended September 5, 2008.

AQMD, 2010. Rule 1110.2 – Emission Reductions from Gaseous and Liquid Fueled Engines, Amended July 9, 2010.

AQMD, 2010-12. Annual RECLAIM Audit Report for 2008 Compliance Year, March 5, 2010; Annual RECLAIM Audit Report for 2009 Compliance Year, March 5, 2010; and Annual RECLAIM Audit Report for 2010 Compliance Year, March 2, 2012.

AQMD, 2012. Stationary Source Committee, Item #4, Twelve-month Rolling Price of 2010 and 2011 Compliance Years RTCs, April 20, 2012

Bay Area, 2006. Regulation 9, Rule 9 – NOx from Stationary Gas Turbines, Amended December 6, 2006.

EPA, Menu of Control Measures - Control Options for Reducing NOx from Point and Area Sources, September 3, 2010.

EPA, Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Petroleum Refining Industry, October 2010.

LBL, 2005. Energy Efficiency Improvement and Cost Saving Opportunities for Petroleum Refineries, Sponsored by the U.S. EPA, Ernest Orlando Lawrence Berkeley National Lab, February 2005.

SJVUAPCD, 2007. Rule 4703 – Stationary Gas Turbines, Amended September 20, 2007.

SJVUAPCD, 2008. Rule 4320 – Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater Than 5 MMBTU/hr, Adopted October 16, 2008.

SJVUAPCD, 2011. Rule 4354 – Glass Melting Furnaces, Amended May 19, 2011.

SJVUAPCD, 2011. Rule 4702 – Internal Combustion Engines, Amended August 18, 2011.

BCM-01: FURTHER REDUCTIONS FROM RESIDENTIAL WOOD BURNING DEVICES [PM2.5]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	RESIDENTIAL WOOD COMBUSTION			
CONTROL METHODS:	BASIN-WIDE EPISODIC MANDATORY CURTAILMENT			
EMISSIONS (TONS/DAY):				
WINTER AVERAGE DAY	**2008**	**2014**	**2019**	**2023**
PM2.5 INVENTORY	10.6	9.4	9.4	9.4
PM2.5 REDUCTION*		7.1	7.1	7.1
PM2.5 REMAINING		2.3	2.3	2.3
CONTROL COST:	NOT DETERMINED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Winter average day reduction based on episodic conditions and on 75% rule effectiveness.*

DESCRIPTION OF SOURCE CATEGORY

The purpose of this measure would be to seek further particulate matter (PM) emissions reductions from residential wood burning fireplaces and wood stoves whenever key areas in the South Coast Air Basin are forecast to approach the federal 24-hour PM2.5 standard.

Background

The types of devices used to burn wood in a typical residence are fireplaces and wood heaters (e.g., fireplace inserts and free-standing wood stoves). Since fireplaces are very inefficient heat sources, they are used primarily for aesthetic purposes. Fireplace inserts and wood stoves are much more efficient and in some residences, are used as the primary source of heating (U.S. EPA, 1996).

Pollutant emissions from residential wood burning devices are caused primarily by incomplete combustion and include PM, CO, NOx, SOx, and VOC. Particulate emissions, however, have been the focus of most state and local control programs for wood smoke. Studies indicate that the vast majority of particulate emissions from residential wood combustion are in the fine (2.5 micrometers or less) fraction (Naeher, 2007). Additionally, incomplete combustion of wood produces polycyclic organic matter (POM), a group of compounds classified as hazardous air pollutants under Title III of the federal Clean Air Act.

In 2011, the California Air Resources Board (CARB) conducted a Statewide evaluation of emissions from residential wood combustion based on the most recent emission factors, activity data, and data (where available) from the American Housing Survey, U.S. Census Bureau (CARB, 2011). The results of the updated residential wood combustion emissions inventory, including reductions from existing control programs (i.e., construction restrictions and curtailments), are factored into the baseline inventory provided in the summary table above.

Regulatory History

Control Measure #MSC-06 (Emission Reductions from Wood-Burning Fireplaces and Stoves) from the 2007 AQMP was implemented in March 2008 through adoption of AQMD Rule 445 - Wood Burning Devices (AQMD, 2008). Under the Rule provisions, only gaseous-fueled hearth devices are allowed in new developments. For existing residential and commercial developments, Rule 445 requires wood burning devices sold or installed in the Basin to be U.S. EPA Phase II-certified or equivalent. Rule 445 prohibits the burning of any product not intended for use as a fuel (e.g., trash) in a wood burning device and requires commercial firewood facilities to only sell seasoned firewood (20% or less moisture content) from July through February. Rule 445 also establishes a mandatory wood burning curtailment program that extends from November 1 through the end of February each winter season. During a wood burning curtailment period, the public is required to refrain from both indoor and outdoor solid fuel burning in specific areas where PM2.5 air quality is forecast to exceed 35 $\mu g/m^3$ (federal 24-hour standard).

In conjunction with the implementation of Rule 445, the District has conducted an incentive program for a discount off of the purchase and installation of a gaseous-fueled device to encourage non-wood burning alternatives. To date the program has resulted in nearly 10,000 installations throughout the Basin and is an ongoing program. In addition, the District is exploring a potential wood stove change-out incentive program whereby certain residences will be offered an incentive to replace their older non-EPA certified wood stove or other non-certified wood burning appliance with an EPA certified wood stove. This will aid in emission reductions by providing a cleaner burning option to those who burn wood as their primary source of heat or otherwise do not have natural gas service for a centralized heating system. These residences are currently exempt from the AQMD Rule 445 residential wood burning curtailment.

PROPOSED METHOD OF CONTROL

Wood smoke reduction programs have been implemented in other jurisdictions for many years. The stringency of each air district's program depends on the region's PM air quality and the relative contribution of wood smoke to ambient fine particulate. While it is acknowledged the overall contribution of residential wood smoke to regional particulate pollution is relatively small (<10%) in the South Coast Basin, its significance can be greater on an episodic basis in the winter months. The severity of the region's PM air quality problem has necessitated a review of wood smoke reduction programs to determine if additional, cost-effective emissions reductions can be achieved.

A review of other California air district regulations and modeling sensitivity analyses have indicated that further reductions in residential wood burning during high PM2.5 days would be an effective way to achieve attainment early. It is recommended that the current mandatory wood burning curtailment threshold be lowered from 35 $\mu g/m^3$ to a more conservative 30 $\mu g/m^3$. This threshold is used in two other California air districts' wood smoke reduction programs (Sacramento Metropolitan AQMD, 2009; San Joaquin Valley APCD, 2008), and would provide for a margin of safety given the uncertainties in the air quality forecasts. In addition to the existing sub-regional curtailment program of Rule 445 (based on areas forecast to exceed the existing PM2.5 standard), this measure would implement a curtailment that would apply Basin-wide whenever a PM2.5 level of greater than 30 µg/m^3 is forecast at any monitoring station which has recorded violations of the design value for the current PM2.5 24-hour standard of 35 µg/m^3 for either of the two previous three-year design value periods. The design value is the 3-year average of the annual 98th percentile of the 24-hour average values of monitored ambient PM2.5 data. For example, for a 2014 implementation year, the three-year average design value would be based on the average of the 98th percentile of ambient PM2.5 monitoring for years 2011 through 2013. Therefore, in 2014 under this criteria, either the 2014 (2011-2013) or a 2013 (2010-2012) design value above 35 µg/m^3 at any monitoring station would lead to Basin-wide curtailment if a 30 µg/m^3 or greater is forecast there. Mira Loma is the only monitoring station that is projected to trigger this Basin-wide curtailment. Current exemptions (e.g., high elevation, sole source of heat, etc.) in Rule 445 will be maintained under this measure. Based on current air quality data, it is expected that there could be up to 20 such curtailment days. It should be noted that, as with the current mandatory program, the Basin-wide curtailment criteria will apply for the entire winter season, which is November through February. Under this measure, consideration will also be given to expanding the defined winter season to potentially include October and/or March.

Key to the success of the control measure is a high level of rule compliance, including consideration of the exemptions provided in Rule 445, such as low-income households, wood burning as the sole source of heat, and a lack of natural gas service. During development of Rule 445 in 2008 AQMD staff reviewed the emissions reduction methodologies for existing wood burning curtailment programs in the San Joaquin Valley and for Sacramento Metropolitan AQMD. The San Joaquin Valley methodology presumed an 80 percent compliance rate while Sacramento Metropolitan presumed a 78 percent compliance rate. Recognizing that the Rule 445 curtailment program contained similar exemptions (e.g., sole source of heat) as the other air district's regulations, a compliance rate of 75 percent was assumed for Rule 445 emissions reductions. Subsequent to adoption of AQMD Rule 445, survey work has been conducted to evaluate the public's knowledge of mandatory wood burning curtailment programs in other California air districts. For the San Joaquin Valley a 2010 survey indicated 83 percent of respondents were aware of the mandatory wood burning curtailment program and a 2009 Sacramento survey documented 92 percent respondent awareness. In the Bay Area, a 2012 survey showed that 75 percent of residents support the no-burn policy and 89 percent stated that they would not burn wood even if a no-burn day was not forecasted for a holiday. Given this information and the fact that the Rule 445 mandatory curtailment notification system is at least equivalent to programs throughout the State, AQMD staff believes that the 75 percent rule effectiveness assumption for this control measure continues to be reasonable.

In order to complement this measure, staff will seek continuation and enhancement of the District's gas log buy-down incentive program

EMISSIONS REDUCTION

Based on historical data from 2009 to 2011, it is estimated that decreasing the existing Rule 445 curtailment threshold from 35 to 30 µg/m^3 could result in an approximate 50% increase in the number of no-burn days (approximately 20 days total) during the November through February winter season. Lowering the wood burning curtailment threshold and applying the curtailment to the entire Basin when triggered could potentially reduce Basin-wide ambient PM2.5 concentrations on these episodic no-burn days by about 7.1 tons per winter day (assuming 75% rule effectiveness).

It should be noted that while controlling emissions from residential wood burning is primarily intended to reduce PM2.5 emissions, there is an added benefit of also reducing emissions of CO, VOC, NOx, SOx, and hazardous air pollutants.

RULE COMPLIANCE AND TEST METHODS

Rule compliance is monitored by AQMD compliance staff on no-burn days in the affected areas. A compliance program has been developed for existing Rule 445, including outreach and education, enhanced surveillance and a progressive warning and fine scheme for violators. Lowering the wood-burning curtailment threshold would represent an increase in no-burn days that are currently monitored by AQMD compliance staff under the current Rule 445 “Check Before You Burn” program. As the program would be expanded to Basin-wide, additional compliance resources may need to be reallocated during no-burn days. A 75% rule effectiveness for this source category is assumed, which accounts for both rule exemptions (i.e. if wood combustion is used as the primary heating source) and expected rule compliance rates.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not been determined. Increasing the number of curtailment days would result in relatively few cost increases to the impacted community. The costs for the district to implement outreach and potentially an incentive program would be approximately $500,000 beyond current Rule 445 implementation. The District will continue to analyze the potential cost impact associated with implementing this control measure and will provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from residential wood combustion sources.

REFERENCES

AQMD, 2008. South Coast Air Quality Management District; AQMD Governing Board Item 37: Draft Final Staff Report for Proposed Rule 445 – Wood Burning Devices; March 7, 2008. http://www.aqmd.gov/hb/2008/March/080337a.html

CARB, 2011. California Air Resources Board; Area Source Methodology, Section 7.1 Residential Wood Combustion; March 2011.

Naeher, 2007. Woodsmoke Health Effects: A Review, Journal of Inhalation Toxicology, 19:67-107, 2007

Sacramento Metropolitan AQMD, 2009. Sacramento Metropolitan Air Quality Management District; Rule 421 – Mandatory Episodic Curtailment of Wood and Other Solid Fuel Burning; September 2009. http://airquality.org/rules/rule421.pdf

San Joaquin Valley APCD, 2008. San Joaquin Valley Air Pollution Control District Rule 4901 – Wood Burning Fireplaces and Wood Burning Heaters; October, 2008. http://www.valleyair.org/rules/currntrules/r4901.pdf

U.S. EPA, 1996. U.S. Environmental Protection Agency AP-42, Section 1.9, Residential Fireplaces; October 1996.

U.S. EPA, 1996. U.S. Environmental Protection Agency AP-42, Section 1.10, Residential Wood Stoves; October 1996.

BCM-02: FURTHER REDUCTIONS FROM OPEN BURNING [PM2.5]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	OPEN BURNING			
CONTROL METHODS:	BASIN-WIDE EPISODIC RESTRICTIONS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
PM2.5 INVENTORY	2.2	4.6	4.6	4.6
PM2.5 REDUCTION*		4.6	4.6	4.6
PM2.5 REMAINING		0	0	0
CONTROL COST:	TBD			
IMPLEMENTING AGENCY:	SCAQMD			

* *Reduction based on episodic implementation. Overall annual average emissions will remain unchanged as open burning will shift to non-episodic days.*

DESCRIPTION OF SOURCE CATEGORY

Rule 444 outlines the criteria and guidelines for agricultural and prescribed burning, as well as training burns to minimize PM emissions and smoke in a manner that is consistent with state and federal laws. Agricultural burning is open burning of vegetative materials produced from the growing and harvesting of crops, as well as fields preparation in agricultural operations. Prescribed burning is a planned open burning of vegetative materials, usually conducted by a fire protection agency and/or department of forestry, to promote a healthier habitat for plants and animals, and to prevent plant disease and pest, as well as fire episodes and destruction. Training burns are hands-on trainings conducted by fire protection agencies on methods of preventing and/or suppressing fire.

Background

Currently, Rule 444 allows open burning on permissive burn days, provided that permit and event authorization are obtained, and that such burning events are not prohibited by a fire protection agency. A permissive burn day is declared by the District when certain meteorological conditions are met in one or more of the defined source/receptor areas. Rule 444 also includes general requirements (i.e., burning time window and ignition device) for open burning, as well as particular requirements, such as moisture level and firing methods for agricultural burning, and a Smoke Management Plan for prescribed burning. In addition, Rule 444 sets District-wide maximum daily burn acreage for agricultural and prescribed burning, but is lenient toward training burns if the duration is less than 30 minutes and clean fuel is utilized.

The rule establishes administration and compliance streamlining of the burn program, as well as additional and/or alternative controls to further reduce PM emissions and smoke from open burning.

Regulatory History

Rule 444 – Open Burning, (previously Open Fires) was adopted October 1976. It has been amended three times, first in 1981. The rule was amended in 1987 to incorporate provisions of California Code of Regulations, Title 17 addressing wildland vegetative management burns. The rule was amended in 2001 to incorporate the Smoke Management Guideline requirement of the amended Title 17 and implement 1999 AQMP Control Measure WST-03. It was again amended in November 2008 to implement 2007 AQMP Control Measure BCM-04.

PROPOSED METHOD OF CONTROL

The restriction for no burn days is based on a PM2.5 daily forecast. Rule 444 currently contains requirements that a no-burn day may be called under a combination of geographical, meteorological, and air quality conditions. This control measure would potentially increase the number of no-burn days by lowering the air quality forecast threshold. This measure would implement a curtailment that would apply Basin-wide whenever a PM2.5 level of greater than 30 $\mu g/m^3$ is forecast at any monitoring station which has recorded violations of the design value for the current PM2.5 24-hour standard of 35 $\mu g/m^3$ for either of the two previous three-year design value periods. The design value is the 3-year average of the annual 98th percentile of the 24-hour average values of monitored data ambient PM2.5 data. For example, for a 2014 implementation year, the three-year average design value would be based on the average of the 98th percentile of ambient PM2.5 monitoring for years 2011 through 2013. Therefore, in 2014 under this criteria, either the 2014 (2011-2013) or a 2013 (2010-2012) design value above 35 $\mu g/m^3$ at a monitoring station would lead to Basin-wide curtailment if a 30 $\mu g/m^3$ or greater is forecast there. As with Control Measure BCM-01, the burn restriction criteria will apply for the entire winter season, which is November through February. Consideration will also be given to expanding the defined winter season to potentially include October and/or March.

For this measure, the rule effectiveness is assumed to be 100% as the open burning activities will be shifted to other permissible burn days, and the full participation of effected entities under the current Rule 444 curtailment program. This measure will also seek to determine economically and technologically feasible alternatives to burning.

EMISSIONS REDUCTION

Enhancing the open burning restrictions with this revised threshold criteria and applying a curtailment to the entire Basin could potentially reduce Basin-wide ambient PM2.5 concentrations on these episodic no-burn days by about 4.6 tons per winter day. Since the burning would likely be shifted to other days, the total annual emissions would remain the same, but would not occur on days where high PM2.5 levels are forecast.

RULE COMPLIANCE

The measure will be implemented through the existing burn authorization process and field inspectors to ensure rule compliance.

COST EFFECTIVENESS

The cost effectiveness of this control measure has not been determined. Increasing the number of curtailment days would result in changes in operations. The District will continue to analyze the potential cost impacts associated with this measure during rulemaking.

IMPLEMENTING AGENCY

The District has the authority to implement this measure.

REFERENCES

Rule 444 – Open Burning California Code of Regulations, Title 17 – Agricultural Burning Guidelines

Rule 444 – Open Burning, Governing Board package, Amended November 2008.

BCM-03: FURTHER PM REDUCTIONS FROM UNDER-FIRED CHARBROILERS
[PM2.5]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	UNDER-FIRED CHARBOILERS			
CONTROL METHODS:	ADD-ON CONTROL EQUIPMENT WITH VENTILATION HOOD REQUIREMENTS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
PM2.5 INVENTORY	9.06	9.15	9.69	10.05
PM2.5 REDUCTION			1.0*	1.0*
PM2.5 REMAINING		9.15	8.69	9.05
CONTROL COST:	$15,000 PER TON REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Reductions will be submitted into the SIP once feasible controls are identified*.

DESCRIPTION OF SOURCE CATEGORY

This control measure is carried over from the 2007 AQMP/SIP. Restaurant operations emit PM and VOCs. Both of these pollutants contribute to the region's exceedances of State and federal PM2.5 and ozone air quality standards.

Background

Restaurant operations include charbroilers (chain-driven and under-fired), griddles, deep fat fryers, ovens, and other equipment. Based on information from the 2007 AQMP, under-fired charbroilers are responsible for 84 percent of the PM emissions from this source category (2007, AQMD). The emissions summary table above presents PM2.5 emissions from under-fired charbroilers. The emission profile at the Mira Loma station showed a high concentration of organic carbon and cooking ranks as the top source category for directly emitted PM2.5 emissions.

Regulatory History

The 1997 AQMP included Control Measure PRC-03 - Emission Reductions from Restaurant Operations. AQMD Rule 1138, adopted in November 1997, implemented Phase I of this control measure, reducing 0.5 tons per day of PM10 emissions from chain-driven charbroilers.

The 1999 Amendment to the 1997 Ozone State Implementation Plan for the South Coast Air Basin included control measure PRC-03 – Emission Reductions from Restaurant Operations – Phase II, with a goal of reducing 0.9 tons per day VOC and 7.0 tons per day of PM10 (AQMD, 1999).

In August 2000, staff reported that cost-effective controls for under-fired charbroilers were limited and recommended substituting the remaining 0.9 tons/day of VOC emissions reductions assigned to this source category with reductions from another control measure (AQMD, 2000). However, because of the significant contribution of PM emissions from under-fired charbroilers the 2003 AQMP included Control Measure PRC-03 – Emission Reductions from Restaurant Operation to reduce PM10 emissions by 1 ton per day by 2010. This represented a conservative reduction from a baseline of approximately 10 tons per day as cost-effective controls for the majority of under-fired charbroilers had not yet been developed.

A report to the Board was made in December 2004 recommending findings of infeasibility be made for control measure PRC-03, and substitute emission reductions from other adopted rules, as required by the 2003 AQMP (AQMD, 2004). AQMD staff also recommended funding for demonstration projects. In December 2004, the Board authorized up to $200,000 from mitigation fees collected pursuant to Rule 1309.1 – Priority Reserve, to fund six to eight new or retrofit demonstration sites on large restaurants. However, no applications were received for this project.

The 2007 AQMP carried over a control measure intended to reduce emissions from under-fired charbroilers (AQMD, 2007). The 2007 control measure (#BCM-05) described Bay Area AQMD rule development efforts that identified use of electrostatic precipitators (ESP), high-efficiency particulate arresting (HEPA) filters, wet scrubbers, and thermal oxidizers at high-volume restaurants with under-fired charbroilers.

In 2008-2009, staff reinitiated rule development for restaurants with under-fired charbroilers and held a series of working group meetings and a Public Workshop (AQMD, 2009). Due to lack of demonstrable cost-effective and affordable control technologies: however, AQMD staff determined rule adoption at that time was not feasible.

Control Technology Research

In 2011, AQMD staff requested an amendment to an existing University of California at Riverside – Center for Environmental Research and Technology (CE-CERT) contract to re-establish a test kitchen and test potential under-fired charbroiler control devices (AQMD, 2011). In October 2011, the Board approved an additional $216,000 for control device testing and authorized release of a Program Opportunity Notice (PON) to solicit proposals from control device vendors. As described in the PON, the District proposed to fund screening tests for up to three devices per manufacturer. Recognizing that any feasible control device must be affordable to the restaurant operator, one focus of the testing program was to evaluate potential control devices that have a capital and installation cost below $30,000 and annual operating costs below $10,000. It is intended that any control installation will not affect the cooking process; therefore the focus is for in-hood or rooftop/duct work placement of the device so as not to impact the taste or appearance of the charbroiled meat. Equipment showing promise in achieving desirable emission reduction rates during the screening tests would be tested using the full AQMD Test Protocol for Determining PM Emissions from Under-fired Charbroilers paid for by the District. An additional action was approved by the AQMD Governing Board in 2011 to develop a sole-source contract with CE-CERT, not to exceed $150,000, to provide a detailed speciation and toxicity analysis of emissions from under-fired charbroilers.

Five manufacturers responded to the PON with control technologies that include a catalytic oxidation device, filtration systems (one with activated charcoal), and a centrifuge system with an aerosol mist nebulizer. Under the PON process all submittals were subsequently reviewed by a technical evaluation panel comprised of AQMD staff and representatives from CE-CERT, Bay Area AQMD, and San Joaquin Valley APCD. The panel determined that all PON applications had technical merit and recommended that each manufacturer participate in the screening evaluations which began in May of 2012. Screening tests for other control devices are ongoing and full AQMD protocol testing will be initiated on control device technologies that pass the screening test.

PROPOSED METHOD OF CONTROL

Restaurant operations continue to be a significant contributor to the PM2.5 emission inventory. To date, a variety of control device technologies have been proposed for testing under the PON process. Results from these evaluations will guide future Rule development efforts. The following paragraph describes an under-fired charbroiler control program implemented by another California air district.

In 2007, the Bay Area AQMD adopted Regulation 6, Rule 2 for commercial cooking equipment (Bay Area AQMD, 2007). While this regulation mirrors the District's Rule 1138 requirements for chain driven charbroilers, it also contains control requirements for new and existing under-fired charbroilers with a facility-wide cooking surface of greater than or equal to 10 square feet. The rule exempts those operations cooking less than 800 lbs of beef per week. The regulation identifies a list of feasible control technologies available to reach an emissions limit of 1.9 pounds of PM10 per 1,000 pounds of meat cooked. Control options include ESPs, HEPA filters, wet scrubbers, and thermal oxidizers. The rule also requires ventilation hoods on new installations to meet standards of the Underwriters Laboratory (UL). There are currently several restaurants operating under-fired charbroilers which will be required to comply with the Bay Area AQMD's Rule in 2013. AQMD staff continues to evaluate the Bay Area AQMD's technical assessment and is monitoring rule implementation.

This control measure will be implemented in two phases. Phase I will be the completion of the technical assessment at CE-CERT, including considerations for compatibility with existing restaurants and all applicable building and safety codes (e.g. fire suppression). Evaluation of cost and affordability associated with the purchase, installation, and operation and maintenance (e.g., cleaning and/or replacing filters) of the equipment will also be assessed.

The findings from the control technology research currently being conducted will be the basis for potential future control requirements. Phase II will be the final technical and economic feasibility analysis in conjunction with potential rule development to establish requirements for under-fired charbroilers, if Phase I results suggest the feasibility of controls.

EMISSIONS REDUCTION

Control measure #BCM 05 - PM Emission Reductions from Under-Fired Charbroilers estimated that requiring large volume restaurants to install either ESP or HEPA control devices with at least 85 percent control could achieve a PM2.5 reduction of 1.1 tons per day from this source category (AQMD, 2007).

A subsequent review of potential emissions reductions was developed during preparation of the 2009 Proposed Amended Rule 1138 Preliminary Draft Staff Report (AQMD, 2009). This analysis was based on restaurant counts and activity data from a locally-developed survey (Rogozen, 1999) and PM emissions factors from a cooking device test report (CE-CERT, 1997). The Preliminary Draft Staff Report indicated potential emission reductions of filterable/condensable PM2.5 of 1.8 to 2.1 tons per day, based on an overall control efficiency of 85 percent, for restaurants cooking 1,250 pounds of hamburger per week. These potential emissions reductions, however, were determined to be infeasible due to a lack of affordable control technologies. Currently, several new control technologies are beginning to be demonstrated. If any of them turn out to be feasible, this measure will require emission reductions equivalent to the use of such technologies.

Emissions reductions specific to this control measure are unknown at this time, however, preliminary evaluation of control technologies indicates the potential to reduce PM2.5 emissions by approximately one ton per day from larger under-fired charbroiler operations. Any future rulemaking efforts would be based on technical and economic feasibility analysis as derived from the ongoing CE-CERT/AQMD research effort.

RULE COMPLIANCE AND TEST METHODS

Compliance requirements for this control measure would depend on the control strategy implemented. In conjunction with the rule development process for Rule 1138 and associated source testing, the document "Protocol – Determination of Particulate and Volatile Organic Compound Emissions from Restaurant Operations" was published November 14, 1997. These test methods are currently being used for testing and potential certification of charbroiler control devices. The test methods are used by qualified labs to certify the emissions level of specific control systems but have not been employed to test emissions at individual restaurants.

COST EFFECTIVENESS

The cost-effectiveness estimate associated with control measure implementation is preliminary at $15,000 per ton PM2.5 reduced and is based on the control technologies currently under evaluation. The District would analyze industry cost impacts as part of potential future Rule development.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from restaurant operations.

REFERENCES

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BCM-04: FURTHER AMMONIA REDUCTIONS FROM LIVESTOCK WASTE [NH3]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	FRESH LIVESTOCK WASTE			
CONTROL METHODS:	EPISODIC APPLICATION OF ACIDIFICATION OF MANURE TO REDUCE AMMONIA EMISSIONS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
NH3 INVENTORY	12.4	11.0	7.7	5.7
NH3 REDUCTION		TBD*	TBD*	TBD*
POLLUTANT REMAINING		TBD	TBD	TBD
CONTROL COST:	TBD			
IMPLEMENTING AGENCY:	SCAQMD			

** TBD are reductions to be determined once the technical assessment is complete and the control approach are identified.*

DESCRIPTION OF SOURCE CATEGORY

The purpose of the control measure is to reduce ammonia emissions from livestock operations with emphasis on dairies.

Background

The SCAB is exceeding both State and federal health-based air quality standards for PM2.5 and is currently designated by the U.S. EPA as non-attainment area for PM2.5. The AQMD is required to attain the 24-hour PM2.5 standards by 2014-2019. Ammonia contributes to formation of PM2.5 and mixes with transport emissions, particularly to form aerosol ammonium nitrate and ammonium sulfate. Livestock waste produces appreciable amounts of ammonia emissions.

In 2008/2009, there were approximately 208,000 dairy cattle, 7.9 million poultry, and 5,500 swine in the South Coast Air Basin. In general, with existing regulatory (i.e., Proposition 2 – known as cage-free proposition that passed in 2008), economic, and product demand climate, the livestock industry in the South Coast jurisdiction is not considered a growth industry into the future. However, with findings from recent research that freshly excreted manure in the animal housing areas is the major source of ammonia emissions and each cow produces approximately 60 kg of manure daily, selection of effective measures to minimize ammonia emissions from fresh manure is the focus of this control measure.

Regulatory History

Rule 1133.2 – Emission Reductions from Co-Composting Operations which was adopted in 2003 requires existing and new co-composting (including manure composting) facilities to comply with proper composting and control in order to achieve a minimum of 70% and 80% VOC reductions, respectively, and similar reductions for ammonia.

The 2007 AQMP Control Measure MCS-05 - Emission Reductions from Livestock Waste sought additional emission reductions from confined animal facilities (CAFs), beyond those achieved by current Rules 223 and 1127. Control Measure MCS-05 suggested adding control requirements for swine operations to meet the objectives of California Senate Bill (SB) 700 – Agriculture & Air Quality Summary and Implementation. The control measure aimed to require more stringent controls (Class Two Mitigation Measures) for large CAFs, including core measures across the board, and lesser controls (Class One Mitigation Measures) for smaller CAFs not currently subject to Rule 223 by bringing them into the District permit system. The control measure also aimed to further expand the scope of Rule 1127 and its Best Management Practices based on anticipated results of on-going and future scientific research regarding manure management. Overall, MCS-05 estimated 20% emissions reduction from each of the dairy, poultry, and swine categories.

Currently, Rule 223 – Emission Reduction Permits for Large Confined Animal Facilities requires a written Permit to Operate for all large CAFs, which are defined as facilities with (1): 1,000 or more milking cows; or 3,500 or more beef cattle; or 7,500 or more calves, heifers, or other cattle; or (2): 650,000 or more laying hens; or (3): 3,000 or more swine. In addition, the rule also requires these large facilities to submit and implement an emission mitigation plan which can be developed based on different classes of mitigation measures to mainly minimize VOC emissions from housing, feed operations, and manure handling.

Rule 1127 – Emission Reductions from Livestock Waste requires best management practices for dairies and specific requirements regarding manure removal, handling, and composting; however, the rule does not focus on fresh manure, which is one of the largest dairy sources of ammonia emissions.

In 2011, staff conducted the Technology Assessment that included a revised emissions inventory for all pollutants, including ammonia, to reflect new emission factors as well as current and future livestock animal headcounts which were higher than anticipated in the 2007 AQMP. Based on the revised emissions inventory, industry-level projections (i.e., mostly negative growth), and current regulatory requirements, staff recommended that Rule 1127 amendments not be pursued at that time. Staff also recommended that the 2014 VOC emission reduction shortfall be made up with excess VOC emission reductions generated from the implementation of Rule 1143 – Consumer Paint Thinners and Multi-Purpose Solvents. However, this category remains a significant source of ammonia emissions.

Emission Control Research

The acidifier sodium bisulfate (SBS) has been used to reduce pH and therefore bacterial level in dairy bedding, as well as to prevent environmental mastitis (a potentially fatal mammary gland infection) and calf respiratory stress. In California, SBS has been used by dairies in Tulare, Fresno, Merced, Stanislaus, San Joaquin, Kings, Kern, San Bernardino, Riverside, San Benito, and Sacramento, mainly to prevent cow lameness and nuisance flies. It has also been used by dairies in Walla Walla, Columbia, and Whitman (Washington), Wallowa (Oregon), and Wisconsin.

SBS is a hygroscopic acid salt and is an effective ammonia-reducing agent for fresh manure. SBS dissociates into Na^+, H^+, and SO_4^{2-}upon application to the manure, bedding, or dry lot surface. H^+ reduces the pH and protonates ammonia, converting it to ammonium. The ammonium is then bound by sulfate to form ammonium sulfate, which is retained in the manure in its solid form. Theoretically, 100 lbs of SBS would bind 14 lbs NH_3.

Research indicates that most ammonia reduction from dairy slurry (up to 84%) occurred during the first day of SBS application and that ammonia emissions decreased with increasing levels of SBS application. However, after 24 hrs, the reduction rates decreased and by day 3, the reduction rates were no longer different between dosages. On the average, SBS application was able to achieve a 60% ammonia emissions reduction with a 0.375 kg/m^2 (76.8 lb/1,000 ft^2) SBS application rate. Other findings reveal that SBS most effectively reduced ammonia emissions from dairy corrals at either an application rate of 50 lbs/1,000 ft^2, 3 times/week, or 75 lbs/1,000 ft^2, 2 times/week.

Recent research findings also indicate the effectiveness of SBS in alcohol control (up to 61% methanol reduction and 58% ethanol reduction), as well as fly control (up to 99% reduction) and bacteria reduction (68%) in dairies, depending on the application rates.

Currently, there is no research regarding the effects of SBS on odors at dairies; however, since pH reduction inhibits bacterial decomposition of nitrogenous compounds in the manure, it is believed that odors would also be reduced.

There is no research on the effects of topical application of SBS on cow milk production. Currently, there is one publication indicating a 5% to 15% increase in milk yield (depending on the lactation stages) for cows on the SBS-treated silage (as silage additive) with no adverse effects on the cows' blood biochemistry.

SBS is safe to be used for water treatment. According to the published findings by EPA, SBS can be used as a disinfectant to prevent damage of the membrane used in reverse osmosis. SBS is certified by the NSF/ANSI for treating drinking water (chlorine removal, corrosion & scale control, and pH adjustment) and has been used in California, Pennsylvania, and Oregon. It has also been used to remediate high pH soil at a construction site in California. Although the Chino area has an on-going desalting project, as with other salt-containing products, the use of SBS should be carefully considered in areas that are sensitive to salts and/or with existing high salt loading in soil. Application at high rates could form nitrous oxide. In addition, SBS must be applied at 50 to 75 lbs/1,000 ft^2, 2 times per week to manure to maintain constant emission reductions as the substance loses its effectiveness over time.

PROPOSED METHOD OF CONTROL

Reducing pH level in manure through the application of acidulant additives (acidifier) is one of the potential mitigations for ammonia. SBS is being considered for use in animal housing areas where high concentrations of fresh manure are located. Research indicates best results with the use of SBS on “hot spots”. SBS can also be applied to manure stock piles and at fencelines, and upon scraping manure to reduce ammonia spiking from the leftover remnants of manure and urine. SBS application may be required seasonally or episodically during times when high ambient PM2.5 levels are of concern.

This control measure will be implemented in two phases. Phase I will be to conduct a technical assessment of the aforementioned method of control. The technical assessment will evaluate the application of SBS at local dairies so as to evaluate the direct technical and economic feasibility of application, including episodic application only. The technical assessment will also examine potential impacts to animal and worker health and safety associated with uses of SBS. Staff intends to work with stakeholders at the Regional Water Quality Control Board relative to potential ground water impacts from the land spreading of manure treated with SBS.

If deemed feasible and effective, Phase II would implement the measure as needed to address future PM2.5 standards. Rule requirements would be specific to dairies in the AQMD jurisdiction and may be unique to localized operations only. As such, the requirements may not be applicable to dairies elsewhere where a site-specific assessment would need to be made relative to those particular conditions. Each air district will likely need to conduct their own assessment as to the feasibility of SBS application in their jurisdiction.

EMISSIONS REDUCTION

The emission reductions associated with SBS application are unknown at this time. Based on historical data, application may only be required for 8 weeks out of the year. Research indicates emission reduction potential in the range of 60%; however, SBS application timing and manure coverage variables require further consideration. Existing information regarding SBS application at dairies in the South Coast Air Basin, and indicates an overall emission reduction potential of about 50%. Current use of SBS and application coverage volume and rates, along with cost, will be examined in conjunction with the above referenced Phase I pilot program and assessment.

RULE COMPLIANCE AND TEST METHODS

TBD

COST EFFECTIVENESS

SBS can be applied by hand application or by tractor-driven fertilizer spreader; therefore, the operating costs would be minimal.

For dairies, SBS application at 50 to 75 lbs/1,000 ft^2, 2 times per week would cost $33 to $49.50/1,000 ft^2/week. For treatment of heavy-traffic areas only, the estimated cost would be $2.48 to $3.71/cow/week (assuming 4 cows/1,000 ft^2).

Costs to livestock facilities could be less when accounting for the fact that many dairies may already be using SBS for other purposes. If dairy operators already have the application equipment and only need to increase the amount and/or frequency of SBS application, they may already be seeing some potential co-benefits of increased milk yield and healthier animals. As discussed under Emission Reductions above, due to the unknown frequency of episodic applications, exact cost per facility or cost-effectiveness will vary by year.

IMPLEMENTING AGENCY

The District has the authority to regulate ammonia emissions from livestock waste.

REFERENCES

Rule 1133.2 – Emission Reductions from Co-Composting Operations, AQMD, January 2003

Rule 1127 – Emission Reductions from Livestock Waste, AQMD, August 2004

Rule 223 – Emission Reduction Permits for Large Confined Animal Facilities, AQMD, June 2006

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Contact with Mr. Chris O'Brien of Jones-Hamilton Co.

Contact with Mr. Edward Kashak of California Regional Water Quality Control Board, Santa Ana Region

IND-01: BACKSTOP MEASURE FOR INDIRECT SOURCES OF EMISSIONS FROM PORTS AND PORT-RELATED FACILITIES [NO_X, SO_X, PM2.5]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: IF THE BACKSTOP MEASURE BECOMES EFFECTIVE (I.E. IF EMISSIONS FROM PORT-RELATED SOURCES EXCEED TARGETS FOR NOX, SOX, AND PM2.5), AFFECTED SOURCES WOULD BE PROPOSED BY THE PORTS AND COULD INCLUDE SOME OR ALL PORT-RELATED SOURCES (TRUCKS, CARGO HANDLING EQUIPMENT, HARBOR CRAFT, MARINE VESSELS, LOCOMOTIVES, AND STATIONARY EQUIPMENT), TO THE EXTENT COST EFFECTIVE AND FEASIBLE STRATEGIES ARE AVAILABLE

CONTROL METHODS: IF THE BACKSTOP MEASURE BECOMES EFFECTIVE, EMISSION REDUCTION METHODS WOULD BE PROPOSED BY THE PORTS AND POTENTIALLY COULD INCLUDE CLEAN TECHNOLOGY FUNDING PROGRAMS, LEASE PROVISIONS, PORT TARIFFS, OR INCENTIVES/DISINCENTIVES TO IMPLEMENT MEASURES, TO THE EXTENT COST EFFECTIVE AND FEASIBLE STRATEGIES ARE AVAILABLE

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
NOX INVENTORY*	78.6	51.2	47.2	39.2
NOX REDUCTION*		N/A	N/A	N/A
NOX REMAINING*		51.2	47.2	39.2
SOX INVENTORY*	25.5	1.8	2.3	2.7
SOX REDUCTION*		N/A	N/A	N/A
SOX REMAINING*		1.8	2.3	2.7
PM2.5 INVENTORY*	3.7	1.0	1.0	1.1
PM2.5 REDUCTION*		N/A	N/A	N/A
PM2.5 REMAINING*		1.0	1.0	1.1

CONTROL COST: TBD

IMPLEMENTING AGENCY: SCAQMD

** The purpose of this control measure is to ensure the emissions from port-related sources are at or below the AQMP baseline inventories for PM2.5 attainment demonstration. The emissions presented herein were used for attainment demonstration of the 24-hr PM 2.5 standard by 2014.*

DESCRIPTION OF SOURCE CATEGORY

This control measure is carried over from the 2007 AQMP/SIP. If the backstop measure goes into effect, affected sources would be proposed by the ports and could include some or all port-related sources (trucks, cargo handling equipment, harbor craft, marine vessels, locomotives, and stationary equipment), to the extent cost effective and feasible strategies are available.

Other sources—i.e. sources that are unrelated to the Ports—would not in any way be subject to emission reductions under this measure (including through funding of emission reduction measures, or purchase of emission credits, by the Ports or port tenants).

Background

Emissions and Progress. The Ports of Los Angeles and Long Beach are the largest in the nation in terms of container throughput, and collectively are the single largest fixed source of air pollution in Southern California. Emissions from port-related sources have been reduced significantly since 2006 through efforts by the Ports and a wide range of stakeholders. In large part, these emission reductions have resulted from programs developed and implemented by the Ports in collaboration with port tenants, marine carriers, trucking interests and railroads. Regulatory agencies, including U.S. EPA, CARB and SCAQMD, have participated in these collaborative efforts from the outset, and some measures adopted by the Ports have led the way for adoption of analogous regulatory requirements that are now applicable statewide. These port measures include the Clean Truck Program and actions to deploy shore-power and low emission cargo handling equipment. The Ports of Los Angeles and Long Beach have also established incentive programs which have not subsequently been adopted as regulations. These include incentives for routing of vessels meeting IMO Tier 2 and 3 NOx standards, and vessel speed reduction. In addition, the ports are, in collaboration with the regulatory agencies, implementing an ambitious Technology Advancement Program to develop and deploy clean technologies of the future.

Port sources such as marine vessels, locomotives, trucks, harbor craft and cargo handling equipment, continue to be among the largest sources of $PM_{2.5}$ and $PM_{2.5}$ precursors in the region. Given the large magnitude of emissions from port-related sources, the substantial efforts described above play a critical part in the ability of the South Coast Air Basin to attain the national $PM_{2.5}$ ambient air standard by federal deadlines. This measure provides assurance that emissions from the Basin's largest fixed emission source will continue to support attainment of the federal 24-hour PM2.5 standard. Reductions in PM2.5 emissions will also reduce cancer risks from diesel particulate matter.

Clean Air Action Plan. The emission control efforts described above largely began in 2006 when the Ports of Los Angeles and Long Beach, with the participation and cooperation of the staff of the SCAQMD, CARB, and EPA, adopted the San Pedro Bay Ports Clean

Air Action Plan (CAAP). The CAAP was further amended in 2010, updating many of the goals and implementation strategies to reduce air emissions and health risks associated with port operations while allowing port development to continue. In addition to addressing health risks from port-related sources, the CAAP sought the reduction of criteria pollutant emissions to the levels that assure port-related sources decrease their "fair share" of regional emissions to enable the Basin to attain state and federal ambient air quality standards.

The CAAP focuses primarily on reducing diesel particulate matter (DPM), along with NOx and SOx. The CAAP includes proposed strategies on port-related sources that are implemented through new leases or port-wide tariffs, Memoranda of Understanding (MOU), voluntary action, grants or incentive programs.

The goals set forth in the CAAP include:

- Health Risk Reduction Standard: 85% reduction in population-weighted cancer risk by 2020
- Emission Reduction Standards:
  - By 2014, reduce emissions by 72% for DPM, 22% for NOx, and 93% for SOx
  - By 2023, reduce emissions by 77% for DPM, 59% for NOx, and 93% for SOx

In addition to the CAAP, the Ports have completed annual inventories of port-related sources since 2005. These inventories have been completed in conjunction with a technical working group composed of the SCAQMD, CARB, and U.S. EPA. Based on the latest inventories, it is estimated that the emissions from port-related sources will meet the 2012 AQMP emission targets necessary for meeting the 24-hr PM2.5 ambient air quality standard. The projected emissions from port-related sources are included in the "baseline" emissions assumed in this plan to attain the PM2.5 standards.

While many of the emission reduction targets in the CAAP result from implementation of federal and state regulations (either adopted prior to or after the CAAP), some are contingent upon the Ports taking and maintaining actions which are not required by air quality regulations. These actions include the Expanded Vessel Speed Reduction Incentive Program, lower-emission switching locomotives, and incentives for lower emission marine vessels. This AQMP control measure is designed to provide a "backstop" to the Ports' actions to provide assurance that, if emissions do not continue to meet projections, the Ports will develop and implement plans to get back on track, to the extent that cost effective and feasible strategies are available.

Regulatory History

The CAAP sets out the emission control programs and plans that will help mitigate air quality impacts from port-related sources. The CAAP relies on a combination of regulatory requirements and voluntary control strategies which go beyond U.S. EPA or CARB requirements, or are implemented faster than regulatory rules. The regulations which the CAAP relies on include international, federal and state requirements controlling port-related sources such as marine vessels, harbor craft, cargo handling equipment, locomotives, and trucks.

The International Maritime Organization (IMO) MARPOL Annex VI, which came into force in May 2005, set new international NO_X emission limits on Category 3 (>30 liters per cylinder displacement) marine engines installed on new vessels retroactive to the year 2000. In October 2008, the IMO adopted an amendment which places a global limit on marine fuel sulfur content of 0.1 percent by 2015 for specific areas known as Emission Control Areas (ECA). The South Coast District waters of the California coast are included in an ECA and ships calling at the Port of Los Angeles and Long Beach have to meet this new fuel standard. In addition, the 2008 IMO amendment required new ships built after January 1, 2016 which will be used in an Emission Control Area (ECA) to meet a Tier III NOx emission standard which is 80 percent lower than the original emission standard.

To reduce emissions from switch and line-haul locomotives, the U.S. EPA in 2008 established a series of increasingly strict emission standards for new or remanufactured locomotive engines. The emission standards are implemented by "Tier" with Tier 0 as the least stringent and Tier 4 being the most stringent. U.S. EPA also established remanufacture standards for both line haul and switch engines. For Tiers 0, 1, and 2, the remanufacture standards are more stringent than the new manufacture standards for those engines for some pollutants.

To reduce emissions from on-road, heavy-duty diesel trucks, U.S. EPA established a series of cleaner emission standards for new engines, starting in 1988. The U.S. EPA promulgated the final and cleanest standards with the 2007 Heavy-Duty Highway Rule. Starting with model year 2010, all new heavy-duty trucks have to meet the final emission standards specified in the rule.

On December 8, 2005, CARB approved the Regulation for Mobile Cargo-Handling Equipment (CHE) at Ports and Intermodal Rail Yards (Title 13, CCR, Section 2479), which is designed to use best available control technology (BACT) to reduce diesel PM and NO_X emissions from mobile cargo-handling equipment at ports and intermodal rail yards. The regulation became effective December 31, 2006. Since January 1, 2007, the regulation imposes emission performance standards on new and in-use terminal equipment that vary by equipment type.

In 1998, the railroads and CARB entered into an MOU to accelerate the introduction of Tier 2 locomotives into the SCAB. The MOU includes provisions for a fleet average in the SCAB, equivalent to U.S. EPA's Tier 2 locomotive standard by 2010. The MOU addressed NOx emissions from locomotives. Under the MOU, NOx levels from locomotives are reduced by 67 percent.

On June 30, 2005, Union Pacific Railroad (UP) and Burlington Northern Santa Fe Railroad (BNSF) entered into a Statewide Rail Yard Agreement to Reduce Diesel PM at California Rail Yards with the CARB. The railroads committed to implementing certain actions from rail operations throughout the state. In addition, the railroads prepared equipment inventories and conducted dispersion modeling for diesel PM.

In December 2007, CARB adopted a regulation which applies to heavy-duty diesel trucks operating at California ports and intermodal rail yards. This regulation eventually will require all drayage trucks to meet 2007 on-road emission standards by 2014.

Areas where the CAAP went beyond existing regulatory requirements or accelerated the implementation of current IMO, U.S. EPA, or CARB rules include emissions reductions from ocean-going vessels through lowering vessel speeds, accelerating the introduction of 2007/2010 on-road heavy-duty drayage trucks, maximizing the use of shore-side power for ocean-going vessels while at berth, early use of low-sulfur fuel in ocean-going vessels, and the restriction of high-emitting locomotives on port property. Each of these strategies is highlighted below.

HDV1 – Performance Standards for On-Road Heavy-Duty Vehicles (Clean Truck Program) This control measure requires that all on-road trucks entering the ports comply with the Clean Truck Program. Several milestones occurred early in the program implementation, but the current requirement bans all trucks not meeting the 2007 on-road heavy-duty truck emission standards from port property. This program has the effect of accelerating the introduction of clean trucks sooner than would have occurred under the state-wide drayage truck regulation framework.

OGV1 –Vessel Speed Reduction Program (VSRP): Under this voluntary program, the Port requested that ships coming into the Ports reduce their speed to 12 knots or less within 20nm of the Point Fermin Lighthouse. The program started in May 2001. The Ports expanded the program out to 40 nm from the Point Fermin Lighthouse in 2010.

OGV3/OGV4 – Low Sulfur Fuel for Auxiliary Engines, Auxiliary Boilers and Main Engines: OGV3 reduces emissions for auxiliary engines and auxiliary boilers of OGVs during their approach and departure from the ports, including hoteling, by switching to MGO or MDO with a fuel sulfur content of 0.2 percent or less within 40 nm from Point Fermin. OGV4 Control measure reduces emissions from main engines during their approach and departure from the ports. OGV3 and OVV4 are implemented as terminal leases are renewed.

RL-3 – New and Redeveloped Near-Dock Rail Yards: The Ports have committed to support the goal of accelerating the natural turnover of line-haul locomotive fleet to at least 95 percent Tier 4 by 2020. In addition, this control measure establishes the minimum standard goal that the Class 1 (UP and BNSF) locomotive fleet associated with new and redeveloped near-dock rail yards use 15-minute idle restrictors and ULSD or alternative fuels, and as part of the environmental review process for upcoming rail projects, 40% of line-haul locomotives accessing port property will meet a Tier 3 emission standard and 50% will meet Tier 4.

PROPOSED METHOD OF CONTROL

The goal of this measure is to ensure that NOx, SOx and PM2.5 emissions reductions from port-related sources are sufficient to attain the 24-hr federal PM2.5 ambient air quality standard. This measure would establish targets for NOx, SOx, and PM2.5 for 2014 that are based on emission reductions resulting from adopted rules and other measures such as railroad MOUs and vessel speed reduction that have been adopted and are being implemented. These emissions from port-related sources are included in the "baseline" emissions assumed in this plan to attain the 24-hour PM2.5 standard. Based on current and future emission inventory projections these rules and measures will be sufficient to achieve attainment of the 24-hr federal PM2.5 ambient air quality standard. Requirements adopted pursuant to this measure will become effective only if emission levels exceed the above targets. Once triggered, the Ports will be required to develop and implement a plan to reduce emissions from port-related sources to meet the emission targets over a time period. The time period to achieve and maintain emission targets will be established pursuant to procedures and criteria developed during rulemaking and specified in the rule.

This control measure will be implemented through a District rule. Through the rule development process the AQMD staff will establish a working group, hold a series of working group meetings, and hold public workshops. The purpose of the rule development process is to allow the AQMD staff to work with a variety of stakeholders such as the Ports, potentially affected industries, other agencies, and environmental and community groups. The rule development process will discuss the terms of the proposed backstop rule and, through an iterative public process, develop proposed rule language. In addition, the emissions inventory and targets will be reviewed and may be refined if necessary. This control measure applies to the Port of Los Angeles and the Port of Long Beach, acting through their respective Boards of Harbor Commissioners. The ports may have the option to comply separately or jointly with provisions of the backstop rule.

Elements of Backstop Rule

Summary: This control measure will establish enforceable nonattainment pollutant emission reduction targets for the ports in order to ensure implementation of the 24-hr PM2.5 attainment strategy in the 2012 AQMP. The “backstop” rule will go into effect if aggregate emissions from port-related sources exceed specified emissions targets. If emissions do not exceed such targets, the Ports will have no control obligations under this control measure.

Emissions Targets: The emissions inventories projected for the port-related sources in the 2012 AQMP are an integral part of the 24-hr PM2.5 attainment demonstration for 2014 and its maintenance of attainment in subsequent years. These emissions serve as emission targets for meeting the 24-hr PM2.5 standard.

Scope of Emissions Included: Emissions from all sources associated with each port, including equipment on port property, marine vessels traveling to and from the port while in California Coastal Waters, locomotives and trucks traveling to and from port-owned property while within the South Coast Air Basin. This measure will make use of the Port’s annual emission inventory, either jointly or individually, as the basis for the emission targets. The inventory methodology to estimate these emissions is consistent with the CAAP methodology. Other sources—i.e. sources that are unrelated to the ports—would not in any way be subject to emission reductions under this measure (including through funding of emission reduction measures, or purchase of emission credits, by the ports or port tenants).

Circumstances Causing Backstop Rule Regulatory Requirements to Come Into Effect: The “backstop” requirements will be triggered if the reported aggregate emissions for 2014 for all port-related sources exceed the 2014 emissions targets. The rule may also provide that it will come into effect if the target is met in 2014 but exceeded in a subsequent year. If the target is not exceeded, the Ports would have no obligations under this measure.

Requirements If Backstop Rule Goes Into Effect: If the "backstop" rule goes into effect, the Ports would submit an Emission Control Plan to the District. The plan would include measures sufficient to bring the Ports back into compliance with the 2014 emission targets. The Ports may choose which sources would be subject to additional emission controls, and may choose any number of implementation tools that can achieve the necessary reduction. These may include clean technology funding programs, lease provisions, port tariffs, or incentives/disincentives to implement measures. As described below, the Ports would have no obligation under this measure to implement measures which are not cost-effective and feasible, or where the Ports lack the authority to adopt an implementation mechanism. The District would approve the plan if it met the requirements of the rule.

RULE COMPLIANCE AND TEST METHODS

Compliance with this control measure will depend on the type of control strategy implemented. Compliance will be verified through compliance plans, and enforced through submittal and review of records, reports, and emission inventories. Enforcement provisions will be discussed as part of the rule development process.

COST EFFECTIVENESS AND FEASIBILITY

The cost effectiveness of this measure will be based on the control option selected. A maximum cost-effectiveness threshold will be established for each pollutant during rule development. The rule will not require any additional control strategy to be implemented which exceeds the threshold, or which is not feasible. In addition, the rule would not require any strategy to be implemented if the Ports lack authority to implement such strategy. If sufficient cost-effective and feasible measures with implementation authority are not available to achieve the emissions targets by the applicable date, the District will issue an extension of time to achieve the target. It is the District's intent that during such extension, the Ports and regulatory agencies would work collaboratively to develop technologies and implementation mechanisms to achieve the target at the earliest date feasible.

IMPLEMENTING AGENCY

The District has authority to adopt regulations to reduce or mitigate emissions from indirect sources, i.e. facilities such as ports that attract on- and off-road mobile sources, and has certain authorities to control emissions from off-road mobile sources themselves. These authorities include the following:

Indirect Source Controls. State law provides the District authority to adopt rules to control emissions from "indirect sources." The Clean Air Act defines an indirect source as a "facility, building, structure, installation, real property, road or highway which attracts, or may attract, mobile sources of pollution." 42 U.S.C. § 7410(a)(5)(C); CAA § 110(a)(5)(C). Districts are authorized to adopt rules to "reduce or mitigate emissions from indirect sources" of pollution. (Health & Safety Code § 40716(a)(1)). The South Coast District is also required to adopt indirect source rules for areas where there are "high-level, localized concentrations of pollutants or with respect to any new source that will have a significant impact on air quality in the South Coast Air Basin." (Health & Safety Code § 40440(b)(3)). The federal Court of Appeals has held that an indirect source rule is not a preempted "emission standard." *National Association of Home Builders v. San Joaquin Valley Unified Air Pollution Control District*, 627 F.3d. 730 (9th Cir. 2010)

Nonvehicular (Off-Road) Source Emissions Standards. Under California law "local and regional authorities," including the Ports and the District, have primary responsibility for the control of air pollution from all sources other than motor vehicles. (Health & Safety Code § 40000). Such "nonvehicular" sources include marine vessels, locomotives and other non- road equipment. CARB has concurrent authority under state law to regulate these sources. The federal Clean Air Act preempts states and local governments from adopting emission standards and other requirements for new locomotives (Clean Air Act § 209(e); 42 U.S.C.§ 7543(e)), but California may establish and enforce standards for other non-road sources upon receiving authorization from EPA (*Id*.). No such federal authorization is required for state or local fuel, operational, or mass emission limits for marine vessels, locomotives or other non- road equipment. (40 CFR Pt. 89, Subpt. A, App.A; *Engine Manufacturers Assn. v. Environmental Protection Agency*, 88 F.3d. 1075 (DC Cir. 1996)).

Fuel Sulfur Limits. With respect to non-road engines, including marine vessels and locomotives, the District and CARB have concurrent authority to establish fuel limits, such as those on sulfur content. As was noted above, fuel regulations for non-road equipment are not preempted by the Clean Air Act and do not require U.S. EPA authorization.

Operational Limits. The District has authority under state law to establish operational limits for nonvehicular sources such as marine vessels, locomotives, and cargo handling equipment (to the extent cargo handling equipment is "nonvehicular"). As was discussed above, operational limits for non-road equipment are not preempted by the Clean Air Act. In addition, the District may adopt operational limits for motor vehicles such as indirect source controls and transportation controls without receiving an authorization or waiver from U.S. EPA.

REFERENCES

San Pedro Bay Ports Clean Air Action Plan, 2010 Update, October 2010

Southern California International Gateway Project Draft Environmental Impact Report, Port of Los Angeles, September 2011

SCAQMD, 2007 Air Quality Management Plan, Appendix IV-A, June 2007

EDU-01: FURTHER CRITERIA POLLUTANT REDUCTIONS FROM EDUCATION, OUTREACH, AND INCENTIVES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	RESIDENTIAL, COMMERCIAL, INDUSTRIAL, AND TRANSPORTATION SOURCES			
CONTROL METHODS:	INCREASED AWARENESS, INCENTIVE PROGRAMS, AND TECHNICAL ASSISTANCE IN MAKING LOW EMITTING PURCHASES, IMPLEMENTING EFFICIENCY PROJECTS, AND CONSERVATION TECHNIQUES.			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
POLLUTANT INVENTORY	N/A	N/A	N/A	N/A
POLLUTANT REDUCTION		N/A	N/A	N/A
POLLUTANT REMAINING		N/A	N/A	N/A
CONTROL COST:	NOT DETERMINED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emissions inventory and reductions cannot be quantified due to the nature of the measure (e.g., outreach, incentive programs).*

DESCRIPTION OF SOURCE CATEGORY

This control measure is carried over from the 2007 AQMP/SIP.

Background

Energy efficiency and conservation have been included in the District's Air Quality Management Plans since 1991. The District continues to implement incentive and education programs to help promote clean air purchases, efficiency projects, and conservation techniques that provide criteria pollutant emissions benefits. The District has since adopted policies such as the Air Quality Related Energy Policy, Climate Change Policy, and Green Policy that help further define the District's efforts in these areas.

This measure seeks to increase awareness of the benefits of purchasing low emitting products and promote further implementation of efficiency and conservation projects**.** When making purchases such as new cars, yard equipment, or household products, there are several factors consumers consider, but emissions and health benefits are typically not considerations. To help make emissions an important factor in purchasers' decision-making process, the District has several existing outreach and education programs in place such as Clean Air Connections, Clean Air Choices, Air Quality Institute, educational materials, conferences, and outreach to specific communities throughout the District. Providing additional outreach and education regarding clean air choices will help consumers consider the emission benefits of their purchases. In some instances, these purchases include efficiency gains that will decrease longer term operating costs, and thus provide a built-in financial incentive. Providing specific outreach and education on these potential cost savings will help increase penetration of such low emitting technologies and practices.

Furthermore, there are several existing incentive programs to help promote higher efficiency and lower emitting technologies such as the utility administered rebate programs for purchases of high efficiency appliances. Some of these existing programs are established for reasons other than emissions benefits. For instance, the electric utility rebate program was established to reduce electricity demand to help decrease the need for additional generation plants. However, this program also provides emission benefits that might be implemented faster with further education and outreach by the District.

The outreach and education regarding these existing programs will include information on co-benefits such as emission reductions and cost savings to promote accelerated implementation of these existing programs. The District will also offer additional incentive programs to complement existing programs or promote specific efficient low emitting technologies. For instance, the District's Lawn Mower Exchange program provides a good example of the significant impacts incentive programs can have. Over the past nine years over 43,000 gasoline lawnmowers have been exchanged for electric mowers.

The District will also help to promote potential efficiency benefits for existing equipment and structures. There are several reasons why many efficiency projects are not undertaken. In many instances tools, incentive programs, and loan programs for efficiency upgrades are not adequately described, advertised, or consolidated. Certain projects require high initial capital costs, despite relatively fast payback periods, which serves as a barrier to implementation. In addition, technical barriers prevent many system operators, home owners, and building maintenance crews from utilizing existing tools and implementing efficiency projects. The District will help develop technical outreach to residents and businesses to help implement projects that have emission benefits and short payback periods. The District may also examine ways to provide assistance through additional incentive programs and/or loan products to defray or amortize capital costs on certain efficiency projects.

Regulatory History

As this measure is not a regulatory item that will be implemented via rulemaking, there is no relevant regulatory history in this area. However, as mentioned above, the District has developed and implemented a wide array of education, outreach, technical assistance, and incentive programs designed to achieve emission reductions on a voluntary basis.

PROPOSED METHOD OF CONTROL

This control measure is a voluntary program that provides education and outreach to consumers, business owners, and residences regarding the benefits of making clean air choices in purchases, conducting efficiency upgrades, installing clean energy sources, and approaches to conservation. These efforts will be complemented with helping implement currently available incentive programs and developing additional incentive programs. Lastly the District may develop programs to offer technical assistance to help implement efficiency measures and other low emission technologies.

EMISSIONS REDUCTION

Predicting emission reductions from these activities is not possible at this time. Outreach and education components will have benefits on emissions that can perhaps be quantified later based on program evaluation, technology penetration, and other assessment and inventory methods. Implementing additional incentive programs will provide a means to quantify these benefits as they are developed. Emission reductions achieved from these activities will be incorporated into the subsequent SIP revisions once projects are implemented.

RULE COMPLIANCE AND TEST METHODS

Not applicable.

COST EFFECTIVENESS

The cost effectiveness of this measure cannot be determined, given the variety of programs and projects that will be developed. The District will continually analyze costs associated for with education and outreach, and where possible quantify resulting emissions reductions. The cost effectiveness for specific incentive programs can be determined as they are developed and implemented by the District.

IMPLEMENTING AGENCY

The implementing agency will be the District, in cooperation with other local governments, agencies, technology manufacturers and distributors, and utility service providers.

REFERENCES

South Coast Air Quality Management District, AQMD Air Quality Related Energy Policy, Sept. 2011.

South Coast Air Quality Management District, AQMD Climate Change Policy, Sept. 2008.

South Coast Air Quality Management District, AQMD Green Policy, Oct, 2009.

National Academy of Sciences, Real Prospects for Energy Efficiency in the United States, 2010.

American Council for an Energy-Efficient Economy (ACEE), Energy-Efficiency: The Slip Switch to a New Track Toward Compliance with Federal Air Regulations, January 2012, Report # E122.

McKinsey and Co., Unlocking Energy Efficiency in the U.S. Economy, July 2009.

MCS-01: APPLICATION OF ALL FEASIBLE MEASURES ASSESSMENT [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	ALL SOURCE CATEGORIES			
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
POLLUTANT INVENTORY	TBD	TBD	TBD	TBD
POLLUTANT REDUCTION		TBD	TBD	TBD
POLLUTANT REMAINING		TBD	TBD	TBD
CONTROL COST*:	NOT DETERMINED			
IMPLEMENTING AGENCY:	SCAQMD			

***** *Emission reductions and cost-effectiveness will be determined after a source category and feasible controls are identified.*

DESCRIPTION OF SOURCE CATEGORY

Background

This control measure serves as a placeholder for any future control measures that may become feasible, prior to subsequent SIP revisions, through technology advances and/or cost decreases. The District continually monitors evolving control technologies, pricing changes, and the actions of other air quality agencies to determine the feasibility of implementing additional controls to achieve emissions reductions.

Regulatory History

The California Clean Air Act (CCAA) requires districts to achieve and maintain state standards by the earliest practicable date and for extreme non-attainment areas, to include all feasible measures Health and Safety (H&S) Code (H&S §§40913, 40914, and 40920.5). While this statute is not applicable to PM, the District believes it is appropriate and necessary to seek all feasible reductions from PM as well. The term "feasible" is defined in the 14 California Code of Regulations, section 15364, as a measure "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." CARB guidance states that this definition, found in the CEQA Guidelines, applies to the requirements under air pollution laws. The required use of best available retrofit control technology (BARCT) for existing stationary sources is one of the specified feasible measures. H&S Code §40440 (b)(1) requires the District to adopt rules requiring best available retrofit control technology for existing sources. H&S Code §40406 specifically defines BARCT as "…best available retrofit technology means an emission limitation that is based on the maximum degree of reduction achievable taking into account environmental, energy, and economic impacts by each class or category of source."

Existing rules and regulations on VOC coatings and solvents as well as regulations for pollutants such as NOx, SOx and PM reflect current BARCT. However, BARCT is ever evolving as new BARCT becomes available that is feasible and cost-effective. Through this control measure, the District commits to the adoption and implementation of new retrofit control technology standards as technology develops.

PROPOSED METHOD OF CONTROL

The District will continue to review new emission limits introduced through federal, state or other local regulations to determine if District regulations remain equivalent or more stringent than other regions. If not, a rulemaking process will be initiated to perform a BARCT analysis with potential rule amendments if deemed feasible. In addition, the District will adopt and implement new retrofit technology control standards, based on research & development and other information, that are feasible and cost-effective as new BARCT standards become available in the future.

EMISSIONS REDUCTION

Further emission reductions would be sought from the amendment of existing rules and regulations to reflect new BARCT standards that may become available in the future prior to subsequent Plan revisions.

RULE COMPLIANCE AND TEST METHODS

Compliance with this measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

Cost-effectives for this control measure cannot be determined because the future set of "all feasible" measures are not known. However, the most cost-effective control strategy using the newest control technologies would be sought. The District will continue to analyze the potential cost impact associated with implementing this control measure, conduct research on the newest control technologies, and provide cost effectiveness information as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from stationary sources.

REFERENCES

Health and Safety (H&S) Code: Sections 40913, 40914, 40920.5, 40406, and 40440 (b)(1)

14 California Code of Regulations, Section 15364

Section 3

8-hour Ozone Measures

CTS-01: FURTHER VOC REDUCTIONS FROM ARCHITECTURAL COATINGS (RULE 1113) [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	ARCHITECTURAL COATINGS			
CONTROL METHODS:	REDUCE THE VOC LIMITS FOR CERTAIN COATINGS TO 25 G/L, REMOVE OR FURTHER RESTRICT SMALL CONTAINER EXEMPTION, &/OR INCLUDE TRANSFER EFFICIENCY REQUIREMENTS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023 (2023-2007 SIP)***
VOC INVENTORY	21.9	15.5	16.2	16.7 (23.7)
VOC REDUCTION			2 - 4	2.1-4.1 (3.1- 6.2)
VOC REMAINING			12.2 - 14.2	12.6-14.6 (17.5 - 20.6)
CONTROL COST:	$10,000 TO $20,000 PER TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provide in parenthesis are based on the 2007 SIP inventory projections for 2023.*

DESCRIPTION OF SOURCE CATEGORY

The proposed control measure seeks to reduce the VOC emissions from large volume coating categories such as flat, non-flat and primer sealer undercoaters (PSU) and/or from the use of high-VOC architectural coatings sold in one liter containers or smaller. Additional emission reductions could be achieved from the application of architectural coatings by use of application techniques with greater transfer efficiency.

Background

Rule 1113 - Architectural Coatings, was originally adopted by the AQMD on September 2, 1977, to regulate the Volatile Organic Compound (VOC) emissions from the application of architectural coatings, and has since undergone numerous amendments. The last amendment, which was adopted on June 3, 2011, achieves 4.4 tons per day (tpd) emissions reduction by 2015.

Regulatory History

VOC Reductions

There have been several amendments to Rule 1113 which reduced the VOC limits for the high volume coating categories.

- November 8, 1996 – Flats Coatings were reduced from 250 g/L to an interim limit of 100 g/L effective July 1, 2001 and finally down to the current 50 g/L limit effective July 1, 2008.

- December 6, 2002

  - Non-Flat Coatings were reduced from 250 g/L to an interim limit of 150g/L effective January 1, 2003 and finally down to the current 50 g/L limit effective July 1, 2006.

  - PSU were reduced from 350 g/L to an interim limit of 200 g/L effective January 1, 2003 and finally down to the current 100g/L limit effective July 1, 2006.

Staff conducted technical assessments prior to each VOC limit reduction which demonstrated that the lower-VOC coatings performed as well as or better than the higher-VOC counterparts.

Small Container Exemption

The Small Container Exemption was adopted during the September 6, 1991 Rule 1113 amendment and allows manufacturers to sell coatings over the VOC limits in liter containers or smaller, provided they report those sales to the AQMD. Staff has been monitoring the use of the exemption and initially proposed phasing out the Small Container Exemption during the July 2011 rule amendment process. However, based on numerous comments and concerns, staff reconsidered the complete phase-out at that time and continues to study the issue.

Transfer Efficiency

Architectural coatings can be applied by brush, roller, sponge or trowel, that all achieve transfer efficiency greater than 90%. However, Rule 1113 – Architectural Coatings currently does not have a provision for transfer efficiency for spray application, as found in other coating rules focused on facility use. Another method used to reduce emissions from applying coatings is to improve the technique of the coating applicator. While HVLP and electrostatic paint spray application equipment can improve transfer efficiency up to a minimum of 65% when used properly, many painters hold the spray gun too close or too far away which also decreases transfer efficiency. A laser paint targeting system has been shown to improve transfer efficiency on average by 30% over equipment not using a targeting system, depending on the size, shape and configuration of the substrate (Iowa, 2010). Other retrofit technology is also available to increase transfer efficiency.

PROPOSED METHOD OF CONTROL

VOC Reductions

Staff will evaluate further reducing the VOC emissions from large volume coating categories such as flat, non-flat and primer sealer undercoaters (PSU), with consideration for appropriate implementation dates and potential creation of new subcategories (e.g., primers for metals) that retain current VOC limits. This approach may require inclusion of alternative test methods and approaches for measuring VOCs.

Small Container Exemption

Staff will evaluate various options for the Small Container Exemption, including a complete phase out of the exemption, creating certain new categories with higher VOC limits (e.g., primer for recycled rubber floor), creating a maximum allowable VOC limit, or phasing out the Small Container Exemption for certain coating categories.

Transfer Efficiency

Staff will evaluate the feasibility of a two-phase approach to achieve greater transfer efficiency from application of architectural coatings. The first phase will be to incorporate (retrofit by a certain date and incorporate into the design by a certain date) laser paint targeting or other available technology into spray guns. The second phase will be the inclusion of transfer efficiency provisions requiring that architectural coatings be applied by hand applications such as brush, roller, sponge, or trowel; or by High-Volume, Low-Pressure (HVLP) Spray or other technology capable of achieving a transfer efficiency equivalent or better to HVLP spray.

EMISSIONS REDUCTION

VOC Reductions

Staff estimated the VOC reduction based on the data that manufacturers reported under Rule 314 – Fees for Architectural Coatings for the 2008 calendar year, which does not include volume of coatings sold under the averaging compliance option, sell through or under the small container exemption. From the large volume categories, staff estimates baseline emissions and potential reductions to be 4.5 and up to 1.7 tpd, respectively.

Small Container Exemption

Depending on the approach implemented, there is the potential for reducing VOC emissions up to 1.9 tpd.

Transfer Efficiency

The first phase would incorporate the laser targeted technology, commercially proven to reduce coating usage by 30%. The second phase of incorporating transfer efficiency requirement of 65% may potentially reduce coating usage by up to an additional 30%. The emission reductions will primarily come from professional paint contractors who account for an estimated 65% of coating application and could result in VOC reductions up to 1 tpd.

RULE COMPLIANCE AND TEST METHODS

VOC Reductions

Rule compliance would be achieved by amending Rule 1113. In order to enforce the 25g/L VOC limit, Rule 1113 would have to include alternative VOC test methods to EPA Reference Method 24 for measuring VOCs in a reproducible and repeatable manner, especially for coatings with very low-VOC content. SCAQMD Method 313 *Determination of Volatile Organic Compounds (VOC) by Gas Chromatography* and/or ASTM Method D6886 *Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content*

Waterborne Air-Dry Coatings by Gas Chromatography are two alternatives currently available for inclusion into Rule 1113. These methods directly measure the VOC content of a coating yielding better precision for waterborne coatings than currently used methods.

In addition to the change in the test method, staff would also propose changing the metric that is used to regulate architectural coatings. The formula for the regulatory VOC, also referred to as the VOC of coating, removes the water and any exempt solvents in the VOC calculation. This calculation was hypothesized to prevent manufacturers from simply adding water to a coating to meet the VOC limit; therefore, requiring additional coats of paint to achieve the same coverage. Unfortunately, the calculation of the regulatory VOC magnifies any error in the VOC analysis, making the value unreliable especially for high-water, low-VOC coatings. Regulating coatings based on either the actual VOC, also referred to as the VOC of material, or the weight percent VOC would eliminate this source of error and allow for VOC limits less than 50g/L in the coatings rules. Further, staff does not believe that diluting waterborne coatings in order to achieve VOC compliance is a valid concern. Consumers have come to expect the type of coverage that today's coatings achieve; the marketplace will not accept coatings with poor coverage.

Small Container Exemption

Rule compliance would be achieved by amending Rule 1113.

Transfer Efficiency

Rule compliance would be achieved by amending Rule 1113 to require transfer efficiency requirements for spray applications.

COST EFFECTIVENESS

The cost-effectiveness of this control measure is estimated to be up to $20,000 per ton of VOC reduced. The District will continue to analyze the potential cost impacts associated with implementing this control measure and will provide specific cost-effectiveness as it becomes available.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from area sources.

REFERENCES

http://www.aqmd.gov/permit/spraytransferefficiency.html

http://iowaenviroassist.org/default/index.cfm/products/laserpaint/

http://www.gardco.com/pages/application/sq/laserpaint.cfm

CTS-02: FURTHER EMISSION REDUCTION FROM MISCELLANEOUS COATINGS, ADHESIVES, SOLVENTS AND LUBRICANTS [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	MISCELLANEOUS COATINGS, ADHESIVES, SOLVENTS AND LUBRICANTS			
CONTROL METHODS:	REDUCE THE ALLOWABLE VOC CONTENT IN PRODUCT FORMULATIONS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023 (2023 – 2007 SIP)***
VOC INVENTORY	14.1	11.5	13.5	14.5 (10.8)
VOC REDUCTION			1 - 2	1.1 – 2.2 (0.9 - 1.8)
VOC REMAINING	14.1	11.5	11.5 – 12.5	12.3 – 13.4 (9 - 9.9)
CONTROL COST:	$8,000 TO $12,000 PER TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provide in parenthesis are based on the 2007 SIP inventory projections for 2023.*

DESCRIPTION OF SOURCE CATEGORY

The proposed control measure seeks to reduce the VOC emissions from miscellaneous coatings, adhesive, solvent and lubricant categories by lowering certain product VOC limits. Examples of the miscellaneous categories to be considered include, but are not limited to, coatings used in aerospace; adhesives used in a variety of sealing applications; solvents for cleaning and preservation cleaning or graffiti abatement activities; fountain solutions for printing operations; and lubricants used as metalworking fluids to reduce heat and friction to prolong life of the tool, improve product quality and carry away debris.

Background

Over the years, the AQMD has developed numerous rules to reduce the Volatile Organic Compound (VOC) emissions from the use of coatings, adhesives, solvents and lubricants in commercial and industrial applications. Subsequent amendments to these rules achieved further VOC emission reductions primarily through product reformulations using low-VOC technologies including alternative resin chemistries, aqueous and bio-based products, and exempt solvents.

Regulatory History

The VOC rules that may be affected by this control measure are as follows:

- Rule 1124 – Aerospace Assembly and Component Manufacturing Operations
- Rule 1144 - Metalworking Fluids and Direct-Contact Lubricants
- Rule 1168 - Adhesive and Sealant Applications
- Rule 1171 - Solvent Cleaning Operations

PROPOSED METHOD OF CONTROL

Reductions would be achieved by lowering the VOC content of select few categories within the above-mentioned source-specific rules rather than relying on across the board lowering of VOC limits. For solvents, reductions could be achieved with the use of alternative low-VOC products or non-VOC product/equipment at industrial facilities. The proposal is anticipated to be accomplished with a multi-phase adoption and implementation schedule.

EMISSIONS REDUCTION

Current estimates are that there is a potential VOC emission reduction of about 1.0-2.0 tons per day.

RULE COMPLIANCE AND TEST METHODS

Rule compliance would be achieved by amending AQMD rules on coatings, adhesives, solvents and lubricants.

COST EFFECTIVENESS

The cost-effectiveness of this control measure is estimated at $8,000 to $12,000 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from area sources and stationary point sources.

REFERENCES

Staff Reports

Material Safety Data Sheets

Product and Technical Data Sheets

CTS-03: FURTHER VOC REDUCTIONS FROM MOLD RELEASE PRODUCTS [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	FACILITIES/PROCESSES USING MOLDS (EXCLUDING AEROSPACE)			
CONTROL METHODS:	LIMITATION OF VOC CONTENT FOR MOLD RELEASE PRODUCTS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023 (2023-2007 SIP)***
VOC INVENTORY	2.3 - 3.6	2.4 - 3.8	2.7 - 4.2	3.0 - 4.7 (2.4)
VOC REDUCTION			0.6 - 2.0	0.8 - 2.2 (0.7)
VOC REMAINING			1.9 - 2.2	2.4 - 2.5 (1.7)
CONTROL COST:	$4,000 TO $8,000 PER TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provide in parenthesis are based on the 2007 SIP inventory projections for 2023.*

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to reduce VOC emissions associated with the use of mold release products used in composite, fiberglass, metal and plastic manufacturing operations.

Background

Thousands of companies in the U.S. and California make metal, fiberglass, composite and plastic products. These products are often manufactured using molds which form the part into a particular configuration. Mold release agents are used to ensure that the parts, as they are made, can be released easily and quickly from the molds. Mold release agents are also used for concrete stamping operations to keep the mold from adhering to the fresh concrete. Mold release agents often contain waxes, silicone and lubricant compounds and many of them are blended with solvent carriers. The solvents used in the formulations are generally petroleum or other volatile organic compound (VOC) solvents and may also contain toxic components such as toluene and xylene. Mold cleaners may contain chlorinated solvents like trichloroethylene (TCE), petroleum solvents, n-methyl pyrollidone (NMP) and hexane.

Regulatory History

Mold release agents and cleaners are extensively used by a variety of different industrial sources. Residential and commercial concrete stamping is a rapidly growing industry, and overall VOC emissions are estimated to be significant. In some cases, particularly for mold release agents used in fiberglass, non-aerospace composite manufacturing and concrete stamping, there are currently no regulations on the VOC content of these products. Aside from general facility toxicity restrictions, such as Rule 1402, there are no limits on the toxic components that can be used in these products. The few applications of these products that are regulated are often subject to outdated, high-VOC limitations that do not reflect the state of the technology. As a result, most of the current mold release agent product formulations are high-VOC, upwards of 600 g/L. However, alternative low-VOC formulations are available. The District regulates mold release agents in architectural coatings, specifically form release compounds. Those products have a current VOC limit of 250 g/L with the limit being lowered to 100 g/L effective in 2014. Similar water-based, bio-based and powder formulations are available for industrial applications, often at competitive pricing. The California Air Resources Board (CARB) currently surveys consumer product mold release sales volume, but does not regulate mold release coatings.

PROPOSED METHOD OF CONTROL

This control measure seeks to reduce emissions from mold release products on metal, fiberglass, composite and plastic products, as well as concrete stamping operations, by requiring the use of low-VOC mold release products that are currently available in the market.

EMISSIONS REDUCTION

The emissions inventory is estimated at 2.3 to 3.6 tons per day based on the 2011 Annual Emission Report data for fiberglass facilities and estimates for the concrete stamping industry. Requiring the use of low-VOC mold release products is estimated to result in emission reductions in the range of 0.8 to 2.0 tons per day.

RULE COMPLIANCE AND TEST METHODS

Compliance with this control measure would be achieved by similar compliance requirements under the existing Regulation XI rules.

COST EFFECTIVENESS

Based on data from similar types of aqueous and bio-based technologies, the cost effectiveness of this control measure is approximately $4,000 to $8,000 per ton of VOC reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from stationary and area sources.

REFERENCES

South Coast Air Quality Management District, "Final Staff Report For Proposed Amended Rule 1113 – Architectural Coatings," June, 2011 http://www.aqmd.gov/hb/attachments/2011-2015/2011Jun/2011-Jun3-024.pdf

CMB-01: FURTHER NO_X REDUCTIONS FROM RECLAIM – PHASE II [NO_X]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: VARIOUS RECLAIM NO_X SOURCES

CONTROL METHODS: VARIOUS CONTROL TECHNOLOGIES AND METHODS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	2008	2014	2019	2023 (2023-2007 SIP)**
NO_X INVENTORY	23.2	26.5	26.5	26.5 (26.5)
NO_X REDUCTION PHASE I*		2* - 3	2* - 3	2* - 3 (2* - 3)
NOX REDUCTION PHASE II				1 - 2 (1 - 2)
NO_X REMAINING		24.48 – 23.48	24.48 – 23.48	23.48 – 20.48 (21.5 -23.5)

CONTROL COST: $ 16,000 PER TON NO_X REDUCED

IMPLEMENTING AGENCY: SCAQMD

**Phase I is proposed as a contingency measure and if not triggered, the total targeted reductions targeted in Phase II will be a cumulative 3-5 tpd of NOx with the lower end of the emission reduction range to be committed in the SIP.*

*** Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provided in parenthesis are based on the 2007 SIP emissions inventory projects for 2023. Emission reductions reflect RTC values and no adjustment between 2007 AQMP and 2012 AQMP is necessary.*

DESCRIPTION OF SOURCE CATEGORY

There were approximately 284 facilities in the Regional Clean Air Incentives Market (RECLAIM) program, as of July 1, 2010. The RECLAIM program includes facilities with NOx or SOx emissions greater than or equal to four tons per year in 1990 or any subsequent year. A wide range of equipment such as fluid catalytic cracking units, boilers, heaters, furnaces, ovens, kilns, coke calciner, internal combustion engines, and turbines are major sources of NOx or SOx emissions at the RECLAIM facilities. This control measure identifies a series of control approaches that can be implemented to further reduce NOx emissions at the RECLAIM facilities.

Background

The RECLAIM program was first adopted in 1993 to further reduce emissions from the largest NOx and SOx emitting stationary sources by providing an alternative regulatory mechanism to the command and control regulatory structure. Under this program, facilities are issued NOx and SOx allocations, also known as RECLAIM Trading Credits (RTCs) or facility emission caps, which are declined annually. To meet the declining annual facility caps, RECLAIM facilities have the option of installing pollution control equipment, changing operations, or purchasing RTCs in the RECLAIM market.

The RECLAIM program is subject to several legal mandates. The Health and Safety code requires the District to monitor the advancement in Best Available Control Retrofit Technology (BARCT), and if BARCT advances, the District is required to periodically re-assess the overall facility caps, and reduce the RTC holdings, as if the equipment located at the facilities would be subject to applicable equivalent command-and-control BARCT levels. The emission reductions resulting from the programmatic RTC reductions will help the basin attain the National Ambient Air Quality Standards (NAAQS) for ozone and $PM_{2.5}$ as expeditiously as practicable. The BARCT evaluation must include an evaluation of the maximum degree of reduction achievable with advanced control technologies taking into account the environmental, energy, and economic impacts for each class or category of source.

A review of the emissions profile of the RECLAIM universe shows that the NOx emissions are not evenly distributed among the RECLAIM facilities: the top 10% of the universe (24 facilities) comprised mainly of refineries, power plants, cement, glass, and steel manufacturing, emitted about 80% of the NOx emissions.

Regulatory History

On October 15, 1993, the AQMD's Governing Board adopted Regulation XX – RECLAIM. The RECLAIM program at its inception included 392 NOx facilities. RECLAIM Regulation XX includes 11 rules that specify the applicability, definitions, allocations, trading and operational requirements, as well as monitoring, reporting, and recordkeeping requirements. The NOx RECLAIM regulation has been revised several times, and one significant amendment (2005) reflected a BARCT re-assessment. The January 2005 amendment resulted in a NOx RTC reduction of 7.7 tons per day (tpd), approximately 22.5% reduction of the RTC holdings, which was implemented in 5 phases: 4 tpd by 2007 and an additional 0.925 tpd in each of the following 4 years.

PROPOSED METHOD OF CONTROL

Phase II of reductions will focus on periodic BARCT evaluation as required under the state law. A review of recently adopted control measures and air regulations in other air pollution control districts, as well as command-and-control rules adopted for non-RECLAIM facilities in the District, show that advancements in control technologies are available and can be applied to the top emitting sources. Such control technologies include but are not limited to selective catalytic reduction, low NOx burners, NOx reducing catalysts, oxy-fuel furnaces, and non-selective catalytic reduction. Several BARCT levels assessed at the inception of the program in 1993 for top emitting sources such as cement kilns, glass furnaces, and gas turbines were not subject to reduction in the 2005 RECLAIM rule amendment. These sources will be examined for further reductions in this control measure and potential rule making.

During the rulemaking process, staff may also incorporate the concepts of facility modernization, as well as include other feasible control measures such as increased energy efficiency and zero and near-zero emission technologies.

EMISSIONS REDUCTION

Staff's initial analysis shows that approximately 1-2 tpd additional NOx RTC reductions are feasible for the second phase from the RECLAIM universe (from the overall 3-5 tpd NOx RTC reductions discussed in the first phase). During the rule development phase, staff may refine the emission reductions to include growth and other unforeseen issues at this stage. Phase II will be incorporated into the 2015 AQMP for implementation by 2020 using the BARCT analysis that is developed in 2013 and 2014. It should be noted that since there are substantial NOx reductions needed by 2023, if additional reductions are feasible and cost effective, they will be evaluated during rulemaking. Note that the California Health and Safety Code requires the District to monitor the advancement in Best Available Control Retrofit Technology (BARCT), and if BARCT advances, the District is required to periodically re-assess the overall facility caps, and reduce the RTC holdings to applicable equivalent command-and-control BARCT levels.

According to the RECLAIM Annual Audit Reports, NOx emissions were reduced from 2008 to 2010, and the vast majority of the RECLAIM facilities complied with their RTC allocations. The audited annual NOx emissions for the entire RECLAIM universe were reported as 22.9, 20, and 19.5 tpd for compliance year 2008, 2009, and 2010, respectively. The NOx RTCs allocated for the universe were reported as 29.4, 28.4, and 27.5 tpd for compliance year 2008, 2009, and 2010, respectively. Data in the audit reports reflected an excess of 6.5, 8.4, and 8.0 tpd of RTCs holdings for compliance year 2008, 2009, and 2010, respectively, or approximately a 22–30% excess in RTC holdings in the most recent three years. Being cognizant that the 2008 emission profile may reflect a period of the economic downturn, staff's estimated target of a 3-5 tpd RTC allocation reduction (approximately 38 - 63 percent of the unused RTC holdings) for both phases combined appears to be achievable.

RULE COMPLIANCE AND TEST METHODS

Compliance with the provisions of this control measure would be based on monitoring, recordkeeping, and reporting requirements that have been established in either the RECLAIM program or existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

It is expected that the cost effectiveness for this control measure would be in the neighborhood of $16,000 per ton NOx reduced. It is based on the cost effectiveness developed for non-RECLAIM facilities or other command-and-control rules in other air pollution control districts. It should be noted that since RECLAIM facilities have the ability to trade RTCs, it tends to lower the actual cost of compliance. Staff will refine the cost effectiveness during the rule development phase.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from RECLAIM facilities.

REFERENCES

AQMD, 2008. Rule 1146 – Emissions of Oxides of Nitrogen from Industrial and Commercial Boilers, Steam Generators, and Process Heaters, Amended September 5, 2008.

AQMD, 2010. Rule 1110.2 – Emission Reductions from Gaseous and Liquid Fueled Engines, Amended July 9, 2010.

AQMD, 2010-12. Annual RECLAIM Audit Report for 2008 Compliance Year, March 5, 2010; Annual RECLAIM Audit Report for 2009 Compliance Year, March 5, 2010; and Annual RECLAIM Audit Report for 2010 Compliance Year, March 2, 2012.

AQMD, 2012. Stationary Source Committee, Item #4, Twelve-month Rolling Price of 2010 and 2011 Compliance Years RTCs, April 20, 2012

Bay Area, 2006. Regulation 9, Rule 9 – NOx from Stationary Gas Turbines, Amended December 6, 2006.

EPA, Menu of Control Measures - Control Options for Reducing NOx from Point and Area Sources, September 3, 2010.

EPA, Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from the Petroleum Refining Industry, October 2010.

LBL, 2005. Energy Efficiency Improvement and Cost Saving Opportunities for Petroleum Refineries, Sponsored by the U.S. EPA, Ernest Orlando Lawrence Berkeley National Lab, February 2005.

SJVUAPCD, 2007. Rule 4703 – Stationary Gas Turbines, Amended September 20, 2007.

SJVUAPCD, 2008. Rule 4320 – Advanced Emission Reduction Options for Boilers, Steam Generators, and Process Heaters Greater Than 5 MMBTU/hr, Adopted October 16, 2008.

SJVUAPCD, 2011. Rule 4354 – Glass Melting Furnaces, Amended May 19, 2011.

SJVUAPCD, 2011. Rule 4702 – Internal Combustion Engines, Amended August 18, 2011.

CMB-02: NOX REDUCTIONS FROM BIOGAS FLARES [NOX]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	LANDFILLS AND DIGESTERS			
CONTROL METHODS:	NOX REDUCTIONS FROM BIOGAS FLARES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
NOX INVENTORY	TBD	TBD	TBD	TBD
NOX REDUCTION			TBD	TBD
NOX REMAINING			TBD	TBD
CONTROL COST:	$20,000 PER TON NOX REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

** TBD are reductions to be determined once the inventory and the control approach are identified.*

DESCRIPTION OF SOURCE CATEGORY

Background

Only hydrocarbon and toxic air contaminant emissions from landfills and waste treatment plants are regulated by AQMD rules 1150.1, 1150.2 and 1179. There are no source specific rules regulating NOx emissions from biogas flares. Flare NOx emissions are regulated through new source review and BACT. A survey of permits for landfill and waste treatment plant flares indicates NOx emissions range from 0.12 to 0.025 pound per million BTU of biogas (BACT since 2006) depending on the age of the flare. This control measure proposes that, consistent with the all feasible control measures, all biogas and non-refinery flares meet current BACT and/or implement flaring minimizations strategies.

Regulatory History

There are no source specific rules regulating NOx emissions from biogas flares.

PROPOSED METHOD OF CONTROL

This control measure proposes that, consistent with the all feasible measures control measure, all biogas and non-refinery flares meet current BACT. Most stringent current BACT (since 2006) for biogas flares is 0.025 pound of NOx per million BTU of biogas. As an alternative control option, staff will also explore opportunities to minimize flaring at landfills and waste water treatment and other non-refinery facilities.

EMISSIONS REDUCTION

Based on facility reported emissions (2010), the annual average emissions for biogas flares are about 0.1 tons per day of NOx. The average emission factor for biogas flares at facilities in the AQMD is 0.056 pounds per million BTU (unweighted average). However, the most stringent current BACT for biogas flares would generate NOx emissions is 0.025 pound per million BTU of biogas. Emissions vary by season and are affected by other operations at landfills and treatment plants. Staff estimates an average emission reduction of about 50% is achievable if all flares meet the most stringent current BACT limit of 0.025 pound NOx per million BTU of biogas.

RULE COMPLIANCE AND TEST METHODS

SCAQMD Method 100.1

COST EFFECTIVENESS

Based on cost information used for the 2006 AQMD BACT determination for biogas flares, the average cost effectiveness for meeting an emission limit of 0.025 pound per million BTU of biogas is less than $20,000 per ton of NOx reduced.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from these stationary sources.

REFERENCES

CMB-03: REDUCTIONS FROM COMMERCIAL SPACE HEATING [NOX]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	COMMERCIAL SPACE HEATERS			
CONTROL METHODS:	NOX EMISSION REDUCTIONS FROM COMMERCIAL SPACE HEATING			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023 (2023-2007 SIP)****
NOX INVENTORY	2.2	2.2	2.2	2.2 (0.7)
NOX REDUCTION		0	0.06*	0.18* (0.1)
NOX REMAINING		2.2	2.2	2.02 (0.6)
CONTROL COST:	$20,000 PER TON NOX REDUCED (0.6 TPD)			
IMPLEMENTING AGENCY:	SCAQMD			

* *Partial Implementation (starting in 2018 with full implementation over 20 years)*

** *Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provide in parenthesis are based on the 2007 SIP inventory projections for 2023.*

DESCRIPTION OF SOURCE CATEGORY

Background

Currently the AQMD regulates boilers and small residential and commercial central furnaces used for space heating. Boilers, depending on size, are subject to Rule 1146, 1146.1 or 1146.2. Residential and small commercial fan-type central furnaces are regulated by AQMD Rule 1111. Large commercial furnaces are not currently regulated by the AQMD unless they have a heat input rating of more than 2 million BTU per hour. Units with a rating of more than 2 million BTU per hour require an AQMD permit and are subject to a NOx BACT limit of 30 ppm (at a reference level of 3% oxygen). This control measure seeks emission reductions from unregulated commercial fan-type central furnaces used for space heating. This control measure will apply to manufacturers, distributors, sellers, installers and purchasers of commercial fan-type central furnaces used for space heating.

Regulatory History

Large commercial furnaces are not currently regulated by the AQMD unless they have a heat input rating of more than 2 million BTU per hour. Units with a rating of more than 2 million BTU per hour require an AQMD permit and are subject to new source review and a NOx BACT limit of 30 ppm (at a reference level of 3% oxygen).

PROPOSED METHOD OF CONTROL

This control measure seeks NOx emission reductions of about 0.12 tpd by 2023 and ultimately at least 0.6 tons/day from unregulated commercial fan-type central furnaces used for space heating. This control measure will apply to manufacturers, distributors, sellers, installers and purchasers of commercial fan-type central furnaces used for space heating.

The technology to reduce emissions from commercial space heating equipment is transferrable from residential space heating furnaces and other heating and drying equipment. Currently commercial space heaters are unregulated and have NOx emissions in the range of 90 to 110 ppm. The AQMD has required residential space heaters to meet a limit of 40 ng/J of heat output (55 ppm) since 1984 and the future limit, starting in 2014, for residential space heaters is 14 ng/J (20 ppm). Low NOx burners are also available for a variety of commercial and industrial heating and drying applications and achieve NOx emission levels of 10 to 30 ppm. Assuming a future NOx emission limit of between 20 ppm to 30 ppm, emissions from a commercial heating unit can be reduced by 60 to 80%. This measure will be implemented in two phases, beginning with a technical assessment to be completed by 2014 and Phase II rule development by 2016.

EMISSIONS REDUCTION

The commercial space heating inventory must be refined in order to identify the amount of natural gas used by fan-type space heaters versus hydronic (boiler-based) space heating. However, based on national estimates of floor space for different types of buildings and uses, staff estimates that 45 to 60% of all commercial, light manufacturing, warehouse, office, school and government building floorspace is heated by commercial forced air units. Assuming an emission reduction of between 60 to 80% and a 2008 baseline commercial heating inventory of 2.2 tons of NOx per day (uncontrolled), the measure would reduce NOx emissions by between 0.6 tons per day (2.2 tons/day X 45% of floor space X 60% reduction) and 1 ton per day (2.2 tons/day X 0.6 X 0.80). Growth and energy efficiency programs will affect the anticipated reduction from this control measure. Energy efficiency programs will reduce the benefit of this control measure, but together they will result in greater reductions from this source category.

RULE COMPLIANCE AND TEST METHODS

SCAQMD Method 100.1

COST EFFECTIVENESS

Based on the cost effectiveness of rules for other heating equipment (Rules 1111, 1121, 1146.2 and 1147), staff estimates the cost effectiveness at $20,000 per ton.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from these stationary sources.

REFERENCES

U.S. Department of Energy (April 2012). INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2010, Table 3.2.2 – Principal Commercial Building Types, as of 2003 (Percent of Total Floorspace)

FUG-01: VOC REDUCTIONS FROM VACUUM TRUCKS [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	VOC EMISSIONS FROM VACUUM TRUCKS			
CONTROL METHODS:	VOC CONTROL DEVICES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
VOC INVENTORY	1.50	1.50	1.50	1.50
VOC REDUCTION			1.05	1.05
VOC REMAINING			0.45	0.45
CONTROL COST:	$3,000 PER TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

DESCRIPTION OF SOURCE CATEGORY

This control measure addresses the attainment of emission reductions from vacuum trucks through the use of traditional control devices and technologies, including carbon adsorption systems, positive displacement pumps, internal combustion engines, thermal oxidizers, refrigerated condensers and liquid scrubbers.

Background

Vacuum truck services are used by a variety of industries, including petroleum refineries, marine terminals, industrial wharfs, gasoline dispensing facilities, gasoline bulk terminals, gasoline bulk plants, gasoline cargo tanks, gas well and oil well fields and pipelines. In the petroleum industry they are used to remove materials from storage tanks, vessels, sumps, boxes and pipelines. They are also used to transport materials from one location to another. The applicability of this control measure will be further studied during rule development taking into consideration the control availability and costs.

Regulatory History

Currently Vacuum Truck emissions are only controlled by Rule 1149, Storage Tank and Pipeline Cleaning and Degassing, when used as part of tank or pipeline degassing control devices. In refineries, the same vacuum trucks are used to remove hydrocarbon liquids from various types of equipment and are currently uncontrolled in these areas.

PROPOSED METHOD OF CONTROL

This measure will primarily focus on high-emitting vacuum truck operations, such as those found in petro-chemical industries, and other operations that include the transfer of volatile liquids, such as gasoline. There are a variety of technologies that are available to limit organic emissions from vacuum truck operations. Most of them can achieve capture and control efficiencies of 95%. Technologies include carbon adsorption systems, internal combustion engines, thermal oxidizers, refrigerated condensers, liquid scrubbers and positive displacement (PD) pumps. Sometimes control technologies can be combined. For example, an internal combustion engine can be combined with a chiller, or carbon adsorption can be combined with a scrubber. While some controls can be integrated into vacuum trucks, most vacuum trucks are not commonly equipped with on-board control equipment. However, vacuum truck operations do use outboard carbon adsorption systems, thermal oxidation, or internal combustion engine technologies. Such control technologies are typically connected as a “skid-mount” or “portable trailer unit.” Control equipment has generally been used for safety reasons, to control odors, or to comply with requirements in the Code of Federal Regulations.

EMISSIONS REDUCTION

Organic emissions from affected vacuum truck operations are estimated at 1.50 tpd. These emission estimates include throughput that is already controlled or minimized through use of external abatement equipment, positive displacement pumps, or gravity feed. Based on studies done in the Bay Area at similar facilities, staff estimates that 50% of vacuum truck operations can be controlled with external control equipment such as carbon adsorption or thermal oxidization. These devices have an efficiency of at least 95%. The other half of affected vacuum truck operations can be minimized by the use of positive displacement pumps or gravity feed. For these operations, staff estimates control efficiency of 75%. VOC emission reductions are estimated to be approximately 1.05 tpd, which represents an 85% reduction in emissions from regulated materials and staff estimates a 70% reduction potential of overall organic emissions from vacuum truck operations along with a high concurrent reductions in toxic air contaminants such as benzene, toluene, xylene, hexane, and possibly greenhouse gas emissions.

RULE COMPLIANCE AND TEST METHODS

Compliance would be based on field inspection and possible recordkeeping requirements that will be established in a rule or regulation requiring control technology installation and usage.

COST EFFECTIVENESS

The proposed controls would be structured to focus on cost effectiveness. Highly volatile liquids, such as gasoline, emit high rates of organic emissions when moved into vacuum trucks. However, source testing has found that many materials moved by vacuum trucks in petroleum refineries, such as wastewater, emit at a very low rate and are thus not cost effective to control. Therefore, only those materials that source tests have shown to have high emissions and that are cost-effective to control would be likely included in the scope of this effort.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from non-vehicular sources. The proposed control measure targets equipment that is not part of the propulsion engine.

REFERENCES

Staff Report - Bay Area Air Quality Management District, Proposed Regulation 8, Rule 53: Vacuum Truck Operations, and Amendments to Regulation 2, Rule 1: Permits.

FUG-02: EMISSION REDUCTIONS FROM LPG TRANSFER AND DISPENSING [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	LPG TRANSFER AND DISPENSING			
CONTROL METHODS:	PHASE I: RETROFITTING STATIONARY STORAGE TANKS AND CYLINDERS WITH LOW EMISSION FIXED LIQUID LEVEL GAUGES AND USE OF LPG LOW EMISSION CONNECTORS FOR TRANSFER AND DISPENSING *(Already adopted)* PHASE II: EXPAND RULE APPLICABILITY TO INCLUDE LPG TRANSFER AND DISPENSING AT OTHER FACILITIES, INCLUDING CURRENTLY EXEMPTED FACILITIES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023***
VOC INVENTORY	9.5	6.8	3.9	4.1
VOC REDUCTION			1 - 2	1 - 2
VOC REMAINING			1.9 - 2.9	2.1 - 3.1
CONTROL COST:	$4,000 - 10,000/TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *New emissions source category. No corresponding emissions in 2007 AQMP.*

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to reduce VOC emissions associated with the transfer and dispensing of Liquefied Petroleum Gas (LPG).

Background

In 1992, the California Air Resources Board (CARB) made the first attempt to quantify LPG transfer and dispensing emissions by conducting a study to determine the usage patterns of LPG and to estimate emissions resulting from these operations for the entire state of California. The study concluded that LPG fugitive emissions from transfer and dispensing operations result from three main areas: volatilization of entrapped product during disconnection of LPG supply and transfer lines, leaks in the equipment used for transfer and dispensing, and venting through fixed liquid level gauges (FLLGs) used as a safety device to ensure that pressurized receiving containers, including cylinders and tanks are not overfilled.

Regulatory History

In August 2010 the District initiated rule development and adopted Rule 1177 on June 1, 2012, which required the use of low emission FLLGs and LPG low emission connectors. Upon full implementation in July 2017, Rule 1177 will achieve 6.1 tpd VOC reductions from the estimated 8.6 tpd baseline inventory for the regulated facilities.

Rule 1177 evaluated fugitive VOC emissions from the venting of FLLGs during filling and from the disconnection of LPG supply and transfer lines to determine baseline VOC emissions and the associated reductions. However, although leaks in the equipment used for transfer and dispensing were not evaluated or quantified due to the lack of data, Rule 1177 will implement a Leak Detection and Repair (LDAR) program for transfer and dispensing facilities that offer LPG for sale to end users.

Currently, Rule 1177 includes an exemption for facilities that are subject to the requirements of Rule 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants. These facilities include refineries, marine terminals, natural gas processing plants and pipeline transfer stations, as well as facilities that conduct fill-by-weight techniques.

PROPOSED METHOD OF CONTROL

The development and adoption of Rule 1177 constitutes Phase I of this control measure. Under Phase II, the proposed control measure will expand the applicability of Rule 1177 to include VOC emissions associated with LPG transfer and dispensing activities at previously exempted facilities and evaluate the potential for further reductions in VOC emissions.

EMISSIONS REDUCTION

The emission reductions from Phase II of the control measure are anticipated to be 1 – 2 tpd in addition to the 6.1 tpd achieved under Phase I adopted June 2012.

RULE COMPLIANCE

Compliance with the provisions of this control measure would be based on monitoring, vapor collection, and inspection requirements. In addition, compliance will be verified through recordkeeping and reporting that will be used to track requirements.

COST EFFECTIVENESS

For Phase 1 of this control measure, the cost-effectiveness is estimated to be approximately $1,700 per ton of VOC emissions reduction. Staff will continue to evaluate technology and costs associated with the broadened applicability and estimate a cost-effectiveness of between $4,000 and $10,000 per ton of VOC emissions.

IMPLEMENTING AGENCY

The District has authority to adopt and enforce rules and regulations applicable to non-vehicular sources. The control measure will not affect propulsion engines (Health and Safety Code, Section 40001).

REFERENCES

South Coast Air Quality Management District, "Draft Staff Report For Proposed Rule 1177 – Liquefied Petroleum Gas Transfer and Dispensing," May, 2012.

Life Cycle Associates, LLC (2011), "Inventory of Fugitive Emissions from LPG Transfers in California, prepared for Western Propane Gas Association," June 2011 (CONFIDENTIAL).

CARB (1992) "Determination of Usage Patterns and Emissions for Propane /LPG in California," May 1992.

FUG-03: FURTHER REDUCTIONS OF FUGITIVE VOC EMISSIONS [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	FUGITIVE EMISSIONS SOURCES			
CONTROL METHODS:	IMPROVED/EXPANDED LEAK DETECTION PROGRAMS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023 (2023-2007 SIP)***
VOC INVENTORY	3.8	3.8	3.8	3.8 (1.6)
VOC REDUCTION			1 - 2	1 -2 (0.4 - 0.8)
VOC REMAINING			1.8 - 2.8	1.8 - 2.8 (0.8 - 1.2)
CONTROL COST:	$11,000/TON VOC REDUCED			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provide in parenthesis are based on the 2007 SIP inventory projections for 2023.*

DESCRIPTION OF SOURCE CATEGORY

This control measure targets a variety of fugitive emissions sources including, but not limited to, oil and gas production facilities, petroleum and chemical products processing, storage and transfer facilities, marine terminals, and other sources. Most of these facilities are required under District and federal rules to maintain Inspection/Maintenance or leak detection and repair (LDAR) programs that involve individual screening of all of their piping components.

The scope of this control measure is to enhance the effectiveness of existing Inspection/Maintenance and LDAR programs that identify and repair leaks from equipment components by upgrading Inspection/maintenance programs to LDAR and enhancing current LDAR Programs, where feasible. This control measure will apply LDAR programs to areas currently not covered by existing rules such as harbor vessels and oil drilling operations. For this purpose, the proposed control measure relies on recently developed technology, called optical gas imaging, to detect leaks. There are two types of optical gas imaging instruments: active and passive. The active type uses a laser beam that is reflected by the background and the attenuation of the beam traversing through a hydrocarbon cloud provides the optical image. The passive type uses the ambient illumination to detect the difference in heat radiance of the hydrocarbon cloud. For either type, the instrument displays an image of the hydrocarbon plume.

Background

Fugitive VOC leaks have been the subject of control measures in previous AQMPs since they are ozone precursors and contribute to formation of smog. Several District rules that affect petroleum and chemical-related industries, such as oil refineries, oil and gas production fields, natural gas processing plants, pipeline transfer stations and chemical plants have some kind of requirement involving the periodic inspection of piping components and the detection and repair of leaks.

Fugitive leaks are detected with an organic vapor analyzer (OVA) that measures the leak rate for each component, using U.S. EPA Reference Method 21. In the early 1970s, U.S. EPA initiated the Petroleum Refinery Assessment Study, which developed average emission factors for each type of piping component (valve, flange, pump, etc) and concluded that mass emission rates are dependent on the phase of the process stream (gas/vapor, light liquid and heavy liquid) and the relative volatility of the liquid stream. Mass emissions from fugitive leaks can be calculated based on correlation equations developed by the U.S. EPA based on data from the 1994 Refinery Equipment Leak Report, which is specific for each type of component, such as valve, flange, pump, compressor, etc. The current LDAR program has been successful in significantly reducing fugitive VOC emissions from a variety of sources. However, the latest technology provides opportunities for further improvements in the efficiency of the conventional LDAR program and for further reductions.

Regulatory History

Fugitive emissions are currently regulated under various District rules that range from a simple inspection/maintenance program, to self-inspection programs or an LDAR program. The following rules address fugitive emissions in this manner: Rules 462 – Organic Liquid Loading, 463 – Storage of Organic Liquids, 1142 – Marine Vessel Tank Operations, 1148.1 Oil Well Enhanced Drilling, 1173 – Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum and Chemical Plants, 1176 – Sumps and Wastewater Separators, and 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities.

PROPOSED METHOD OF CONTROL

There are numerous EPA air pollution standards as well as AQMD Rules that require specific work practices for equipment leak detection and repair (LDAR). The current work practice requires the use of a monitor which meets required performance specifications. This work practice is based on 25-year-old technology. While such work practices have been extremely successful in reducing fugitive emissions, recent developments in optical gas imaging provide opportunities for further improvements.

This control measure will pursue two goals: First, as described below, to upgrade inspection/ maintenance rules to at least a self-inspection program, or to an optical gas imaging-assisted LDAR program where feasible. Second, to explore the use of new technologies to detect and verify VOC fugitive emissions in order to supplement existing programs in achieving additional emission reductions.

Rule 462 – Organic Liquid Loading, Rule 1142 - Marine Vessel Tank Operations and Rule - 1148.1 Oil Well Enhanced Drilling are rules that require owner/operators to inspect and to repair and maintain equipment in good operating order when the equipment is operating. Under this control measure, the work practices for these rules would be upgraded to a self-inspection program that requires repairs and maintenance to be documented with records and, where appropriate, reported. Some of these same programs could be enhanced by adding some of if not all of the requirements of an LDAR program.

Rule 463 - Storage of Organic Liquids and 1178 - Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities are two rules that utilize a self-inspection program. Rules 1173 - Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum and Chemical Plants and Rule 1176 - Sumps and Wastewater Separators incorporate an LDAR program. Under this control measure, these rules would be candidates for further improvements in current work practices through the use of new detection technology.

For new detection technology this control measure will be implemented in two phases: Phase I will be a pilot LDAR program to demonstrate feasibility with the new technology and to establish implementation protocols. The completion of phase I will result in the identification of facilities/industries currently subject to LDAR programs and identification of those where the new technology is not yet ready to be utilized. Based on the results of Phase I, fugitive VOC rules will be amended as appropriate under the subsequent phase (Phase II) to enhance their applicability and effectiveness, and to further achieve emissions reductions.

EMISSIONS REDUCTION

The emission reductions from this control measure have not been determined. However, implementing an LDAR program to source categories that are currently not subject to such programs and/or augmenting current and new LDAR programs with the optical gas imaging capabilities would further reduce fugitive emissions by improving operators' ability to detect leaking components and accelerate repairs. Emission reductions are estimated at 1 – 2 tons per day.

RULE COMPLIANCE

Rule compliance would be similar to compliance requirements under existing Rules 462, 463, 1142, 1148.1 1173, 1176, and 1178. Recordkeeping and monitoring requirements would be similar to Rule 109.

TEST METHODS

Test methods include the following:

U.S. EPA Reference Method 21 - Determination of Volatile Organic Compounds Leaks.

Federal Register Vol. 71, No. 66 April 6, 2006 - Alternative Work Practice to Detect Leaks from Equipment.

COST EFFECTIVENESS

Emission reductions associated with this control measure has been determined to be approximately $11,000 per ton VOC reduced.

IMPLEMENTING AGENCY

The District has authority to regulate fugitive VOC emissions sources from non-vehicular sources.

REFERENCES

U.S. EPA – Protocol for Equipment Leak Emission Estimates, November 1995.

Federal Register /Vol. 71, No. 66/April 6, 2006, Alternative Work Practice to Detect Leaks from Equipment.

MCS-01: APPLICATION OF ALL FEASIBLE MEASURES ASSESSMENT [ALL POLLUTANTS]

As this measure is a continued implementation from the short-term PM2.5 measures, the reader is referred back to MCS-01 in Section 2 of this appendix.

MCS-02: FURTHER EMISSION REDUCTIONS FROM GREENWASTE PROCESSING (CHIPPING AND GRINDING OPERATIONS NOT ASSOCIATED WITH COMPOSTING) [VOC]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	GREENWASTE MATERIAL HANDLING OPERATIONS			
CONTROL METHODS:	ALL FEASIBLE MITIGATION MEASURES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE	**2008**	**2014**	**2019**	**2023**
VOC INVENTORY*	1.67	1.67	1.67	1.67
VOC REDUCTION		1.0 - 1.34	1.0 - 1.34	1.0 - 1.34
VOC REMAINING		0.33 - 0.67	0.33 - 0.67	0.33 - 0.67
CONTROL COST:	NOT DETERMINED			
IMPLEMENTING AGENCY:	SCAQMD			

** Preliminary estimates only – not in current inventory, therefore reductions are not included in the SIP commitment.*

DESCRIPTION OF SOURCE CATEGORY

Chipping and grinding is a process to mechanically reduce the size of greenwaste and woodwaste materials. Chipped or ground greenwaste can be utilized in related operations as feedstock for composting, bulking agent for co-composting, land-application for erosion control or soil reclamation, or alternative daily cover at landfills.

Background

California Integrated Waste Management Act of 1989 (AB 939) established a new direction for waste management in the state of California and set up a new mandate for local jurisdiction to meet diversion goals to conserve resources and extend landfill capacity. AB 939 mandated local jurisdictions to meet solid waste diversion goal of 25% by 1995 and 50% by 2000. California's statewide estimated diversion rate has been steadily increased and the rate for 2006 is 54%, 2% points higher than the 2005 estimate. Compostable organic materials comprise of approximately 25% of California's waste stream. Compostable material handling operations are currently regulated by CalRecycle in accordance with the California Code of Regulations, Title 14, Division 7, Chapter 3.1 that was promulgated in 2003. In 2007, the former California Integrated Waste Management Board (currently CalRecycle) adopted Strategic Directive 6.1, which in addition to the diversion goals outlined in AB 939, seeks an additional 50% diversion of organics from landfills, thereby increasing diversion from 50 to 75%, by 2020 in support of the California Global Warming Solutions Act of 2006. Along with the adoption of SB 1016 in 2008, the 50% diversion rate is now measured in terms of per-capita disposal expressed as pounds of solid waste disposed per person per day, to help determine each jurisdiction's progress toward achieving AB 939 diversion goals. Cities and local jurisdictions are also seeking to improve on diversion efforts through alternative uses for foodwaste, either from unused food at restaurants or expired grocery store food products. Efforts also include limited residential foodwaste pilot programs. There has been some success in California relative to foodwaste composting and future statewide requirements are possible.

District rules currently establish Best Management Practices (BMPs) for greenwaste composting and related operations under Rule 1133.1 – Chipping and Grinding Activities, and Rule 1133.3 – Greenwaste Composting Operations. Rule 1133.1 established maximum stockpile holding times at chipping and grinding facilities consistent with the greenwaste material processing requirements in the Title 14, Division 7, Chapter 3.1, Section 17852 (a)(10)(A)(2) of the California Code of Regulations (CCR). Rule 1133.3 established BMPs and VOC emissions reduction requirements for greenwaste composting operations that process greenwaste only or a greenwaste mixture with manure or foodwaste. During rule development, stakeholders suggested the need to develop a more holistic approach, identifying and accounting for emissions from all greenwaste streams, and reducing potential emissions from greenwaste material handling operations at chipping and grinding facilities and other related facilities, not just those associated with composting operations.

Greenwaste material generated from commercial and non-commercial properties are typically transported to material recovery facilities (MRFs), transfer stations, or processing (i.e., chipping and grinding) facilities. Processed greenwaste is further utilized as feedstock for composting, used as fuel, used as an alternative daily cover at landfills, or directly applied to land for erosion control or soil reclamation. However, it is also possible that processed or unprocessed greenwaste is stockpiled for long periods of time without appropriate handling. It is possible that some processed greenwaste may be directly applied to land without a specific purpose, or even illegally dumped. In either case, unwanted VOC emissions may occur from the greenwaste piles. There is currently a lack of information on the greenwaste streams that are generated, processed, and utilized or disposed of in the District.

Regulatory History

Currently, there are approximately 70 chipping and grinding facilities in the District's jurisdiction that are covered by Rule 1133.1. These chipping and grinding facilities are required to remove stockpile from the site within 48 hours of receipt to conform to the state green material holding time requirements. San Joaquin Valley APCD developed daily VOC emission factors for greenwaste stockpile during their organic waste composting rule development process.

There is a lack of data on VOC emissions from chipping and/or grinding itself, not associated with composting operations, as well as from chipped or ground greenwaste. The existing database of chip and grind operations does not necessarily include landscape and tree trimming operations that use chippers to reduce trimmings for transport. Some operations hold materials for 4 to 7 days prior to actual disposal and it is unknown what the end use of the material is. Such operations are not necessarily in the CalRecycle database or regulated by the local enforcement agency. Key to this measure is to determining where all green material comes from and what is its end use, if not for composting, and at what point is the material most emissive, whereby control strategies can be focused. End uses include dumping and spreading material on open land, landfill disposal for daily cover, drying chips for ground cover (such as freeway interchanges), and taking the material through the pathogen reductions process and selling as a soil amendment.

PROPOSED METHOD OF CONTROL

The greenwaste streams in the District would need to be re-evaluated in order to better understand the greenwaste material handling operations including generation processing, and final destination. This control measure would seek to establish additional BMPs for handling processed or unprocessed greenwaste material by processors, haulers, and operators who handle or stockpile material or directly apply the material to land.

According to a study of biogenic VOC emissions from leaf mulch, VOC emissions peak immediately after leaves were mulched. The emission rates declined with time after chipping and ceased after approximately 30 hours. Another study found that wounded plants have the potential to produce and emit VOCs as a wound defense mechanism. In the latter study, emissions of wound-induced VOCs occurred immediately following excising the leaf, were dependent on the degree of wounding, and were oxygen-dependent. Drying of a cut leaf also resulted in the formation of wound-induced VOCs. Such VOC emissions from chipped greenwaste are likely to be associated with the biological mechanisms of the plant's response to mechanical trauma, rather than with microbial consumption of nutrients. The biological mechanisms driving these emissions are only partially understood.

Based on these initial findings, the following control methods would be proposed.

- Cover chipped or ground greenwaste material as early as operationally possible after chipping and grinding. An impermeable tarp may be considered as a cover material. Finished compost or compost overs would be a good cover material because of a VOC adsorption effect; however, finished compost or compost overs would not be readily available at chipping and grinding facilities, but also may deteriorate the qualitative value of chipped or ground greenwaste material for further use (compost overs are defined as the oversized woody materials that do not decompose in a typical composting cycle and are screened out of finished product at the end of composting).
- Chipped or ground greenwaste material would remain covered until it is removed from the site within 48 hours, as required in the current stockpile holding time requirement pursuant to Rule 1133.1. The cover duration may be adjusted to 12 hours or 24 hours after chipping or grinding since the VOC emissions are short-lived and the emission rates decrease exponentially with time.
- Seasonal covering of the chipped or ground greenwaste material may also be considered for the summer months when ozone and secondary particulate formation potential is greatest.
- In addition, greenwaste material streams need to be understood from generation to destination. Actual throughput of the processed and produced feedstock would be better understood by strengthening the requirements of reporting in Rule 1133 Registration/Annual Update and the requirements of Rule 1133.1 Recordkeeping. Updated feedstock inventory would be used to refine emissions and reduction potentials, as well as to develop cost-effective BMPs or controls.

There are some uncertainties for this proposed control measure. According to the above studies, VOC emissions occur immediately after branches and leaves are being cut. By the time cut greenwaste material arrives at a processing facility, VOCs from the first cutting may already have been released to the air. Although the study reported that the subsequent cutting of the cut leaf still emitted VOCs, it is uncertain how much VOCs would continue to be emitted from chipping and grinding of greenwaste upon receipt at the processing facility.

This proposed control measure would be implemented in two phases:

- Phase 1 – The existing database would be reviewed to refine the greenwaste material inventory, including the Rule 1133 Registration database and any study results on greenwaste processing infrastructure conducted by public or private entities, as available. Recent regulatory development activities by CalRecycle and other air districts, including San Joaquin Valley APCD, as applicable, would be reviewed to seek potential emission mitigation measures where feasible. Recent studies on emission factors and BMPs would also be reviewed to assess reduction potential. Emission source tests may be warranted to determine VOC emissions from processed greenwaste material. Staff will work with counties and cities relative to green material handling practices in light of the aforementioned state diversion requirements and goals in order to determine green material end use and minimize any potential adverse impacts associated with implementing this measure. A survey of greenwaste processors, haulers and operators may be implemented to better comprehend the greenwaste streams and utilization.
- Phase 2 – A rule would potentially be developed to incorporate technically feasible and cost-effective BMPs or controls. The District will convene its working group involving all stakeholders to develop cost-effective and workable solutions for this source category.

EMISSIONS REDUCTION

In review of research on emissions potential from greenwaste operations commissioned by San Joaquin Valley APCD, District staff derived an emission factor of 0.196 pounds of VOC per wet ton per day for greenwaste feedstock storage and processing. For 17,000 tons of maximum permitted greenwaste throughput per day that were preliminarily estimated from 55 chipping and grinding facilities in the CalRecycle's SWISS database (accessed in 2010), about 1.67 tons of VOCs per day are estimated to be emitted from greenwaste stockpile using the District staff's daily VOCs emission factor. Note that this emission factor was initially derived from greenwaste feedstock at varying ages before it was formed into a windrow at composting facilities. Actual VOC emission factors from chipped or ground greenwaste at a processing facility may be different. New source testing is possibly warranted to derive better emission factors. An updated and comprehensive emissions inventory and facility identification is also needed to better quantify potential emissions reductions.

According to Fedele et al.'s study, VOC concentrations decreased from about 37 ppmC at 1 hour after chipping leaves to 5 ppmC at 12 hours and to about 2 ppmC at 24–30 hours. The emissions reduction potential can be calculated at about 60-80% control with proposed covering of chipped or ground greenwaste.

RULE COMPLIANCE AND TEST METHODS

A District regulation or other enforceable instrument will be considered to ensure emission reductions. The most effective regulatory tool will be selected based on the BMP options. Implementation of this control measure will not conflict with efforts under AB939. District staff will work with CalRecycle to develop appropriate test methods, based on BMPs.

COST EFFECTIVENESS

Cost-effectiveness for BMPs or controls will be determined during rule development process based on findings from Phase I.

IMPLEMENTING AGENCY

The District has the authority to regulate emissions from non-vehicular sources.

REFERENCES

Final Staff Report for Proposed Amended Rule 1133.1 and Proposed Rule 1133.3, AQMD, July 2011.

Compost VOC Emission Factors, SJVUAPCD, September 15, 2010.

Fedele, R., Galbally, I.E., Porter, N., Weeks, I.A., 2007, Biogenic VOC emissions from fresh leaf mulch and wood chips of *Grevillea robusta* (Australian Silky Oak), Atmospheric Environment 41, 8736–8746.

Ray, F., Karl, T., Hansel, A., Jordan, A., Lindinger, W., 1999, Volatile organic compounds emitted after leaf wounding: On-line analysis by proton-transfer-reaction mass spectrometry, Journal of Geophysical Research 104 (D13), 15963–15974.

MCS-03: IMPROVED START-UP, SHUTDOWN AND TURNAROUND PROCEDURES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	ALL SOURCE CATEGORIES			
CONTROL METHODS:	OPERATIONAL PROCEDURES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
POLLUTANT INVENTORY	TBD	TBD	TBD	TBD
POLLUTANT REDUCTION		TBD	TBD	TBD
POLLUTANT REMAINING		TBD	TBD	TBD
CONTROL COST:	NOT DETERMINED			
IMPLEMENTING AGENCY:	SCAQMD			

* *TBD are reductions to be determined once the inventory and control approach are identified.*

DESCRIPTION OF SOURCE CATEGORY

This control measure is carried over from the 2007 AQMP/SIP.

Background

Equipment start-up, shutdown and turnaround are typically associated with significantly higher emission rates compared to the emission rates observed from the same equipment operating under steady state or normal operating conditions. The higher emission rates observed during start-up, shutdown and turnaround are in part due to the higher loads equipment is subjected to during these transient operating conditions compared to the normal operating conditions as well as the lead times necessary for the conditioning of certain control technologies. The emission rates observed during start-up, shutdown and turnaround, in addition to the equipment design, are influenced by the speed with which particular equipment is fired to reach normal operating conditions or is taken out of service. Start-up, shutdown or turnaround often adversely impact the emission rates from pieces of equipment that are interconnected, either upstream or downstream, to the equipment undergoing start-up/shutdown. This is a phenomenon commonly observed in refinery operations and chemical plants that rely on interconnected equipment and processes. Refinery operations predominantly rely on flares to minimize the emissions impact resulting from start-up, shutdown and turnarounds. However, there are adverse environmental impacts associated with the use of flares as well.

Regulatory History

On November 4, 2005 the District's Governing Board adopted an amendment to Rule 1118 - Control of Emissions from Refinery Flares. In an effort to minimize flaring and associated emissions, the amendment established declining emission targets over time that each refinery had to meet. The amendment eliminated the flaring of vent gases except for those resulting from emergencies, shutdowns and startups, turnarounds and essential operational needs. The amendment also established operational requirements of diagnostic practices to minimize flaring.

Reducing flaring and associated emissions continued to be an area of intense interest by the community, regulators as well as industry. The Rule 1118 staff report listed several possible alternatives of minimizing flare emissions that could be incorporated further explored:

Optimization of turnaround schedules

Coordination of turnaround schedules for different units can result in minimizing emissions associated with these periodic maintenance activities.

Developing startup and shutdown procedures that do not increase emissions

For certain units, it is possible to develop procedures that avoid flaring during shutdown and startup, such as using reduced loads, recycling feeds, better decontamination procedures, etc. Sometimes more time is necessary for a startup or shutdown, or physical modifications are needed to achieve this purpose.

Several of these approaches are also applicable to other types of industries in minimizing emissions from these types of operations. For example, the installation of redundant equipment to increase reliability and the promotion of operator training for environmental awareness could help a particular facility in minimizing the number of start-ups and shutdowns within a given operational cycle.

PROPOSED METHOD OF CONTROL

This measure will be implemented in two phases, beginning with a technical assessment to be completed in the 2012/2013 timeframe. Under Phase I, effort will include establishing procedures that better quantify emission impacts from start-up, shutdown or turnarounds. Under Phase II, analyses will be conducted to identify improved operating procedures that minimize emissions from such processes and develop rule amendments that could seek implementation of best management practices and/or additional hardware

EMISSIONS REDUCTION

Implementation of the control measure is expected to result in emission reductions. The magnitude of these reductions cannot be readily quantified at this time.

RULE COMPLIANCE AND TEST METHODS

Compliance would be based on monitoring, recordkeeping, and reporting requirements that have been established in existing source specific rules and regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

The Phase I of the study may cost up to $300,000 and the cost of Phase II will be assessed based on findings from Phase I.

IMPLEMENTING AGENCY

The District has authority to regulate non-vehicular sources, including to establish procedures for the purpose of minimizing or eliminating emissions during equipment start-up, shutdown and turnaround.

REFERENCES

Final Staff Report, Proposed Amended Rule 1118 – Control of Emissions from Refinery Flares, October 2005

INC-01: ECONOMIC INCENTIVE PROGRAMS TO ADOPT ZERO AND NEAR-ZERO TECHNOLOGIES [NOx]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	ALL COMBUSTION CATEGORIES			
CONTROL METHODS:	ALL AVAILABLE CONTROL METHODS			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
NOx INVENTORY	TBD	TBD	TBD	TBD
NOx REDUCTION		TBD	TBD	TBD
NOx REMAINING		TBD	TBD	TBD
CONTROL COST:	TBD			
IMPLEMENTING AGENCY:	SCAQMD			

* *TBD are reductions to be determined once the inventory and control approach are identified*.

DESCRIPTION OF SOURCE CATEGORY

There is a need for significant NOx reductions. The primary objective of this measure is to develop a program that promotes and encourages adoption and installation of cleaner, more efficient stationary combustion equipment with a focus on zero and near-zero emission technologies, such as boilers, ovens, furnaces, internal combustion engines, water heaters and commercial space heating, through economic incentive programs subject to the availability of public funding. Currently, there are approximately 20,000 pieces of permitted combustion equipment within the South Coast Air Basin. Incentives may include grants for new purchases of equipment as well as loan programs in areas where long-term cost savings from increased efficiency can be achieved. Projects or programs that demonstrate emission reductions also serve to protect public health by reducing the public's exposure to air pollutants.

This control measure would provide funds to reduce emissions by encouraging energy efficiency improvements and expanding renewable energy sources, so as to potentially create and retain jobs, and promote economic growth and competitiveness.

Background

In the past, the SCAQMD has adopted a series of programs that incorporate a variety of different incentive approaches, such as emissions trading programs, mitigation fee programs, Air Quality Investment Program (AQIP), and averaging. These programs were developed to promote the commercialization of advanced pollution control technologies while encouraging economic growth and providing compliance flexibility.

The District continues to implement incentive programs to help promote efficient clean equipment purchases, efficiency projects, and conservation techniques that provide toxic and criteria pollutant emissions benefits, as well as greenhouse gas emission reductions.

Currently, there are several existing incentive programs which help promote higher efficiency and lower emitting technologies such as: Coachella Valley Emission Reduction Projects; Lawn Mower and Leaf Blower Exchanges; SOON Program; Carl Moyer Memorial Air Quality Standards Attainment Program; MSRC & Area Source Credit Programs; and Voucher Incentive Program.

Regulatory History

AQMD offers a number of funding /grant resources to encourage the immediate use of commercially available, low-emission mobile and stationary technologies. The incentive programs, which include incremental funding or subsidies, are designed to promote voluntary introduction of new technologies on an accelerated schedule. These programs may also provide manufacturers with incentives to accelerate the deployment of the cleaner combustion technologies.

As this measure is not a regulatory item that will be implemented via rulemaking, there is no relevant regulatory history in this area. However, as mentioned above, the District has developed and implemented a wide array of incentive programs designed to achieve emission reductions on a voluntary basis.

PROPOSED METHOD OF CONTROL

This control measure is intended to result in the accelerated turnover of older high-polluting combustion equipment with newer, low-emission equipment providing real emission reductions above those that would otherwise occur through normal equipment turnover. This is a stationary source Moyer-type program in that the economic incentives provide additional funds for businesses to adopt cleaner, more efficient combustion equipment than currently required by the District and help meet 2023 and 2032 ozone standards.

The District in conjunction with other entities would fund cost effective projects that meet certain technical criteria in combination with implementing best management practices through various incentive programs and competitive grants. These funds would help accelerate turnover of older, energy inefficient and higher polluting equipment. The incentives would cover some or all of the cost difference associated with purchasing newer cleaner combustion equipment, add-on control equipment, and / or rebuilding the existing equipment. This could be of great benefit to companies that do not have the financial means to modernize their facilities to become more energy efficient and less polluting. Projects funded under this program must achieve emission reductions in excess of requirements under local, state or federal regulations.

Priority could be given to the projects that quality for the use of available funds that provide: Maximum environmental and energy co-benefits such as criteria and toxic pollutant reductions as well as greenhouse gas emission reductions; energy security and efficiency; advanced technology; and demonstrate local job creation.

EMISSIONS REDUCTION

Estimates for criteria pollutant emission reduction from these technologies can potentially result in 65 percent or greater reduction in emission from today's regulatory requirements. Implementation and evaluation of additional incentive programs will provide a means to quantify emission reduction benefits as they are developed. Emission reductions achieved from these activities will be in excess of reductions achieved by current regulatory programs and will be used for SIP purposes.

RULE COMPLIANCE AND TEST METHODS

Combustion equipment and control of combustion equipment require a permit under existing District rules and regulations. Making a modification with the combustion equipment or control of emissions will require a permit modification or surrender of existing permit ensuring the cleaner equipment remains in the jurisdiction, along with the emission benefits. If there are any remaining combustion emissions, the permit conditions would ensure its limitation and compliance.

COST EFFECTIVENESS

The cost effectiveness of this measure cannot yet be determined, given the variety of incentive programs and projects that will be developed. The District will continually analyze costs associated with incentive programs and, where possible, quantify resulting emissions reductions. The cost effectiveness for specific incentive programs can be determined as they are developed and implemented by the District.

IMPLEMENTING AGENCY

The District in cooperation with other local governments, agencies, technology manufacturers and distributors will seek funding sources and provide incentives to encourage adoption of cleaner, more efficient combustion equipment.

REFERENCES

South Coast Air Quality Management District, "Surplus Off-Road Opt-In for NOx (SOON) Program," (http://www.aqmd.gov/tao/Implementation/SOONProgram.htm), May 2012.

California Air Resources Board. "The Carl Moyer Program Guidelines", March 2012.

South Coast Air Quality Management District, "Coachella Valley Emission Reduction Projects," (http://www.aqmd.gov/prdas/CVRFP-AB1318/Coachella.htm), February 2012.

South Coast Air Quality Management District, "Mobile Source Emission Reduction Credit (MSRC) and Area Source Credit (ASC) Programs," (http://www.aqmd.gov/tao/Implementation/mobile_source_emission_reduction.htm), November 2008.

South Coast Air Quality Management District, "Air Quality Investment Program - AQIP," (http://www.aqmd.gov/trans/aqip.html), June 2010.

South Coast Air Quality Management District, "Voucher Incentive Program," (http://www.aqmd.gov/tao/Implementation/VIP.htm), April 2012.

South Coast Air Quality Management District, "Lawn Mower and Leaf Blower Exchanges," (http://www.aqmd.gov/tao/lawnmower.html), April 2012.

INC-02: EXPEDITED PERMITTING AND CEQA PREPARATION FACILITATING THE MANUFACTURING OF ZERO AND NEAR-ZERO TECHNOLOGIES [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY				
SOURCE CATEGORY:	ALL SOURCE CATEGORIES			
CONTROL METHODS:	VOLUNTARY INCENTIVES			
EMISSIONS (TONS/DAY):				
ANNUAL AVERAGE*	**2008**	**2014**	**2019**	**2023**
POLLUTANT INVENTORY	N/A	N/A	N/A	N/A
POLLUTANT REDUCTION		N/A	N/A	N/A
POLLUTANT REMAINING		N/A	N/A	N/A
CONTROL COST:	None			
IMPLEMENTING AGENCY:	SCAQMD			

* *Emissions inventory and reductions cannot be quantified due to the nature of the measure (e.g., outreach, incentive programs).*

DESCRIPTION OF SOURCE CATEGORY

This proposed measure is aimed at providing incentives for companies to manufacture zero and near-zero emission technologies locally, thus populating the market, potentially lowering the purchase cost, increasing demand, and creating local manufacturing jobs. With availability and usage of such technologies, air quality benefits will be achieved. This proposed measure focuses on two elements: 1) process the required air permit(s) in an expedited procedure; and 2) facilitate the preparation of the applicable CEQA document. A stakeholder process will be initiated to design the program and leverage other existing SCAQMD or local programs.

Background

In the past, the SCAQMD has adopted a series of programs developed to promote the commercialization of advanced pollution control technologies while encouraging economic growth and providing compliance flexibility by offering expedited permitting and CEQA preparation. Such programs include "Green Carpet" Priority Permitting Service, Business Clean Air Partnership, Regulatory Reform Initiative, and Environmental Justice Enhancement III-2 ("Super Clean Air Actions"). The manufacturing and deployment of zero and near-zero emission technologies will help reduce criteria pollutant emissions in the region, accelerate removal of equipment that can last for many decades, and advance economic development and job opportunities in the region.

Regulatory History

The SCAQMD has permitting authority over stationary sources that emit air pollutants and the controls designed to limit air pollution. The process of obtaining an air quality permit includes a thorough review to ensure compliance with all applicable rules and regulations, such as source specific standards, new source review, air toxic risk, and best available control technology.

Under Title 14 of the California Code of Regulations, Chapter 3, Article 1, Section 15002(e), "a government agency is required to comply with California Environmental Quality Act (CEQA) procedures when the agency proposes to carry out or approve the activity." Further, under Section 15002(f), "CEQA applies in situations where a governmental agency can use its judgment in deciding whether and how to carry out or approve a project." As a discretionary authority to approving a project through the required air quality permit, the SCAQMD has a legal obligation to ensure compliance with CEQA requirements before issuing an air quality permit.

PROPOSED METHOD OF CONTROL

This measure would seek to promote zero and near-zero emission technologies by offering the incentive of an expedited permitting and assistance in CEQA document preparation for manufacturing or distribution of such technologies. By agreeing to manufacture and distribute zero and near-zero emission technologies, a proponent would be rewarded with a streamlined administrative review by the SCAQMD while providing significant emission reduction benefits to the region. The expedited permitting and review program would only accelerate the processing of applications, which would still need to comply with all applicable rules, regulations, and guidelines.

To implement this measure, a stakeholder working group will be established to discuss and propose program designs that will provide meaningful incentives to manufacturers of zero and near zero technologies to be sited locally.

Examples of zero and near-zero emission technologies will be further developed during program development. They include, but are not limited to, the manufacturing of fuel cells, electric batteries for any stationary or mobile applications, and other zero- and near-zero technologies.

Under this measure, the SCAQMD will also evaluate potential permit system modifications that would incentivize use of zero and near zero emission technologies, and would adopt such measures that are determined to be feasible.

EMISSIONS REDUCTION

Due to the voluntary nature of this control measure, potential emission reductions associated with the implementation of this control measure cannot be quantified. The benefit of this measure is to facilitate the deployment of zero and near zero technologies that are needed to achieve the air quality standards and to create local manufacturing jobs.

RULE COMPLIANCE AND TEST METHODS

Not applicable.

COST EFFECTIVENESS

Savings, since this is a voluntary incentive program.

IMPLEMENTING AGENCY

The District has the authority to provide incentives to encourage the manufacturing of zero and near-zero technologies, and to prioritize permit applications and review processes as needed.

REFERENCES

South Coast Air Quality Management District. "Environmental Justice Enhancement III-2 ("Super Clean Air Actions")." July 2003.

South Coast Air Quality Management District. "Green Carpet" Priority Permitting Service. April 1996.

South Coast Air Quality Management District. "Business Clean Air Partnership." April 1995.

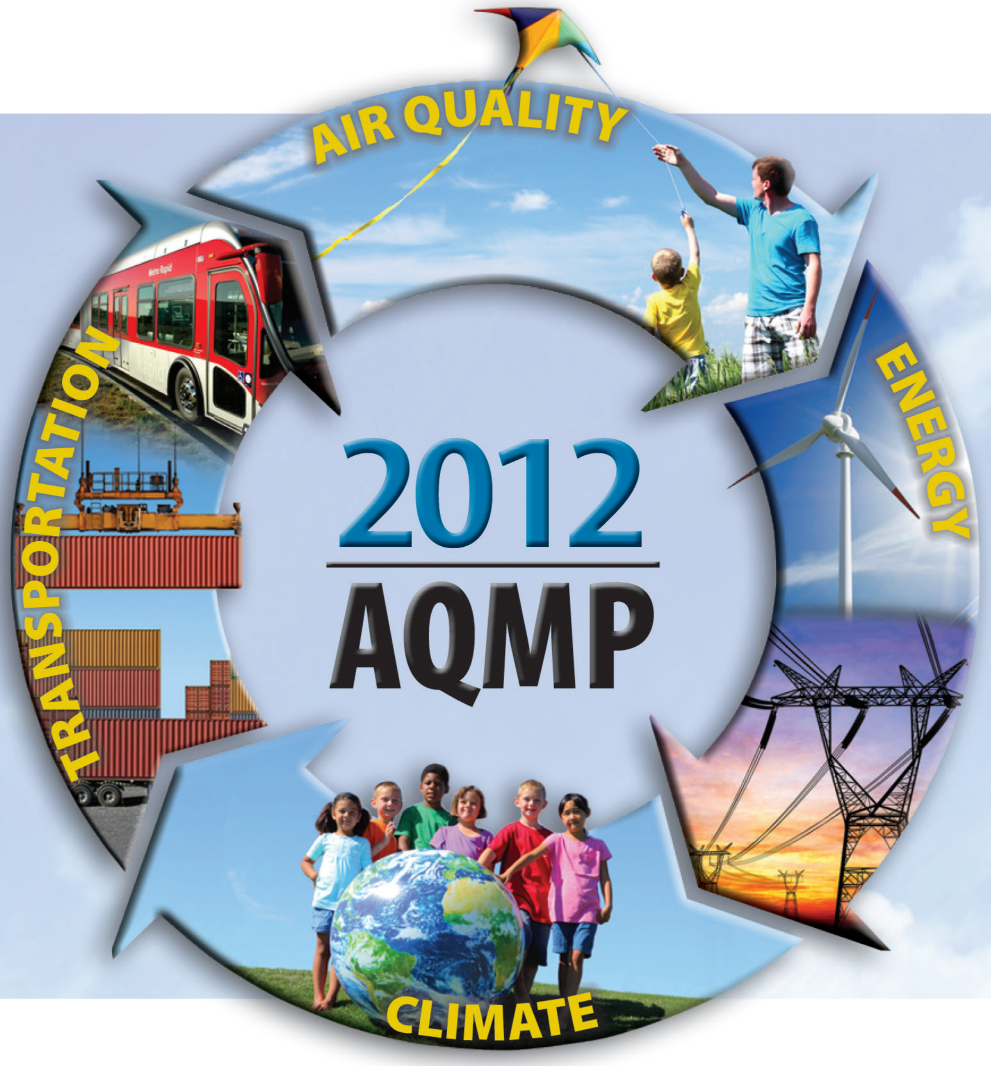
South Coast Air Quality Management District. "Regulatory Reform Initiative." March 1996.

EDU-01: FURTHER CRITERIA POLLUTANT REDUCTIONS FROM EDUCATION, OUTREACH, AND INCENTIVES [ALL POLLUTANTS]

As this measure is a continued implementation from the short-term PM2.5 measures, the reader is referred back to EDU-01 in Section 2 of this appendix.

Appendix IV-B

Air Quality Management Plan



Proposed 8-Hour Ozone Measures

February 2013

South Coast Air Quality Management District

Cleaning the air that we breathe...™

South Coast AQMD

FINAL 2012 AQMP
APPENDIX IV-B

PROPOSED 8-HOUR OZONE MEASURES

FEBRUARY 2013

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OFFRD-05 Emission Reductions from Ocean-Going Marine Vessels [NOx, PM] IV-B-43

GROUP 3 ACTIONS TO DEPLOY ADVANCED CONTROL TECHNOLOGIES

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SECTION 1

INTRODUCTION

INTRODUCTION

The 2007 State Implementation Plan (SIP) for the 8-hour National Ambient Air Quality Standard (NAAQS) contains commitments for emission reductions from mobile sources that rely on advancement of technologies, as authorized under Section 182(e)(5) of the federal Clean Air Act. These measures, which have come to be known as the "black box," account for a substantial portion of the NOx emission reductions needed to attain the federal ozone standards – over 200 tons/day. The deadlines to reduce ozone concentrations in the region are 2023 (to attain the 80 ppb NAAQS) and 2032 (to attain 75 ppb NAAQS)[1]. Attaining these standards will require reductions in emissions of nitrogen oxides (NOx) well beyond reductions resulting from current rules, programs and commercially-available technologies.

Mobile sources emit over 80 percent of regional NOx and therefore must be the largest part of the solution. On-road truck categories are projected to comprise the single largest contributor to regional NOx in 2023. Other equipment involved in goods movement, such as marine vessels, locomotives and aircraft, are also substantial NOx sources.

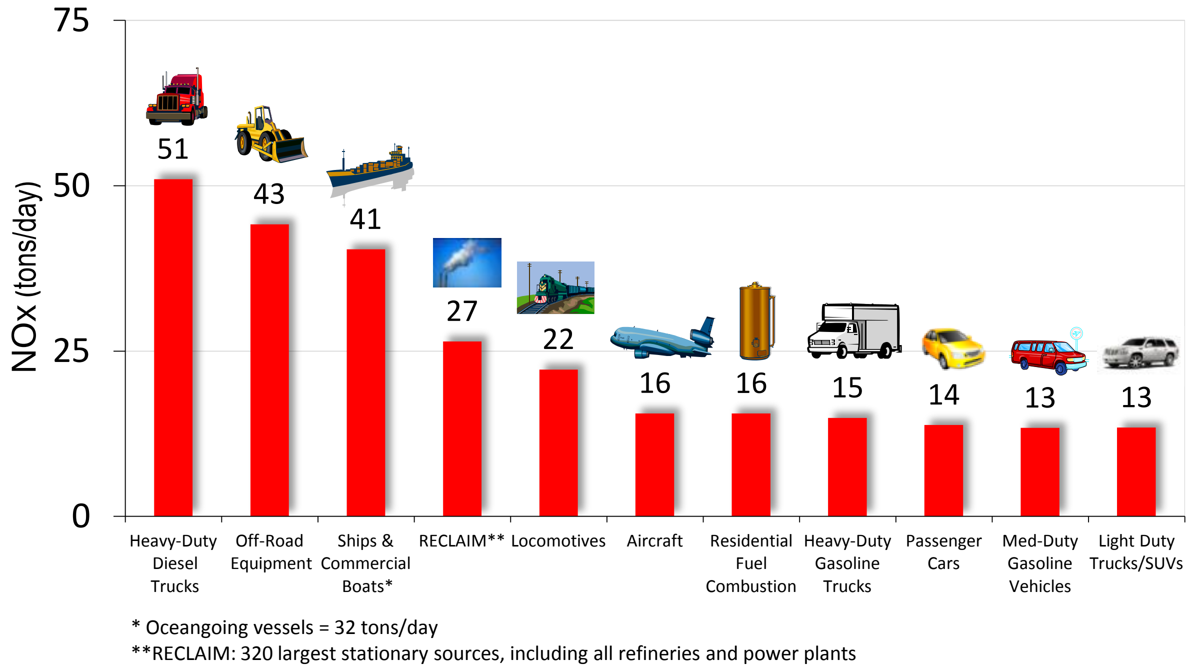

FIGURE IV-B-1

Top NOx Emissions Categories in 2023 in the South Coast Air Basin, Annual Average (tpd)

[1] The attainment deadline for the 75 ppb standard (adopted in 2008) has been established by U.S. EPA for extreme nonattainment areas by December 31, 2032.

Preliminary District staff projections indicate that **the region must reduce regional NOx emissions by about 65 percent by 2023, and 75 percent by 2032, to attain the national ozone standards as required by federal law.**

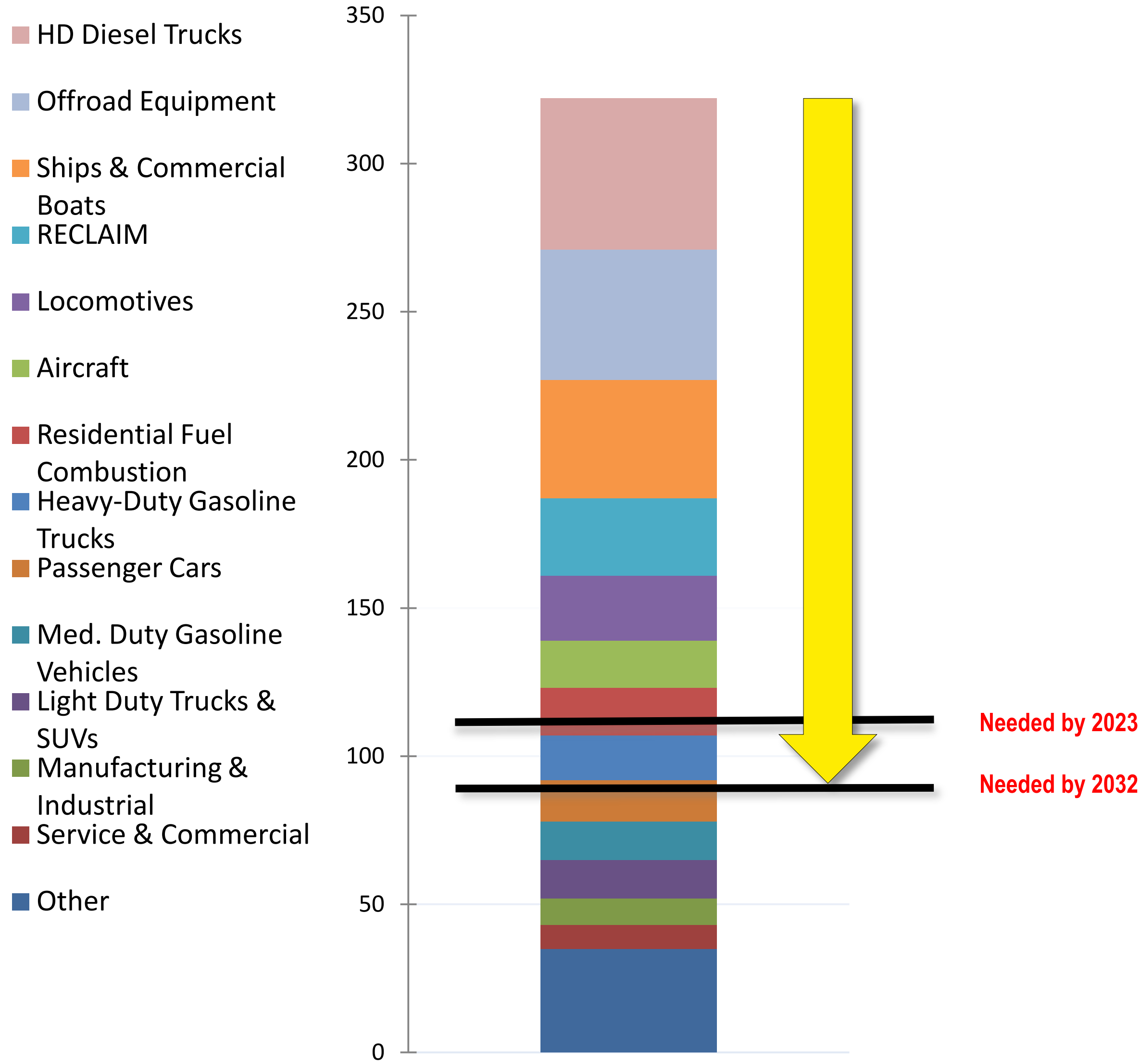

FIGURE IV-B-2

Needed NOx Emission Reductions to Achieve Federal 8-Hour Ozone Ambient Air Quality Standards

Since NOx emissions from most significant sources are already controlled by over 90%, **attainment of the ozone standards will require broad deployment of zero- and near-zero[2] emission technologies in the 2023 to 2032 timeframe.** On-land transportation sources such as trucks, locomotives and cargo handling equipment have technological potential to achieve zero- and near-zero emission levels. Current and potential technologies include hybrid-electric, hybrid with all electric range, battery-electric, and hydrogen fuel cell on-road vehicle technologies. New types of hybrids could also serve long-term needs while providing additional fuel diversity. These could include, for example, natural gas-electric hybrid technologies for on-road and other applications, particularly if coupled with improved aftertreatment technologies. Equipment powered solely by alternative fuels such as natural gas may also play a long-term role in some applications, if those applications are found to pose technological barriers to achieving zero- or near-zero emissions. Even in such applications, however, substantial additional emission reductions will be needed through development of new, advanced aftertreatment technologies. In addition, alternative fuels will likely play a transitional near-term role. Alternative fuels such as natural gas have historically helped the region make progress toward attaining air quality standards, and -- while not achieving zero- or near-zero NOx emission levels -- they are generally cleaner than conventional fuels. Given the region's need to attain air quality standards in a few short years, alternative-fueled engines will continue to play a role. Finally, we emphasize that air quality regulatory agencies have traditionally set policies and requirements that are performance-based and technology and fuel neutral -- a policy that the District intends to continue. In short, all technologies and fuels should be able to compete on equal footing to meet environmental needs.

While there has been much progress in developing and deploying transportation technologies with zero- and near-zero emissions (particularly for light-duty vehicles and passenger transit), additional technology development, demonstration and commercialization will be required prior to broad deployment in freight and other applications. This Appendix describes a path to evaluate, develop, demonstrate, fund and deploy such technologies for land-based transportation sources. It also proposes

[2] The term "near-zero emissions" refers to emissions approaching zero and will be delineated for individual source categories through the process of developing the Air Quality Management Plan/State Implementation Plan. Based on current analyses, on-land transportation sources will need to achieve zero emissions where possible, and otherwise will need to be substantially below adopted emission standards — including standards with future effective dates. Near-zero emissions technologies can help meet this need, particularly if they support a path toward zero emissions (e.g., electric/fossil fuel hybrids with all- electric range).

near-term measures to accelerate fleet turnover to the lowest emission units, and require deployment of zero-emission technologies where most feasible.

The District staff believes that a combination of regulatory actions and public funding is the most effective means of achieving these emission reductions. Voluntary incentive programs such as the Carl Moyer Program can help to accelerate turnover to the cleanest commercially-available equipment. A majority of the on-road and off-road measures proposed are based on existing funding programs implemented by the District or the California Air Resources Board. However, several of the existing funding programs will sunset in the 2014 – 2015 timeframe. Continued funding beyond 2015 will be needed to reduce the emissions associated with the black box. Developing, demonstrating and deploying new technologies will require public/private partnerships and, in some cases, regulatory actions.

The measures described in this appendix are relatively small down payments on the total emission reductions needed to attain the current NAAQS for ozone. The measures in this section are feasible steps that must be commenced in the near-term to establish a path toward broader transition to the technologies that will be needed to attain federal air quality standards. Between now and 2015, the District will flesh out in greater detail the additional measures needed to attain the ozone NAAQS. The federal Clean Air Act requires the state to submit an ozone attainment plan for the 75 ppb ozone NAAQS by 2015. In addition, with the 2023 attainment deadline for the 80 ppb ozone NAAQS approaching, the District needs to specify plan measures to timely attain that standard, something which the District intends to also adopt as part of the 2015 plan update. Given the magnitude of needed emission reductions, and the time remaining until attainment deadlines, **it is important that progress and momentum to identify, develop and deploy needed technologies be sustained and accelerated.**

The District staff recognizes these are very difficult policy choices the Basin is facing. Transitioning over the next 10 to 20 years to cleaner transportation technologies will involve major costs and effects on the economy. However, adopting sufficient plan measures to attain the ozone air quality standard by 2024 is required by federal law, and failing to do so is, therefore, not an acceptable public policy. Such failure would also risk adverse health consequences highlighted in recent health studies, not to mention the potentially adverse economic impacts on the region due to potential federal sanctions. The following sections further describe the measures to help reduce the emissions associated with the black box.

SECTION 2

PROPOSED 8-HOUR OZONE MEASURES

INTRODUCTION

District staff analyzed the need to accelerate the penetration of cleaner engine technologies in various mobile source sectors. This Section describes the District staff's proposals for additional mobile source emission reductions towards achieving the 8-hour ozone ambient air quality standard by 2023 to be included in the 2012 Final AQMP. The early action measures presented in this appendix are based upon a variety of control technologies that are commercially available and/or technologically feasible to implement in the next several years. The focus of these measures includes accelerated retrofits or replacement of existing vehicles or equipment, acceleration of vehicle turnover through voluntary vehicle retirement programs, and greater use of cleaner fuels in the near-term. In the longer-term, in order to attain the federal ozone ambient air quality standard, there is a need to increase the penetration and deployment of near-zero and zero-emission vehicles such as plug-in hybrids, battery-electric, and fuel cells; further the use of cleaner fuels (either alternative fuels or new formulations of gasoline and diesel fuels); and obtain additional emission reductions from aircraft engines.

PROPOSED MEASURES

Ten early action measures are proposed by the District staff for mobile sources and seven additional early action measures are proposed to accelerate near-zero and zero-emission technologies for goods movement related sources. The early action mobile source measures call for greater emission reductions through significant increase in the turnover of older vehicles to the cleanest vehicles currently available with an emphasis on zero-emission vehicles. In addition, actions are identified for earlier deployment of near-zero and zero-emission technologies in the goods movement sector. A summary of the 17 measures is provided in Table 1.

TABLE IV-B-1

Proposed Mobile Source Implementation Measures

ON-ROAD MOBILE SOURCE MEASURES	
Number	**Title**
ONRD-01	Accelerated Penetration of Partial Zero-Emission and Zero-Emission Vehicles [VOC, NOx, CO]
ONRD-02	Accelerated Retirement of Older Light- and Medium-Duty Vehicles [VOC, NOx, CO]
ONRD-03	Accelerated Penetration of Partial Zero-Emission and Zero-Emission Light-Heavy- and Medium-Heavy-Duty Vehicles [NOx, PM]
ONRD-04	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]

TABLE IV-B-1 (concluded)

Proposed Mobile Source Implementation Measures

ON-ROAD MOBILE SOURCE MEASURES	
Number	**Title**
ONRD-05	Further Emission Reductions from Heavy-Duty Vehicles Serving Near-Dock Railyards [NOx, PM]
OFF-ROAD MOBILE SOURCE MEASURES	
Number	**Title**
OFFRD-01	Extension of the SOON Provision for Construction/Industrial Equipment [NOx]
OFFRD-02	Further Emission Reductions from Freight Locomotives [NOx, PM]
OFFRD-03	Further Emission Reductions from Passenger Locomotives [NOx, PM]
OFFRD-04	Further Emission Reductions from Ocean-Going Marine Vessels While at Berth [All Pollutants]
OFFRD-05	Emission Reductions from Ocean-Going Marine Vessels [NOx, PM]
ACTIONS TO DEPLOY ADVANCED CONTROL TECHNOLOGIES	
Number	**Title**
ADV-01	Actions for the Deployment of Zero- and Near-Zero Emission On-Road Heavy-Duty Vehicles [NOx, PM]
ADV-02	Actions for the Deployment of Zero-Emission and Near-Zero Emission Locomotives [NOx, PM]
ADV-03	Actions for the Deployment of Zero- Emission and Near-Zero Emission Cargo Handling Equipment [NOx, PM]
ADV-04	Actions for the Deployment of Cleaner Commercial Harbor Craft [NOx, PM]
ADV-05	Actions for the Deployment of Cleaner Ocean-Going Marine Vessels [NOx, PM]
ADV-06	Actions for the Deployment of Cleaner Off-Road Equipment [NOx, PM]
ADV-07	Actions for the Deployment of Cleaner Aircraft Engines [NOx, PM]

On-Road Mobile Source Measures

The District staff is proposing five on-road mobile source control measures. The focus of the first two measures is on-road light- and medium-duty vehicles operating in the South Coast Air Basin. By 2023, it is estimated that about 12 million vehicles will be operating in the Basin. The first measure would implement programs to accelerate the penetration and deployment of partial zero-emission and zero-emission vehicles in the light- and medium-duty vehicles categories. The second control measure would seek to accelerate retirement of older gasoline- and diesel-powered vehicles up to 8,500 gross vehicle weight (GVW). These vehicles include passenger cars, sports utility vehicles, vans, and light-duty pick-up trucks.

The remaining three measures focus on heavy-duty vehicles. The first of these measures seeks additional emission reductions from the early deployment of partial zero-emission and zero-emission light- and medium-heavy-duty vehicles with gross vehicle weights between 8,501 pounds to 26,000 pounds. The fourth control measure for heavy-duty vehicles seeks additional emissions reductions from older, pre-2010 heavy-duty vehicles beyond the emission reductions targeted in CARB's Truck and Bus Regulation. Additional emission reductions could be achieved if an additional percentage of the oldest, pre-2010 heavy-duty vehicles, not subject to the Truck and Bus Regulation, are targeted. The fifth on-road measure seeks emission reductions at near-dock railyards through the deployment of zero-emission heavy-duty vehicles.

Off-Road Mobile Source Measures

The District staff is proposing five control measures that seek further emission reductions from off-road mobile sources and industrial equipment. Transportation sources such as aircraft, locomotives, and marine vessels are associated with anticipated economic growth not only in the Basin, but also nationwide. These sources are principally regulated by federal and state agencies. Certain local actions can result in emission reductions beyond the emissions standard setting authority of the state and U.S. EPA. The first measure calls for the continuation of the Surplus Off-Road Opt-In for NOx (SOON) provision of the statewide In-Use Off-Road Diesel-Fueled Fleets Regulation beyond 2014. The SOON provision implemented to-date has realized additional NOx reductions beyond the statewide regulation. The second and third measures call for additional emission reductions from freight and passenger locomotives. The fourth measure seeks additional emission reductions from ocean-going vessels while at berth. The fifth early action measure recognizes the efforts that the Ports of Los Angeles and Long Beach are implementing to incentivize cleaner Tier 2 and Tier 3 ocean-going vessels to call at the ports.

Actions to Deploy Advanced Control Technologies

The District staff is proposing seven additional measures to deploy the cleanest control technologies as early as possible and the development and deployment of near-zero and zero-emission technologies. Many of these actions have already begun. However, additional research and development will be needed that will lead to commercial deployment of control technologies that achieve emission levels below current adopted emission standards. Other near-zero and zero-emission technologies that are commercially available will require infrastructure development to facilitate their deployment.

The term "near-zero" technology is not defined in these actions. The term's specific meaning could depend on the source category and feasible technologies. The actions needed to deploy zero-emission technologies, "near-zero" emission technologies, and the next generation of cleaner combustion engines will be discussed in the development of the proposed control measures in future AQMPs. To initiate the development of cleaner engines (either through in-cylinder or aftertreatment controls or in combination with hybrid systems that lead to further criteria pollutant emission reductions), District staff is proposing that optional NOx standards be adopted. Having such optional standards will facilitate the early development of cleaner technologies and to deploy these technologies as soon as possible. Several of the technologies to achieve emission levels lower than current standards, or zero-emission levels, are currently available and are potentially transferrable to various vehicle vocations and in-use applications. However, further research and demonstration of many of these technologies is needed to evaluate their performance prior to commercialization.

The District staff, U.S. Department of Energy, U.S. Environmental Protection Agency, Federal Aviation Administration, California Air Resources Board, California Energy Commission, engine manufacturers, advanced engine control developers, and electric hybrid system developers have been discussing potential technologies to further reduce engine exhaust emissions or eliminate exhaust emissions entirely. Public forums such as technology symposiums will be used to solicit public input on technology development as part of the proposed actions.

FORMAT OF IMPLEMENTATION MEASURES

Included in each control measure description is a title, summary table, description of source category (including background and regulatory history), proposed method of control, estimated emission reductions, discussion of rule compliance, identification of test methods, estimated cost effectiveness, and references. The type of information that can be found under each of these subheadings is described below.

Implementation Measure Number

Each measure is identified by a measure number such as "CM #ONRD-04" located at the upper right hand corner of every page. "CM #" is the abbreviation for the "control measure number" and is immediately followed by the year of the AQMP revision.

The next three- to five-letter designation represents the abbreviation for a source category or specific programs. For example, “ONRD” is an abbreviation for “On-Road Mobile Sources.” The following provides a description of the abbreviations for each of the measures.

- ONRD On-Road Mobile Sources for the South Coast Air Basin
- OFFRD Off-Road Mobile Sources for the South Coast Air Basin
- ADV Actions to Deploy Advanced Control Technologies

Summary Table

Each measure contains a table that summarizes the measure and is designed to identify the key components of the measure. The table contains a brief explanation of the source category, control method, emission reductions, control costs, and implementing agency.

Description of Source Category

This section provides an overall description of the source category and the intent of the early action measure. The source category is presented in two sections, background and regulatory history. The background has basic information about the control measure such as the number of sources in the Basin, description of emission sources, and targeted pollutants.

The regulatory history contains information regarding existing regulatory control of the source category such as applicable state or federal rules or regulations and whether the source category was identified in the 2007 or prior AQMPs.

Proposed Method of Control

The purpose of this section is to describe the actions over the next several years and beyond. Relative to the “ADV” measures, this section reflects actions to be taken to further develop zero- and near-zero emission technologies or advanced control technologies that will lead to further emission reductions.

Emissions Reduction

The emission reductions are estimated based on the baseline inventories prepared for the 2012 AQMP and are provided in the Control Measure Summary Table. The emissions data are based on the annual average inventory for all five criteria pollutants. The planning inventory adjusts the emissions by taking into consideration a source category’s seasonal variations. The emissions affecting ozone concentration (i.e., VOC and NO_x) are presented under the Summer Planning Inventory. The emissions section of the summary table includes the 2008 and 2023 inventories. The 2023 emission projections reflect implementation of adopted rules. Based on the expected reductions associated with implementing the measure, emissions data are calculated for 2023 assuming the implementation of the early actions in the absence of other competing measures.

The emission reductions listed in the summary table represent the current best estimates, which are subject to change as the actions are implemented. For three of the measures, ONRD-05, OFFRD-01, and OFFRD-02, emissions reductions are also reported based on the projected 2023 emissions inventory provided in the 2007 SIP since the reductions are associated with the Section 182(e)(5) emission reduction commitments in the 2007 SIP.

Rule Compliance

This section was designed to satisfy requirements in the 1990 Clean Air Act in which EPA has indicated that it is necessary to have a discussion of rule compliance with each control measure. This section discusses the recordkeeping and monitoring requirements envisioned for the control measure. In general, the District would continue to verify rule compliance through site inspections and submittal of compliance plans.

Test Methods

In addition to requiring recordkeeping and monitoring requirements, U.S. EPA has stated that "An enforceable regulation must also contain test procedures in order to determine whether sources are in compliance." This section of the measure write-up identifies appropriate approved District, ARB, and EPA source test methods, where currently available.

Cost Effectiveness

The Discounted Cash Flow (DCF) method is used to calculate the cost-effectiveness of each measure. As measures undergo the rule making process, more detailed control costs will be developed.

The cost effectiveness values contained herein may overestimate actual levels because of a number of factors. As additional information on costs and more accurate numbers of affected entities becomes available, the cost effectiveness will be revised and analyzed in the socioeconomic assessment report of the 2012 AQMP.

Implementing Agency

This section identifies the agency(ies) responsible for implementing the measure or may have an ability to implement the measure. Also included in this section is a description of any jurisdictional issues that may affect the measure's implementation. Relative to the "ADV" measures, entities identified in this section are envisioned to work collaboratively to advance the development and commercialization of zero- and near-zero emission technologies or advanced engine control technologies that will lead to further emission reductions. For measures that involve voluntary incentive programs, agency(ies) identified have historically implemented such programs or may be recipients of funds to implement such programs. It is envisioned that the same agencies will implement the measure if funds are available to the implementing agency.

References

This section identifies directly cited references, or those references used for general background information.

GROUP 1

ON-ROAD MOBILE SOURCE MEASURES

ONRD-01: ACCELERATED PENETRATION OF PARTIAL ZERO-EMISSION AND ZERO-EMISSION VEHICLES [VOC, NOX, CO]

CONTROL MEASURE SUMMARY		
SOURCE CATEGORY:	GASOLINE- AND DIESEL-POWERED ON-ROAD VEHICLES WITH GROSS VEHICLE WEIGHT RATING UP TO 8,500 LBS	
CONTROL METHODS:	INCENTIVES FOR PARTIAL ZERO-EMISSIONS VEHICLES AND ZERO-EMISSIONS VEHICLES	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023**
VOC INVENTORY	165.9	49.0
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	167.8	40.7
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CO INVENTORY	1,641.9	462.6
CO REDUCTION		TBD*
CO REMAINING		TBD
PLANNING INVENTORY (SUMMER FOR VOC AND NOx; WINTER FOR CO)	**2008**	**2023**
VOC INVENTORY	169.9	51.1
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	149.4	36.3
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CO INVENTORY	1,621.0	454.2
CO REDUCTION		TBD*
CO REMAINING		TBD
CONTROL COST:	TBD. MINIMUM INCENTIVES FUNDING - $5,000,000/YEAR	
IMPLEMENTING AGENCY:	CARB, SCAQMD	

* Emission reductions will be determined after projects are identified and implemented.

DESCRIPTION OF SOURCE CATEGORY

The purpose of this early action measure is to seek emission reductions from existing passenger cars, sports utility vehicles, and other light- and medium-duty vehicles through the increased use of partial zero-emission and zero-emission vehicles that would provide substantial improvements in emissions performance beyond current conventional gasoline and diesel vehicle technologies. This measure would continue the use of voluntary incentive programs that would facilitate the commercial deployment of plug-in hybrid-electric, battery-electric, and fuel cell vehicles.

Background

Emissions from passenger vehicles continue to represent a significant portion of the emissions inventory in the South Coast Air Basin, adversely affecting regional air quality. The intent of this measure is to specifically mitigate impacts associated with passenger car emissions through early deployment of partial-zero- and zero-emission vehicles that are currently available commercially or expected to be offered commercially in the next two to three years.

Regulatory History

To address California's acute air quality problems, the federal Clean Air Act provides California the authority to adopt and enforce rules to control mobile source emissions within California. The California Air Resources Board (CARB) is the responsible agency to adopt emissions standards that are as stringent or more stringent than federal requirements.

Significant strides have been made in reducing emissions from motor vehicles through CARB's mobile source regulations that apply predominately to new vehicles. As a result, a "new" vehicle today is approximately 99% less polluting compared to a vehicle manufactured a couple of decades ago. However, on-road and off-road mobile sources account for about 70 percent of ozone precursor emissions in the State. Because of the large emissions contribution, requiring the use of advanced technology such as plug-in hybrid electric vehicle technology capable of zero-emission transportation is essential if clean air standards are to be realized, especially for in-use vehicles. In January 2012, CARB adopted amendments to the Low-Emission Vehicle (LEV) program and the Zero-Emission Vehicle (ZEV) regulation.

In addition, CARB implements a "Clean Vehicle Rebate Project" (CVRP) that provides individual vehicle incentives of up to $2,500 for full zero-emission vehicles; $1,500 for plug-in hybrid vehicles; $900 for neighborhood electric vehicles; and $900 for zero-emission motorcycles. For the 2011/2012 fiscal year, a total of $15 million was allocated statewide.

PROPOSED METHOD OF CONTROL

This measure proposes to continue the CVRP through 2023 with a minimum number of 1,000 vehicles per year to be incentivized through the CVRP. The proposed incentives would be up to $5,000 per vehicle. As part of this action, additional funding opportunities will be sought.

EMISSIONS REDUCTION

Emission reductions are not estimated at this time and will depend on the actual number of vehicles participating in the program.

RULE COMPLIANCE AND TEST METHODS

Not applicable.

COST EFFECTIVENESS

This proposed control measure will affect light- and medium-duty vehicles with gross vehicle weight ratings up to 8,500 lbs. The estimated funding level is $5 million per year to incentivize a minimum of 1,000 vehicles per year.

The cost effectiveness of this control measure has not been estimated at this time. The cost effectiveness will be affected by any changes to the per-vehicle incentive levels or if total funding levels are not realized.

IMPLEMENTING AGENCY

CARB is currently implementing the AB118 CVRP. This early action measure would continue the implementation of the CVRP.

REFERENCES

CARB (2012). Advanced Clean Cars Program Adoption.

CARB (2011). Grant Proposal Solicitation Air Quality Improvement Program (AQIP) Clean Vehicle Rebate Project.

ONRD-02: ACCELERATED RETIREMENT OF OLDER LIGHT-DUTY AND MEDIUM-DUTY VEHICLES [VOC, NOX, CO]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: GASOLINE- AND DIESEL-POWERED LIGHT- AND MEDIUM-DUTY VEHICLES UP TO 8,500 LBS GROSS VEHICLE WEIGHT

CONTROL METHODS: INCENTIVES PROGRAM FOR THE VOLUNTARY EARLY RETIREMENT OF OLDER LIGHT- AND MEDIUM-DUTY VEHICLES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**2008**	**2023**
VOC INVENTORY	165.9	49.0
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	167.8	40.7
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CO INVENTORY	1,641.9	462.6
CO REDUCTION		TBD*
CO REMAINING		TBD
SUMMER PLANNING INVENTORY	**2008**	**2023**
VOC INVENTORY	169.9	51.1
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	149.4	36.3
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CO INVENTORY	1,621.0	454.2
CO REDUCTION		TBD*
CO REMAINING		TBD

CONTROL COST: UP TO $2,500 PER VEHICLE RETIRED INCLUDING INCENTIVE REPLACEMENT VOUCHER. ESTIMATED PUBLIC FUNDING – $5,000,000/YEAR

IMPLEMENTING AGENCY: CARB, BUREAU OF AUTOMOTIVE REPAIR, SCAQMD

* Emission reductions will be determined after projects are identified and implemented.

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to implement a strategy to accelerate retirement of older gasoline- and diesel-powered vehicles up to 8,500 lbs. gross vehicle weight (GVW). These vehicles include passenger cars, sports utility vehicles, vans, and light-duty pick-up trucks.

Background

Light-duty vehicles are major contributors of air pollutants in the South Coast Air Basin. While vehicle miles traveled increased more than 50 percent over the last 20 years, vehicle emissions have dropped by a factor of almost three due to increasingly stringent vehicle emission standards. Yet, the light- and medium-duty vehicle fleet continues to contribute more than a third of the Basin's total emissions of ozone and particulate matter forming pollutants in part due to high emitting vehicles.

Motor vehicle emissions progressively increase as vehicles age and accumulate mileage. The causes of these emissions increases are numerous, but can be broadly categorized in terms of normal deterioration of properly-functioning on-board emission control system components, emission control system malfunctions due to design flaws and/or lack of proper maintenance, and tampering. In recognition that emission reductions could occur through regular emission testing of vehicles and repair of those vehicles with high in-use emissions, Smog Check programs have been established in an attempt to ensure that vehicles stay clean as they age, but room for improvement in such programs exists. In addition, through the Bureau of Automotive Repairs (BAR) High Emitter profile, certain model year vehicles are considered inherently high emitters despite passing Smog Check.

Regulatory History

On September 23, 2004, the Governor signed AB 923 (Firebaugh) which resulted in a significant increase in incentive funding for programs that achieve emission reductions from vehicular sources and off-road engines. The legislation identified and emphasized that in-use higher-emitting vehicles are sources that need additional scrutiny and control in part because of their large contribution to the fleet's total emissions. To address this, the District is implementing, under the AB923 program, pilot programs to identify and retire high-emitting on-road vehicles. In addition, based on cost effectiveness guidelines, model year 1992 and older vehicles would be considered for early retirement.

CARB adopted the Enhanced Fleet Modernization Program (EFMP) Regulation in June 2009. The regulation implements the voluntary vehicle scrap and replacement voucher provisions of AB 118 (Nunez). The legislation includes $30 million annually statewide for an Enhanced Fleet Modernization Program (EFMP). The EFMP augments the State's existing voluntary accelerated vehicle retirement program, referred to as the Consumer Assistance Program (CAP). The focus of the EFMP is to augment existing retirement programs and provide funding through vehicle replacement vouchers to retire the highest-polluting vehicles in the areas with the greatest air quality problems.

PROPOSED METHODS OF CONTROL

Currently, California vehicles less than 10,000 lbs. GVW are required to undergo Smog Check testing every two years or upon change of a vehicle's ownership. Recent studies have indicated that repairs performed in conjunction with the Smog Check Test Program do not last the entire biennial cycle and result in high-emitting vehicles being driven on California roadways. The current Consumer Assistance Program (CAP) operated by BAR encourages vehicle retirement for on-cycle (those vehicles within three months of their smog check test due dates) vehicles that cannot pass the Smog Check Test. Vehicles identified as high emitters that are off-cycle to the Smog Check Test are not eligible under the CAP program implemented by BAR and the State of California. This measure would give first priority to pre-1992 model year vehicles identified as high emitters and are off-cycle to California's Smog Check Program.

The early action is to retire at a minimum, 2,000 light- and medium-duty vehicles per year to 2023. The proposed incentives would be up to $2,500 which could include a replacement voucher under the AB 118 EFMP program.

EMISSIONS REDUCTION

Emission reductions are not estimated at this time and will depend on the actual number of vehicles participating in the program.

COST EFFECTIVENESS

The Carl Moyer $17,080 per ton threshold is used to calculate the cost-effectiveness of the vehicle retirement program. Because this program is solely reliant on a volunteer participation rate by the consumers, the exact cost effectiveness of the program is difficult to assess prior to the program implementation.

IMPLEMENTING AGENCY

The implementing agencies would be the South Coast Air Quality Management District under AB 923 and guidelines set forth by CARB for the Light-Duty Vehicle Program. In addition, the EFMP would be implemented by CARB and BAR with the District's administration of the replacement voucher provisions of the EFMP regulation.

REFERENCES

CARB (2009). AB118 Enhanced Fleet Modernization Program Regulation (Car Scrap).

CARB/BAR (2010). Evaluation of the California Smog Check Program Using Random Roadside Data.

ONRD-03: ACCELERATED PENETRATION OF PARTIAL ZERO-EMISSION AND ZERO-EMISSION LIGHT-HEAVY- AND MEDIUM-HEAVY-DUTY VEHICLES [NOX, PM]

SOURCE CATEGORY:	ON-ROAD LIGHT-HEAVY- AND MEDIUM-HEAVY-DUTY VEHICLES (8,501 LBS TO 26,001 GVWR)	
CONTROL METHODS:	ACCELERATED PENETRATION OF PARTIAL ZERO-EMISSION AND ZERO-EMISSION LIGHT-HEAVY- AND MEDIUM-HEAVY-DUTY VEHICLES	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023**
NOx INVENTORY	87.1	30.9
NOx REDUCTION		TBD*
NOx REMAINING		TBD
PM10 INVENTORY	1.3	0.30
PM10 REDUCTION		TBD*
PM10 REMAINING		TBD
PM2.5 INVENTORY	1.2	0.25
PM2.5 REDUCTION		TBD*
PM2.5 REMAINING		TBD
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	81.6	29.1
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CONTROL COST:	TBD. ESTIMATED PUBLIC FUNDING – $25 MILLION PER YEAR	
IMPLEMENTING AGENCY:	CARB AND SCAQMD	

* Emission reductions will be determined after projects are identified and implemented.

DESCRIPTION OF SOURCE CATEGORY

Background

Emissions from heavy-duty diesel mobile sources continue to represent a significant and increasing portion of the emissions inventory in the South Coast Air Basin, adversely affecting regional air quality. The two primary pollutants resulting from diesel fuel combustion are particulate matter (PM) and oxides of nitrogen (NOx). PM typically constitutes the visible emissions from diesel engine exhaust, and it contains over 40 known cancer-causing substances. In 1998, California identified diesel PM as a toxic air contaminant based on its potential to cause cancer. In March 2005, the District released a report titled, "The Multiple Air Toxic

Exposure Study in the South Coast Air Basin." This report concluded that about 85 percent of the carcinogenic risk associated with breathing ambient air can be attributed to diesel particulate emissions. Diesel engines also emit significant quantities of NOx, which is a precursor to ozone and secondary particulate matter formation. Additional control on diesel engine emissions is essential for attainment of ozone and PM ambient air quality standards, as well as mitigating its toxic air quality impact.

The intent of this measure is to seek greater emission reduction benefits through the early deployment of partial zero-emission and zero-emission light-heavy- and medium-heavy-duty vehicles with gross vehicle weight ratings (GVWR) from 8,501 lbs to 26,000 lbs.

Regulatory History

The regulation of emissions from heavy-duty diesel mobile emission sources is the responsibility of CARB and U.S. EPA. Specifically, heavy-duty vehicle engines are subject to specific emission standards pursuant to state and/or federal requirements. Emission standards for new diesel engines powering heavy-duty vehicles were first established for the 1973 model-year and have gradually increased in stringency over time. The current most stringent set of heavy-duty engine emission standards has been established by CARB and U.S. EPA for 2010 and subsequent model-years, which includes a 0.2 g/bhp-hr NO_x emission standard.

In December 2008, CARB adopted the Truck and Bus Regulation which applies to a significant number of heavy-duty vehicles with gross vehicle weight ratings of 14,001 lbs and greater. Heavier trucks (26,001 lbs and greater) must meet regulatory requirements beginning January 1, 2012. Lighter trucks (14,001 lbs to 26,000 lbs) must meet regulatory requirements beginning January 1, 2015.

Currently, heavy-duty diesel engine manufacturers are introducing electric-hybrid systems in medium-heavy-duty on-road vehicle applications. Such systems in conjunction with a 2010-compliant conventionally-fueled or alternative-fueled engine can potentially result in additional NOx emissions benefits. Many of the hybrid systems introduced to-date are for lighter vehicles with gross vehicle weight ratings from 8,501 to 26,000 lbs.

PROPOSED METHOD OF CONTROL

This measure seeks additional emission reductions through the early introduction of electric hybrid vehicles. The proposed actions would continue the state hybrid truck and bus voucher incentive project (HVIP) which accelerates the deployment of hybrid and zero-emission medium-heavy-duty vehicles in the South Coast Air Basin.

Incentives of up to $25,000 per vehicle are proposed with a minimum target of 1,000 hybrid and zero-emission vehicles funded each year to 2023. The proposed funding would place the highest priority towards zero-emission vehicles and hybrid vehicles with a portion of their operation in an "all electric range" mode.

EMISSIONS REDUCTION

Emission reductions are not estimated at this time and will depend on the actual number of vehicles participating in the program.

RULE COMPLIANCE AND TEST METHODS

Not Applicable.

COST EFFECTIVENESS

This proposed control measure will affect heavy-duty engine manufacturers, heavy-duty diesel truck owners, and heavy-duty diesel fleet operators. Costs of replacement engines vary depending on the specific model and vehicle application, and an evaluation would need to be conducted to determine the specific types of trucks and engine models that would be primarily affected by this measure, as well as prioritizing vehicle applications on a cost-effectiveness basis for engine or vehicle replacement. The proposed incentives of $25,000 per vehicle will help offset the capital cost of the vehicles.

IMPLEMENTING AGENCY

CARB, SCAQMD or U.S. EPA could jointly or separately implement incentive programs that would help offset the costs associated with new hybrid or zero-emission truck purchase, engine repower, and/or retrofit kit installation.

REFERENCES

SCAQMD (2005). Multiple Air Toxic Exposure Study, MATES-III.

CARB (2009). Air Quality Improvement Program - Hybrid Truck and Bus Voucher Incentive Program.

ONRD-04: ACCELERATED RETIREMENT OF OLDER ON-ROAD HEAVY-DUTY VEHICLES [NOX, PM]

SOURCE CATEGORY:	ON-ROAD HEAVY-DUTY DIESEL VEHICLES (26,001 LBS AND GREATER GVWR)	
CONTROL METHODS:	ACCELERATED REPLACEMENT OF EXISTING HEAVY-DUTY VEHICLES WITH VEHICLES MEETING 2010 STANDARDS AND RETROFITTING/REPOWERING EXISTING HEAVY-DUTY VEHICLES TO ACHIEVE LOWER EMISSION LEVELS	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023**
NOx INVENTORY	166.7	22.4
NOx REDUCTION		TBD*
NOx REMAINING		TBD
PM10 INVENTORY	6.2	0.60
PM10 REDUCTION		TBD*
PM10 REMAINING		TBD
PM2.5 INVENTORY	5.7	0.50
PM2.5 REDUCTION		TBD*
PM2.5 REMAINING		TBD
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	158.1	20.9
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CONTROL COST:	TBD. ESTIMATED PUBLIC FUNDING – $50 MILLION PER YEAR	
IMPLEMENTING AGENCY:	CARB AND SCAQMD	

* Emission reductions will be determined after projects are identified and implemented.

DESCRIPTION OF SOURCE CATEGORY

Background

Emissions from heavy-duty diesel mobile sources continue to represent a significant portion of the emissions inventory in the South Coast Air Basin, adversely affecting regional air quality. The two primary pollutants resulting from diesel fuel combustion are particulate matter (PM) and oxides of nitrogen (NOx). PM typically constitutes the visible emissions from diesel engine exhaust, and it contains over 40 known cancer-causing substances. In 1998, California identified diesel PM as a toxic air contaminant based on its potential to cause cancer. In March 2005, the District released a report titled, "The Multiple Air Toxic Exposure Study in the South

Coast Air Basin." This report concluded that about 85 percent of the carcinogenic risk associated with breathing ambient air can be attributed to diesel particulate emissions. Diesel engines also emit significant quantities of NOx, which is a precursor to ozone and secondary particulate matter formation. Additional control of diesel engine emissions is essential for attainment of ozone and PM ambient air quality standards, as well as mitigating its toxic air quality impact.

Over the past decade, warehouse and distribution centers have been steadily increasing in size and number throughout the region. The greatest growth in warehouses/distribution centers has been in the Riverside and San Bernardino areas. Based on the Southern California Association of Governments, by 2035 over 1 billion square feet of warehousing will be needed in the Southern California area to support goods movement activities (SCAG, 2010).

Distribution centers and/or warehouses are facilities that serve as a distribution point for the transfer of goods. Such facilities include cold storage warehouses, goods transfer facilities, and transloading facilities, where imported goods are sorted, tagged, repackaged and prepared for retail distributions. These operations involve trucks, trailers, shipping containers, and other equipment with diesel engines. A warehouse/distribution center can be comprised of multiple centers or warehouse/distribution centers within an area. The size can range from 100,000 square feet to well over a million square feet. Depending on the size and type, a warehouse/distribution center may have hundreds of diesel trucks a day that deliver, load, and/or unload goods, generally operating seven days a week. To the extent that these trucks are transporting perishable goods, they are equipped with diesel-powered transport refrigeration units (TRUs) or TRU generator sets. The activities associated with delivering, storing, and loading freight produce NOx and PM emissions, including diesel particulate matter (DPM).

The intent of this control measure is to seek additional emission reductions from existing heavy-duty vehicles with gross vehicle weight ratings (GVWR) greater than 26,000 lbs through an accelerated vehicle replacement program with new 2010 and later model year engines. In addition, for heavy-duty vehicles not replaced with new models, existing vehicle engines would be repowered with commercially-available engines meeting 2010 emission standards or modified with retrofit kits to achieve the lowest possible emission levels. Given the exceedences of the federal 24-hour fine particulate (PM2.5) ambient air quality standard in the Mira Loma area, the proposed measure will place priority to replace older heavy-duty vehicles serving warehouse and distribution centers located within a 10 mile radius of the District's Mira Loma air monitoring station.

Regulatory History

The regulation of emissions from heavy-duty diesel mobile emission sources is the responsibility of CARB and U.S. EPA. Specifically, heavy-duty vehicle engines are subject to specific emission standards pursuant to state and/or federal requirements. Emission standards for new diesel engines powering heavy-duty vehicles were first established for the 1973 model-year and have gradually increased in stringency over time. The current most stringent set of heavy-duty engine emission standards has been established by CARB and U.S. EPA for 2010 and subsequent model-years, which includes a 0.2 g/bhp-hr NO_x emission standard.

In December 2008, CARB adopted the Truck and Bus Regulation which applies to a significant number of heavy-duty vehicles with gross vehicle weight ratings of 14,001 lbs and greater. Heavier trucks (26,001 lbs and greater) must meet regulatory requirements beginning January 1, 2012. Lighter heavy-duty trucks (14,001 lbs to 26,000 lbs) must meet regulatory requirements beginning January 1, 2015.

The Carl Moyer Memorial Air Quality Standards Attainment Program is in its 13th year. The Carl Moyer Program was placed into state law and is the enabling mechanism to fund the cleanup of older diesel vehicles and equipment. At its initial inception, the Carl Moyer Program was funded annually through a state budget line item that must be approved by the state legislature. In 2004, the state legislature approved Senate Bill (SB) 1107, which allowed for the funding of the Carl Moyer Program. In addition, the state legislature passed Assembly Bill (AB) 923, which provides funding until 2015 and allowed California local air districts to opt into a local Carl Moyer Program.

The SB1107 funds are generated from new vehicle sales. In lieu of having Smog Check inspections in the first four years, new vehicles are now subject to their first Smog Check inspection after six years. A fee of $48 is assessed at the time of vehicle purchase, which is typically less expensive than the Smog Check inspection and certificate. Half of the $48 is directed to CARB, who distributes the funds among local air districts for implementation of the Carl Moyer Program.

The AB923 program has two components. One is a tire disposal fee which generates about $10 million a year and is distributed by CARB among the local air districts. The other is a $2 Department of Motor Vehicle registration fee that each local air district's Board has the authority to approve independently and generate funds from vehicles registered within their respective district boundaries. Fees generated are used for both the Carl Moyer and the School Bus Programs.

In 2006, California voters approved a bond measure called Proposition 1B. The bond measure would generate $19 billion of which $2 billion would go towards improving California's freight transportation infrastructure; $1 billion towards the cleaning up older diesel vehicles; and $200 million to school bus retrofits. The funding is predicated on bond sales. To-date, close to 2,000 older diesel trucks have been replaced with either newer diesel trucks or alternative fuel trucks.

PROPOSED METHOD OF CONTROL

This measure seeks additional emission reductions from older, pre-2010 heavy-duty vehicles beyond the emission reductions targeted in CARB's Truck and Bus Regulation. In addition, the proposed action is to direct a portion of available public funding to assist in replacing older diesel trucks serving warehouse and distribution centers to a truck with an engine meeting on-road heavy-duty exhaust emission standards and replacing older cargo handling equipment with equipment meeting Tier 4 off-road exhaust emission standards by 2015. The incentive programs will place the highest priority on on-road vehicles that provide at least 75% of their service to warehouse and distribution centers in the Mira Loma region and have gross vehicle weight ratings of 26,001 lbs or greater.

A significant number of heavy-duty trucks have been replaced through Proposition 1B Goods Movement Emission Reduction Program funding, the Carl Moyer Program, and other local incentives programs. This measure would continue these programs through 2023. In addition, this measure would seek a provision from the State for the District to implement a SOON-like (Surplus Off-Road Option for NOx) provision for the largest on-road truck fleets operating in the South Coast Air Basin.

While the Truck and Bus Regulation will ultimately require a majority of the heavy-duty trucks to meet 2010 heavy-duty exhaust emission standards by 2023, funding programs, which partially offset the costs, are typically made available to fleets with 10 or less trucks. However, many of these smaller fleets are not able to provide the remaining capital necessary to purchase a 2010-compliant truck and thus, cannot take advantage of funding opportunities. As such, the District staff believes a SOON-like program for the largest on-road truck fleets can lead to greater emission reductions earlier and complement traditional funding programs.

Examples of SOON-like programs include the San Pedro Bay Ports Clean Truck Program where the Ports adopted programs to incentivize the use of 2007 or cleaner trucks entering the Ports. Revenues from the Clean Truck Program are used to help fund cleaner trucks. A SOON-like program implemented regionwide would require the largest on-road truck fleets to access incentives funding to replace older model trucks earlier than required or to replace older model trucks which would otherwise be exempt from the regulation.

EMISSIONS REDUCTION

Emission reductions are not estimated at this time and will depend on the actual number of vehicles participating in the program.

RULE COMPLIANCE AND TEST METHODS

CARB, subject to existing and future waiver decisions by U.S. EPA, has the authority to establish emission standards and certification requirements, and verify compliance with these requirements, for on-road vehicles and engines sold in California. In addition, CARB has the authority to establish requirements for the verification of retrofit kits that would be used to modify heavy-duty diesel engines. Compliance with requirements of an incentive program(s) used to offset the costs of new heavy-duty vehicles, engines, or retrofit kits could be jointly or separately administered by SCAQMD or CARB.

COST EFFECTIVENESS

The cost effectiveness of the proposed action is not estimated. Recent funding for goods movement related vehicles under the Proposition 1B Air Quality Improvement Funds provided at least $35,000 per truck replaced.

IMPLEMENTING AGENCY

CARB, SCAQMD or U.S. EPA could jointly or separately implement incentive programs that would help offset the costs associated with new truck purchase, engine repower, and/or retrofit kit installation. In particular, there is a need to incentivize emission reductions from interstate trucks registered outside of California, but operating substantially within California.

REFERENCES

CARB (2010). Amendments to the On-Road Truck and Bus Regulation.

CARB (2010). Proposition 1B Goods Movement Emissions Reduction Program: Final Guidelines for Implementation.

ONRD-05: FURTHER EMISSION REDUCTIONS FROM HEAVY-DUTY VEHICLES SERVING NEAR-DOCK RAILYARDS [NOX, PM]

SOURCE CATEGORY:	ON-ROAD HEAVY-DUTY DIESEL VEHICLES (26,001 LBS AND GREATER GVWR) TRANSPORTING CONTAINERS BETWEEN MARINE PORTS AND NEAR-DOCK RAILYARDS	
CONTROL METHODS:	ACCELERATED REPLACEMENT OF UP TO 1,000 EXISTING HEAVY-DUTY VEHICLES WITH ZERO-EMISSION VEHICLES OR ZERO-EMISSION CONTAINER MOVEMENT SYSTEMS	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023 (2023 – 2007 SIP)***
NOx INVENTORY	3.17	0.75 (0.88)
NOx REDUCTION		0.75 (0.88)
NOx REMAINING		0.00 (0.00)
PM10 INVENTORY	0.13	0.027 (0.03)
PM10 REDUCTION		0.027 (0.03)
PM10 REMAINING		0.00 (0.00)
PM2.5 INVENTORY	0.12	0.025 (0.03)
PM2.5 REDUCTION		0.025 (0.03)
PM2.5 REMAINING		0.00 (0.00)
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	3.01	0.72 (0.89)
NOx REDUCTION		0.72 (0.89)
NOx REMAINING		0.00 (0.00)
CONTROL COST:	TBD	
IMPLEMENTING AGENCY:	CARB, SAN PEDRO BAY PORTS, SCAQMD	

* Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provided in parentheses are based on the 2007 SIP emissions inventory projections for 2023.

DESCRIPTION OF SOURCE CATEGORY

Background

Intermodal container movement is the movement of containers directly between the marine ports and a railyard. There are three types of railyards used for intermodal: on-dock railyards, near-dock railyards, and off-dock railyards. On-dock railyards are located on marine terminals, near-dock railyards are less than five miles from marine terminals, and off-dock railyards are more than five miles from marine terminals. Heavy-duty diesel trucks are currently used to transport containers from marine terminals to near- and off-dock railyards. These trucks are a significant source of NOx and PM emissions.

The Intermodal Container Transfer Facility (ICTF) operated by Union Pacific (UP) is presently the only near-dock railyard. ICTF serves both the Ports of Los Angeles and Long Beach. In January 2009, the Ports of Los Angeles and Long Beach released a California Environmental Quality Act (CEQA) Notice of Preparation to double the throughput at ICTF. In addition, Burlington Northern Santa Fe (BNSF) Railway is proposing to build the Southern California International Gateway (SCIG) facility that will be a near-dock railyard directly south of the ICTF. ICTF and the proposed SCIG facility are located less than five miles from the Ports of Los Angeles and Long Beach.

Regulatory History

In December 2007, the California Air Resources Board (ARB) adopted a regulation to reduce emissions from drayage trucks operating at California's ports and intermodal railyards. This regulation was amended in 2010. The drayage truck regulation applies to diesel-fueled drayage trucks having a gross vehicle weight rating greater than 26,000 pounds operating at specified California ports, intermodal railyards, or both. The regulation sets two compliance deadlines that affect all drayage trucks operating specifically at California's ports and intermodal railyards:

- Phase 1: By December 31, 2009, all pre-1994 model year (MY) engines are to be retired or replaced with 1994 and newer MY engines. Furthermore, all drayage trucks with 1994 – 2003 MY engines are required to achieve an 85 percent PM emission reduction through the use of an approved Level 3 verified diesel emission control strategy (VDECS).

- Phase 2: By December 31, 2013, all trucks would be required to further reduce emissions to meet the 2007 MY California or federal heavy-duty diesel-fueled on-road emission standards.

CARB's On-Road Heavy-Duty Diesel Truck and Bus Rule incorporates the Drayage Truck Regulation and will further require that trucks operating at the Ports meet 2010 federal on-road standards by 2021.

In 2006, the Ports of Los Angeles and Long Beach adopted the San Pedro Bay Ports Clean Air Action Plan (CAAP), a planning and policy document that sets goals and implementation strategies to reduce air emissions and health risks associated with Port operations. One measure contained in the CAAP reduces emissions from on-road heavy-duty trucks used to dray goods to and from the Ports. CAAP Control Measure HDV-1: Performance Standards for On-Road Heavy Duty Vehicles (Clean Truck Program) requires all on-road trucks entering the Ports comply with the following:

- October 1, 2008: All pre-1989 trucks are banned from entering the Port.
- January 1, 2010: 1989-1993 trucks will be banned, in addition to 1994-2003 trucks that have not been retrofitted to achieve 85 percent DPM reduction and 25 percent NOx reduction through use of a CARB-approved Level 3 VDECS.

- January 1, 2012: All trucks that do not meet the 2007 federal on-road standards will be banned from the Ports starting in 2012; CARB's Drayage Truck Regulation aligns with the Clean Truck Program.

When fully implemented, this CAAP measure and the statewide Drayage Truck Regulation will reduce emissions from drayage trucks accessing current and future near-dock railyards, such as the ICTF and SCIG railyards. However, due to the large number of truck trips to the ICTF and potential future near-dock railyards, additional emission reductions are needed from trucks.

PROPOSED METHOD OF CONTROL

This control measures calls for CARB to adopt a regulation or through other enforceable mechanisms, which further reduce emissions from near-dock railyard drayage trucks. The regulation would require by 2020, all containers transported between the marine ports and the near-dock railyards to use zero-emission technologies that do not create tailpipe emissions from the vehicle or systems that transport containers by regulating truck emissions and potentially allowing alternative technologies. Zero-emission technologies are well suited for transporting containers to near-dock railyards because of their short distance to and from marine terminals. In lieu of a regulation or to complement a regulation, other enforceable mechanisms may achieve the objectives of the control measures. The Ports of Los Angeles and Long Beach have successfully implemented the Clean Truck Program as mentioned above. A second phase of such a program could be implemented to bring zero-emission trucks or hybrid trucks with sufficient all-electric range to serve the near-dock railyards. In addition, incentives funding programs will encourage the deployment of such zero-emission trucks.

Any of several types of zero-emission container movement systems could be used to implement this measure. Zero-emission container movement systems include, but are not limited to, on-road technologies such as battery-electric trucks, fuel cell trucks, hybrid-electric trucks with all-electric range (AER) and zero-emission hybrid or battery-electric trucks with "wayside" power (such as electricity from overhead wires). The measure could also be implemented with the deployment of zero-emission fixed guideway systems such as electric, maglev or linear synchronous motor propulsion or any other technologies that result in zero-emission track miles.

Such systems are not currently in use for full-scale port to railyard operations and, depending on the technology, may require different levels of additional development and optimization. However, a variety of these technologies are being demonstrated, and there is substantial evidence that they can be made commercially available prior to 2020, particularly if regulations create a positive signal to technology developers by requiring the use of zero-emission technologies.

In addition, many of these zero-emission technologies are expected to be operationally feasible to serve the ports. For example, electric trucks with adequate zero-emission range, power and reliability – such as are being developed and demonstrated at the Ports could fit into current operating procedures as a replacement for fossil fuel-powered trucks. Drayage service to and from near-dock railyards is particularly conducive to implementation of zero-emission trucking technologies because of the relatively short distance involved (less than five miles) and because near-dock railyards could be served by a relatively limited number of trucks compared to the total number serving the ports and region.

Zero-emission trucks can be powered by grid electricity stored in a battery, by electricity produced onboard the vehicle through a fuel cell, or by "wayside" electricity from outside sources such as overhead catenary wires, as is currently used for transit buses and heavy mining trucks. All technologies eliminate fuel combustion and utilize electric drive as the means to achieve zero-emission and higher system efficiency compared to conventional fossil fuel combustion technology. Hybrid-electric trucks with all-electric range can provide zero emission in certain corridors and flexibility to travel extended distances (e.g., outside the region) powered by alternative fuels, conventional fuels, or fuel cells.

EMISSIONS REDUCTION

The proposed control measure would require zero-emission technologies to replace up to 1,000 heavy-duty trucks that serve the San Pedro Bay Ports and the near-dock railyards. Implementation of this control measure is expected to result in 0.75 and 0.025 tons/day of NOx and PM emission reductions.

RULE COMPLIANCE AND TEST METHODS

Compliance would be based on monitoring, recordkeeping, and reporting requirements that have been established in existing regulations. In addition, compliance would be verified through inspections and other recordkeeping and reporting requirements.

COST EFFECTIVENESS

Not determined.

IMPLEMENTING AGENCY

CARB would adopt a new regulation or amend the existing Drayage Truck Regulation to require zero-emission on-road technologies or fixed guideway systems, if feasible. This control measure should be adopted by CARB no later than 2015, with full implementation by 2020.

REFERENCES

SCAQMD (2012). Comment letter on Port of Los Angeles Draft Environmental Impact Report for the Southern California International Gateway (SCIG) Project.

GROUP 2

OFF-ROAD MOBILE SOURCE MEASURES

OFFRD-01: EXTENSION OF THE SOON PROVISION FOR CONSTRUCTION/INDUSTRIAL EQUIPMENT [NOx]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY:	OFF-ROAD DIESEL-FUELED CONSTRUCTION, INDUSTRIAL EQUIPMENT, AIRPORT GROUND SUPPORT EQUIPMENT, AND DRILLING EQUIPMENT	
CONTROL METHODS:	ACCELERATED TURNOVER OR RETROFIT OF OLDER EQUIPMENT AND ENGINES	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023***
NOx INVENTORY	37.1	15.91
NOx REDUCTION		7.47
NOx REMAINING		8.44
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	37.1	15.91
NOx REDUCTION		7.47
NOx REMAINING		8.44
CONTROL COST:	TBD. FUNDING FROM SOON – UP TO $30 MILLION PER YEAR	
IMPLEMENTING AGENCY:	SCAQMD	

* Emission reductions provided are based on the 2012 AQMP emissions inventory. The emissions inventory in the 2007 SIP was updated as part of the Final Approval of the 2007 SIP for the 1997 8-Hour Ozone Standards (77 FR 12674) and is the same inventory used for the 2012 AQMP.

DESCRIPTION OF SOURCE CATEGORY

The purpose of this measure is to promote faster turnover of older in-use construction and industrial diesel engines.

Background

In 2023, off-road equipment is the second largest source category of NOx emissions and accounts for 14 percent of the total NO_x emissions in the South Coast Air Basin. Heavy-duty construction, industrial, airport ground support (GSE), and drilling equipment are eligible for participation in the District's Surplus Off-road Opt-in for NOx (SOON) program and represent almost 40 percent of the off-road equipment category NOx emissions. In 2007, CARB adopted the In-Use Off-Road Diesel-Fueled Fleets Regulation that reduces primarily PM and secondarily NOx emissions through retrofit controls, engine repowers, equipment replacement and fleet reduction. NOx emission reductions of about 17 percent are expected to be achieved with full implementation of the regulation by 2023.

Regulatory History

The Federal Clean Air Act prohibits states from regulating emissions from new engines used in construction and farming equipment less than 175 horsepower. Diesel engines greater than 175 horsepower are regulated by CARB. In September 1996, CARB, U.S. EPA, and the diesel engine manufacturers signed a statement of principles, which called for a cooperative effort to reduce NO_x, VOC, and PM emissions by more than 60 percent. In August 1998, U.S. EPA adopted new emission standards pertaining to off-road diesel engines. Subsequently, in January 2000 and in December 2004, CARB adopted amendments to existing California emission standards to harmonize with the federal requirement. These amendments included a tiered approach starting from 1996 for Tier 1 and concluding in 2015 with all engines required to meet Tier 4 standards.

In order to accelerate the introduction of new low emission equipment, CARB adopted the In-Use Off-Road Diesel-Fueled Fleets Regulation (Off-Road rule) in 2007. The rule applies to diesel-fueled construction, mining, industrial, airport ground support equipment, and mobile oil drilling equipment and established annual fleet average emission targets. Fleets that do not meet the fleet average in any year are required to "turnover," (i.e., retire, replace, retrofit, or repower) a specified percentage of their horsepower. The Off-Road rule was amended in 2011 which relaxed the target emission reductions and set the initial date for vehicle compliance to 2014.

As part of the statewide regulation, CARB adopted the SOON provision that allows air districts to opt-in to additional NOx emission reductions from the largest off-road fleets subject to the regulation. The District has been implementing the SOON provision since 2008. The District Governing Board set aside up to $30 million per year to implement the SOON provision.

PROPOSED METHOD OF CONTROL

New off-road diesel engines are now required to meet Tier 4 emission standards. Tier 4 includes optional phase-in provisions (Interim Tier 4 standards) with relaxed standards from 2008 to 2014, depending on horsepower category. By 2015, all new off-road diesel engines between 75 hp and 750 hp, which represent most off-road construction equipment, will be required to meet exhaust emissions standards of 0.3 g/bhp-hr NOx and 0.015 g/bhp-hr PM. To comply with these standards, advanced fuel injection, air induction, and after-treatment technologies are required. The emission reductions from Tier 4 engines compared to Tier 0 engines are at least 95 percent for NOx and PM.

The long life of off-road equipment means that older, high-emitting engines will remain in the off-road equipment population beyond 2020. District staff believes that by using incentive programs, such as the Carl Moyer Program and the SOON Provision of the Off-Road rule, significant emission reductions could be realized by accelerating fleet turnover through equipment replacement and engine repowers.

During the last four years, the SOON program has funded close to 500 engine repowers at an average cost effectiveness of approximately $11,000/ton NOx reduction. The District Governing Board has allocated up to $30,000,000 per year for the program. This measure proposes to extend the current SOON Program beyond 2014 to 2023.

EMISSIONS REDUCTION

While the NOx emissions from the off-road category are projected to be around 44 tpd in 2023, emissions from vehicles eligible to participate in the SOON program are 15.91 tpd. Reductions from this proposed measure are estimated to be 7.47 tpd for NOx.

COST EFFECTIVENESS

The SOON program has funded approximately 500 engine repowers during the last four years at an average cost effectiveness of approximately $11,000/ton NOx reduced. While the cost of Tier 4i and Tier 4 engine repowers are expected to be higher, the cost effectiveness is expected to remain the same because of the lower NOx emission standards of the Tier 4 engines. This measure proposes to extend the SOON program with proposed funding of up to $30,000,000 per year and is expected to repower at least 1,200 Tier 0 engines to Tier 4 by 2023 resulting in 7.47 tpd of NOx reductions.

IMPLEMENTING AGENCY AND ISSUES

The District would implement the SOON provision of the In-Use Off-Road Diesel-Fueled Fleets Regulation.

REFERENCES

CARB (2010). Emissions Inventory Model for Baseline and Final Proposal (Access database) – OSM vehicle scenario table; total population adjusted for 2012 Growth Factor of 1.046. Database available at http://www.arb.ca.gov/msprog/ordiesel/offroad_1085.htm

CARB (2010). Initial Statement of Reasons – Proposed Amendments to the Regulation for In-Use Off-road Diesel Fueled Fleets.

CARB (2011). Final Regulation Order Dec 2011- Regulation for In-Use Off-Road Diesel-Fueled Fleets.

OFFRD-02: FURTHER EMISSION REDUCTIONS FROM FREIGHT LOCOMOTIVES* [NOX, PM]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: LOCOMOTIVE ENGINES (ALL CLASSES EXCEPT PASSENGER)

CONTROL METHODS: ACCELERATED REPLACEMENT OF EXISTING LOCOMOTIVE ENGINES MEETING TIER 4 OR CLEANER EXHAUST STANDARDS

EMISSIONS (TONS/DAY)*:

ANNUAL AVERAGE	**2008**	**2023 (2023 – 2007 SIP)***
NOx INVENTORY	22.12	17.8 (22.6)
NOx REDUCTION		12.7 (16.6)
NOx REMAINING		5.1 (6.0)
PM10 INVENTORY	0.67	0.41 (0.83)
PM10 REDUCTION		0.34 (0.67)
PM10 REMAINING		0.07 (0.16)
PM2.5 INVENTORY	0.62	0.38 (0.76)
PM2.5 REDUCTION		0.32 (0.62)
PM2.5 REMAINING		0.06 (0.14)
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	22.12	17.8 (22.6)
NOx REDUCTION		12.7 (16.6)
NOx REMAINING		5.1 (6.0)

CONTROL COST: TBD

IMPLEMENTING AGENCY: CARB, U.S. EPA, AND SAN PEDRO BAY PORTS

* Emission reductions provided are based on the 2012 AQMP emissions inventory. Values provided in parentheses are based on the 2007 SIP emissions inventory projections for 2023. The reductions will not be resubmitted as part of the 2012 AQMP SIP since the commitment is already contained in the approved 2007 SIP for the 8-hour ozone ambient air quality standard.

DESCRIPTION OF SOURCE CATEGORY

Background

Diesel-electric locomotives have a large diesel engine (main traction engine) for generating electric power which in turn drives electric motors in each axle. Locomotives can be grouped into three major categories: switch or yard locomotives, medium-horsepower (MHP) locomotives, and interstate line haul locomotives. Switch or yard locomotives range in sizes from 1,006 to 2,300 horsepower (hp), and are generally used within railyards to assemble railcars to form a train. They are also, in limited cases, used in short local haul services. MHP locomotives range from 2,300 to 3,800 hp, and are used in passenger and various local and intrastate freight line haul locomotive operations. The small-size MHP locomotives ranging in sizes from 2,301 to 2,999 hp are used in local service and as large switch locomotives. The mid-size MHP locomotives (3,000 to 3,300 hp) perform local and regional short line-haul services, or provide additional power to assist trains over steep grades. The large-size MHP locomotives (3,301 to 3,800 hp) are generally used for intrastate or regional line haul locomotive operations. Interstate line haul locomotives are high-power locomotives with over 4,000 hp, and are used to move freight over long distances and many states.

CARB estimates that about 139 switchers, 150 MHP, and 200 interstate line haul locomotives operate within the South Coast Air Basin at any given time. Locomotives contributed approximately 22.1 tons per day of NOx and 0.62 ton per day of PM2.5 emissions to the South Coast Air Basin emissions inventory in 2008. The U.S. EPA locomotive regulations, CARB diesel fuel regulation, and the 1998 Memorandum of Understanding (MOU) between CARB, Union Pacific Railroad Company (UP), and Burlington Northern Santa Fe Railway Company (BNSF) have collectively produced reductions in locomotive emissions from 2000 to 2010. CARB projected freight locomotives to contribute 17.8 tons per day in 2023 to the South Coast Air Basin's annual average NOx emissions inventory.

Regulatory History

In December 1997, the U.S. EPA published emission standards for diesel locomotives. These standards included Tier 0 standards for 1973-2001 uncontrolled locomotives upon rebuilding of their diesel engines; more stringent Tier 1 standards for new 2002-2004 locomotives; and modestly stringent Tier 2 standards for 2005 and newer locomotives. In 2008, the U.S. EPA adopted a three-part regulation to further reduce emissions from existing locomotive engines, reduce idling emissions, and introduce new generations of clean locomotives. First, locomotives originally manufactured after 1972 and powered by Tier 0, Tier 1, and Tier 2 engines are required to meet new emission standards when the locomotives are remanufactured. Second, newly-built line-haul and switch locomotives are subject to a different set of stringent near-term (Tier 3) and longer-term (Tier 4) emissions standards. Tier 3 standards are already effective, and Tier 4 standards will be effective beginning in 2015. Lastly, newly-built and remanufactured locomotives are also required to be equipped with an Automatic Engine Stop/Start System capable of shutting-down a locomotive after idling for no more than 30 minutes continuously. This three-part regulatory approach is expected to achieve up to 22 percent NOx and 63 percent PM reductions from remanufactured locomotives, compared to their corresponding current standards. Additionally, locomotives powered by Tier 3 or Tier 4 engines will achieve up to 83 percent NOx and 87 percent PM reductions, compared to engines meeting the current Tier 2 standards.

Besides the federal emission requirements for locomotives, CARB has signed two memorandums of understanding (MOU) with the two Class 1 freight railroads operating in California, Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UP). The first agreement, the South Coast MOU, was signed in 1998. Among other features, it commits the two Class 1 railroads to meeting Tier 2 NOx standards, on average, starting in 2010 with their locomotives operating in the South Coast Air Basin. The second CARB agreement, the Rail Yard Agreement, was signed in 2005. It calls upon the two Class 1 railroads to reduce diesel emissions in and around railyards in California including a statewide locomotive idling limitation program, increase use of low-sulfur diesel for locomotives fueled in California, and a visible emissions detection and repair program.

In 2010, the Ports of Los Angeles and Long Beach updated the San Pedro Bay Ports Clean Air Action Plan that includes a measure calling nearly all locomotives entering the Ports and nearby intermodal yards to meet an emissions goal of Tier 4 by 2020.

PROPOSED METHOD OF CONTROL

The proposed measure carries forward the freight locomotive control measures from the 2007 SIP. The measure calls for replacing existing locomotive engines with Tier 4 engines beginning 2015 such that by 2023, there will be at least 95% Tier 4 locomotives operating in the South Coast Air Basin. CARB would seek further emission reductions from freight locomotives through enforceable mechanisms within its authority. In addition, the Ports as landlords of the property which the near-dock railyards operate have the ability to negotiate (either through lease agreements or environmental mitigation measures) the use of Tier 4 locomotives to achieve the emission reductions provided in this measure. As part of the proposed efforts, the District and CARB will work with U.S. EPA to develop additional enforceable mechanisms to ensure that the proposed control measure is fully implemented by 2023.

EMISSIONS REDUCTION

It is estimated that by 2023, this measure would reduce NOx by 70 percent and direct PM2.5 by about 75 percent. Full implementation of the proposed control measure would result in a 12.7 tons/day reduction in NOx and 0.32 tons/day reduction in PM2.5 emissions by 2023.

COST EFFECTIVENESS

The cost-effectiveness will be determined after further discussion with CARB and railroads.

IMPLEMENTING AGENCY

U.S. EPA has the legal authority to adopt emission standards for locomotives. CARB has developed voluntary agreements with the Class I railroads for further emission reductions. In addition, the Ports of Los Angeles and Long Beach have the ability as landlords to negotiate certain conditions on leases and other contractual arrangements, potentially including port-wide conditions.

REFERENCES

CARB (2009). Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards.

U.S. Environmental Protection Agency (2008). Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 liters per Cylinder: Republication; Final Rule, 40 CFR Parts 9, 85, et. al.

Port of Los Angeles and Long Beach (2010). San Pedro Bay Ports Clean Air Action Plan, 2010 Update.

OFFRD-03: FURTHER EMISSION REDUCTIONS FROM PASSENGER LOCOMOTIVES [NOX, PM]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: LOCOMOTIVE ENGINES (PASSENGER)

CONTROL METHODS: ACCELERATED REPLACEMENT OF EXISTING LOCOMOTIVE ENGINES MEETING TIER 4 OR CLEANER EXHAUST STANDARDS

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**2008**	**2023**
NOx INVENTORY	3.94	4.46
NOx REDUCTION		2.96
NOx REMAINING		1.50
PM10 INVENTORY	0.083	0.094
PM10 REDUCTION		0.088
PM10 REMAINING		0.006
PM2.5 INVENTORY	0.076	0.086
PM2.5 REDUCTION		0.062
PM2.5 REMAINING		0.024
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	3.94	4.46
NOx REDUCTION		2.96
NOx REMAINING		1.50

CONTROL COST: THE COST-EFFECTIVENESS OF THIS MEASURE WILL VARY DEPENDING ON THE TYPE OF CONTROL EQUIPMENT. THE AVERAGE COST-EFFECTIVENESS IS ESTIMATED TO BE AROUND $5,000/TON.

IMPLEMENTING AGENCY: SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY (METROLINK)

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to promote earlier and cleaner replacement or upgrade of existing passenger locomotives to meet Tier 4 locomotive emission standards.

Background

Diesel-electric locomotives have a large diesel engine (main traction engine) for generating electric power which in turn drives electric motors in each axle. Passenger locomotives have engines with about 3,800 horsepower and four drive axles. U.S. EPA emission standards affect 1973-2001 locomotives upon engine rebuild and new 2002 and later locomotives. Locomotives remain in commercial service from 25 to 40 years.

Two passenger railroads, Metrolink and Amtrak, operate passenger train service in the South Coast Air Basin. Metrolink operates seven service lines, 55 stations, and moves approximately 40,000 passengers daily over a 512 track-mile network located almost exclusively within the South Coast Air Basin. Amtrak operates three interstate routes and one intrastate route that travel through the Basin. Metrolink locomotives contribute approximately 77 percent of the emissions of NOx and PM2.5, with Amtrak locomotives responsible for the remainder. Metrolink's fleet consists of approximately 60 percent older Tier 0 locomotives with the remainder being locomotives that meet the Tier 2 emission standards. Metrolink plans to upgrade their fleet so that all locomotives will meet the cleanest (Tier 4) emission standards from 2014 through 2016 which will result in a fleet with at least 85 percent lower emissions. Amtrak's fleet that travels in the South Coast Air Basin is almost exclusively locomotives meeting the Tier 0 emission standards and plans are being made to upgrade them to Tier 0+ emission standards.

Regulatory History

U.S. EPA promulgated regulations for the control of emissions from locomotives in 1998 and 2008. The regulations require locomotives to meet increasingly more stringent emission levels (Tier 0 thru Tier 4) when they are manufactured and in some cases additional emissions improvements when they are remanufactured at the end of their useful life. For newly manufactured passenger locomotives the cleanest emission standards (Tier 4) are required beginning in 2015 and will result in emissions that are over 90 percent cleaner than those from unregulated locomotive engines. For passenger locomotives manufactured before 2012 (i.e., meeting Tier 0, 1 or 2 emission standards), modest emissions improvements (referred to as "plus" standards) are required at the date of remanufacture which usually occurs seven to 10 years after the new locomotive is put into service.

Locomotives by design remain in operation for a long time (typically over 30 years). As such, emission reductions from natural turnover of the passenger locomotive fleet will take many years to be realized. Additionally, as most of the passenger locomotives operating in the Basin meet the Tier 0 or Tier 2 standards, they are only required to meet the more modest Tier 0 plus and Tier 2 plus standards on remanufacture unless they are replaced with new locomotives.

PROPOSED METHOD OF CONTROL

Metrolink's Board (Southern California Regional Rail Authority) has adopted a locomotive replacement plan which includes the procurement of Tier 4 locomotive engines to replace its 30 Tier 0 locomotives over a three-year period. In addition, the replacement plan calls for repowering the existing Tier 2 locomotives to Tier 4 emissions levels. These actions will result in 100% Tier 4 passenger locomotives by 2023.

In addition, the District will encourage Amtrak to replace or repower their Tier 0 locomotives to meet Tier 4 locomotive emission standards starting in 2015 rather than remanufacturing these engines.

EMISSIONS REDUCTION

Emission reductions are estimated to be 2.96 tons/day for NO_x and 0.06 tons/day PM2.5 in 2023.

COST EFFECTIVENESS

Metrolink staff estimates that upgrading their oldest locomotives will cost approximately $3.4 million per locomotive, and for their newer locomotives, approximately $2.4 million each. Total cost to upgrade the fleet will be approximately $150 million. Assuming a 20-year locomotive life, the cost effectiveness of the upgrades will be in the range of $5,000 per ton of emissions reduced.

IMPLEMENTING AGENCY

The Southern California Regional Rail Authority will be considering the procurement of Tier 4 locomotive engines.

REFERENCES

Southern California Regional Rail Authority (2012). Adoption of Locomotive and Equipment Fleet Plan.

OFFRD-04: FURTHER EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS WHILE AT BERTH [ALL POLLUTANTS]

CONTROL MEASURE SUMMARY

SOURCE CATEGORY: AUXILIARY ENGINES AND BOILERS ON OCEAN-GOING MARINE VESSELS

CONTROL METHODS: USE OF SHORE-SIDE ELECTRICAL POWER OR OTHER EQUIVALENT CLEAN TECHNOLOGIES

EMISSIONS (TONS/DAY):

ANNUAL AVERAGE	**2008**	**2023**
VOC INVENTORY	0.52	0.47
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	13.7	7.06
NOx REDUCTION		TBD*
NOx REMAINING		TBD
SOx INVENTORY	16.8	2.11
SOx REDUCTION		TBD*
SOx REMAINING		TBD
PM10 INVENTORY	1.42	0.33
PM10 REDUCTION		TBD*
PM10 REMAINING		TBD
PM2.5 INVENTORY	1.38	0.33
PM2.5 REDUCTION		TBD*
PM2.5 REMAINING		TBD

SUMMER PLANNING INVENTORY	**2008**	**2023**
VOC INVENTORY	0.53	0.47
VOC REDUCTION		TBD*
VOC REMAINING		TBD
NOx INVENTORY	13.7	7.06
NOx REDUCTION		TBD*
NOx REMAINING		TBD

CONTROL COST: TO BE DETERMINED

IMPLEMENTING AGENCY: SAN PEDRO BAY PORTS, CARB, SCAQMD

* Emission reductions will be determined after projects are identified and implemented.

DESCRIPTION OF SOURCE CATEGORY

The purpose of this control measure is to incentivize additional controls on auxiliary engines and boilers on ocean-going marine vessels while at berth.

Background

Ocean-going vessels (OGV) visit the Ports of Los Angeles and Long Beach over 4,500 times per year and can remain at berth for up to 48 hours or more loading and unloading cargo. While at berth (also called hotelling), ships use auxiliary engines to provide electricity and boilers to provide steam while the ship is in operation. Ships require electrical power while at berth for operation of lights, ventilation, and loading and unloading operations and steam is used for heating. Beginning August 2012 until January 1, 2014, auxiliary engines and boilers use diesel oil that can contain sulfur levels as high as 10,000 ppm (as compared to diesel used by other mobile vehicles at 15 ppm). These engines and boilers produce significant amounts of NO_x, SOx, PM, and toxic air contaminant (TAC) emissions. A typical medium-size cargo ship burns seven tons of diesel fuel a day while at the port, and generates as much as one ton of NO_x, 0.5 tons of SOx and 60 pounds of PM10 daily. Overall, auxiliary engines produce upwards of 12.3 tpd of NOx, 6.0 tpd of Sox, and 0.88 tons per day of PM10 in the South Coast Air Basin each year with boilers contributing the remainder of the at-berth NOx, SOx, and PM10 emissions of 1.3, 10.6, 0.52 tpd, respectively.

This early action measure focuses on having ocean-going vessels not subject to the statewide shorepower regulation to cold iron, which is a technology that is used to provide on-board power from the shore, while berthed at the Ports of Los Angeles and Long Beach. Other technologies that are currently being evaluated include a bonnet system to funnel ship exhaust emissions into filter and NOx reduction systems, and are considered under this measure.

Regulatory History

The regulation of emissions from ocean-going vessels is primarily accomplished through CARB and U.S. EPA regulations. Cargo container, cruise lines, and refrigerated cargo (reefers) vessels are subject to CARB's shorepower regulation which requires fleets that have vessels that frequently visit California ports (for cargo container and reefers - 25 visits per year or more, and for cruise liners - five visits or more per year) to reduce emissions from their fleets by 50 percent beginning in 2014 and by 80 percent in 2020. Strategies to control emissions include shorepowering of vessels (utilizing grid based electrical power in lieu of auxiliary engines) and exhaust after-treatment by ducting exhaust gases from auxiliary engines and boilers to treatment systems.

PROPOSED METHOD OF CONTROL

Electrical power for hotelling operations can be provided to a ship via electrical cables using shorepower. Shorepower can be locally generated at the port or obtained from the grid. Shorepower can be locally generated using clean technologies such as fuel cells, gas turbines, microturbines, and combined cycle units. These stationary power generating systems can use alternative fuels such as natural gas, reducing emissions to very low levels. The in-Basin grid power generation NO_x emission factor is significantly lower than that of diesel-fueled engines especially because most stationary power generating units have installed selective catalytic reduction (SCR) control technologies. The use of shorepower for hotelling operations is termed "cold ironing."

Due to technical and operational (i.e., frequency of calls) reasons, however, cold ironing may not be a viable option for all types of ships. Also, ships require steam for hotelling operations. If all the electrical power for hotelling is supplied by cold ironing, steam must be provided from the ship's boilers or the shore to the ships. Based on energy consumption, steam can account for as much as 30 percent of all energy used during hotelling.

This measure would seek at a minimum, an additional 25 percent of the calls not subject to the statewide shorepower regulation to deploy shorepower technologies or alternative forms of emission reductions as early as possible.

EMISSIONS REDUCTION

Emission reductions are not estimated at this time and will depend on the number of vessels participating and the type of technology utilized.

COST EFFECTIVENESS

CARB staff estimated the cost effectiveness of the regulation to range from $11,000 to $47,000 per ton of NOx controlled as part of the adoption of the statewide Shorepower Regulation. TIAX under contract to the District evaluated the bonnet system that funnels the emissions to a shore-side treatment system. The cost effectiveness of this system range from $15,000 to $45,000 per ton of NOx controlled. The expected cost effectiveness of this control measure should fall within the ranges of these two studies.

IMPLEMENTING AGENCY

San Pedro Bay Ports, CARB, SCAQMD.

REFERENCES

CARB (2007). Initial Statement of Reasons for the Proposed Rulemaking: Regulations to Reduce Emissions From Diesel Auxiliary Engines on Ocean-Going Vessels While At-berth at a California Port.

Ports of Los Angeles and Long Beach (2010). San Pedro Bay Ports Clean Air Action Plan, 2010 Update.

TIAX (2008). Evaluation of the Advanced Maritime Emission Control System (AMECS), Report to South Coast Air Quality Management District.

OFFRD-05: EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS [NOX, PM]

CONTROL MEASURE SUMMARY		
SOURCE CATEGORY:	MARINE VESSELS (CATEGORY 3 ENGINES)	
CONTROL METHODS:	PORTS INCENTIVES FOR TIERS 2 AND 3 OCEAN-GOING VESSEL CALLS	
EMISSIONS (TONS/DAY):		
ANNUAL AVERAGE	**2008**	**2023**
NOx INVENTORY	25.7	24.1
NOx REDUCTION		TBD*
NOx REMAINING		TBD
PM10 INVENTORY	2.3	0.78
PM10 REDUCTION		TBD*
PM10 REMAINING		TBD
PM2.5 INVENTORY	2.2	0.74
PM2.5 REDUCTION		TBD*
PM2.5 REMAINING		TBD
SUMMER PLANNING INVENTORY	**2008**	**2023**
NOx INVENTORY	25.7	23.2
NOx REDUCTION		TBD*
NOx REMAINING		TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED	
IMPLEMENTING AGENCY:	SAN PEDRO BAY PORTS, CARB, U.S. EPA	

* Emission reductions will be determined after the vessel participation rates are reported.

DESCRIPTION OF SOURCE CATEGORY

The purpose of this measure is to incentivize the newest Tier 2 and Tier 3 vessels to call at the Ports of Los Angeles and Long Beach.

Background

Ocean-going vessels (OGV), because of their large relatively-uncontrolled diesel engines, contribute a significant portion of NO_x, PM, greenhouse gas and toxic emissions particularly in coastal regions and in and around shipping ports. OGV engines can range in size from 1,000 to over 100,000 horsepower and can burn significant amounts of fuel a day. Beginning in 2016, vessels built to operate in North American waters will be required to meet emission standards requiring exhaust emission controls that will be significantly cleaner than today's engines. However, because of OGV long lifetimes (on the order of 20 or more years), it will be many years before sufficient numbers of the cleanest vessels will call at marine ports in the region to significantly reduce emissions. Moreover, post-2015 vessels may not be routed to North American ports. It is essential that the cleanest vessels be incentivized to call at marine ports as expeditiously as possible to ensure progress toward meeting ambient air quality standards.

Regulatory History

The regulation of emissions from mobile port-related emission sources is traditionally the responsibility of CARB and U.S. EPA. Specifically, ships are each subject to specific emission standards pursuant to state, federal, and/or international requirements. The standards, primarily affecting new units, vary in stringency and compliance dates.

OGV main and auxiliary engines are subject to the International Maritime Organizations international emission standards as contained in Annex VI to the International Convention on the Prevention of Pollution from Ships (MARPOL Annex VI). U.S. flagged ships must meet similar U.S. EPA requirements, but most vessels must meet the IMO standards as they are not U.S. flagged ships. In October 2008, the IMO adopted new standards for engines and require vessels to meet increasingly more stringent NOx emission standards. The standards are designated by Tiers ranging from Tier 0 being uncontrolled or no emission controls, to the most stringent Tier 3 standard. Tier 2 NOx emission standards are around 20% cleaner than Tier 0 standards and can be achieved through engine design changes. The Tier 3 NOx standard is significantly more stringent (better than 80 percent cleaner) and most likely can only be met using engine aftertreatment systems. Engines on vessels must meet the Tier 3 NOx standard if they are built after 2015 and must travel through designated Emission Control Areas (ECA). ECAs can be created by member states if approved by the IMO. On March 26, 2010, the IMO designated waters within 200 nautical miles of the United States and Canadian coasts as the North American ECA.

In addition to NOx emission requirements, IMO and CARB require vessels to use lower sulfur distillate fuels when the vessels travel within 200 nautical miles (as defined in the ECA) or 24 nautical miles of the California coastline (as defined in the CARB regulation). By 2015, all vessels will be required to use distillate fuels with sulfur contents less than 1,000 ppmw when they travel within the North American ECA.

PROPOSED METHOD OF CONTROL

As part of the San Pedro Bay Ports Clean Air Action Plan 2010 update, the Ports adopted incentive programs to maximize the early introduction and preferential deployment of vessels to the San Pedro Bay Ports with cleaner/newer engines meeting the new Tier 2 and Tier 3 IMO NOx standards. The Port of Long Beach is proposing to offer up to $2,500 for each Tier 2 vessel call and up to $6,000 for each Tier 3 vessel call. The Port of Los Angeles is proposing a scoring standard based on the "Environmental Ship Index" or ESI to establish the level of incentive funding. The Ports indicated that the program will be monitored annually regarding participation and if adjustments will be necessary to maximize Tier 2 and Tier 3 vessel calls.

This measure seeks to enhance the Ports' programs as necessary to maximize the number of Tier 3 vessels calling at the Ports. In addition, other mechanisms that could complement the Port program will be explored. Examples include discussions on the state and federal level on mechanisms to incentivize Tier 2 and Tier 3 vessel calls through the North American ECA and programs to retrofit or repower existing vessels to meet Tier 3 standards.

EMISSIONS REDUCTION

Based on the assumed penetration of new Tier 2 and Tier 3 vessels in the U.S. EPA rulemaking, this measure could achieve, at a minimum, NOx, PM10, and PM2.5 reductions of 2.8 tpd, 0.1 tpd, and 0.09 tpd, respectively, by 2023. Emission reductions could be higher if the participation rate of the Ports programs and other potential programs are greater than anticipated.

COST EFFECTIVENESS

Not Determined.

IMPLEMENTING AGENCY

San Pedro Bay Ports relative to existing incentives programs. San Pedro Bay Ports, CARB, U.S. EPA, and the District relative to seeking additional mechanisms to incentivize Tier 3 vessel calls at the state and federal levels.

REFERENCES

Ports of Los Angeles and Long Beach (2010). San Pedro Bay Ports Clean Air Action Plan, 2010 Update.

GROUP 3

ACTIONS TO DEPLOY ADVANCED CONTROL TECHNOLOGIES

ADV-01: ACTIONS FOR THE DEPLOYMENT OF ZERO AND NEAR-ZERO EMISSION ON-ROAD HEAVY-DUTY VEHICLES [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	ON-ROAD HEAVY-DUTY VEHICLES (26,001 LBS AND GREATER)
CONTROL METHODS:	ADVANCED NEAR-ZERO AND ZERO-EMISSION TECHNOLOGIES
EMISSIONS (TONS/DAY):	NOT ESTIMATED
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, SCAG, LOS ANGELES COUNTY TRANSPORTATION AUTHORITY, SAN PEDRO BAY PORTS, CARB, CALTRANS, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

The technology and infrastructure phases, combined with the agency implementation actions, focus on defining, developing, demonstrating and deploying transportation systems and technologies that will address mid- to long-term regional needs. These actions seek to develop coordinated solutions for mobility, economy, energy and the environment, so that single investments can provide multiple benefits. A key strategy is to deploy zero- and near-zero freight transport equipment powered by clean energy. This strategy has the potential to simultaneously address regional and local air quality problems, foster public support for needed freight infrastructure capacity enhancements, provide greater energy security and cost certainty, address climate change, and foster local jobs in logistics and clean technology.

Background

This measure describes the actions needed to commercialize advanced zero-emission and cleaner combustion emission technologies that could be deployed in the 2015 to 2035 timeframe. Such technologies include advanced engine controls to achieve at least 95 percent reduction in NOx exhaust emissions beyond the current 2010 heavy-duty exhaust emissions standards or a combination of advanced engine controls deployed with electric hybrid systems and zero-emission technologies such as electric, battery-electric, and fuel cells. In addition, greater use of any alternative fuels and renewable fuels with relatively low NOx emissions compared to conventional fuels, in conjunction with zero-emission technologies, are important over the next 10 to 20 years for any vehicle vocations where zero-emission technologies could not be applied in that timeframe.

Regulatory History

The establishment of emission standards for on-road heavy-duty diesel emission sources is the responsibility of CARB and U.S. EPA. Specifically, heavy-duty vehicle engines are subject to specific emission standards pursuant to state and/or federal requirements. Emission standards for new diesel engines powering heavy-duty vehicles were first established for the 1973 model-year and have gradually increased in stringency over time. The current most stringent set of heavy-duty engine emission standards has been established by CARB and U.S. EPA for 2010 and subsequent model-years, which includes a 0.2 g/bhp-hr NO_x emission standard.

In December 2008, CARB adopted the Truck and Bus Regulation which applies to a significant number of heavy-duty vehicles with gross vehicle weight ratings of 14,001 lbs and greater. Heavier trucks (26,001 lbs and greater) must meet regulatory requirements beginning January 1, 2012. Lighter trucks (14,001 lbs to 26,000 lbs) must meet regulatory requirements beginning January 1, 2015.

In the South Coast Air Basin, the two national ozone standards established by U.S. EPA will require reductions in emissions of nitrogen oxides (NOx) well beyond reductions resulting from current rules, programs and commercially-available technologies. Because most significant emission sources are already controlled by over 90 percent, attainment of the ozone standards will require broad deployment of zero- and near-zero emission technologies in the 2015 to 2035 timeframe.

PROPOSED METHOD OF CONTROL

Two separate sets of actions are proposed under this measure. The first is the establishment of an optional NOx exhaust emissions standard that is at least 95 percent lower than the current 2010 on-road exhaust emissions standard (i.e., at or below 0.01 g/bhp-hr). The second set of actions is to develop zero-emission technologies for heavy-duty vehicles that can be deployed in the 2015 to 2035 timeframe.

Actions to Deploy Technologies to Achieve 95 Percent or Greater Reductions in NOx

This proposed action seeks CARB to establish an optional NOx exhaust emissions standard which represents a 95 percent reduction of the 2010 standard or 0.01 g/bhp-hr. The optional NOx standard serves as a benchmark for heavy-duty engine manufacturers to develop the next generation of cleaner combustion engines. Such engines in combination with the ability to achieve a specific level of zero-emission miles are likely to be developed in the near-term to achieve the proposed optional NOx exhaust emission standard. In addition, having optional NOx emission standards provides certainty in funding incentives, by establishing a standard for engines to meet in order to receive incentives.

Actions to Deploy Zero-Emission Technologies for On-Road Heavy-Duty Vehicles

There has been much progress in developing on-road technologies with zero- and near-zero emissions, particularly for light-duty vehicles and passenger transit. In general, however, additional technology development, demonstration and commercialization will be required prior to broad deployment of zero-emission technologies for freight movement. The actions and schedules specified below describe a path to evaluate, develop, demonstrate, fund and deploy such technologies for on-road heavy-duty vehicles.

Infrastructure Planning Actions. Part of the actions and schedules specified below involve evaluations and determinations regarding infrastructure needed to support deployment of zero- and near-zero emission technologies. The key question is whether on-road trucks will be able to operate fully under their own power with zero-emission technologies, or whether that equipment will require some form of "wayside" electric or magnetic power built into the roadway infrastructure to boost the pulling capacity or range of the equipment.

This may include battery charging or fueling infrastructure, as well as transportation infrastructure such as dedicated truck lanes. Such lanes can provide opportunities to incentivize zero-emission vehicles (e.g., through discounts of any applicable tolls) as well as to provide wayside electric power to trucks, much as power is now provided to electric transit buses in San Francisco and other cities. Alternatively, if battery, fuel cell or other zero- and near-zero emission technologies progress sufficiently, the need for wayside power for rail or trucks may be diminished or eliminated.

There are multiple technologies under consideration, and each must be analyzed to assess utility and practicality, costs, benefits, and reliability. Some technologies are more developed than others; some may have a quicker ramp-up to commercialization than others. A path forward to development and deployment of a long-term freight system is set out below, including a schedule with milestones and key decision points.

Phase 1: Project Scoping and Existing Work

Continue to build on current regional research and technology testing efforts.

Southern California has long been a goods movement hub, and a significant amount of work has already been done to assess current and future goods movement volumes; to explore the range of technologies under consideration; to evaluate user needs and potential markets; to analyze current and projected transportation corridors and select the highest priority corridors; and to begin to develop and test some vehicle prototypes. That work has already been initiated, and constitutes Phase 1 of the effort to develop and implement a long-term freight system.

A high level summary of the work completed or underway in Southern California is provided below, along with the challenges that remain for successful commercialization and widespread deployment of zero- or near-zero emission truck technologies.

Existing Work

Over the last five years, studies have assessed the transportation corridors that currently carry high volumes of freight truck traffic and are likely to be heavily impacted in the future.[3] The I-710 corridor was selected as high priority for introduction of zero-emission technology.[4] The 2012 Regional Transportation Plan also designates a route along the 60 freeway as an east-west freight corridor.

[3] Los Angeles County Metropolitan Transportation Authority, et al, *Multi-County Goods Movement Action Plan.* Prepared by Wilbur Smith Associates, April 30, 2008.

[4] Los Angeles County Metropolitan Transportation Authority , *Alternative Goods Movement Technology Analysis-Initial Feasibility Study Report. Final Report. I-710 Corridor Project EIR/EIS*. Prepared by URS. January 6, 2009.

The truck technologies being assessed for a zero-emission freight transport system can be grouped into two categories: zero-emission trucks alone and zero-emission trucks combined with wayside power systems. Zero-emission trucks using their own motive power would have significantly smaller infrastructure needs but would be limited in their applicability by the technology. Integrating infrastructure, such as wayside power, with the truck technology would provide a system to power trucks while on the road and thereby significantly increase the utility and range of the trucks while operating in zero-emission mode.

Zero-emission truck technology includes full battery-electric trucks, fuel cell trucks, and dual-mode (hybrid) electric trucks with all-electric range. Battery-electric trucks are established in smaller trucks and in a variety of different vocations. Fuel cell trucks – either with a small battery pack or with the fuel cell as a range extender with a larger battery pack – have been demonstrated in other categories and are seeing significant progress in both light- and heavy-duty vehicle applications.

Dual-mode trucks would have sufficient battery power to operate in electric-only mode, but would also have a source of motive power (internal combustion engine running on diesel, natural gas, hydrogen, or other fuel) that provides flexibility for longer routes. The terminology of dual-mode is being used here to signify a truck with a distinct all-electric range as opposed to most current hybrids which use a battery and electric motor to augment an internal combustion engine.

Wayside power technologies include overhead catenary, in-road power such as third rail or linear synchronous motor (LSM), and fast charging. All three technologies must be integrated closely with the zero-emission trucks, and all have the potential to significantly increase the functionality and range of trucks utilizing batteries, including dual mode-hybrids. (It is unlikely that fuel cell trucks would need wayside power, due to their range and relatively quick refueling capability). In overhead catenary systems, power is delivered from the electrical grid through the overhead wire to a pantograph on the vehicle itself. Catenary systems are well-established and efficient in light-rail applications, trolley cars and buses, and even mining trucks.

For in-road power, the roadway itself provides power to the vehicles, which must be equipped with pick-up devices. In one technology, cables/wires embedded in the roadway carry electric power; in another technology, LSMs provide power by interacting with a permanent magnet on the vehicle. In-road power systems have advantages but the technology is currently less developed than catenary. Fast-charging is a high-power charging system used to quickly recharge the batteries in an electric vehicle at destination points, e.g., railyards or distribution centers. While technically not "wayside" power, fast charging is similarly grouped with other approaches that require infrastructure to be designed and built into the freight facilities and corridors.

Zero-emission truck prototype testing is underway with funding from the Port of Los Angeles, the Port of Long Beach, and the District. A demonstration of the Balqon lead-acid battery electric truck was initiated in 2007. The battery was upgraded to a lithium-ion battery, and testing of the upgraded system is underway. Additional testing is ongoing with units made specifically for drayage by Vision Motor Corporation, using a combination of lithium-ion batteries and fuel cells.

Phase 2: Evaluation, development, and prototype testing

Overview. The actions described below are directed at developing and demonstrating truck technologies for regional service, developing and demonstrating truck technologies for interstate transport, and evaluating the logistics impacts of a zero- or near- zero emission freight system.

Near-Term Major Infrastructure Project Approvals. In the near term, while the technology development and demonstration actions described below are being undertaken, it is anticipated that several major regional infrastructure projects will be considered for approval. These include the I-710 freight corridor project, the BNSF Southern California International Gateway railyard project, and the Union Pacific Intermodal Container Transfer Facility modernization and expansion project. These proposed projects will, if approved, comprise key portions of regional freight infrastructure for many decades to come. (Other major projects may also be considered for approval in this timeframe). The action to approve such projects will be a key opportunity to establish appropriate operating and environmental requirements for the infrastructure. In some cases, the project approval action may be the only opportunity to establish requirements. *It is therefore important that such project approvals be fashioned to assure that the projects participate in the technology development and demonstration activities for trucks described below, and that the project approvals ensure implementation of resulting technologies when determined to be feasible.*

Port to Near-Dock Railyard Transport. The case of container transport between the ports and the near-dock railyards is unique. Such transport presents fewer technical and other issues compared to regional transport due to the relatively short distances involved — about five miles. In addition, as described in the Roadmap for Moving Forward with Zero Emission Technologies at the Ports of Long Beach and Los Angeles,[5] the ports have already done considerable work to evaluate and develop truck technologies for this service, and battery and fuel cell hybrid vehicles are now being actively demonstrated. It is also possible that zero-emission trucks for this relatively short corridor can be successfully deployed without wayside power (although, as noted below, this corridor would be a good location to initially demonstrate wayside power technology that ultimately could be deployed for longer range regional transport). Finally, the total number of trucks needed for this service is limited compared to the thousands of vehicles needed for regional service. The number required between the ports and near-dock railyards is likely approximately 500 per railyard.

The truck technologies being developed and demonstrated for container transport between the ports and near-dock railyards can form the basis of technologies used in the region as a whole. For example, development of trucks capable of operating on electric power, even for relatively short distances, can potentially be coupled with wayside power to extend zero-emission range farther through the region. Fuel cell hybrid truck technologies hold the promise of extended range without wayside power. The current effort to develop and demonstrate zero-emission truck technologies for the port to near-dock railyard application thus should be viewed as an important initial part of the effort to develop regional zero-emission transport.

5 http://www.cleanairactionplan.org/civica/filebank/blobdload.asp?BlobID=2527

For these reasons, it is appropriate that the schedules for technology development and demonstration activities, and technology deployment, reflect the potential for earlier technology implementation between the ports and near-dock railyards than for the region as a whole. The schedules specified below for regional zero-emission truck technology deployment extend from 2015 to beyond 2021, depending on need for wayside power. *By contrast, the technology development, demonstration and deployment schedules for container transport between the ports and near-dock railyards target full deployment of zero-emission technologies as soon as practicable but no later than 2020.*

Phase 3: Initial deployment and operational demonstration

Truck Fleet Evaluation Testing. Develop, deploy and assess, with local fleet users, multiple vehicles with on-going data collection, analysis and sharing for rapid iterative design improvement.

Further Demonstrate Wayside Power. Demonstrate the ability to introduce and power multiple trucks on a test corridor.

Select Truck Corridor Technologies and Needed Infrastructure for Phase 4 Deployment. Assess whether viable truck technologies will require wayside power or other infrastructure. Incorporate needed infrastructure into constrained portion of RTP for corridors determined to be high priority based on potential truck volumes.

Phase 4: Full scale demonstrations, commercial deployment and infrastructure construction (if wayside power is needed)

Phases 1-3 are designed to bring truck technologies and needed infrastructure to the beginning of commercial deployment. This timing corresponds well with needed decisions for what technologies and infrastructure to include in the 2016 RTP, the next major SIP, and the I-710 corridor. The results of the first three phases will be used to determine the concrete commercialization steps needed in Phase 4, especially the regulatory and market mechanisms needed to launch and expand commercialization. In addition, it is necessary to continue expanding plans for any needed wayside power infrastructure to additional high priority corridors (e.g., priority East-West corridor route identified by SCAG). The timing for this step is highly dependent on the need for wayside power if needed, and the construction of such infrastructure.

Actions

- By 2013 – Demonstration: Develop and build trucks and wayside power infrastructure sufficient for demonstration within the transport corridor consisting of the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations); commence demonstration upon completion of trucks and infrastructure.

- By 2015 – Initial Operational Deployment: Build wayside power infrastructure sufficient for operation on the Terminal Island Freeway and connecting routes to the Ports (or alternative routes serving the same locations), and build maximum number of trucks for initial operational deployment allowed by available funding (with all feasible leveraging of private resources), unless a zero-emission technology not utilizing wayside power is determined to be superior and can be implemented in a similar or earlier time frame. In the latter case, remaining funds allocated to this project will be applied to demonstration and deployment of zero-emission trucks not utilizing wayside power.

Major Agency Implementation Actions

YEAR(S)	AGENCY	AGENCY ACTION
2012	SCAG	• Incorporate "footprint" and planning for incorporation of wayside power into regional truck lanes in 2012 constrained RTP • Incorporate funding to support truck and wayside power evaluation and demonstration efforts described in this chapter into constrained portion of RTP • Implement plan of advocacy to secure action by federal or other governments where required to implement any related elements of the SIP or RTP; include evaluation of impacts of zero-emission technologies on national priorities, e.g., energy security, energy cost certainty, interstate transportation, climate protection.
2012-2014	District, CARB, and SCAG	• Evaluate and demonstrate potential truck technology implementation and funding mechanisms, including: ▪ Regulatory requirements; incentives (local, state, federal, interstate cooperative); differential tolls; public-private partnerships • Evaluate potential funding mechanisms for truck infrastructure (e.g., wayside power), including: ▪ federal, state, local government funding; tolling; public-private partnerships; electric utility funding of corridor construction

Major Agency Implementation Actions

YEAR(S)	AGENCY	AGENCY ACTION
2015	District, CARB, and SCAG	• Resolve need for wayside power infrastructure for trucks on I-710 and other corridors beyond near-dock railyards, including East-West corridor (based on expected range and functionality of technologies in zero-emission mode without wayside power in 2020-2030 timeframe) • If wayside power is needed, incorporate such technology description into RTP constrained plan and next major SIP • Develop recommendations regarding type of funding and implementation mechanisms for trucks and any needed infrastructure • Incorporate recommendations regarding type of funding and implementation mechanisms into RTP constrained plan and next major SIP, including: ▪ Strategy description and timeframe for any rules ▪ Strategy description, potential funding sources and timeframe for any incentives
2015-2016	District, CARB, SCAG	Determine need for wayside power infrastructure for trucks on major freight movement corridors. Incorporate decisions regarding type of funding and implementation mechanisms into RTP constrained plan and SIP, including: • Strategy description and timeframe for potential regulatory actions • Strategy description, potential funding sources and timeframe for needed incentives • Begin deployment of zero- and near-zero emission trucks for regional service.
2017+	District, CARB, SCAG	• Begin full deployment of appropriate zero- and near-zero emission trucks for substantially all regional transport. • 2020 – Target for full deployment of zero-emission trucks transporting containers between the ports and near-dock railyard facilities.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, SCAG, Los Angeles County Transportation Authority, San Pedro Bay Ports, SCAG, CARB, Caltrans, and U.S. EPA. In July 2011, the Los Angeles County Metropolitan Transportation Authority formed the Countywide Zero-Emission Trucks Collaborative, which includes the Ports of Los Angeles and Long Beach, Caltrans, SCAG, and the District, to address issues including, but not limited to, developing a common definition of "zero-emission trucks", establishing performance standards, coordinating infrastructure policies/standards, and seeking funding for demonstration projects.

Potential Partners For Development, Testing, Funding, and Deployment of Landside Freight Transport Technology

Achieving zero- or near-zero emissions freight transport is an ambitious goal, but given the current volume of freight movement in Southern California, and the projected increases over the next two decades, accomplishing this goal is critical to economic and public health in the region. Success will require private companies and public agencies working together with a shared vision and a commitment to address the practical issues to ensure efficient operations.

Following is a partial list of entities that will be contacted to seek a contribution of expertise, in-kind services, equipment, space, and/or funding to support the effort.

Government:
California Department of Transportation
Southern California Association of Governments and its member agencies
Los Angeles County Metropolitan Transportation Authority
Alameda Corridor Transportation Authority

U.S. Environmental Protection Agency
California Air Resources Board and air quality agencies in other states
South Coast Air Quality Management District

U.S. Department of Energy
California Energy Commission

Port of Long Beach
Port of Los Angeles

Private:
Commercial Technology Developers and Manufacturers
Trucking
Rail
Shipping
Warehousing and Distribution Centers
Logistics Supply Chain Specialists
Beneficial Cargo Owners

Non-Profit and Academic:
CALSTART
Center for Environmental Research and Technology (CE-CERT)
Philanthropic Foundations in Coordination with Environmental Organizations
Academic Institutions with Specialized Knowledge in Logistics Field

REFERENCES

SCAG (2012) Regional Transportation Plan, Adopted

ADV-02: ACTIONS FOR THE DEPLOYMENT OF ZERO-EMISSION AND NEAR-ZERO LOCOMOTIVES [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	LOCOMOTIVES (ALL CLASSES)
CONTROL METHODS:	ADVANCED NEAR-ZERO AND ZERO-EMISSION TECHNOLOGIES BEYOND LOCOMOTIVE TIER 4 EMISSION STANDARDS
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, SAN PEDRO BAY PORTS, CARB, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

This measure describes the actions needed to commercialize advanced zero-emission and near-zero emission technologies that could be deployed in the 2020 to 2030 timeframe. Such technologies include advanced engine controls or a combination of advanced engine controls with hybrid systems or external power source to power the electric motor to achieve greater reduction in NOx exhaust emissions beyond the Tier 4 locomotive engine emissions standards and zero-emission technologies such as electric, battery-electric, and fuel cells. In addition, greater use of any alternative fuels and renewable fuels with relatively low NOx emissions compared to conventional fuels, in conjunction with zero-emission technologies, are important over the next 10 to 20 years for any locomotive applications where zero-emission technologies could not be applied in that timeframe.

Regulatory History

U.S. EPA promulgated regulations for the control of emissions from locomotives in 1998 and 2008. The regulations require locomotive engines to meet increasingly stringent emission levels (Tier 0 through Tier 4) when they are manufactured and in some cases, additional emissions improvements when they are remanufactured at the end of their useful life. For newly manufactured locomotives the cleanest emission standard (Tier 4) is required in 2015 and will result in emissions that are over 90 percent cleaner than those from unregulated locomotive engines.

Beside the federal emission requirements for locomotives, CARB has signed two agreements with the two Class 1 railroads operating in California, Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UP). The first agreement, the South Coast Memorandum of Understanding (MOU), was signed in 1998. Among other features, it commits these railroads to meeting Tier 2 NOx standards, on average, starting in 2010 with their locomotives operating in the South Coast Air Basin. The second agreement, the Rail Yard Agreement signed in 2005, calls upon the Class I railroads to reduce diesel emissions in and around railyards in California including a statewide locomotive idling limitation program, increase use of low-sulfur diesel for locomotives fueled in California, and a visible-emissions detection and repair program.

In 2010, the Ports of Los Angeles and Long Beach updated the San Pedro Bay Ports Clean Air Action Plan that includes a measure calling for locomotives entering the Ports and nearby intermodal yards to meet a goal of using Tier 4 locomotives by 2020.

PROPOSED METHOD OF CONTROL

Actions for the deployment of near-zero or zero-emission locomotives would include four phases as outlined below:

Phase 1: Project Scoping and Existing Work

Southern California has long been a goods movement hub with locomotives playing a central role. Significant effort has gone into analyzing the options for a zero-emission rail system in the Basin. These include recent efforts by the Ports of Long Beach and Los Angeles in their *Roadmap* study[6] and by SCAG in the freight rail electrification report[7]. Each of these efforts highlights the technical opportunities and the need to pursue a zero-emission freight transport system for the future. However, they also highlight the difficult challenges associated with this sector, especially with regard to operational needs, integration of the technologies into the national rail system, federal safety requirements, and cost.

At this time, several broad technology categories have gained the most focus and could be applied toward freight and passenger locomotives to achieve zero-emissions track miles: overhead catenary (with electric or dual-mode locomotives), linear synchronous motor (LSM) technology, and battery-hybrid systems (either integrated into a new locomotive or as a tender car). Another technology with potential for zero emissions is fuel cells.

In addition, the use of alternative fuels such as liquefied natural gas (LNG) have a potential role in reducing emissions further prior to commercialization of battery-hybrid systems and as a primary fuel in conjunction with battery-hybrid technologies.

Of these technologies, catenary systems are the most extensively used today, although more commonly in passenger train and light-rail applications. LSM systems are less developed, but have potential in terms of being able to use existing rail beds and conventional rail cars, with modifications. Dual mode (i.e., combined diesel-electric and electric capable) locomotives with wayside power have the potential for zero-emission range capability within catenary system areas, and have the ability to minimize operational changes, but have not been developed or demonstrated in a freight application due to insufficient market case or regulatory impetus.

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6 Port of Long Beach and Port of Los Angeles, Roadmap for Moving forward with Zero Emission Technologies at the Ports of Long Beach and Los Angeles, Technical Report, August 2011.

7 Southern California Association of Governments. *Task 8.2 Analysis of Freight Rail Electrification in the SCAG Region*, Technical Memorandum. Draft Version, Prepared by Cambridge Systematics, August 26, 2011.

General Electric (GE) indicated that Tier 4 diesel-electric locomotives could be augmented with advanced battery technology to allow periodic zero-emission operation. GE indicated that the goal would be for the batteries to be able to provide full power for a line-haul locomotive for up to 30 miles with no emissions from the locomotive engine, operate in the Tier 4 diesel-electric mode for up to 70 miles while also recharging the battery bank, and then return back to the battery mode for the next 30 miles. The fuel savings would allow a one-third downsizing of the fuel storage tank to be able to provide additional space for battery storage within a conventional-length locomotive. This approach would allow the battery mode to be engaged up to twice while operating within the South Coast Air Basin. Under this scenario, the hybrid locomotive could provide up to a 60 percent reduction beyond Tier 4 emissions levels within the Basin.

Another option is the potential use of battery tender cars connected to locomotives to provide power within urban areas with air quality issues. Such a system could provide zero-emission operation with either new or existing locomotives, and would reduce or eliminate the need for wayside power. Tender cars could also potentially be designed to connect existing locomotives to wayside power. The operational impacts of tender car augmentations, the duty cycle and power demands of line haul locomotives, and the power, weight, and costs of battery tender cars – while operating within the South Coast Air Basin – would need to be studied further. However, the potential benefits can be significant since the battery tender car could potentially be used in any urban area and recharged as the train transits from the South Coast Air Basin to its destination. In addition, the use of tender cars addresses the concerns regarding sufficient space for the batteries if they are installed inside the locomotive and capacity and number of batteries needed will not be limited to the dimensions of the locomotive, but to the capacity and dimension of the rail car.

All of these systems and approaches (with the exception of traditional catenary-electric locomotives) will need additional study, research, design, proof of concept testing, and both small and full scale demonstration programs to advance the technology for freight and passenger applications within Southern California. All will need additional examination of means to address operational impacts and costs.

Phase 2: Evaluation, development, and prototype testing (2012 – 2014)

Actions needed to implement phase 2 include:

1. *Secure Funding.* Collaborate with public and private partners to secure funding commitments for the development of new technology locomotive prototypes and infrastructure demonstrations.

2. *Evaluate Practicability of Applying Existing Electrified Rail Technologies to Region*. Conduct an evaluation of the practicability of applying existing electrified rail technologies to the region. Electrified rail technologies are currently used in many countries to move passenger and freight. This evaluation would comprehensively assess the practicability of utilizing such existing technologies for rail service in the South Coast Air Basin.

3. *Develop Locomotive Prototypes and Wayside Power Infrastructure*. This phase involves the development and design validation, and initial proof of concept and prototype testing of several types of zero-emission locomotive technologies and supporting infrastructure. This includes improvements to currently available technologies as well as new technologies that may have cost or operational advantages. Basic performance requirements at this stage include, but not limited to, sufficient tractive power to haul double-stacked railcars, adequate braking capability and other parameters to support safe operation, and the ability to operate in zero-emission mode. This task should seek to further evaluate, develop, and test prototypes for the following technologies, at a minimum:

   - Overhead catenary electric system: Initiate development of an overhead catenary demonstration, with either an all-electric or dual-mode locomotive. The prototype locomotive must be built to provide comparable performance capabilities (e.g., tractive effort) as a U.S. diesel-electric freight locomotive. The prototype electric or dual-mode electric locomotive would need to be tested with an existing electrical rail system (e.g., Amtrak passenger electric rail system for the Acela on the east coast) – assuming the electric rail system has the proper voltage and electrical connections/hardware for the prototype locomotive.

   - LSM technology: Set up a test track and demonstrate proof of concept for an LSM system in a freight locomotive application.

   - Dual-mode with battery-hybrid system: Initiate development of battery-hybrid locomotives with zero-emission range that would achieve up to 60 percent lower than Tier 4 emissions when operating within the South Coast Air Basin

   - Battery tender car: Develop a prototype designed for compatibility with existing U.S. diesel-electric or new Tier 4 locomotives. If the battery tender car is designed for use with catenary systems, similar to the electric or dual-mode locomotives, it would need to be tested within an existing electrical rail system.

   - Other technology options: CARB and the District are currently funding a study by UC Irvine to develop a design for a Solid Oxide Fuel Cell to power a locomotive. The fuel cell will need to be able to generate comparable horsepower as a current U.S. diesel-electric freight line haul locomotive, or about 4,500 gross horsepower. Union Pacific Railroad has agreed to participate in the construction of a prototype fuel cell locomotive upon successful completion.

4. *Select Locomotive Technologies for Phase 3 Demonstration*. Assess the development of the locomotive technologies and infrastructure from Phase 2 programs and select appropriate technologies to proceed with prototype development and testing programs.

Phase 3: Initial deployment and operational demonstration (2014-2016)

Actions needed to implement Phase 3 include:

1. *Conduct Advanced Technology Locomotive Demonstrations*. Evaluate zero-emission line-haul rail technologies with any needed wayside power source on test or operations track

with sufficient length, switches and grades to validate operational feasibility within the Basin. Move most promising technologies to initial demonstration in operational service, preferably within the Basin.

2. *Select Advanced Technology Locomotive Technologies for Phase 4 Deployment*. Assess the development of the locomotive technologies and infrastructure from Phase 3 testing and demonstration programs, and select technologies and infrastructure to proceed to initial deployment.

Phase 4: Full scale demonstrations, commercial deployment and infrastructure construction (if wayside power is needed) (2017-2023)

Actions to implement Phase 4 include:

At this stage, it is still expected that advanced rail technologies will require additional field demonstrations prior to full commercialization. Technology choices need to advance from small scale demonstration phase to full scale demonstration in operational service. New technology deployments must be coordinated with any needed infrastructure. The timing for this step is highly dependent on the need for wayside power (or not) and the construction of such infrastructure.

The actions needed to develop implementation mechanisms (e.g., funding and regulatory mechanisms) to deploy zero and near-zero emission rail technologies as part of a long-term freight system that meets the performance objectives described earlier are provided in the schedule below.

Major Agency Implementation Actions

YEAR(S)	AGENCY	AGENCY ACTION
2012-2013	SCAG	• Identify funding to support rail evaluation and demonstration efforts. • Implement plan of advocacy to secure action by federal or other governments where required to implement any related elements of the SIP or RTP; include evaluation of impacts of zero-emission technologies on national priorities, e.g., energy security, energy cost certainty, interstate transportation, and climate protection. Evaluate and determine practicability of applying existing electrified rail technologies to region. • Evaluate potential funding and implementation mechanisms for zero- and near-zero emission locomotives, and wayside power, including: ▪ Private (railroads); federal, state, local government; public-private partnerships; electric utility.

YEAR(S)	AGENCY	AGENCY ACTION
2012-2014	District, CARB	• Begin discussions on development and deployment of Tier 4 locomotives with footprint to hookup external power source. • Evaluate and determine practicability of external sources of power such as battery tender cars. • Initiate demonstration projects for identified technologies. • If demonstrations of battery tender cars or other zero- and near-zero emission technologies are determined feasible, begin discussions to deploy such technologies on a phase-in basis.
2015-2016	District, CARB, SCAG	• Identify technologies, infrastructure, and implementation mechanisms in RTP amendment and next major SIP. • If existing electrified rail technologies were determined to be practicable for the region, begin infrastructure planning, development and deployment of such technologies.
2017-2018	District, CARB, SCAG	• If new rail technologies are needed to achieve zero- or near-zero emission in the region, determine need for wayside power for new rail technologies (based on expected range of technologies in zero-emission mode without wayside power in 2020-2030 timeframe). • If wayside power is needed, incorporate “footprint” and planning for wayside power into rail lines into 2018 constrained RTP. • Incorporate recommendations regarding type of funding and implementation mechanisms into constrained RTP and next major SIP, including: ▪ Strategy description and timeframe for any rules. ▪ Strategy description, potential funding sources and timeframe for any incentives.
2018+		• If battery tender car or other external sources of electrical power are demonstrated, begin deployment of such technologies. • Construct needed infrastructure for zero-emission technologies, as needed.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA.

Potential Partners For Development, Testing, Funding, and Deployment of Landside Freight Transport Technology

Achieving zero- or near-zero emissions freight transport is an ambitious goal. But given the current volume of freight movement in Southern California, and the projected increases over the next two decades, accomplishing this goal is critical to economic and public health in the region. Success will require private companies and public agencies working together with a shared vision and a commitment to address the practical issues to ensure efficient operations.

Following is a partial list of entities that will be contacted to seek a contribution of expertise, in-kind services, equipment, space, and/or funding to support the effort.

Government:
California Department of Transportation
Southern California Association of Governments and its member agencies
Alameda Corridor Transportation Authority

U.S. Environmental Protection Agency
California Air Resources Board and air quality agencies in other states
South Coast Air Quality Management District

U.S. Department of Energy
California Energy Commission

Port of Long Beach
Port of Los Angeles

Private:
Commercial Technology Developers and Manufacturers
Trucking
Rail
Shipping
Warehousing and Distribution Centers
Logistics Supply Chain Specialists
Beneficial Cargo Owners

Non-Profit and Academic:
CALSTART
Center for Environmental Research and Technology (CE-CERT)
Philanthropic Foundations in Coordination with Environmental Organizations
Academic Institutions with Specialized Knowledge in Logistics Field

REFERENCES

CARB (2009). Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyard.

U.S. Environmental Protection Agency (2008). Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 liters per Cylinder: Republication; Final Rule, 40 CFR Parts 9, 85, et. al.

Ports of Los Angeles and Long Beach (2010). San Pedro Bay Ports Clean Air Action Plan 2010 Update.

Ports of Los Angeles and Long Beach (2011). Roadmap for Moving forward with Zero Emission Technologies at the Ports of Long Beach and Los Angeles, Technical Report.

Southern California Association of Governments (2011). Task 8.2 Analysis of Freight Rail Electrification in the SCAG Region, Technical Memorandum, Draft Version, Prepared by Cambridge Systematics.

Southern California Association of Governments (2012). 2012 Regional Transportation Plan.

ADV-03: ACTIONS FOR THE DEPLOYMENT OF ZERO-EMISSION AND NEAR-ZERO CARGO HANDLING EQUIPMENT [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	OFF-ROAD EQUIPMENT USED TO MOVE FREIGHT CONTAINERS
CONTROL METHODS:	ADVANCED NEAR-ZERO AND ZERO-EMISSION TECHNOLOGIES
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, SAN PEDRO BAY PORTS, CARB, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

Emissions from goods movement related mobile sources (e.g., ships, trains, trucks, and off-road equipment) continue to represent a significant and increasing portion of the emissions inventory in the South Coast Air Basin, adversely affecting not only the local port area, but also the regional air quality of the Basin. The purpose of this early action measure is to demonstrate and commercialize advanced zero-emission and near-zero emission technologies for cargo handling equipment operated at marine ports, intermodal freight facilities, and warehouse distribution centers that could be deployed in the 2020 to 2030 timeframe. Such technologies include advanced engine controls to achieve further reductions in NOx exhaust emissions beyond the Tier 4 off-road exhaust emissions standards and zero-emission technologies such as electric, battery-electric, and fuel cells.

Regulatory History

The U.S. EPA and CARB's Tier 1, Tier 2, Tier 3, and Tier 4 emission standards for non-road diesel engines require compliance with progressively more stringent standards for hydrocarbon, CO, NOx, and PM. Tier 4 standards for non-road diesel-powered equipment complement the latest 2007 and later on-road heavy-duty engine standards requiring 90 percent reduction in NOx and PM when compared against the current level. To meet these standards, engine manufacturers will produce new engines with advanced emissions control technologies similar to those already expected for on-road heavy-duty diesel vehicles. These standards for new engines will be phased in starting with smaller engines in 2008 until all but the very largest diesel engines meet NOx and PM standards in 2015.

In December 2005, CARB adopted a regulation to reduce emissions from cargo handling equipment (CHE) such as yard tractors and forklifts starting in 2007. The regulation calls for the replacement or retrofit of existing engines with engines that use Best Available Control

Technology (BACT). Beginning January 1, 2007, the regulation will require that newly purchased, leased, or rented CHE be equipped with either a 2007 or later on-road engine, a Tier 4 off-road engine or the cleanest verified diesel PM emissions control system which reduces PM by 90% and NOx by at least 70 percent for yard tractors. For non-yard tractors cargo handling equipment currently verified technologies reduce PM by 85 percent.

In November 2006, the Ports of Los Angeles and Long Beach adopted the San Pedro Bay Ports Clean Air Action Plan (CAAP). One of the control measures (CHE-1) provided in the CAAP calls for terminal operators to use cargo handling equipment with the cleanest engines by 2012 (2007 on-road heavy-duty engine emission standards or Tier 4 off-road engine standards). The CAAP accelerates the implementation of CARB's rule requirements through lease requirements or other mechanisms. The CAAP measure provides an additional 15 percent NOx and 19 percent PM reductions by 2011 beyond CARB's regulation based on the replacement of existing cargo handling equipment with equipment meeting Tier IV off-road or 2007 on-road engine standards (for port tenants with lease openings by 2011).

By 2020 under current regulations, all cargo handling equipment will meet Tier 3 off-road standards with a PM retrofit device, 2007 or 2010 on-road standards, or Tier 4 off-road standards.

PROPOSED METHOD OF CONTROL

Cargo handling equipment is generally categorized as construction equipment (excavators, front-end loaders, tractors, etc) used for bulk material handling, forklifts, container handling equipment (top picks, side picks), rubber-tired gantry cranes, and yard trucks. This equipment is predominately diesel powered. Due to the CARB regulation, the 2023 population is estimated from the CHE Emissions Inventory Model to be 85 percent Tier 4 or 2010 on-road, 9 percent Tier 4i or 2007 on-road, and 6 percent Tier 3 with PM retrofit devices. As a result, there are opportunities to further reduce emissions through accelerated turnover to zero-emission and near-zero emission technologies.

The proposed measure is to further develop zero-emission technologies for cargo handling equipment. Zero-emission technologies include battery electric (BEV) and plug-in electric hybrid (PHEV) technologies. These technologies are based on automotive systems and are now being demonstrated in cargo handling equipment. Other potential technologies include fuel cell (FC) and fuel cell-battery hybrids (FCH) for mobile equipment, as well as container movement systems using wide-span grid-power based overhead cranes and container conveyer systems to replace cranes, forklifts, and yard trucks. In addition, hybrid systems have been developed and deployed on cranes used at marine ports and intermodal railyards. The following table summarizes potential zero-emission and hybrid systems to be evaluated over the next several years.

TECHNOLOGY	APPLICATION	STATUS/ POTENTIAL EMISSION REDUCTION
Electric	Wide Span Gantry Cranes	Available but not used in local ports, demonstrations under discussion/100%
Battery-Electric	Yard Tractor; Top-Pick/Side-Pick; Forklifts	Yard tractor demonstrations underway, other CHE demonstrations planned/100%
Fuel Cell	Yard Tractor; Top-Pick/Side-Pick; Forklifts	Demonstrations under discussion /100%
Plug-In Hybrid Electric	Yard Tractor; Top-Pick/Side-Pick; Forklifts	Drayage truck demonstration underway, CHE Demonstrations under discussion /75%
Alternative Fuels	Compressed/Liquefied Natural Gas	Available for trucks and forklifts, demonstrations under discussion for CHE/ 50%
Hybrid Systems	Gantry Cranes	Available but in limited use; Demonstration under discussion/50%
Battery-Electric	Gantry Cranes	Demonstration under discussion/100%

Battery-electric and fuel-cell equipment. Zero-emission yard truck prototype testing is underway with funding from the Port of Los Angeles, the Port of Long Beach, and the District. A demonstration of the Balqon lead-acid battery electric truck was initiated in 2007. The battery was upgraded to a lithium-ion battery, and testing of the upgraded system is underway. Additional testing is ongoing with units made specifically for drayage by Vision Motor Corporation, using a combination of lithium-ion batteries and fuel cells. Transfer of these technologies from on-road truck applications to off-road yard trucks are considered to be straightforward and is currently in the planning stage at the Ports of Los Angeles. Transfer of the technology to cargo handling equipment such as top-picks is in the discussion stage but has not been demonstrated.

Hybrid diesel-electric equipment. Class 6 hybrid and/or plug-in hybrid trucks offering reduced emissions are now becoming commercially available from a number of established manufacturers, e.g. Kenworth T370. These trucks could operate in drayage service and development is continuing on Class 7 and Class 8 trucks. Application of these technologies to yard trucks are also considered to be straightforward. The Ports are currently considering a demonstration of a hybrid yard truck. Applications of hybrid technologies to other cargo handling equipment including forklifts, top-picks/side-picks, and gantry cranes are in the research and development stage with demonstrations possible within two years. Ports are also evaluating alternative-fueled drayage trucks and are planning to demonstrate CNG and LNG cargo handling equipment.

Grid electric. Wide span gantry cranes and automated guideways for moving and positioning cargo containers in the ports and railyards are commercially feasible but have not been used in local port applications. The Ports have reviewed some proposals for demonstrations and are in continuing discussions with applicants.

Alternative Fuels. Natural gas fueled trucks and buses are commonly available. Gasoline and propane fueled off-road equipment is available and could be adapted to compressed or liquid natural gas.

Schedule for Action

The actions described below are directed at developing and demonstrating technologies for zero-or near-zero emission cargo handling systems. Development of equipment capable of operating on electric power, even for relatively short times, should be viewed as an important initial part of the effort to develop a zero-emission cargo handling system. For these reasons, it is appropriate that the schedules for technology development and demonstration activities, and technology deployment, reflect the potential for earlier technology implementation in focused applications rather than for all equipment categories and vocations. The schedules specified below for zero-emission cargo handling equipment technology deployment extend from 2015 to beyond 2023.

Actions

San Pedro Bay Ports Technology Advancement Program (TAP) Working Group (2012-2014). The District, CARB, and U.S. EPA serve on the TAP Working Group to evaluate potential emission reduction projects. The TAP could serve as a forum to focus efforts specifically on zero-emission penetration into specific types of cargo handling equipment. The power storage, drive systems, and fast charging technologies are currently emerging technologies. Other technologies and/or combinations of technologies may emerge that could also play a role in the longer-term zero emission cargo handling system. The Working Group would coordinate with core end users to define their needs and key vehicle design parameters in the 2012 – 2014 timeframe.

Secure Funding (2012-2014). Collaborate with public and private partners to secure funding commitments for the development of vehicle prototypes and infrastructure demonstrations.

Develop and Demonstrate Equipment Prototypes (2012-2015). This phase involves the development, design validation, and initial demonstration of several types of advanced prototype vehicles. The demonstration would include technology optimization for prescribed equipment types and functions. This task should seek to further evaluate, develop, and test prototypes.

Select Technologies for Field Evaluation (2012-2017). Identify potential equipment types and drive technologies to test in small-scale demonstrations. Designate equipment test deployment, and develop a test and development plan for a limited number of equipment.

Equipment Evaluation Testing (2013-2020). Develop, deploy and assess, with operators, multiple equipment types with on-going data collection, analysis, and sharing for rapid iterative design improvement.

Deployment (2015+). Identify/develop mechanisms to deploy demonstrated technologies as early as possible. Such mechanisms may include lease agreements, environmental mitigation measures, and funding incentives.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, San Pedro Bay Ports.

REFERENCES

CARB (2005). California Code of Regulations, Title 13, Chapter 9, Article 4.8, Section 2423 - California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines.

CARB (2005). California Code of Regulations, Title 13, Chapter 9, Article 4.8, Section 2479 - Regulation for Mobile Cargo Handling equipment at Ports and Intermodal Rail Yards.

CARB (2011). Cargo Handing Emissions Inventory Model, available at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm

Los Angeles County Metropolitan Transportation Authority (2008). Multi-County Goods Movement Action Plan, prepared by Wilbur Smith Associates.

Los Angeles County Metropolitan Transportation Authority (2009). Alternative Goods Movement Technology Analysis-Initial Feasibility Study, I-710 Corridor Project EIR/EIS Final Report, prepared by URS.

Ports of Los Angeles and Long Beach (2010). San Diego Ports Clean Air Action Plan, 2010 Update.

ADV-04: ACTIONS FOR THE DEPLOYMENT OF CLEANER COMMERCIAL HARBOR CRAFT [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	CATEGORY 1 AND 2 MARINE ENGINES USED IN COMMERCIAL HARBOR CRAFT
CONTROL METHODS:	ADVANCED HYBRID SYSTEMS AND ALTERNATIVE FUEL ENGINES
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, SAN PEDRO BAY PORTS, CARB, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

This measure describes the actions needed to commercialize advanced engine control technologies and hybrid systems that could be deployed in the 2020 to 2030 timeframe. Such technologies include advanced engine controls to achieve at least a 60 percent reduction in NOx exhaust emissions beyond the most stringent Category 1 and 2 marine engine exhaust emissions standards. There are approximately 750 commercial harbor craft operating within the District that are estimated to emit 17.7 tpd of NOx. Commercial harbor craft includes tug, ferry, crew and supply, excursion, commercial fishing, work, barge, dredge, and pilot vessels. Commercial harbor craft generally have multiple propulsion and auxiliary engines per vehicle with total power of between several hundred and several thousand horsepower. Essentially all are currently diesel powered. Work activity varies significantly with some vessels spending most time within the port harbor and adjacent waters while others leave the local port for adjacent ports, Catalina Island, or oil platforms. Several harbor craft operators have deployed hybrid systems on their harbor craft to improve fuel efficiency and reduce criteria and greenhouse gas emissions. NOx and PM-reducing after treatment systems are also beginning to be demonstrated.

Regulatory History

The U.S. EPA established new engine standards for new "Category 1 and 2" diesel engines – engines rated over 50 hp used for propulsion in most commercial harbor craft. These standards are to be phased in between 2004 and 2017 and limit NOx, VOC, CO and PM emissions, but the emissions reductions achieved are modest in the next five years. The current most stringent standard for marine engines is Tier 4 (0.03 g/bhp-hr PM and 1.3 g/bhp-hr NOx) which takes effect in all engine categories by 2017. These standards do not require either diesel particulate filters or selective catalytic reduction after-treatment systems.

In 2007, CARB adopted a Regulation for Commercial Harbor Craft to accelerate deployment of low emission engines. A compliance schedule was included requiring that commercial harbor craft with Tier 0 and Tier 1 engines would have to be retired or repowered by 2023. In addition, any new vessel had to have engines built to the then-current emission standard (Tier 2, Tier 3 or Tier 4).

The San Pedro Bay Ports Clean Air Action Plan (CAAP) contains a source specific control measure (HC-1) to repower all home port vessels to Tier 3 within five years of engine availability. The CAAP HC-1 measure is implemented through lease requirements or other mechanisms.

PROPOSED METHOD OF CONTROL

Available control technologies that achieve maximum control of emissions include aftertreatment systems using catalysts to control NOx and PM emissions, as well as hybrid engine technologies. The following table summarizes potential near zero-emission technologies to evaluated over the next several years.

TECHNOLOGY	APPLICATION	STATUS/ POTENTIAL EMISSION REDUCTION
Battery-Electric	Vessels with high percentage of standby time or low load time while docked	Small excursion or pleasure craft are available but not commercial harbor craft/100%
Fuel Cell	Vessels with high percentage of medium to high power that have access to fueling infrastructure	Demonstration units in development/100%
Diesel-Electric Hybrid Systems	Vessels with variable engine loads, limited standby time while docked and need for extended range some times.	Technology demonstrated on two tugboats/50% NOx and 70% PM compared to similar standard diesel engine
SCR/DPF Aftertreatment	Vessels with high usage and space available for installation of the systems.	Commercialized in Europe, local demonstration projects underway/80% from Tier 2

Battery-electric. Battery powered recreational boats have been available for many years. Advanced lithium battery technology can be applied to harbor craft.

Fuel cells. Fuel cell power systems are being demonstrated for on-road vehicles and have been used commercially for stationary power generation. Testing is ongoing with units made specifically for drayage by Vision Motor Corporation, using a combination of lithium-ion batteries and fuel cells. Application of these technologies to harbor craft operating appears technically feasible and would provide extended range needed for many harbor craft.

Diesel-electric hybrid. Diesel-battery hybrid technology has been demonstrated on two tugboats at the Ports of Los Angeles and Long Beach. The vessels are equipped with batteries and an electric propulsion motor. This system allows the auxiliary engines to provide electrical propulsion power, as well as supply electrical power to the vessel. With advanced software the power to propel the vessel can come from on-board batteries, one or both auxiliary engines and one or both of the main engines, or any combination of on-board power sources. In addition, when the vessel is docked, grid-based power can be used to charge the batteries thereby displacing a portion of the use of the diesel engines for propulsion and electrical generation. Engine use is thus minimized and optimized and can result in significant emission reductions. The two hybrid tugs are in operation in the Ports of Los Angeles and Long Beach have shown emission reductions of 50 percent for NOx and 70 percent for diesel PM, as well as fuel savings of over 25 percent.

SCR/DPF Aftertreatment. Diesel aftertreatment systems have been demonstrated on ferries in New York and California and will soon be demonstrated on tugs in the District. These systems include selective catalytic reduction (SCR) catalysts for control of NOx and diesel oxidation catalysts (DOC) or DOC plus diesel particulate filters (DPF) for control of PM, VOC, and CO. SCR catalyst systems have been in operation in Europe for more than 10 years on over 200 vessels without any technical issues. These systems have achieved up to 80 percent control of emissions from commercial harbor craft engines. After-treatment systems are particularly appropriate for in-use vessels because of the long useful life of boats and marine engines but space constraints, urea tanks, and high heat from DPF systems are safety concerns. Currently, CARB in coordination with the District and Hug Filtersystems has begun a demonstration of an SCR/DPF aftertreatment device on a tug boat at the Ports of Los Angeles and Long Beach.

Schedule for Action

The following actions are directed at developing and demonstrating reduced emission technologies for commercial harbor craft.

San Pedro Bay Ports Technology Advancement Program (TAP) Working Group (2012-2013). The District, CARB and U.S. EPA serve on the San Pedro Bay Ports Technology Advancement Program (TAP) advisory committee. The TAP could serve as a forum to focus efforts specifically for reduced emission technologies for commercial harbor craft.

Secure Funding (2012-2014). Collaborate with public and private partners to secure funding commitments in 2013 for the development of technology prototypes and in-vessel demonstrations.

Develop and Demonstrate Prototypes (2012-2015). This phase involves the development, design validation, and initial demonstration of reduced emission technologies on vessels. The demonstration would include technology optimization primarily for vessels identified by the Working Group as good candidates for early implementation.

Select Technologies for Field Evaluation (2012-2017). Identify potential vessels and low emission technologies to test in the small scale demonstrations in Phase 3. Designate vessel deployment and lay out a test and development plan for a limited number of vessels.

Technology Evaluation Testing (2013-2020). Develop, deploy, and assess, with vessel operators, multiple technology and vessel types with on-going data collection, analysis, and sharing for rapid iterative design improvement.

Deployment (2015+). Identify/develop mechanisms to deploy demonstrated technologies as early as possible. Such mechanisms may include lease agreements, environmental mitigation, measures, and funding incentives.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA.

REFERENCES

CARB (2010). Initial Statement of Reasons for Amendments to the Regulations to Reduce Emissions from Diesel Engines on Commercial Harbor Craft Operated Within California Waters and 24 Nautical Miles of the California Baseline.

CARB (2011). Regulations to Reduce Emissions from Diesel Engines on Commercial Harbor Craft Operated with California Waters and 24 Nautical Miles of the California Baseline, California Code of Regulations, Title 17, Section 93118.5, as amended 2011.

University of California Riverside – CE-CERT (2010). Evaluating Emission Benefits of a Hybrid Tug Boat, Final Report, ARB Contracts 07-413 and 07-419.

ADV-05: ACTIONS FOR THE DEPLOYMENT OF CLEANER OCEAN-GOING MARINE VESSELS [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	CATEGORY 3 MARINE ENGINES USED IN OCEAN-GOING MARINE VESSELS
CONTROL METHODS:	DEPLOY TIER 3 MARINE ENGINES IN NEW SHIP BUILDS AND TIER 3 LEVEL RETROFIT TECHNOLOGIES IN EXISTING CATEGORY 3 MARINE ENGINE VESSELS
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, SAN PEDRO BAY PORTS, CARB, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

Ocean-going marine vessels, which primarily run on diesel oil, contribute a significant portion of NO_x, PM, greenhouse gas, and toxic emissions particularly in coastal regions and in and around shipping ports. These emissions contribute to on-shore air quality problems. In order for progress to continue to meet clean air goals, emission reductions from marine vessels are necessary.

Currently, the San Pedro Bay Ports Technology Advancement Program (TAP) Advisory Group, which is comprised of CARB, U.S. EPA, and SCAQMD is exploring promising retrofit technologies to be used on marine vessels. The TAP is also working on demonstration projects. The primary objectives of the marine vessel technology demonstration projects are to identify technologies that are capable of reducing NO_x, PM, and greenhouse gases, identify and demonstrate emission measurement systems capable of accurately measuring pollutant emissions in ship exhaust streams; and install the most promising technology on an in-use Category 3 ocean-going vessel for demonstration under real world conditions and establish the emission reduction potential in different modes of operation.

This measure describes the actions needed to deploy retrofit technologies on existing Category 3 marine engines to achieve Tier 3 marine engine emission standards. The actions proposed are consistent with Measure OGV-6 provided in the San Pedro Bay Ports Clean Air Action Plan (CAAP). Marine engine manufacturers have indicated that such retrofits are feasible. The Ports of Los Angeles and Long Beach have documented various control technologies that are potentially feasible to deploy. To-date, a limited number of demonstrations have been conducted.

Regulatory History

The regulation of emissions from mobile port-related emission sources is traditionally the responsibility of CARB and U.S. EPA. Specifically, ships are each subject to specific emission standards pursuant to state, federal, and/or international requirements. The standards, primarily affecting new units, vary in stringency and compliance dates.

OGV main and auxiliary engines are subject to the International Maritime Organizations international emission standards as contained in Annex VI to the International Convention on the Prevention of Pollution from Ships (MARPOL Annex VI). U.S. flagged ships must meet similar U.S. EPA requirements. In October 2008, the IMO adopted the current standards for engines and these require vessels to meet increasingly more stringent NOx emission standards. The standards are designated by tiers ranging from Tier 0 being uncontrolled or no emission controls to the most stringent Tier 3 standard. NOx emission standards are modestly more stringent when going from Tier 0 to Tier 2 (approximately 20 percent cleaner) and can be achieved through engine design changes. The Tier 3 NOx standard is significantly more stringent (better than 80 percent cleaner) and most likely can only be met using engine after-treatment systems. Engines on vessels must meet the Tier 3 NOx standard if they are built after 2015 and travel through designated Emission Control Areas (ECA). ECAs can be created by member states if approved by the IMO. On March 26, 2010, the IMO officially designated waters within 200 nautical miles of the United States and Canadian Coasts as the North American ECA.

In addition to NOx emission requirements, IMO and CARB require vessels to use lower sulfur distillate fuels when the vessels travel close enough to our shores. By 2015, all vessels will be required to use distillate fuels with sulfur contents less than 1,000 ppmw when they travel within the North American ECA. With the low sulfur fuel requirements, reduction of SOx and PM emissions will be realized.

PROPOSED METHOD OF CONTROL

As part of the San Pedro Bay Ports Clean Air Action Plan 2010 update, the Ports have adopted a program to reduce diesel particulate matter (DPM) and NOx emissions from the existing fleet of vessels through the identification of new effective technologies. Numerous emission reduction technologies are being evaluated for integration into vessel new builds and use of these technologies as a retrofit for existing vessels will be explored. These would fall into several broad categories shown in the table below. Many of these retrofit technologies are currently available and demonstrated in Europe on smaller ocean-going vessels. The two major marine engine manufacturers, MAN Diesel and Wartsila, have been developing these technologies to meet current and future International Maritime Organization (IMO) standards.

CONTROL	CONTROL DETAILS	ESTIMATE EMISSION REDUCTIONS*	
		NOx	PM
Engine Technologies	Common Rail Fuel Injection, Slide Valves, Electronic Fuel Control, Electronically Controlled Lubrication Systems, and Automated Engine Monitoring/Control Systems	Up to 20%	Up to 40%
Engine Support Technologies	Water Injection, Exhaust Gas Recirculation, High Efficiency Turbo Charging, Scavenging Air Moistening/Humid Air Motor, Two-Stage Turbo Charging	Up to 60%	Up to 20%
After-Treatment Technologies	Selective Catalytic Reduction (SCR), and Exhaust Gas Scrubbers (Wet –freshwater, saltwater, hybrid, and Dry)	Up to 90%	Up to 90%
Alternative Fuels	Liquefied Natural Gas	Up to 90%	Up to 99%
Alternative Supplemental Power Systems	Wind and Solar Power, Marine Fuel Cell, Marine Hybrid Systems, Waste Heat Recovery	Data Not Available	Data Not Available

***** San Pedro Bay Ports Clean Air Action Plan – Guide to OGV Emission Control Strategies

New Slide Valve Designs - Replacement of existing valves on main and auxiliary engines with new "slide" valves could provide up to 30 percent reduction in NOx (depending on the design). In addition, installing slide valves reduces particulate emissions and leads to greater fuel efficiency. MAN Diesel (one of the two leading manufacturers of marine engines) currently has such slide values commercially available. Slide valves are in use on several marine vessels operating in Europe. Slide valves are being tested on container vessels operating in California.

Internal Engine Modifications - There are several modifications that could be made to the engine's operation that would lead to reduced NOx emissions. Modifications include: delayed fuel injection and ignition, which reduces the in-cylinder duration of the combustion gases at high temperatures; lowering fuel injection pressure; raising the degree of premixing; advancing the closing time of the inlet valve to lower the final combustion temperature ("Miller valve timing"); reducing the temperature and pressure of the combustion air fed into the cylinders; optimizing the geometry of the combustion space and the compression ratio; and optimizing the fuel injection method. Such modifications could result in up to 30 percent reduction in NOx emissions.

Direct Water Injection (DWI) - Direct water injection is a form of diesel emulsification, where freshwater is injected into the combustion chamber. Injecting water lowers the combustion temperature leading to lower NOx emissions (on the order of 40 to 50 percent reduction).

Typical water-to-fuel ratio ranges between 40 to 70 percent. As of 2005, there are about 23 vessels operating in the Baltic Region, equipped with water injection, primarily on auxiliary engines. Such use could be transferred to vessels operating in and out of California ports.

Humid Air Motor (HAM) or Saturated Air Motor (SAM) - HAM is similar to the direct water injection application except that seawater is vaporized directly into the combustion chamber to lower the combustion temperature. The waste heat is recovered and used to vaporize the seawater. The salt content of the Baltic Sea water is not as high as in other parts of the ocean, which makes the HAM application more appealing since there is no need to store freshwater on board the vessel.

Selective Catalytic Reduction (SCR) - Similar application to stationary source boilers and engines. SCR technologies have been applied to ferries and roll-on/roll-off vessels in Europe. In addition, four steel carrier vessels operating between California and Korea have used SCR since the early 1990s. The two major Category 3 marine engine manufacturers have indicated that SCR technologies will most likely be Tier 3 solutions. Such technologies can achieve over 90 percent emission reduction in NOx from uncontrolled levels.

Exhaust Gas Recirculation (EGR) - EGR technologies are similar to that used on on-road engines. However, the units are much larger in size and have not been fully developed at this point. As with on-road engine applications, the expected NOx emission reduction is about 50 percent.

Sea Water Scrubbers - Sea water scrubber systems are developed primarily for the cleanup of sulfur oxides and particulates. Relative to NOx emissions reduction, the sea water scrubber has been estimated to have about a 5 percent benefit.

LNG-Fueled Marine Engines - Currently there is limited use of liquid natural gas (LNG) to power propulsion engines on marine vessels. One of the major category 3 marine engine manufacturers recently announced plans to manufacture additional LNG-fueled ocean-going vessels. LNG could meet Tier 3 emissions levels and reduce greenhouse gas emissions.

All of these systems and approaches need additional study, research, design, proof of concept testing, and both small- and full-scale demonstration programs to advance the technology for application on ocean-going vessels traveling in the South Coast Air Basin, as well as a greater examination of operational impacts and costs.

Schedule for Actions

With the goal of ensuring only the cleanest vessels visit the San Pedro Bay Ports, the following actions are identified.

Actions

San Pedro Bay Ports OGV 5 and OGV 6 Task Force (2012-2014). The Ports along with the District, CARB, and U.S. EPA have formed the OGV 5 and OGV 6 task force to work with stakeholders (including vessel operators, engine manufacturers, regulatory agencies) to identify and prioritize technology options, as well as the most appropriate vessel types for early introduction of the technology using cost, feasibility, operational integration, and other parameters identified by the task force. Technology gaps will also be identified.

Identify and Secure Funding (2012-2014). The TAP program is the ports' vehicle to identify sources and develop partnerships that would accelerate the deployment of developing or developed technology. Through the TAP, partnerships with other public and private groups are developed to secure funding commitments for the development of prototype demonstrations. Efforts to expand these partnerships for other candidate funding sources such as other U.S. Ports, Federal Agencies (e.g., U.S. Maritime Administration), international organizations (e.g., IMO) and air districts should be considered. Interested technology developers and engine manufacturers are also candidates for in-kind contributions, as well as vessel operators.

Develop and Demonstrate Prototypes (2012-2015). Through the TAP collaborative demonstration projects with stakeholders for the development, design validation, and initial demonstration of reduced emission retrofit technologies on vessels are performed. These demonstrations would include retrofit technology optimization primarily for vessel types and engines identified as good candidates for early implementation.

Select Technologies for Fleet Evaluation (2012-2017). Identify potential vessels and retrofit technologies to test in the small-scale demonstrations. Through the TAP designate vessel test deployment, and lay out a test and development plan for a limited number of vessels.

Technology Evaluation Testing (2015-2020). Develop, deploy and assess with multiple vessels with on-going data collection, analysis and sharing for rapid iterative design improvement. The TAP can provide the structure to monitor and evaluate equipment performance and emission benefits during demonstration projects.

Deployment (2017+). Identify and develop mechanism to deploy demonstrated technologies as early as possible. Such mechanism may include lease agreements, environmental mitigation measures, and funding. The San Pedro Bay Ports have adopted programs to incentivize Tier 2 and Tier 3 vessel calls.

As part of this action, between 2012 to 2015, the South Coast Air Quality Management District, CARB, the San Pedro Bay Ports, and U.S. EPA will collaborate and develop potential additional mechanisms to incentivize or require Tier 3 vessel calls at the state and federal levels.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA.

REFERENCES

San Pedro Bay Ports Clean Air Action Plan 2010 Update, October 2010

ADV-06: ACTIONS FOR THE DEPLOYMENT OF CLEANER OFF-ROAD EQUIPMENT [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	OFF-ROAD CONSTRUCTION, INDUSTRIAL ENGINES
CONTROL METHODS:	ADVANCED HYBRID SYSTEMS AND CONTROL TECHNOLOGIES TO ACHIEVE AT LEAST AN ADDITIONAL 60 PERCENT REDUCTION BEYOND TIER 4 EMISSION STANDARDS
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, CARB, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

This measure describes the actions needed to commercialize advanced zero-emission and near-zero emission technologies that could be deployed in the 2020 to 2030 timeframe. Such technologies include advanced engine controls to achieve at least an additional 60 percent reduction in NOx exhaust emissions beyond the Tier 4 off-road emission standards.

Regulatory History

The federal Tier 4 final standards are currently the most stringent emission standards for off-road diesel engines used in heavy construction and industrial equipment. These standards take effect in 2014 or 2015 for engines in the 75-750 hp range which includes the majority of this equipment and requires NOx emissions not to exceed 0.3g/bhp-hr. In addition to these standards for new engines, CARB adopted the In-Use Off-Road Diesel-Fueled Fleets Regulation (Off-Road rule) in 2007 in order to accelerate the introduction of equipment using Tier 4 engines. The off-road rule applies to diesel-fueled construction, mining, industrial, airport ground support equipment, and mobile oil drilling equipment and established increasingly stringent annual fleet average emission targets. Fleets that do not meet the fleet average in any year are required to "turnover," (i.e., retire, replace, retrofit, or repower) a specified percentage of their horsepower. The rule currently requires large- and medium-sized fleets to meet 1.5 g/bhp-hr NOx by 2023 and small fleets to meet 1.5 g/bhp-hr NOx by 2028. This represents 70 percent Tier 4, 7 percent Tier 4i equipment with decreasing fractions of Tier 3, Tier 2, Tier 1 and Tier 0 equipment.

PROPOSED METHOD OF CONTROL

Equipment subject to the Off-Road rule represents 59 percent of the 2023 NOx emissions from this source category. Diesel engines produce 70 percent of the 2023 construction and industrial NOx emissions while large spark ignition (LSI) engines, primarily gasoline, represent about 30 percent of the NOx emissions. Different methods of control may be best suited to different types of equipment due to size, work location, and duty cycle. The following four-phase program is proposed to identify and apply the most appropriate control method for each equipment type.

Construction and industrial equipment have substantially different work locations and duty cycles and include engines from all horsepower categories and fuel types. Equipment types range from small boom lifts to heavy off-road trucks and dual-engine scrapers. Construction equipment is usually operated at field locations with limited grid power and limited access. As a result, zero-emission drive systems are more difficult to deploy in construction equipment than other off-road mobile categories. Industrial equipment is usually operated at fixed sites with readily available grid power and with access to alternative fuel required for fuel cells. Industrial equipment therefore is a more likely candidate for early introduction of zero-emission drive systems than off-road construction equipment. The following table summarizes potential zero- and near zero-emissions systems to be evaluated over the next several years.

TECHNOLOGY	APPLICATION	STATUS/POTENTIAL EMISSION REDUCTION
Battery-Electric	Equipment with high percentage of standby time or low load time and located at site with grid power	Industrial equipment commercialized, smaller construction equipment demonstrations needed/100%
Fuel Cell	Equipment with access to fuel infrastructure – most likely equipment at fixed sites or returning to equipment yards at night.	Development of forklifts and other industrial equipment in process/100%
Plug-In Hybrid Electric	Equipment with energy recovery duty cycles or high percentage of idle/low power operation. Equipment can operate at remote sites with conventional fuel or grid power if available at job site. Hybrid technology may vary by equipment type.	On-road truck systems commercialized; industrial equipment in development, construction equipment depends on market interest/40% from Tier 4
CNG/LNG	Equipment at fixed sites or returning to equipment yards at night	Available for some forklifts; demonstrations underway for heavy construction equipment/60% from Tier 4
Hybrid Systems	Equipment with energy recovery duty cycles or high percentage of idle/low power operation. Equipment can operate at remote sites with diesel fuel. Hybrid technology may vary by equipment type.	Entering commercialization in selected applications/25% from Tier 4
Cleaner Combustion Engines	Heavy construction equipment >300 hp	Engines with NOx emissions at least 60% cleaner from Tier 4 standards

Battery-Electric Equipment. Battery-electric equipment is already commercialized for many industrial equipment categories. However, this equipment has been developed with conventional automotive lead acid battery technology. Further demonstrations are needed in conjunction with the latest battery technologies.

Fuel Cell Equipment. This zero-emission technology is being demonstrated in light-duty passenger cars, buses and trucks. Fuel cell technologies need additional development for off-road applications.

Hybrids. Hybrid-electric drives are now being introduced into construction equipment (Caterpillar D7E bulldozer and Komatsu excavator). Other manufacturers including Volvo and John Deere are developing diesel hybrid equipment. For smaller equipment, plug-in hybrid systems are being adapted from light-and medium-duty on-road vehicles.

In order to establish the emission benefit and to facilitate the deployment of hybrid equipment through incentive programs, a methodology to determine the emissions of hybrid drive systems compared to conventional diesel engines will be developed in cooperation with CARB, EPA, and equipment manufacturers with input through the Working Group.

Reduced Emission Diesel Engines. More significant emission reductions (60% below Tier 4 – 0.12 g/bhp-hr) will require further advancements in engine and exhaust treatment technologies for diesel engines or use of alternative fuels such as natural gas. Many of these technologies currently exist and are used for passenger car and truck engines. However, these technologies are not likely to be used in off-road engines without new technology forcing exhaust emissions standards.

Schedule for Action

The following actions are directed at developing and demonstrating technologies for zero- or near-zero emission construction and industrial equipment. Since all of these technologies are currently in some stage of development for on-road trucks and industrial equipment, it is appropriate that the schedules for technology development, demonstration activities and technology deployment, reflect the potential for earlier technology implementation in selected applications than for all equipment categories and applications. The schedules specified below for zero-emission construction equipment technology deployment where feasible extend from 2015 to beyond 2021.

Actions

Off-road Equipment Working Group (2012-2014). A technical working would be formed to focus efforts specifically on near-zero and zero-emission opportunities for penetration into each type of off-road construction and industrial equipment. Performance requirements, work location, and duty cycle will be matched to technology factors including power storage, drive system type, system size and weight, and charging technologies. The Working Group would coordinate with core end users to define their needs and key equipment design parameters in the 2012 – 2013 timeframe. The Working Group will include air quality regulatory agencies, equipment and drive system manufacturers, equipment operators, and independent research and academic organizations.

Secure Funding (2012-2014). Collaborate with public and private partners to secure funding commitments for the development of vehicle prototypes and infrastructure demonstrations similar to the Off-Road Showcase.

Develop and Demonstrate Equipment Prototypes (2012-2015). This phase involves the development, design validation, and initial demonstration of several types of advanced prototype vehicles. The demonstration would include technology optimization for equipment types and applications recommended by the Working Group.

Select Technologies for Field Evaluation (2012-2017). Identify potential equipment types and drive technologies to test in the small-scale demonstrations. Designate equipment deployment and lay out a test and development plan for a limited number of equipment.

Equipment Evaluation Testing (2013-2020). Develop, deploy and assess, with equipment operators, multiple equipment types with on-going data collection, analysis and sharing for rapid iterative design improvement.

Deployment (2015+). Identify/develop mechanisms to deploy demonstrated technologies as early as possible. Such mechanisms may include lease agreements, environmental mitigation measure, and funding incentives.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, CARB, U.S. EPA

REFERENCES

CARB (2005). California Exhaust Emission Standards and Test Procedures for New 2008 and Later Tier 4 Off-Road Compression-Ignition Engines, California Code of Regulations, Title 13, Chapter 9, Article 4.8, Section 2423.

CARB (2011). In-Use Off-Road Diesel Fueled Fleet Regulation, California Code of Regulations, Title 13, Chapter 9, Article 4.8, Sections 2449 through 2449.2.

CARB (2010). Off-Road Simulation Model, available at http://www.arb.ca.gov/msprog/ordiesel/offroad_1085.htm

ADV-07: ACTIONS FOR THE DEPLOYMENT OF CLEANER AIRCRAFT ENGINES [NOX, PM]

CONTROL MEASURE SUMMARY	
SOURCE CATEGORY:	COMMERCIAL JET AIRCRAFT ENGINES
CONTROL METHODS:	ADVANCED ENGINE TECHNOLOGIES AND CLEANER AVIATION FUELS
EMISSIONS (TONS/DAY):	TBD
CONTROL COST:	THE CONTROL COSTS VARY WITH THE TYPE OF CONTROL TECHNOLOGY IMPLEMENTED
IMPLEMENTING AGENCY:	SCAQMD, CARB, FAA, U.S. EPA

DESCRIPTION OF SOURCE CATEGORY

Background

This measure describes the actions needed to develop, demonstrate, and commercialize advanced technologies, procedures, and sustainable alternative jet fuels that could be deployed in the 2020 to 2030 timeframe. Such technologies include advanced engine controls to reduce landing and takeoff cycle NOx emissions by at least 60 percent, without increasing other gaseous or particulate emissions beyond the International Civil Aviation Organization (ICAO) standards adopted in 2004. In addition, greater use of sustainable alternative jet fuels in conjunction with advanced technologies is critical over the next 10 to 20 years to realize substantial emissions reductions from commercial jet aircraft applications.

Regulatory History

In 1973, the U.S. EPA published emission standards and test procedures to regulate gaseous emissions, smoke, and fuel venting from aircraft engines. In 1997, the standards were revised to be more consistent with those of the ICAO Committee of Aviation Environmental Protection (CAEP) for turbo engines used in commercial aircraft. These standards (CAEP/2) included new CO, HC, and NOx emission standards of 118 grams per kilonewtons (g/kN), 19.6 g/kN, and 40 g/kN, respectively. In 2005, the standards were harmonized with ICAO CAEP/4 requirements which tightened the CAEP/2 NOx standards by 32% for newly-certified commercial aircraft engines.

On June 1, 2012, the U.S. EPA Administrator signed a final rule to further revise the standards to be consistent with the current ICAO CAEP/6 and CAEP/8 requirements to further reduce NOx emissions. The first set of standards take effect 30 days after from the date the rule is published in the Federal Register and will require all new engines meet the ICAO CAEP/6 standards. The CAEP/6 standards represent approximately 12 percent emission reductions from the ICAO Tier 4 levels. The second set of standards, Tier 8, take effect in 2014 and represents approximately a 15 percent from Tier 6 levels.

PROPOSED METHOD OF CONTROL

The proposed actions seek the development and deployment of new and cleaner commercial aircraft engines beginning 2015 such that by 2023, there will be a substantial number of low-emissions commercial jet aircraft that could be routed to the South Coast Air Basin.

Schedule for Action

State and local aircraft emission regulation is preempted by the Clean Air Act which gives that responsibility to U.S. EPA in consultation with the Federal Aviation Administration (FAA). New engine aircraft standards were adopted in 2005 and revised standards are being proposed by U.S. EPA and CAEP. No regulations are planned for the in-use aircraft fleet so emission reductions can only be achieved through fleet turn-over. Fortunately, new aircraft offer lower fuel consumption, as well as reduced emissions providing an economic incentive for airlines to accelerate replacement of their older aircraft.

In 2010, the FAA initiated the Continuous Lower Energy, Emissions and Noise (CLEEN) Program to reduce NOx emissions by 75% relative to the 2005 emission standards by 2025. Potential low-emission aircraft technologies include alternative fuels, lean combustion burners, high rate turbo bypass, advanced turbo-compressor design, and engine weight reduction. This program provides a framework and goal to develop and demonstrate technologies for improved efficiency and reduced emissions on a continuous incremental basis. The major elements of the framework are described below.

Actions

Formation of the CLEEN program working group (completed). The working group consists of aircraft manufacturers, jet engine manufacturers, component suppliers, the U.S. EPA, and NASA. The working group meets biannually.

Secure Funding (2012-2018). The FAA is providing limited funding for test and evaluation. Participating companies are also providing internal research, prototype preparation and laboratory tests.

Develop and Demonstrate Equipment Prototypes (2012-2018). Prototype technologies are being prepared for laboratory testing.

Select Technologies for Fleet Evaluation (2015-2018). Select successful technology improvements from bench test data to test in flight operations. Identify target flight test partners and lay out a test and development plan for a limited number of vehicles.

Technology Evaluation Testing (2018-2020). Develop, deploy and assess the selected engine technologies on aircraft operated by participating airlines. Provide on-going data collection, analysis and sharing for rapid iterative design improvement and support for FAA and international flight certification.

Prepare and Submit FAA Certification and Application (2018-2020). Each engine manufacturer is responsible for obtaining certification of successfully demonstrated technology improvements.

Deployment (2020+). Identify/develop mechanisms to deploy demonstrated technologies as early as possible.

EMISSIONS REDUCTION

Not Determined

COST EFFECTIVENESS

Not Determined

IMPLEMENTING AGENCY

SCAQMD, U.S. FAA, U.S. EPA, CARB

REFERENCES

Federal Aviation Administration (2011). Continuous Lower Energy, Emissions, and Noise (CLEEN) Program Presentation by Jim Skalecky. Presented at the AIAA Aerospace Sciences Meeting.

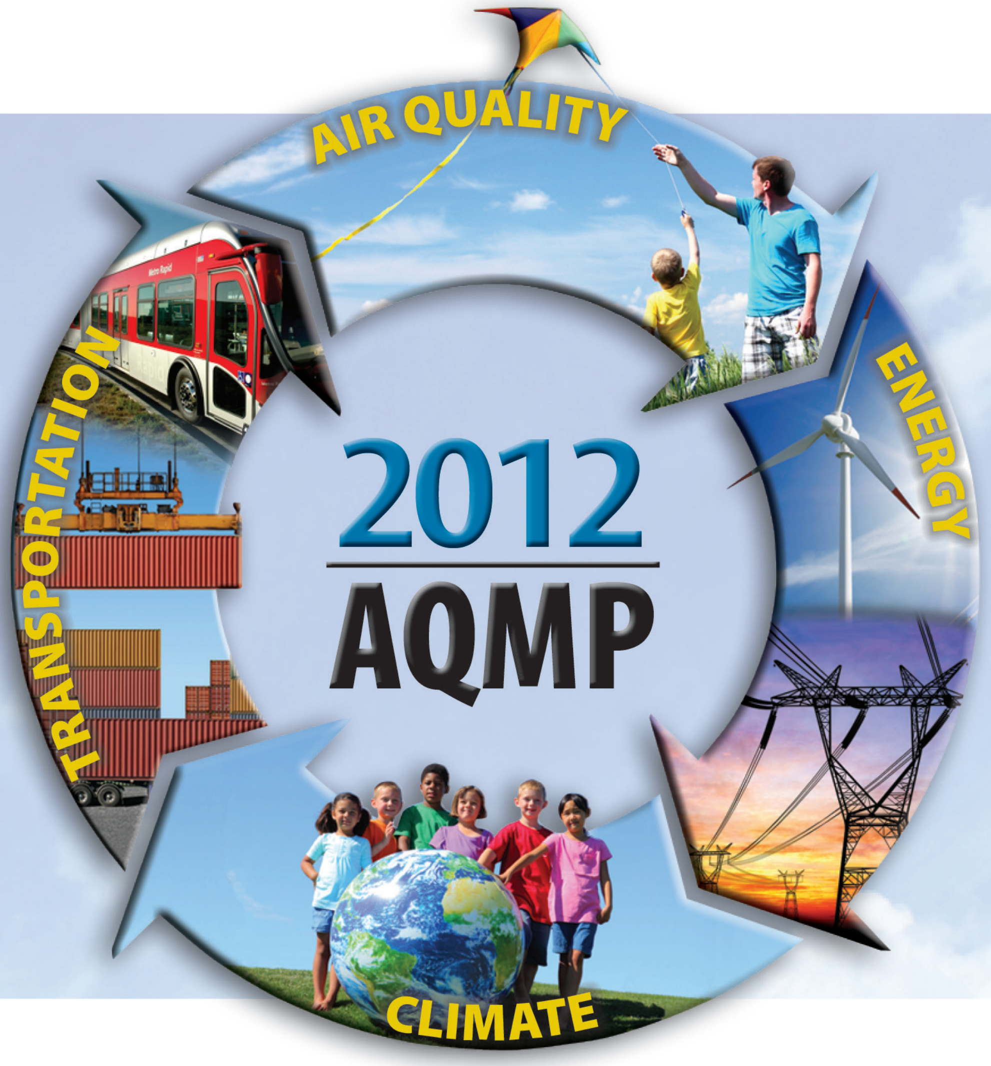
Federal Aviation Administration (2011). Continuous Lower Energy, Emissions, and Noise (CLEEN) Program Presentation by Rhett Jeffries. Presented at the UC Davis Symposium.

Federal Aviation Administration (2012). FAA CLEEN Program Website: http://www.faa.gov/about/office_org/headquarters_offices/apl/research/aircraft_technology/cleen/

U.S. EPA (2012). Control of Air Pollution From Aircraft and Aircraft Engines; Final Emission Standards and Test Procedures, signed June 1, 2012.

Appendix IV-C

Air Quality Management Plan



Regional Transportation Strategy and Control Measures

February 2013

South Coast Air Quality Management District

Cleaning the air that we breathe...™

South Coast AQMD

FINAL 2012 AQMP
APPENDIX IV-C

Regional Transportation Strategy and Control Measures

FEBRUARY 2013

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Mission Statement

Under the guidance of the Regional Council and in collaboration with our partners, our mission is to facilitate a forum to develop and foster the realization of regional plans that improve the quality of life for Southern Californians.

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

SCAG Regional Council

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First Vice President: Greg Pettis, Cathedral City
Second Vice President: Carl Morehouse, San Buenaventura
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Riverside County: Jeff Stone, Riverside County | Jim Hyatt, Calimesa | Darcy Kuenzi, Menifee | Ron Loveridge, Riverside | Greg Pettis, Cathedral City | Lupe Ramos Watson, Indio | Ronald Roberts, Temecula

San Bernardino County: Gary Ovitt, San Bernardino County | Paul Eaton, Montclair | Ed Graham, Chino Hills | Jon Harrison, Redlands | Bill Jahn, Big Bear Lake | Larry McCallon, Highland | Deborah Robertson, Rialto

Ventura County: Linda Parks, Ventura County | Glen Becerra, Simi Valley | Bryan A. MacDonald, Oxnard | Carl Morehouse, San Buenaventura

Tribal Government Representative: Vacant

Orange County Transportation Authority: Jerry Amante, Tustin

Riverside County Transportation Commission: Mary Craton, Canyon Lake

San Bernardino Associated Governments: Alan Wapner, Ontario

Ventura County Transportation Commission: Keith Millhouse, Moorpark

Transportation Corridors Agency: Lisa Bartlett, Dana Point

Ex-Officio: Randall Lewis, Lewis Group of Companies

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Executive Summary

This Appendix describes the Southern California Association of Government's (SCAG) transportation strategy and transportation control measures (TCMs) to be included as part of the 2012 Air Quality Management Plan (AQMP) / PM2.5 State Implementation Plan (SIP) for the South Coast Air Basin. The transportation strategy and TCMs are based on SCAG's adopted 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and 2011 Federal Transportation Improvement Program (FTIP) as amended which were developed in consultation with federal, state and local transportation and air quality planning agencies and other stakeholders. The four County Transportation Commissions (CTCs) in the South Coast Air Basin, namely Los Angeles County Metropolitan Transportation Authority, Riverside County Transportation Commission, Orange County Transportation Authority and the San Bernardino Associated Governments, were actively involved in the development of the regional transportation measures of this Appendix.

The Regional Transportation Strategy and Transportation Control Measures portion of the 2012 AQMP/SIP consists of the following three related Sections.

<u>Section I. Linking Regional Transportation Planning to Air Quality Planning</u>

As required by federal and state laws, SCAG is responsible for ensuring that the regional transportation plan, program, and projects are supportive of the goals and objectives of AQMPs/SIPs. SCAG is also required to develop demographic projections and regional transportation strategy and control measures for the AQMPs/SIPs.

As the Metropolitan Planning Organization (MPO), SCAG develops the RTP/SCS every four years. The RTP/SCS is a long-range regional transportation plan that provides a vision for transportation investments throughout the SCAG region. The 2012-2035 RTP/SCS also integrates land use and transportation planning to achieve regional greenhouse gas (GHG) reduction targets set by the California Air Resources Board (ARB) pursuant to SB375.

SCAG also develops the biennial FTIP. The FTIP is a multimodal list of capital improvement projects to be implemented over a six year period. The FTIP implements the programs and projects in the RTP/SCS.

<u>Section II. Regional Transportation Strategy and TCMs</u>

The SCAG region faces daunting mobility, air quality, and transportation funding challenges. Under the guidance of the goals and objectives adopted by SCAG's Regional Council, the 2012-2035 RTP/SCS was developed to provide a blueprint to integrate land use and transportation strategies to help achieve a coordinated and balanced regional transportation system. The 2012-2035 RTP/SCS represents the culmination of more than two years of work involving dozens of public agencies, 191 cities, hundreds of local, county, regional and state officials, the business community, environmental groups, as well as various nonprofit organizations. The 2012-2035 RTP/SCS was formally adopted by the SCAG Regional Council on April 4, 2012.

The 2012-2035 RTP/SCS contains a host of improvements to every component of the regional multimodal transportation system including:

- Active transportation
- Transportation demand management (TDM)
- Transportation system management (TSM)
- Transit
- Passenger and high-speed rail
- Goods movement
- Aviation and airport ground access
- Highways
- Arterials
- Operations and maintenance

Included within these transportation system improvements are projects that reduce vehicle use or changing traffic flow or congestion conditions ("TCMs"). TCMs include the following three main categories of transportation improvement projects and programs:

- High occupancy vehicle (HOV) measures,
- Transit and systems management measures, and
- Information-based transportation strategies.

New to this cycle of the RTP is the inclusion of the SCS as required by SB 375. The primary goal of the SCS is to provide a vision for future growth in Southern California that will decrease per capita GHG emissions from passenger vehicles. However, the strategies contained in the 2012-2035 RTP/SCS will produce benefits for the region far beyond simply reducing GHG emissions. The SCS strives to integrate the transportation network and related strategies with an overall land use pattern that responds to projected growth, housing needs, changing demographics, and transportation demands. The regional vision of the SCS maximizes current voluntary local efforts that support the goals of SB 375. The SCS focuses the majority of new housing and job growth in high-quality transit areas and other opportunity areas on existing main streets, in downtowns, and commercial corridors, resulting in an improved jobs-housing balance and more opportunity for transit-oriented development. In addition, SCAG is a strategic partner in a regional effort to accelerate fleet conversion to near-zero and zero-emission transportation technologies. A significant expansion of alternative-fuel infrastructure is needed throughout the region to accommodate the anticipated increase in alternative fueled vehicles.

Section III. Reasonably Available Control Measure Analysis

As required by the Federal Clean Air Act (CAA), a reasonably available control measure (RACM) analysis must be included as part of the overall control strategy in the AQMP/SIP to ensure that all potential control measures are evaluated for implementation and that justification is provided for those measures that are not implemented. Appendix IV-C contains the TCM RACM component for the South Coast PM2.5 control strategy. In accordance with EPA procedures, this analysis considers TCMs in the 2012-2035 RTP/SCS, measures identified by the CAA, and relevant measures adopted in other non-attainment areas of the country.

Based on this comprehensive review, it is determined that the TCMs being implemented in the South Coast Air Basin are inclusive of all TCM RACM. None of the candidate measures reviewed and determined to be infeasible meets the criteria for RACM implementation.

Section I. Linking Regional Transportation Planning to Air Quality Planning

Federal and State Requirements

The air quality conformity requirements of the Federal CAA establish a need to integrate air quality planning and regional transportation planning. This integration presents the challenge of balancing the real need for improved mobility with the equally important goal of cleaner air. As the federally-designated MPO for the six-county Southern California region, SCAG is required by law to ensure that transportation activities "conform" to, and are supportive of, the goals of regional and state air quality plans to attain the National Ambient Air Quality Standards (NAAQS). In addition, SCAG is a co-producer, with the South Coast Air Quality Management District (AQMD), of the AQMP for the South Coast Air Basin. SCAG has the responsibility for the demographic projections and integrated regional land use, housing, employment, and transportation programs, measures, and strategies, as well as analyzing and providing emissions data related to its planning responsibilities (California Health and Safety Code §40460).

Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and Federal Transportation Improvement Program (FTIP)

The SCAG Region is the largest metropolitan planning area in the United States, encompassing 38,000 square miles. The region is divided into 14 subregions and is one of the largest concentrations of population, employment, income, business, industry and finance in the world. The six-county SCAG Region is home to more than 18 million people, nearly half of the population of the state of California.

Federal and state regulations require SCAG, as the Regional Transportation Planning Agency and MPO, to develop an RTP every four years in order for our region's transportation projects to qualify for federal and state funding. The RTP is updated to reflect changes in trends, progress made on projects, and to adjust the growth forecast for population changes. The long-range transportation plan provides a vision for transportation investments throughout the region. Using growth forecasts and economic trends that project out over a 20-year period, the RTP considers the role of transportation in the broader context of economic, environmental, and quality-of-life goals for the future, identifying regional transportation strategies to address our mobility needs.

The SCS is a newly required element of the RTP. The SCS integrates land use and transportation strategies that will achieve ARB greenhouse gas emissions reduction targets. According to SB 375, "The Sustainable Communities Strategy shall:

1. identify the general location of uses, residential densities, and building intensities within the region;
2. identify areas within the region sufficient to house all the population of the region, including all economic segments of the population, over the course of the planning period of the regional transportation plan taking into account net migration into the region, population growth, household formation and employment growth;

3. identify areas within the region sufficient to house an eight-year projection of the regional housing need for the region;
4. identify a transportation network to service the transportation needs of the region;
5. gather and consider the best practically available scientific information regarding resource areas and farmland in the region;
6. consider the state housing goals specified in Sections 65580 and 65581;
7. set forth a forecasted development pattern for the region, which, when integrated with the transportation network, and other transportation measures and policies, will reduce the greenhouse gas emissions from automobiles and light trucks to achieve, if there is a feasible way to do so, the greenhouse gas emission reduction targets approved by the state board;
8. allow the regional transportation plan to comply with the federal Clean Air Act."

The RTP/SCS was developed through a collaborative process, guided by the SCAG Regional Council and its Policy Committees and Sub-committees, the Plans & Programs Technical Advisory Committee, numerous task forces, CTCs, subregions, local governments, state and federal agencies, environmental and business communities, tribal governments, non-profit groups, as well as the general public. The RTP/SCS constitutes the Regional Transportation Strategy and Control Measures for the AQMP.

SCAG is also responsible for developing a biennial short-term (six year planning horizon) FTIP. SCAG develops the FTIP in partnership with the CTCs of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura, and Caltrans Districts 7, 8, 11, and 12. The FTIP is a multimodal list of capital improvement projects to be implemented over a six-year period. The FTIP identifies specific funding sources and fund amounts for each project. It is prioritized to implement the region's overall strategy for providing mobility and improving both the efficiency and safety of the transportation system, while supporting efforts to attain federal and state air quality standards for the region by reducing transportation related air pollution. The FTIP must include all federally funded transportation projects in the region, as well as all regionally significant transportation projects for which approval from federal funding agencies is required, regardless of funding source. The FTIP is developed to incrementally implement the programs and projects in the RTP. TCMs that are committed to in the applicable SIP are derived from the first two years of the prevailing FTIP.

Section II. Regional Transportation Strategy and TCMs

Introduction

The 2012-2035 RTP/SCS is a long-range regional transportation plan that provides a blueprint to integrate land use and transportation strategies to help achieve a coordinated and balanced regional transportation system. Transportation projects in the SCAG region must be included in the RTP/SCS in order to receive federal funding. The 2012-2035 RTP/SCS is comprised of the following elements: (1) a policy element that presents an overview of the challenges facing the region; the RTP/SCS goals, policies and performance outcomes; (2) the SCS, which includes land use policies and forecasted future growth and land use for the region; (3) an action element that describes the transportation investments and programs necessary to implement the Plan and performance measures to determine how the Plan performs; and (4) the financial element that summarizes the cost of Plan implementation constrained by a realistic projection of available revenues and provides recommendations for the allocation of funds.

The 2012-2035 RTP/SCS represents the culmination of more than two years of work involving dozens of public agencies, 191 cities, hundreds of local, county, regional and state officials, the business community, environmental groups, as well as various nonprofit organizations, and was founded on a broad-based public outreach effort. The implementation of one of the most comprehensive and coordinated public participation plans ever undertaken by SCAG is documented in the 2012-2035 RTP/SCS, Public Participation and Consultation Appendix[1].

The 2012-2035 RTP/SCS was formally adopted by the SCAG Regional Council on April 4, 2012 and submitted for approval to the federal agencies. The 2012-2035 RTP/SCS constitutes the transportation control strategy portion of the 2012 AQMP. A full, illustrative list of the 2012-2035 RTP/SCS projects can be found in the Project List Appendix of the 2012-2035 RTP/SCS. (See http://rtpscs.scag.ca.gov/Pages/2012-2035-RTP-SCS.aspx)

Key Planning Challenges

The challenges facing the region's future are daunting:

Mobility Challenges: The region's roadways are the most congested in the nation, resulting in over three million hours wasted each year sitting in traffic. Traffic relief is critical, even more so in the region's current economic situation. By failing to adequately address congestion in the Region, we have foregone jobs - every 10 percent decrease in congestion can bring an employment increase of about 132,000 jobs.

Air Quality Challenges: While Southern California is a leader in reducing emissions and ambient levels of air pollutants are improving, the SCAG region continues to have the worst air quality in the nation, and air pollution causes thousands of premature deaths

[1] http://rtpscs.scag.ca.gov/Documents/2012/final/SR/2012fRTP_PublicParticipation.pdf

every year, as well as other serious adverse health effects. The South Coast Air Basin has the worst air quality of the four air basins contained in the SCAG region.

Funding Need: Of all the challenges facing the transportation system today, there is perhaps none more critical than funding. With the projected growth in population, employment, and demand for travel, the costs of our multimodal transportation needs surpass projected revenues available from our historic transportation funding source - the gas tax. State and federal gas taxes have not changed in nearly 20 years. Yet, highway construction costs have grown by over 80 percent. The region must consider ways to stabilize existing revenue sources and supplement them with reasonably available new sources.

Regional Goals and Policies: To Realize a Sustainable Future

To guide development of the projects, programs, and strategies, SCAG's Regional Council adopted goals and objectives that help carry out the 2012-2035 RTP/SCS vision which encompasses three principles: mobility, economy, and sustainability. The regional goals reflect the wide-ranging challenges facing transportation planners and decision-makers in achieving the RTP/SCS vision. The goals demonstrate the need to balance many priorities in the most cost-effective manner. SCAG's Regional Council adopted the following goals as part of the 2012-2035 RTP/SCS.

- Align the plan investments and policies with improving regional economic development and competitiveness
- Maximize mobility and accessibility for all people and goods in the region
- Ensure travel safety and reliability for all people and goods in the region
- Preserve and ensure a sustainable regional transportation system
- Maximize the productivity of our transportation system
- Protect the environment and health of our residents by improving air quality and encouraging active transportation (non-motorized transportation, such as bicycling and walking)
- Actively encourage and create incentives for energy efficiency, where possible
- Encourage land use and growth patterns that facilitate transit and non-motorized transportation
- Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies

The six 2012-2035 RTP/SCS guiding policies below help focus future investments on the best-performing projects and strategies that seek to preserve, maintain, and optimize the performance of the existing system.

1) Transportation investments shall be based on SCAG's adopted regional Performance Indicators
2) Ensuring safety, adequate maintenance, and efficiency of operations on the existing multimodal transportation system should be the highest RTP/SCS priorities for any incremental funding in the region

3) RTP/SCS land use and growth strategies in the RTP/SCS will respect local input and advance smart growth initiatives
4) Transportation demand management (TDM) and non-motorized transportation will be focus areas, subject to Policy 1
5) HOV gap closures that significantly increase transit and rideshare usage will be supported and encouraged, subject to Policy 1
6) Monitoring progress on all aspects of the Plan, including the timely implementation of projects, programs, and strategies, will be an important and integral component of the Plan

<u>Transportation Investments</u>

The RTP/SCS contains a host of improvements to the regional multimodal transportation system. These improvements include closures of critical gaps in the network that hinder access to certain parts of the region, as well as the strategic expansion of our transportation system where there is room to grow in order to provide the region with the mobility it needs.

Active Transportation Component: $6.7 billion will be invested in various active transportation strategies to increase bikeways in the SCAG region from 4,315 miles to 10,122 miles, bring significant amount of sidewalks into compliance with the Americans with Disabilities Act (ADA), safety improvements, and various other strategies.

Transportation Demand Management (TDM) Component: $4.5 billion will be invested in various TDM strategies to incentivize drivers to reduce solo driving: (1) Increase carpooling and vanpooling; (2) Increase the use of transit, bicycling, and walking; (3) Redistribute vehicle trips from peak periods to non-peak periods by shifting work times/days/locations; (4) Encourage greater use of telecommuting; and (5) Other "first mile/last mile" strategies to allow travelers to easily connect to and from transit service at their origin and destination. These strategies include the development of mobility hubs around major transit stations, the integration of bicycling and transit through folding-bikes-on-buses programs, triple bike racks on buses, and dedicated racks on light and heavy rail vehicles.

Transportation System Management (TSM) Component: $7.6 billion will be invested in various TSM strategies to enhanced incident management, advanced ramp metering, traffic signal synchronization, advanced traveler information, improved data collection, universal transit fare cards (Smart Cards), and Transit Automatic Vehicle Location (AVL) to increase traffic flow and reduce congestion.

Transit Component: A total of $55.0 billion will be invested in (1) bus rapid transit (BRT) - new BRT routes, extensions, and/or service enhancements in Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties; (2) light rail transit - new light rail and commuter rail routes/extensions in Los Angeles and San Bernardino Counties; (3) heavy rail transit – heavy rail extension in Los Angeles County; and (4) bus - new and expanded bus service in Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties.

Passenger and High-Speed Rail Component: A total of $51.8 billion will be invested in (1) commuter rail - Metrolink extensions in Riverside County and Metrolink system-wide improvements to provide higher speeds; and (2) high speed rail - improvements to the Los Angeles to San Diego (LOSSAN) Rail Corridor with an ultimate goal of providing San Diego-Los Angeles express service in under two hours, and Phase I of the California High-Speed Train (HST) project that would provide high-speed service from the Kern County line to Anaheim via L.A. Union Station with stops in Palmdale, San Fernando Valley, L.A. Union Station, Norwalk and Anaheim.

Goods Movement (includes Grade Separations) Component: $48.4 billion will be invested in various goods movement strategies including Port access improvements, freight rail enhancements, grade separations, truck mobility improvements including an East-West Freight Corridor, intermodal facilities, and support of emission-reduction strategies such as the deployment of commercially available lower-emission trucks and locomotives in the near term while taking critical steps (including technology demonstration projects) toward the phased implementation of a zero- and near-zero emission freight system.

Aviation and Airport Ground Access Component: As included in their respective modal investments, substantial investment will be made in various airport ground access improvements including rail extensions and improvements to provide easier access to airports, and new express bus service from remote terminals to airports.

Highways Component: $64.2 billion will be invested in (1) toll facilities - closure of critical gaps in the highway network to provide access to all parts of the region ($27.3 billion); (2) High-Occupancy Vehicle (HOV)/High-Occupancy Toll (HOT) - closure of gaps in the HOV lane network and the addition of freeway-to-freeway direct HOV connectors to complete Southern California's HOV network and a connected network of Express/HOT lanes ($20.9 billion); and (3) mixed flow – interchange improvements to and closures of critical gaps in the highway network to provide access to all parts of the region ($16.0 billion).

Arterials Component: $22.1 billion will be invested in various arterial improvements including spot widening, signal prioritization, driveway consolidations and relocations, grade separations at high-volume intersections, new bicycle lanes, and other design features such as lighting, landscaping, and modified roadway, parking, and sidewalk widths.

Operations and Maintenance Component: $216.9 billion will be invested in the operations and maintenance of transit ($139.3 billion), highways ($56.7 billion), and arterials ($20.9 billion) to preserve our multimodal system in a good state of repair.

<u>Financial Plan</u>

The 2012–2035 RTP/SCS financial plan identifies how much money is available to support the region's transportation investments. The plan includes a core revenue forecast of existing local, state, and federal sources along with funding sources that are reasonably available over the time horizon of the RTP/SCS. These new sources include adjustments to state and federal gas tax rates based on historical trends and recommendations from two national commissions (National Surface Transportation Policy and Revenue Study Commission and National Surface Transportation Infrastructure Financing Commission) created by Congress, further leveraging of existing local sales tax measures, value capture strategies, potential national freight program/freight fees, as well as passenger and commercial vehicle tolls for specific facilities. Reasonably available revenues also include innovative financing strategies, such as private equity participation. In accordance with federal guidelines, the plan includes strategies for ensuring the availability of these sources.

Sustainable Communities Strategy

Under SB 375, the primary goal of the SCS is to provide a vision for future growth in Southern California that will decrease per capita greenhouse gas emissions from automobiles and light trucks. This leads to strategies that can help reduce per capita vehicle miles traveled over the next 25 years. The strategies contained in the 2012–2035 RTP/SCS will produce benefits for the region far beyond simply reducing GHG emissions. Because it is the latest refinement of an evolving regional blueprint that SCAG began in 2000, the 2012–2035 RTP/SCS will help the region contend with many ongoing issues across a wide range of concerns, including better placemaking, lower cost to taxpayers and families, benefits to public health and environment, greater responsiveness to changing demographics and housing markets, and improved access and mobility.

The 2012–2035 RTP/SCS was built primarily from local General Plans and input from local governments using the Local Sustainability Planning Tool, from the subregional COGs and from the County Transportation Commissions. A review of local plans and subregional strategies points to the common ground that is inherent in SCAG's 2008 Advisory Land Use Policies. The advisory land use policies are a foundation for the overall regional land use development pattern:

- Identify regional strategic areas for infill and investment – Identify strategic opportunity areas for infill development of aging and underutilized areas and increased investment in order to accommodate future growth.
- Structure the plan on a three-tiered system of centers development – Identify strategic centers based on a three-tiered system of existing, planned, and potential, relative to transportation infrastructure.
- Develop "complete communities" – Create mixed-use districts, or "complete communities," in strategic growth areas through a concentration of activities with housing, employment, and a mix of retail and services, located in close proximity to each other.
- Develop nodes on a corridor – Intensify nodes along corridors with people-scaled, mixed-use developments.

- Plan for additional housing and jobs near transit – Support and improve transit use and ridership by creating pedestrian-friendly environments and more compact development patterns in close proximity to transit.
- Plan for a changing demand in types of housing – Address shifts in the labor force that will likely induce a demand shift in the housing market for additional development types such as multifamily and infill housing in central locations, which will appeal to the needs and lifestyles of these large populations.
- Continue to protect stable, existing single-family areas – Continue to protect stable, existing single-family neighborhoods as future growth and a more diverse housing stock are in infill locations near transit stations.
- Ensure adequate access to open space and preservation of habitat – Ensure access to open space and habitat preservation despite competing quality-of-life demands driven by growth, housing and employment needs, and traditional development patterns.
- Incorporate local input and feedback on future growth – Continue public outreach efforts and incorporate local input through public workshops, scenario planning, and stakeholder outreach.

These policies have evolved over time and serve as the basis for SCAG's Compass Blueprint, a regional voluntary program that offers innovative planning tools, creative strategies, and collaborative partnerships to all local governments within the region. Since its inception, Compass Blueprint has supported local demonstration projects that seek to improve mobility for all residents, foster livability in all communities, enable prosperity for all people, and promote sustainability for future generations.

The SCS strives to integrate the transportation network and related strategies with an overall land use pattern that responds to projected growth, housing needs, changing demographics, and transportation demands. The regional vision of the SCS maximizes current voluntary local efforts that support the goals of SB 375, as evidenced by several Compass Blueprint demonstration projects and various county transportation improvements. The SCS focuses the majority of new housing and job growth in high-quality transit areas and other opportunity areas in existing main streets, downtowns, and commercial corridors, resulting in an improved jobs-housing balance and more opportunity for transit-oriented development. This overall land use development pattern supports and complements the proposed transportation network that emphasizes system preservation, active transportation, and transportation demand management measures. The RTP/SCS fully integrates the two subregional SCSs prepared by the Gateway Cities and Orange County Council of Governments.

In addition to Compass Blueprint, cities and counties within the SCAG region continue to implement their own local land use and transportation projects that support the goals of the 2012–2035 RTP/SCS.

To achieve the goals of the 2012–2035 RTP/SCS, public agencies at all levels of government may implement a wide range of strategies that focus on four key areas:

- A Land Use growth pattern that accommodates the region's future employment and housing needs and protects sensitive habitat and natural resource areas;
- A Transportation Network that consists of public transit, highways, local streets, bikeways, and walkways;
- Transportation Demand Management (TDM) measures that reduce peak-period demand on the transportation network; and
- Transportation System Management (TSM) measures that maximize the efficiency of the transportation network.

In addition, SCAG is a strategic partner in a regional effort to accelerate fleet conversion to zero- and near-zero emission transportation technologies. SCAG's policy with regard to alternative fuels is technology neutral and does not favor any one technology over any other. To accommodate the anticipated increase in alternative fueled vehicles, a significant expansion of infrastructure is needed throughout the region, among other preparedness steps.

SB 375 provides incentives in the form of CEQA streamlining to encourage community design that supports reduction in per capita GHG emissions. Generally, two types of projects are eligible for streamlined CEQA review once a compliant RTP/SCS has been adopted: (1) residential/ mixed-use projects (consistent with the SCS) or (2) a Transit Priority Project (TPP).

<u>Regional Transportation Emissions</u>

Based on the data generated from SCAG's Regional Travel Demand Model (e.g., traffic volumes, vehicle speeds, transit ridership, etc.), an estimate of emissions associated with on-road mobile sources can be generated using CARB's emission factor model (EMFAC). Through this process, future emissions from on-road mobile sources can be compared for the regional transportation system assuming implementation of the RTP/SCS versus a baseline case without RTP/SCS implementation. It is generally understood that potential future improvements in air quality deriving from the RTP/SCS will likely be much smaller, since motor vehicle emissions have and will continue to be substantially reduced through technology (i.e., emission standards for new engines and in-use standards for existing fleets). Table 1 below compares VOC (ROG), NOx, and PM2.5 emissions between implementation of the 2012-2035 RTP/SCS and the baseline without the regional transportation strategy for 2014 and 2035.

Table 1 Regional Transportation Emissions (annual average) (tons per day) *

	VOC (ROG)		**NOx**		**$PM_{2.5}$ ****	
	2014	2035	2014	2035	2014	2035
2012 RTP/SCS	137.5	70.9	285.9	119.6	15.2	14.2
2012 RTP Baseline	137.6	72.8	285.5	124.8	15.2	15.6
RTP/SCS Reduction	-0.1	-1.9	-0.4	-5.2	0.0	-1.4

Note: * Calculated with EMFAC2007; ** Does not include fugitive dust calculations

Transportation Control Measures

TCMs are measures that are specifically identified and committed to in the applicable implementation plan that are either one of the types listed in CAA section 108, or any other measures for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Vehicle technology-based, fuel-based, and maintenance-based measures which control the emissions from vehicles under fixed traffic conditions are not TCMs. TCMs in this plan include the following three main categories of transportation improvement projects and programs:

- High occupancy vehicle (HOV) measures,
- Transit and systems management measures, and
- Information-based transportation strategies.

The 2012-2035 RTP/SCS includes TCM type projects throughout the entire Plan horizon (i.e., 2035) and are all part of the regional transportation strategy for the 2012 South Coast PM2.5 AQMP. Those TCM type projects which have funding programmed for right of way or construction in the first two years of the prevailing FTIP are considered committed for air quality planning purposes in the applicable SIP. Attachment A of this Appendix illustrates the currently committed TCMs that are derived from the TCM projects of the 2011 FTIP, as amended.

TCM Emissions Reduction Benefits To estimate the emission benefits of TCMs, the socio-economic data variables of the 2012-2035 RTP/SCS were held constant while the transportation network was modified to account for the TCMs in the Plan (both TCM-type projects and committed TCMs). In other words, the TCM emissions reduction benefits are the difference between the 2012-2035 RTP/SCS which includes TCMs and the AQMP baseline which is defined as RTP minus TCMs. It should be noted that this analysis is done for illustrative purposes as the regional transportation strategy is appropriately viewed on a systems-level basis, and not by its components since each of the individual transportation improvements and strategies affect each other and the system.

Compared to previous AQMPs/SIPs, potential future improvements in air quality deriving from TCMs is consistently diminishing for two reasons. On one hand, motor vehicle emissions have and will continue to be substantially reduced through technology. On the other hand, most of the TCM projects in the South Coast Air Basin were adopted into the SIP to meet the one-hour ozone standard by 2010 and have already been implemented. Thus, the emission reductions associated with these projects are now included in the baseline emissions and no longer show up in the TCM benefit values. Table 2 shows the results of the TCM modeling analysis for years 2014, 2019, and 2023.

Table 2 TCM Emissions (annual average) (tons per day) *

	VOC (ROG)			NOx			$PM_{2.5}$ **		
	2014	**2019**	**2023**	**2014**	**2019**	**2023**	**2014**	**2019**	**2023**
2012 RTP/SCS	137.5	110.7	93.7	285.9	194.1	157.7	15.2	14.8	13.5
RTP/SCS without TCM	137.8	111.1	94.4	286.6	195.5	159.2	15.3	15.1	13.9
TCM Reduction	-0.3	-0.4	-0.7	-0.7	-1.4	-1.5	-0.1	-0.3	-0.4

Note: * Calculated with EMFAC2007; ** Does not include fugitive dust calculations

Section III. Reasonably Available Control Measure Analysis

Introduction

Clean Air Act Section 172(c)(1) requires SIPs to provide for the implementation of all reasonably available control measures (RACM) as expeditiously as practicable. Guidance on interpreting RACM requirements in the context of the 1990 Amendments was set forth in the General Preamble (57 FR 13498, 13560) in 1992. In the General Preamble, U.S. Environmental Protection Agency (EPA) interpreted section 172(c)(1) as imposing a duty on States to consider all available control measures and to adopt and implement measures that are reasonably available for implementation in a specific nonattainment area. It also retained an earlier interpretation of RACM that it would not be reasonable to require the implementation of measures that do not advance the date for attainment.

With regard to TCMs, EPA revised earlier guidance by indicating that it is inappropriate to presume that all Section 108(f)(1)(A) measures of the CAA are available in all nonattainment areas. Instead, States should consider Section 108(f)(1)(A) measures as potential options that are not exhaustive, but indicative of the types of measures that should be considered. In addition, any measure identified as reasonably available during the public comment period should also be considered for implementation. EPA indicated that States could reject measures as not reasonably available for reasons related to local conditions. States are required to justify why available measures were not considered RACM and not adopted in the SIP.

To meet the RACM requirements articulated in the EPA guidance described above, this RACM analysis was performed using several steps. First is a description of the process by which SCAG and related transportation agencies in the South Coast Air Basin identify, review, and make enforceable commitments to implement TCMs. Second is the assembly and review of a list of control measures recently implemented in other ozone nonattainment areas. This effort involved a review of measures implemented in California nonattainment areas as well as those located in Arizona, Colorado, Georgia, New York, Texas, and Washington D.C., and the organization of those measures in the 16 categories specified in CAA Section 108(f). The third step is to determine RACM measures by contrasting the list of candidate measures with measures implemented to date in the South Coast Air Basin, as well as any new commitments in the current AQMP. The fourth step is to provide a reasoned justification for any of the available measures that have yet to be implemented. These justifications must address criteria described in the above-cited guidance.

SCAG RACM/TCM Development Process

While the SCAG Region has an extensive, systematic TCM development program continually updated through the FTIP process, areas are obligated during SIP preparation to evaluate TCMs and determine whether they qualify as RACM.

The RACM process relies predominantly on the continuous updating and addition process for TCMs in the South Coast Air Basin. The TCM process was established for the South Coast Air Basin by replacing a process that developed TCMs each time a SIP was produced with a continuous ongoing TCM process. This process continues to govern the selection and implementation of TCMs today. TCMs are continuously identified and reviewed throughout the transportation planning process. SCAG's ongoing public outreach effort, including an involved interagency input process via the TCWG, helps ensure that the process to identify and review TCMs is robust, inclusive, and comprehensive. Development of TCMs arises from multiple processes and multiple sources, which include CTCs, subregional agencies, task forces, committees, and the public. These funding and scheduling incentives ensure that TCMs are developed, sponsored, and clearly identified throughout the process.

<u>Assembly and Review of Candidate RACM</u>

EPA and related court decisions have maintained that TCMs considered RACM must be measures that 1) advance the attainment date, typically by at least one year and 2) are technologically and economically feasible. Measures must pass both the advance attainment and technical/economic feasibility tests to be deemed RACM.

U.S. EPA guidance documents provide help in identifying the type of measures to be considered. CAA Section 108(f)(1)(A) provides a list of sixteen categories of TCMs that are potential options that should be considered indicative types of control measures:

- i. *Programs for improved use of public transit;*
- ii. *Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;*
- iii. *Employer-based transportation management plans, including incentives;*
- iv. *Trip-reduction ordinances;*
- v. *Traffic flow improvement programs that achieve emission reductions;*
- vi. *Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;*
- vii. *Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;*
- viii. *Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;*
- ix. *Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;*
- x. *Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;*
- xi. *Programs to control extended idling of vehicles;*
- xii. *Programs to reduce motor vehicle emissions, consistent with Title II of the Clean Air Act, which are caused by extreme cold start conditions;*

xiii. *Employer-sponsored programs to permit flexible work schedules;*

xiv. *Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;*

xv. *Programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation, when economically feasible and in the public interest; and*

xvi. *Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.*

EPA guidance has emphasized that these sixteen measures are an illustrative, but not exhaustive list. Instead, TCMs need to be evaluated on an area-by-area basis to determine which are reasonably available. In addition to the measures listed above, the 1992 General Preamble of the CAA cite other sources to include TCMs that were a) suggested during public comments (e.g. at workshops, public hearings, in written comments, etc.); b) adopted in other nonattainment areas of the country; and c) specifically identified by the EPA (i.e. EPA TCM database, support documents for rulemaking, etc.).[2]

To develop a list of candidate RACM, SCAG performed a comprehensive review of available TCMs in California, as well as in other states. SCAG reexamined the candidate RACM identified during the comprehensive RACM analysis performed for the 2007 AQMP. Additionally, SCAG coordinated with other MPOs and air quality districts to identify measures that are being implemented in the following other nonattainment areas:

- **Maricopa County, Arizona**: Maricopa Association of Governments. Eight-Hour Ozone Resignation Request and Maintenance Plan for the Maricopa Nonattainment Area, February, 2009.
- **Bay Area, California**: Bay Area Air Quality Management District. Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard, October 24, 2001.
- **Sacramento, California**: Sacramento Metropolitan Air Quality Management District. Sacramento Regional 8-Hour Ozone Attainment and RFP Plan, December 19, 2008. EPA approval pending.
- **San Joaquin Valley, California**: San Joaquin Valley Air Pollution Control District. 2007 Ozone Plan, April 30, 2007.
- **Denver Metropolitan Area, Colorado**: North Front Range Metropolitan Organization. Denver Metro Area and North Front Range Ozone Action Plan, December 12, 2008.

[2] Seitz, John S. (December 2, 1999). Memo from John Seitz: Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas. Available at: **http://www.epa.gov/ttn/oarpg/t1/memoranda/revracm.pdf.**

- **Atlanta Metropolitan Area, Georgia**: Georgia Department of Natural Resources, Environmental Protection Division. Proposed Georgia's State Implementation Plan for the Atlanta 8-Hour Ozone Nonattainment Area, March 26, 2009. EPA approval pending.
- **New York Metropolitan Area, New York**: New York State Department of Environmental Conservation Ozone (8-Hour NAAQS) Attainment Demonstration for NY Metro Area, August 9, 2007.
- **Dallas-Fort Worth Area, Texas**: Texas Commission on Environmental Quality. Revisions to the State of Texas Air Quality Implementation Plan for the Control of Ozone Air Pollution, Dallas-Forth Worth 8-Hour Ozone Nonattainment Area, December 7, 2011. EPA approval pending.
- **Houston-Galveston Area, Texas**: Texas Commission on Environmental Quality. Revisions to the State of Texas Air Quality Implementation Plan for the Control of Ozone Air Pollution, Houston-Galveston-Brazoria 1997 8-Hour Ozone Nonattainment Area, March 10, 2010. EPA approval pending.
- **Washington D.C.**: Metropolitan Washington Council of Governments (MWCOG). Plan to Improve Air Quality in the Metropolitan Washington, DC-MD-VA Region: State Implementation Plan (SIP) for 8-Hour Ozone Standard, May 23, 2007.

Additionally, TCMs were discussed and reviewed at numerous TCWG meetings as part of the 2011 FTIP, 2012-2035 RTP/SCS, and 2012 AQMP. Further, SCAG has an extensive and robust public participation process for the development of the RTP/FTIP through ongoing public meetings, and technical, advisory, and policy committees. These groups generally meet on a monthly basis and provide explicit opportunities for the public to participate and contribute.

In summary, SCAG performed the RACM analysis based on information reviewed from the following sources:

- CAA Section 108(f)(1)(A)
- 2007 South Coast AQMP RACM Analysis
- Other nonattainment areas in California
- Other nonattainment areas outside California
- RTP/FTIP Updates
- Interagency Consultation (TCWG)

The candidate measures were reviewed to determine which can be considered RACM. As discussed above, the RACM TCM requirement consists of two core criteria that must be satisfied: 1) TCMs must advance attainment of the air quality standards; and 2) TCMs must be both technically and economically feasible. EPA has not provided specific definitions on these core criteria, but has preferred to allow flexibility in each region's determination.

In practice, agencies have based their determination of the first criteria on whether a measure or group of measures would help an area achieve attainment one year earlier than in the absence of the measure or group of measures. In other words, TCM implementation must significantly reduce emissions to facilitate attainment of the NAAQS one year earlier than without the TCMs. Considering the magnitude of the emissions reductions necessary to demonstrate attainment in the South Coast Air Basin, the implementation of TCMs is not expected to meet this criterion. Technical feasibility has been determined in terms of local factors, such as environmental impacts, availability of control measures, and ability to achieve the emission reductions. Project cost-effectiveness has been considered a determining factor to determine economic feasibility.

Determining RACM Measures

For this step of the RACM analysis, SCAG compared the list measures implemented within the South Coast Air Basin with those implemented in other areas. SCAG then organized measures, including candidate measures and those measures currently implemented in the region, according to the sixteen categories specified in Section 108(f)(1)(A) of the CAA. No formal requirement exists on how to organize TCMs. However, SCAG utilized this organization scheme as a way to highlight those measures that fall within the sixteen CAA categories, which are formally recognized as "TCMs" and subject to CAA and federal conformity requirements. SCAG found a small number of candidate measures that were not currently implemented in the region and not included in the 2007 AQMP RACM analysis. In addition, a new category titled “Other Measures and Programs” was added to the list of measures. This category includes TCMs that do not fall in any of the sixteen Section 108(f) categories. New measures that were in addition to those reviewed as part of the 2007 RACM analysis were highlighted in bold font as shown in Attachment B.

For this RACM analysis, SCAG also reviewed statewide and South Coast AQMD measures that have been adopted since the last RACM analysis. Although these measures are out of the realm of SCAG’s funding authority, they are discussed below for completeness. Statewide mobile source measures are also covered in California RACM analysis completed for the latest ozone SIP revision for the South Coast Air Basin. Table 3 shows on-road TCMs and mobile source measures that were adopted by the ARB and are currently being implemented in the SCAG region.

Table 3 Adopted California Transportation Control Measures

RACM	**Implementing Nonattainment Area**	**Implemented in SCAG?**
California Diesel Fuel Regulation	ARB	Yes
On-Road Heavy-Duty Diesel Vehicles Regulation	ARB	Yes
California Reformulated Gasoline	ARB	Yes
Low Emission Vehicle Standards (LEV II)	ARB	Yes
Transportation Refrigeration Unit ATCM	ARB	Yes
School Bus Idling ATCM	ARB	Yes
Fleet Rule for Transit Agencies	ARB	Yes
Drayage Truck Regulation	ARB	Yes
Hybrid Truck and Bus Voucher Incentive Program	ARB	Yes
Clean Vehicle Rebate Project	ARB	Yes
Solid Waste Collection Vehicle Rule	ARB	Yes
Heavy-Duty Vehicle Inspection Program	ARB/BAR	Yes
Periodic Smoke Inspection Program	ARB/BAR	Yes
School Bus Retrofit Program	ARB/SCAQMD	Yes
Goods Movement Program/Proposition 1B	ARB/CTC/SCAQMD	Yes

Reasoned Justification

The fourth step is to provide a reasoned justification for any of the available measures that have yet to be implemented or will not be implemented. In 1999, EPA issued a memorandum entitled "Guidance on the Reasonably Available Control Measures Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas."[3] In this memorandum, EPA states that in order to determine whether a state has adopted all RACM necessary for attainment and as expeditiously as practicable, the state must explain why the selected implementation schedule is the earliest schedule based on the circumstances of the area. This indicated that States could reject measures as not reasonably available for reasons related to local conditions. In such cases, States are obligated to provide justification as to why potentially reasonable measures have not been adopted. Valid reasons for rejecting a measure include that it would not advance the attainment date, it is economically infeasible, or it is technologically infeasible.

The complete listing of all candidate measures evaluated for RACM determination is included in Attachment B. A "Measure Number" is assigned for each strategy for ease of discussion (not rank in priority). The "Description" column provides a brief description of the relevant measure in discussion. "Has It Been Implemented?" confirms whether the measure is currently implemented in the SCAG region. The final column "Reasoned Justification for Not Implementing" provides a reasoned justification for those measures that were not considered RACM. SCAG appropriately considered a number of factors that included technical and economic feasibility, enforceability, geographic applicability, and ability to provide emission reductions. Of the TCMs that were deemed candidate measures, none were found to meet the criteria for RACM implementation.

Conclusion

CAA Section 172(c)(1) requires SIPs to provide for the implementation of all RACM as "expeditiously as practicable." EPA and related court decisions have maintained that TCMs considered RACM must be measures that 1) advance the attainment date, typically by at least one year and 2) are technologically and economically feasible. Measures must pass both the advance attainment and technical/economic feasibility tests to be deemed RACM.

Based on a comprehensive review of TCM projects in other nonattainment areas or otherwise identified, it is determined that the TCMs being implemented in the South Coast Air Basin are inclusive of all RACM. None of the candidate measures reviewed herein and determined to be infeasible meets the criteria for RACM implementation.

[3] Seitz, John S. (December 2, 1999). *Memo from John Seitz: Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas.* Available at: http://www.epa.gov/ttn/oarpg/t1/memoranda/revracm.pdf

SCAG and the local transportation agencies have in place a comprehensive, formal process for identifying, evaluating, and selecting TCMs. The regular RTP, FTIP, and AQMP/SIP public update processes ensure that TCM identification and implementation is a routine consideration that helps SCAG and the AQMD demonstrate attainment of applicable NAAQS.

Attachment A: Committed Transportation Control Measures (TCMs)

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
BALDWIN PARK	LAFA141	BALDWIN PARK METROLINK TRANSPORTATION CENTER. FUNDED THRU STIP AUGMENTATION CONSTRUCTION A TRANSPORTATION CENTER AND PARKING STRUCTURE AT THE BALDWIN PARK METROLINK STATION.	11/1/2014
FOOTHILL TRANSIT ZONE	LA0B311	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM SAFETEA-LU # 341 (E-2006-BUSP-092) (E-2006-BUSP-173)	12/31/2013
GLENDALE	LA0G406	FAIRMONT AVE. PARK-N-RIDE FACILITY (83 PARKING SPACES) TO SERVE COMMUTERS USING SR-134, I-5. THE LOCATION OF THE PARK-N-RIDE IS FAIRMONT AVENUE AND SAN FERNANDO RD.	12/30/2013
LOS ANGELES COUNTY	LAF1514	EMERALD NECKLACE BIKE TRAIL PROJECT. DESIGN AND CONSTRUCT 1.1 MILES OF CLASS I BIKE PATH TO CONNECT DUARTE ROAD TO THE SAN GABRIEL RIVER BICYCLE TRAIL.	6/30/2013
LOS ANGELES COUNTY MTA	LA0G270	EXPANSION AND IMPROVEMENT TO EXISTING TRANSIT CENTER IN THE CITY OF PALMDALE. E2009-BUSP-137.	9/30/2013
LOS ANGELES COUNTY MTA	LA0F021	EXPOSITION LIGHT RAIL TRANSIT SYSTEM PHASE II – FROM CULVER CITY TO SANTA MONICA	12/31/2017
LOS ANGELES COUNTY MTA	LA29202W	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. FROM VERMONT TO SANTA MONICA DOWNTOWN- MID-CITY WILSHIRE BRT INCL. DIV. EXPANSION AND BUS ONLY LANE	12/31/2014
LOS ANGELES COUNTY MTA	LA0G194	ACQUIRE FOUR (4) ALTERNATE FUEL BUSES FOR THE CITY OF ARTESIA TO BE USED FOR NEW FIXED ROUTE SERVICE EARMARK ID #E2008-BUSP-0694	10/31/2012
LOS ANGELES COUNTY MTA	LA0C10	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT PHASE I TO VENICE-ROBERTSON STATION	12/31/2012
LOS ANGELES COUNTY MTA	LA0G431	MULTI-MODAL TRANSIT CENTER AT CSUN TO INCLUDE PASSENGER LOADING AREAS AND BUS SHELTERS	10/1/2012
LOS ANGELES COUNTY MTA	LA974165	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMMODATE PUBLIC ACCESS (PEDESTRIAN ENTRANCES, WALKWAYS, BICYCLE FACILITIES) PPNO# 3417	12/30/2011
LOS ANGELES, CITY OF	LA0G155	LACRD – TRANSIT SIGNAL PRIORITY IN THE CITY OF LOS ANGELES.	02/28/2012

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
PASADENA	LAE3790	THE PASADENA ITS INTEGRATES 3 COMPONENTS; TRAFFIC SIGNAL COMMUNICATION AND CONTRL, TRANSIT VEHICLE ARRIVAL INFO AND PUBLIC PARKING AVAILABILITY INFO. SAFETEA-LU PRJ #3790 AND #399	6/30/2013
PICO RIVERA (PREVIOUSLY LEAD AGENCY WAS SGVCOG)	LA0C57	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEP. AT PASSONS BLVD IN PICO RIVERA (& MODIFY PROFILE OF SERAPIS AV,)(PART OF ALAMEDA CORR EAST PROJ.)SAFETEA-LU HPP # 1666 (TCRP #54.3)	12/31/2012
ROLLING HILLS ESTATE	LAF1529	PALOS VERDES DRIVE NORTH BIKE LANES. CONSTRUCTION OF CLASS II BIKE LANE AND RELATED IMPROVEMENTS ON PALOS VERDES DRIVE NORTH	12/31/2013
SANTA CLARITA	LAF1424	MCBEAN REGIONAL TRANSIT CENTER PARK AND RIDE. PURCHASE LAND, DESIGN, AND CONSTRUCT A REGIONAL PARK-AND-RIDE LOT ADJACENT TO THE MCBEAN REGIONAL TRANSIT CENTER IN THE CITY OF SANTA CLARITA.	10/1/2013
WHITTIER	LA0G257	WHITTIER GREENWAY TRAILHEAD PARK. EXTENSION OF WHITTIER GREENWAY TRAIL FROM MILLS AVENUE TO 300 FEET EAST OF MILLS AVENUE ON CITY OWNED RIGHT-OF-WAY IN CONJUNCTION WITH THE CONSTRUCTION OF NEW TRAILHEAD PARK WITH A PARK AND RIDE PARKING LOT FOR NEARBY PUBLIC TRANSIT STOP. NEW 20 SPACE PARKING LOT WOULD BE CONSTRUCTED OF “GREEN” PERMEABLE PAVEMENT IN COMPLIANCE WITH NPDES REQUIREMENTS. INCLUDES THE INSTALLATION OF PARK AMENITIES, DRINKING FOUNTAIN FOR THE CONVENIENCE OF PEDESTRIAN AND BICYCLE PATRONS OF THE WHITTIER GREENWAY TRAIL. CONSTRUCTION OF NEW SIDEWALKS ALONG MILLS AVENUE TO PROVIDE WHITTIER GREENWAY TRAIL CROSSING CONNECTION AT THE SIGNALIZED INTERSECTION OF MILLS AVENUE AT LAMBERT ROAD.	9/30/2014
ARTESIA	LAF1607	SOUTH STREET PEDESTRIAN, BIKEWAY AND TRANSIT IMPROVEMENT. IMPROVE PEDESTRIAN ENVIRONMENT AND TRANSIT STOP LOCATIONS WITH LANDSCAPED MEDIANS, TRANSIT SHELTERS, BENCHES, SIDEWALK ENHANCEMENTS AND LIGHTING. CLOSE EXISTING BIKE LANE GAP.	10/1/2014
AVALON	LAF1501	COUNTY CLUB DRIVE BIKEWAY IMPROVEMENT PROJECT. CONSTRUCTION OF A 4-FOOT WIDE CLASS II BIKE LANE IN BOTH DIRECTIONS ALONG A ONE MILE SECTION OF COUNTRY CLUB DRIVE.	10/1/2013
AZUSA	LAF3434	AZUSA INTERMODAL TRANSIT CENTER. CONSTRUCT REGIONAL AZUSA INTERMODAL TRANSIT CENTER TO ACCOMMODATE EXISTING AND FUTURE PARKING DEMAND AND SUPPORT EFFECTIVE TRANSIT USE.	6/30/2015

Attachment A: Committed Transportation Control Measures (TCMs)

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
BALDWIN PARK	LAE0076	CONSTRUCT ADD'L VEHICLE PARKING (200 TO 400 SPACES), BICYCLE PARKING LOT AND PEDESTRIAN REST AREA AT THE TRANSIT CENTER	12/31/2014
BALDWIN PARK	LAF1654	BALDWIN PARK METROLINK PEDESTRIAN OVERCROSSING. CONSTRUCT A PEDESTRIAN OVERCROSSING OVER BOGART AVE AND THE METROLINK LINE TO LINK THE STATION WITH VITAL BUS TRANSFER POINTS AND TO PROVIDE ACCESS TO PARKING OVERFLOW AREAS.	10/1/2015
BURBANK	LAF1502	SAN FERNANDO BIKEWAY. IMPLEMENT A CLASS I BIKEWAY ALONG SAN FERNANDO BLVD, VICTORY PLACE AND BURBANK WESTERN CHANNEL TO COMPLETE THE BURBANK LEG OF A 12 MILE BIKEWAY.	6/30/2014
CALTRANS	LA000358	ROUTE 5: – FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 12180, 12181,12182,12183,12184, 13350 PPNO 0142F,151E,3985,3986,3987) SAFETEA LU # 570. CONSTRUCT MODIFIED IC @ I-5 EMPIRE AVE, AUX LNS NB & SB BETWEEN BURB	12/31/2014
CALTRANS	LA000548	ROUTE 10: FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (EA# 117080, PPNO# 0309N)	2/12/2016
CALTRANS	LA0B875	ROUTE 10: HOV LANES FROM CITRUS TO ROUTE 57/210 – (EA# 11934, PPNO# 0310B)	3/15/2016
CALTRANS	LA0D73	ROUTE 5: LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW (EA 2159A0, PPNO 2808). TCRP#42.2&42.1	12/1/2016
CALTRANS	LA000357	ROUTE 5: FROM ROUTE 170 TO ROUTE 118 ONE HOV LANE IN EACH DIRECTION (10 TO 12 LANES) INCLUDING THE RECONSTRUCTION OF THE I-5/SR-170 MIXED FLOW CONNECTOR AND THE CONSTRUCTION OF THE I-5/SR-170 HOV TO HOV CONNECTOR (CFP 345) (2001 CFP 8339; CFP2197).	12/31/2013
CALTRANS	LA01342	ROUTE 10: RT 10 FROM RT 605 TO PUENTE AVE HOV LANES (8+0 TO 8+2) (EA# 117070, PPNO 0306H) PPNO 3333 3382 AB 3090 REP (TCRP #40)	10/28/2013
CALTRANS	LA996134	ROUTE 5: RTE. 5/14 INTERCHANGE & HOV LNS ON RTE 14 – CONSTRUCT 2 ELEVATED LANES – HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO 0168M)	5/24/2013
CLAREMONT	LAF1510	CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY. THIS PROJECT PROPOSES THE IMPLEMENTATION OF THE CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY UTILIZING BONITA AVENUE AND FIRST STREET AS PRIMARY CLASS II BIKE ROUTES.	10/1/2012

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
EL MONTE	LAF1504	EL MONTE: TRANSIT CYCLE FRIENDLY. EL MONTE PROPOSES TO IMPLEMENT THE 1ST PHASE OF THE EL MONTE BIKE-TRANSIT HUB COMPONENT (METRO BICYCLE TRANSPORTATION STRATEGIC PLAN) A COUNTYWIDE EFFORT TO IMPROVE BIKE FACILITIES	10/1/2013
LONG BEACH	LAE1296	LONG BEACH INTELLIGENT TRANSPORTATION SYSTEM	9/30/2012
LONG BEACH	LAF1530	BICYCLE SYSTEM GAP CLOSURES & IMPROVED LA RIVER BIKE PATH. PROJECT WILL CONSTRUCT PRIORITY CLASS I & III BICYCLE SYSTEM GAP CLOSURES IN LONG BEACH AND IMPROVE CONNECTION TO LA RIVER.	10/1/2014
LOS ANGELES COUNTY MTA	LA0D198	CRENSHAW TRANSIT CORRIDOR	12/31/2018
LOS ANGELES COUNTY MTA	LA0G010	REGIONAL CONNECTOR – LIGHT RAIL IN TUNNEL ALLOWING THROUGH MOVEMENTS OF TRAINS, BLUE, GOLD, EXPO LINES. FROM ALAMEDA / 1ST STREET TO 7TH STREET/METRO CENTER	12/31/2019
LOS ANGELES COUNTY MTA	LA0G154	LACRD – EL MONTE TRANSIT CENTER IMPROVEMENTS AND EL MONTE BUSWAY IMPROVEMENTS, INCLUDING BIKE LOCKERS, TICKET VENDING MACHINES AT EL MONTE BUSWAY STATIONS AND UP TO 10 BUS BAYS.	12/31/2012
LOS ANGELES COUNTY MTA	LA0G447	METRO PURPLE LINE WESTSIDE SUBWAY EXTENSION SEGMENT 1 – WILSHIRE/WESTERN TO FAIRFAX	12/31/2019
LOS ANGELES COUNTY MTA	LA0C8114	LA CITY RIDESHARE SERVICES; PROVIDE COMMUTE INFO, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS. PPNO 9003	12/30/2016
LOS ANGELES COUNTY MTA	LA963542	ACQUISITION REVENUE VEHICLES – 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS); FY05-FY10 TOTAL OF 1000 BUSES.	6/30/2014
LOS ANGELES COUNTY MTA	LAE0036	WILSHIRE/ VERMONT PEDESTRIAN PLAZA IMPROVEMENTS AND INTERMODAL PEDESTRIAN LINKAGES	2012
LOS ANGELES COUNTY MTA	LAE0195	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES PIERCE COLLEGE AND MTA'S RAPID BUS TRANSIT STOPS TO INCLUDE PASSENGER AMENITIES, 2007 CFP # F1658	10/1/2014

Attachment A: Committed Transportation Control Measures (TCMs)

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
LOS ANGELES, CITY OF	LA0C8164	EXPOSITION BLVD RIGHT-OF-WAY BIKE PATH-WESTSIDE EXTENSION. DESIGN AND CONSTRUCTION OF 2.5 MILES OF CLASS 1 BIKEWAY, LIGHTING, LANDSCAPING & INTERSECTION IMPROVEMENTS. (PPNO# 3184)	2/2/2012
LOS ANGELES, CITY OF	LAF1704	DOWNTOWN L.A. ALTERNATIVE GREEN TRANSIT MODES TRIAL PROGRAM. OFFER SHARED RIDE-BICYCLE AND NEIGHBORHOOD ELECTRIC VEHICLE TRANSIT SERVICES TO LA CITY HALL AS AN ALTERNATIVE TO OVERCROWDED DASH SERVICE	6/27/2014
LOS ANGELES, CITY OF	LA002738	BIKEWAY/PEDESTRIAN BRIDGE OVER LA RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077) (PPNO# 3156)	7/31/2015
LOS ANGELES, CITY OF	LA0B7330	SAN FERNANDO RD ROW BIKE PATH PHSE II – CONSTRUCT 2.75 MILES CLAS I FRM FIRST ST TO BRANFORD ST,ON MTA-OWND ROW PARLEL TO SAN FERNANDO RD. LINK CYCLSTS TO NUMEROUS BUS LNE. PPNO 2868.	1/30/2014
LOS ANGELES, CITY OF	LAF1450	ENCINO PARK-AND-RIDE FACILITY RENOVATION. RENOVATION OF THE ENCINO PARK-AND-RIDE FACILITY IN ORDER TO ADDRESS PHYSICAL AND STRUCTURAL DEFICIENCIES AND ADD CAPACITY TO THIS HEAVILY UTILIZED FACILITY. INCLUDES 50 NEW PARKING SPACES AND BIKE LOCKERS.	10/1/2013
LOS ANGELES, CITY OF	LAF1520	IMPERIAL HIGHWAY BIKE LANES. THIS PROJECT INVOLVES THE MODIFICATION OF THE MEDIAN ISLAND AND THE WIDENING OF IMPERIAL HIGHWAY ALONG 1000 FT EAST OF PERSHING DRIVE TO ACCOMMODATE BIKE LANES.	6/1/2014
LOS ANGELES, CITY OF	LAF1524	SAN FERNANDO RD. BIKE PATH PH. IIIA/IIIB – CONSTRUCTION. RECOMMEND PHASE IIIA-CONSTRUCTION OF A CLASS I BIKE PATH WITHIN METRO OWNED RAIL RIGHT-OF-WAY ALONG SAN FERNANDO RD. BETWEEN BRANFORD ST. AND TUXFORD ST INCL BRIDGE.	10/1/2015
LOS ANGELES, CITY OF	LAF1615	EASTSIDE LIGHT RAIL PEDESTRIAN LINKAGE. IMPROVE LINKAGES WITHIN 1/4 MILE OF METRO'S GOLD LINE LRT.	6/29/2012
LOS ANGELES, CITY OF	LAF1657	LOS ANGELES VALLEY COLLEGE (LAVC) BUS STATION EXTENSION. PROJECT WILL EXTEND THE ORANGE LINE STATION AT THE LA VALLEY COLLEGE BY PROVIDING A DIRECT PEDESTRIAN CONNECTION FROM THE STATION TO A NEW PEDESTRIAN ENTRANCE TO LAVC.	10/1/2013
LOS ANGELES, CITY OF	LAF1708	HOLLYWOOD INTEGRATED MODAL INFORMATION SYSTEM. INSTALLATION OF ELECTRONIC, DIRECTION AND PARKING AVAILABILITY SIGNS WITH INTERNET CONNECTIVITY TO PROVIDE ADVANCE AND REAL-TIME INFORMATION INTENDED TO INCREASE TRANSIT RIDERSHIP	9/21/2015

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
LOS ANGELES, CITY OF	LAF3419	SUNSET JUNCTION PHASE 2. CREATE A MULTI-MODAL TRANSIT PLAZA TO INTEGRATE PUBLIC TRANSPORTATION, PEDESTRIAN & BICYCLE IMPROVEMENTS THAT WOULD RESULT IN REGIONAL & LOCAL BENEFITS (CFP3844). TRIANGLE PROPERTY ON SUNSET BLVD BWT MANZANITA AND SANTA MONICA.	6/30/2017
MONROVIA	LAE0039	TRANSIT VILLAGE – PROVIDE A TRANS. FACILITY FOR SATELLITE PARKING FOR SIERRA MADRE VILLA GOLD LINE STA, P-N-R FOR COMMUTERS, A FOOTHILL TRANSIT STORE.	12/31/2012
PORT OF LOS ANGELES	LAF3170	PORT TRUCK TRAFFIC REDUCTION PROGRAM: WEST BASIN RAILYARD. INTERMODAL RAILYARD CONNECTING PORT OF LA WITH ALAMEDA CORRIDOR TO ACCOMMODATE INCREASED LOADING OF TRAINS AT THE PORT, THEREBY REDUCING TRUCK TRIPS TO OFF-DOCK RAILYARDS.	12/1/2014
RANCHO PALOS VERDES	LAF1506	BIKE COMPATIBLE RDWY SAFETY AND LINKAGE ON PALOS VERDES DR. THE PROJECT WILL HAVE A CLASS II BIKE LANE ON BOTH SIDES OF PALOS VERDES DRIVE SOUTH, WITH AN UNPAVED SHOULDER FOR EMERGENCY USE.	10/9/2014
RANCHO PALOS VERDES	LAF1605	PEDESTRIAN SAFE BUS STOP LINKAGE. LINKING 11 BUS STOPS CURRENTLY INACCESSIBLE BECAUSE OF LACK OF SIDEWALKS ON BOTH THE EAST AND WEST SIDE OF HAWTHORNE BLVD. FROM CREST RD. TO PALOS VERDES DR. SOUTH (ABOUT 13,000’)	12/9/2013
SAN DIMAS	LAF1503	BIKEWAY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH. THE BWY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH; WILL CLOSE THE GAP ON A BRIDGE & CONNECT THE EXISTING CLASS II BIKE LANES TO THE EAST & WEST OF SAN DIMAS WASH CROSSING.	12/1/2013
SAN GABRIEL VALLEY COG	LA990359	GRADE SEP XINGS SAFETY IMPR; 35- MI FREIGHT RAIL CORR. THRGH SAN.GAB. VALLEY – EAST. L.A. TO POMONA ALONG UPRR ALHAMBRA &L.A. SUBDIV – ITS 2318 SAFETEA #2178;1436 #1934 PPNO 2318	6/30/2018
SANTA FE SPRINGS	LA0F096	NORWALK SANTA FE SPRINGS TRANSPORTATION CENTER PARKING EXPANSION AND BIKEWAY IMPROVEMENTS. PROVIDE ADDITIONAL 250 PARKING SPACES FOR TRANSIT CENTER PATRONS AND IMPROVE BICYCLES ACCESS TO THE TRANSIT CENTER	6/30/2012
SANTA MONICA	LAE0364	CONSTRUCT INTERMODAL PARK AND RIDE FACILITY AT SANTA MONICA COLLEGE CAMPUS ON SOUTH BUNDY DRIVE NEAR AIRPORT AVENUE	12/31/2013

Attachment A: Committed Transportation Control Measures (TCMs)

Los Angeles County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
TORRANCE	LA0G358	SOUTH BAY REGIONAL INTERMODAL TRANSIT CENTER PROJECT. THE LAND IS IN THE PROCESS OF BEING PURCHASED AND ESCROW WILL CLOSE ON DECEMBER 17, 2009. PRESENTLY, THE LOT IS VACANT/OPEN LAND WITH NO EXISTING STRUCTURE UPON IT. THE ADDRESS IS 465 N. CRENSHAW BLVD., TORRANCE, CA 90503.	12/31/2015
WESTLAKE VILLAGE	LA960142	LINDERO CANYON ROAD FROM AGOURA TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION	1/30/2013

Orange County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
ANAHEIM	ORA000100	GENE AUTRY WAY WEST @ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HASTER (3 LANES IN EA DIR.)	11/16/2012
CALTRANS	ORA000193	HOV CONNECTORS FROM SR-22 TO I-405, BETWEEN SEAL BEACH BLVD. (I-405 PM 022.558) AND VALLEY VIEW ST. (SR-22 PM R000.917), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTORS.	2/1/2015
CALTRANS	ORA000194	HOV CONNECTORS FROM I-405 TO I-605, BETWEEN KATELLA AVE. (I-605 PM R001.104) AND SEAL BEACH BLVD. (I-405 PM 022.643), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTIONS.	7/1/2015
FULLERTON	ORA020113	FULLERTON TRAIN STATION – PARKING STRUCTURE, PHASE I AND II. TOTAL OF 800 SPACES (PPNO 2026)	5/31/2012
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA041501	PURCHASE (71) STANDARD 30FT EXPANSION BUSES – ALTERNATIVE FUEL – (31) IN FY08-09, (9) IN FY09-10, (7) IN FY11-12, (6) IN FY12-13 AND (18) IN FY13-14	6/30/2016
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA110633	RIDESHARE VANPOOL PROGRAM – CAPITAL LEASE COSTS	9/30/2012
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING (ORANGE COUNTY PORTION).	6/30/2016

Orange County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA0826016	PURCHASE (72) PARATRANSIT EXPANSION VANS – (21) IN FY09/10, (51) IN FY10/11.	6/30/2016
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA082618	PURCHASE PARATRANSIT VEHICLES EXPANSION (MISSION VIEJO) (11) IN FY09/10. ON-GOING PROJECT.	6/30/2030
TCA	10254	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/5/01	12/31/2020
TCA	ORA050	ETC (RTE 241/261/133) (RTE 91 TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/05/01.	12/31/2020
TCA	ORA051	(FTC-N) (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR, 2 ADDITIONAL M/F LANES, PLS CLMBNG & AUX LANS AS REQ BY 2020 PER SCAG/TCA MOU 4/05/01.	12/31/2020
TCA	ORA052	(FTC-S) (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2013; AND 1 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2030 PER SCAG/TCA MOU 4/05/01. #1988	6/15/2030

Riverside County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV010212	ON SR91 – ADAMS TO 60/215 IC: ADD ONE HOV LN IN EACH DIRECTION, RESTRIPE TO EXTEND 4TH WB MIXED FLOW LANE FROM 60/215 IC TO CENTRAL OFF-RAMP, RESTRIPE TO EXTEND 5TH WB MIXED FLOW LANE FROM 60/215 IC TO 14TH ST OFF-RAMP, AUX LNS (MADISON-CENTRAL), BRIDGE WIDENING & REPLACEMENTS, EB/WB BRAIDED RAMPS, IC MOD/RECONSTRUCT + SOUND/RETAINING WALLS	8/3/2015
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV050555	ON I-215 (N/O EUCALYPTUS AVE TO N/O BOX SPRINGS RD) & SR60 (E/O DAY ST TO SR60/I-215 JCT): RECONSTRUCT JCT TO PROVIDE 2 HOV DIRECT CONNECTOR LNS (SR60 PM: 12.21 TO 13.6) AND MINOR WIDENING TO BOX SPRINGS RD FROM 2 TO 4 THROUGH LANES BETWEEN MORTON RD AND BOX SPRINGS RD/FAIR ISLE DR IC (EA: 449311)	4/29/2013

Attachment A: Committed Transportation Control Measures (TCMs)

Riverside County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV051201	IN CORONA – CONTINUE THE IMPLEMENTATION OF A 60 SPACE PARK-AND-RIDE LOT (VIA ANNUAL LEASE AGREEMENT) AT LIVING TRUTH CHRISTIAN FELLOWSHIP AT 1114 W. ONTARIO AVE.	6/30/2013
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070303	ON SR60 IN NW RIV CO: CONTINUE THE IMPLEMENTATION OF THE EXPANDED SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #7 PATROL , 2 TRUCKS) BETWEEN MILIKEN AVE & MAIN ST (SR60 HOV LN CHANGE TCM SUBSTITUTION PROJECT)	ON GOING TCM PROGRAM IN RIVERSIDE COUNTY
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070304	ON I-215 IN SW RIV CO: CONTINUE THE IMPLEMENTATION OF I-215 FREEWAY SERVICE PATROL (FSP) (BEAT #19, 2 TRUCKS) BETWEEN SR74/4TH ST AND ALESSANDRO BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	ON-GOING TCM PROGRAM IN RIVERSIDE COUNTY
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070307	ON SR60 IN MORENO VALLEY: CONTINUE THE IMPLEMENTATION OF SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #8, 2 TRUCKS) BETWEEN DAY ST AND REDLANDS BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	ON-GOING TCM PROGRAM IN RIVERSIDE COUNTY
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520109	RECONSTRUCT & UPGRADE SAN JACINTO BRANCH LINE FOR RAIL PASSENGER SERVICE (RIVERSIDE TO PERRIS) (PERRIS VALLEY LINE) (FY 07 5307) (UZA: RIV-SAN)	2014
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	REGIONAL RIDESHARE – CONTINUING PROGRAM.	ON-GOING TCM PROGRAM IN RIVERSIDE COUNTY
RIVERSIDE TRANSIT AGENCY	RIV041030	IN THE CITY OF HEMET – CONSTRUCT NEW HEMET TRANSIT CENTER (WITH APPROXIMATELY 4 BUS BAYS) AT 700 SCARAMELLA CR., HEMET, CA (5309C FY 04 + 05 EARMARKS).	6/30/2013
RIVERSIDE TRANSIT AGENCY	RIV050553	IN TEMECULA – CONSTRUCT NEW TEMECULA TRANSIT CENTER AT 27199 JEFFERSON AVE. (SW OF JEFFERSON AVE & SE OF CHERRY ST) (04, 05, 06, 07, E-2006-091, E-2007-0131, & 2008-BUSP-0131, SAFETEA-LU).	12/30/2014
RIVERSIDE TRANSIT AGENCY	RIV090609	IN WESTERN RIVERSIDE COUNTY FOR RTA: INSTALL ADVANCE TRAVELER INFORMATION SYSTEMS (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND INSTALLATION OF ELECTRONIC MESSAGE SIGNS AT APPROX. 60 BUS STOPS (FY 'S 05, 07, 08, 09, AND 10 – 5309).	12/30/2012

Riverside County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
TEMECULA	RIV62029	AT HWY 79 SO AND LA PAZ ST: ACQUIRE LAND, DESIGN AND CONSTRUCT PARK-AND-RIDE LOT – 250 SPACES (FY 05 HR4818 EARMARK)	12/31/2015

San Bernardino County			
Lead Agency	**Project ID**	**Project Description**	**Completion Date**
OMNITRANS	981118	BUS SYSTEM – PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	5/31/2012
RIALTO	200450	RIALTO METROLINK STATION – INCREASE PARKING SPACES FROM 225-775	12/1/2012
SANBAG	200074	LUMP SUM – TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS (PROJECTS CONSISTENT W/40CFR PART 93.126,127,128, EXEMPT TABLE 2 & 3).	12/1/2015
SANBAG	20040827	RIDESHARE PROGRAM FOR SOUTHCOAST AIR DISTRIST	12/1/2015
VARIOUS AGENCIES	713	I-215 CORRIDOR NORTH – IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 210 – ADD 2 HOV & 2 MIXED FLOW LNS (1 IN EA. DIR.) AND OPERATIONAL IMP INCLUDING AUX LANES AND BRAIDED RAMP	9/1/2013

Note: Projects may include TCM and non-TCM portions. Committed TCMs include only that portion of the projects that meets the definition of TCMs.

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 1. Programs for Improved Public Transit

Measure #	Measure Title	Description	Has It Been Implemented	Reasoned Justification for Not Implementing Measure	Implementing Agency or Agencies
1.1	Regional Express Bus Program	Purchase of buses to operate regional express bus services.	Yes		CTCs (MTA, OCTA), Transit Operators
1.2	Transit access to airports	Operation of transit to airport to serve air passengers.	Yes		Transit Operators, CTCs (MTA, SCRRA)
1.3	Accelerate Bus Retrofit Program	Accelerate application of retrofit of diesel-powered buses to achieve earlier compliance with state regulations.	Yes		CTCs (MTA, OCTA), Transit Operators
1.4	Mass transit alternatives	Major change to the scope and service levels.	Yes		SCAG, CTCs
1.5	Expansion of public transportation systems	Expand and enhance existing public transit services.	Yes		CTCs
1.6	Transit service improvements in combination with park-and-ride lots and parking Management	Local jurisdictions and transit agency improve the public transit system and add new park-and-ride facilities and spaces on an as needed basis.	Yes		CTCs (MTA, SCRRA)

Section 108 (f) 1. Programs for Improved Public Transit					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
1.7	Free transit during special events	Require free transit during selected special events to reduce event-related congestion and associated emission increases.	No *(The Mobile Source Air Pollution Reduction Review Committee has been co-funding free event center shuttle service demonstration projects)*	The Legislature significantly reduced authority of AQMD to implement indirect source control measures through revisions to the Health & Safety Code (HSC 40717.8). Transit agencies should decide individually whether this measure is economically feasible for them.	
1.8	Require that government employees use transit for home to work trips, expand transit, and encourage large businesses to promote transit use	Require all government employees use transit a specified number of times per week, or expand transit, and encourage business to promote transit use.	Yes		CTCs
1.9	Increase parking at transit centers or stops	Encourage transit convenience by providing additional parking at transit centers.	Yes		CTCs
1.10	Expand regional transit connection ticket distribution	Provides interchangeability of transit ticket.	Yes		CTCs, Metrolink

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 2. Restriction of Certain Roads or Lanes to, or Construction of Such Roads or Lanes for Use By, Passenger Buses or High Occupancy Vehicles					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
2.1	Update High Occupancy Vehicle (HOV) Lane Master Plan	Analysis of increased enforcement, increasing occupancy requirements, conversion of existing HOV lanes to bus only lanes and/or designation of any new carpool lanes as bus-only lanes; utilization of freeway shoulders for peak-period express bus use; commercial vehicle buy-in to HOV lanes; and appropriateness of HOV lanes for corridors that have considered congestion pricing or value pricing.	Yes		SCAG, Caltrans, CTCs
2.2	Fixed lanes for buses and carpools on arterials	Provide fixed lanes for buses and carpools on arterial streets where appropriate.	Yes		CTCs (MTA, OCTA), LA City
2.3	Expand number of freeway miles available, allow use by alternative fuel vehicles, changes to HOV lane requirements and hours	Various measures evaluated in many ozone nonattainment areas. Specifics vary according to freeway system, use patterns and local characteristics.	Yes		ARB, Caltrans

Section 108 (f) 3. Employer-Based Transportation Management Plans, Including Incentives					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
3.1*	Commute solutions	The federal law that complements parking cash-out is called the *Commuter Choice Program*. It provides for benefits that employers can offer to employees to commute to work by methods other than driving alone.	Yes		Employer, AQMD
3.2*	Parking cash-out	State law requires certain employers who provide subsidized parking for their employees to offer a cash allowance in lieu of a parking space.	Yes		Employer, AQMD
3.3*	Employer Rideshare Program Incentives	Employer rideshare incentives and introduction of strategies designed to reduce single occupant vehicle trips. Examples include: public awareness campaigns, Transportation Management Associations among employers, alternative work hours, and financial incentives.	Yes		Employer, AQMD
3.4*	Implement Parking Charge Incentive Program	Evaluate feasibility of an incentive program for cities and employers that convert free public parking spaces to paid spaces. Review existing parking polices as they relate to new development approvals.	Yes		Cities, Counties, Employer
3.5*	Preferential parking for carpools and vanpools	This measure encourages public and private employers to provide preferential parking spaces for carpools and vanpools to decrease the number of single occupant automobile work trips. The preferential treatment could include covered parking spaces or close-in spaces.	Yes		Employer, AQMD

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 3. Employer-Based Transportation Management Plans, Including Incentives					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
3.6*	Employee parking fees	Encourage public and private employers to charge employees for parking.	Yes		Employer, AQMD
3.7	Merchant transportation incentives	Implement "non-work" trip reduction ordinances requiring merchants to offer customers mode shift travel incentives such as free bus passes and requiring owners/managers/developers of large retail establishments to provide facilities for non-motorized modes.	No	Require state legislation.	
3.8*	Purchase vans for vanpools	Purchase a specified number of vans for use in employee commute travel.	Yes		Employer, AQMD
3.9*	Encourage merchants and employers to subsidize the cost of transit for employees	Provide outreach and possible financial incentives to encourage local employers to provide transit passes or subsidies to encourage less individual vehicle travel.	Yes		Employer, AQMD
3.10*	Compressed work weeks	Work 80 hours in 9 days, or 40 hours in 4 days, or 36 hours in 3 days in lieu of working 40 hours in 5 days.	Yes		Employer, AQMD
3.11*	Telecommuting	Goal of specified percentage of employees telecommuting at least once per week.	Yes		Employer, AQMD
3.12	**Income Tax Credit to Telecommuters**	**Provide tax relief to employees telecommuting to work.**	**No**	**Requires state legislation.**	

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Section 108 (f) 4. Trip Reduction Ordinance
In December 1995, Congress changed the Clean Air Act Amendments to make the Employee Commute Option program voluntary (no longer mandatory). California State Law prohibits mandatory employer based trip reduction ordinance programs (SB437). (HSC 40717.9) To account for these restrictions, SCAQMD Rule 2202 provides employers with a menu of options to reduce mobile source emissions generated from employee commutes. Rule 2202 complies with federal and state Clean Air Act requirements, HSC 40458, and HSC 182(d)(1)(B) of the federal Clean Air Act. Nevertheless, some jurisdictions continue to implement Trip Reduction Ordinances. For example, the City of Santa Monica requires new and existing non-residential development projects to adopt Emission Reduction Plans and pay transportation impact fees to reduce traffic congestion and improve air quality in the city.

Section 108 (f) 5. Traffic Flow Improvement Programs That Achieve Emissions Reductions

Measure #	Measure Title	Description	Has It Been Implemented	Reasoned Justification for Not Implementing Measure	Implementing Agency or Agencies
5.1	Develop Intelligent Transportation Systems	The term "Intelligent Transportation Systems" includes a variety of technological applications intended to produce more efficient use of existing transportation corridors.	Yes		CTCs, Caltrans
5.2	Coordinate traffic signal systems	This measures implements and enhances synchronized traffic signal systems to promote steady traffic flow at moderate speeds.	Yes		CTCs, Counties, and Cities
5.3	Reduce traffic congestion at major intersections	This measure implements a wide range of traffic control techniques designed to facilitate smooth, safe travel through intersections. These techniques include signalization, turn lanes or median dividers. The use of grade separations may also be appropriate for high volume or unusually configured intersections.	Yes		CTCs, Counties, and Cities
5.4	Site-specific transportation control measures	This measure could include geometric or traffic control improvements at specific congested intersections or at other substandard locations. Another example might be programming left turn signals at certain intersections to lag, rather than lead, the green time for through traffic.	Yes		CTCs, Counties, and Cities

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 5. Traffic Flow Improvement Programs That Achieve Emissions Reductions					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
5.5	Removal of on-street parking	Require all commercial/industrial development to design and implement off-street parking.	Yes		CTCs, Counties, and Cities
5.6	Reversible lanes	Implement reversible lanes on arterial streets to improve traffic flow where appropriate.	Yes		CTCs, Counties, and Cities
5.7	One-way streets	Redesignate streets (or portions of in downtown areas) as one-way to improve traffic flow.	Yes		CTCs, Counties, and Cities
5.8	On-Street parking restrictions	Restrict on-street parking where appropriate.	Yes		CTCs, Counties, and Cities
5.9	Bus pullouts in curbs for passenger loading	Provide bus pullouts in curbs, or queue jumper lanes for passenger loading and unloading.	Yes		CTCs, Counties, and Cities
5.10	Additional freeway service patrol	Operation of additional lane miles of new roving tow truck patrols to clear incidents and reduce delay on freeways during peak periods.	Yes		CTCs, CHP
5.11	Fewer stop signs, remove unwarranted and "political" stop signs and signals	Improve flow-through traffic by removing stop signs and signals. Potential downside in safety issues.	Yes		CTCs, Counties, and Cities
5.12	Ban left turns	Banning all left turns would stop the creation of bottlenecks although slightly increase travel distances.	No	No clear demonstration of air quality emissions benefits.	
5.13	Changeable lane assignments	Increase number of one-way lanes going in congested flow direction during peak traffic hours.	Yes		Caltrans, CTCs, Counties, and Cities
5.14	Adaptive traffic signals and signal timing	Self explanatory.	Yes		Counties, Counties, and Cites

Section 108 (f) 5. Traffic Flow Improvement Programs That Achieve Emissions Reductions					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
5.15	Freeway bottleneck improvements (add lanes, construct shoulders, etc.)	Identify key freeway bottlenecks and take accelerated action to mitigate them.	Yes		Caltrans, SCAG
5.16	Minimize impact of construction on traveling public. Have contractors pay when lanes are closed as an incentive to keep lanes open.	Prohibit lane closures during peak hours, limit work to weekends and/or nights.	Yes		Caltrans
5.17	Internet provided road and route information	Reduce travel on highly congested roadways by providing accessible information on congestion and travel.	Yes		CTCs, Caltrans, Counties, Cities
5.18	Regional route marking systems to encourage underutilized capacity	Encourage travel on local roads and arterials by better route marking to show alternatives.	Yes		Caltrans, Counties, Cities
5.19	Congestion management field team to clear incidents	Self explanatory.	Yes		CTCs, CHP
5.20	Use dynamic message signs to direct/smooth speeds during incidents	Self explanatory.	Yes		Caltrans
5.21	Get real-time traffic information to trucking centers and rental car agencies	Reduce travel in congested areas by providing information directly to high volume travelers.	Yes		CTCs, Caltrans

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 5. Traffic Flow Improvement Programs That Achieve Emissions Reductions					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
5.22	55 mph speed limit during ozone season	Self explanatory	No	Reductions in freeway speeds are governed by California Vehicle Code 22354, which authorizes Caltrans to lower speeds after doing an engineering and traffic survey, which shows that the legislatively- set maximum speed of 65 mph, is more than is reasonable or safe. No consideration of emissions is contemplated under this statute. This measure is not feasible until the statute is changed.	
5.23	Require 40 mph speed limit on all facilities	Depends on area's emission factors.	No	The California Vehicle Code Sections 22357 and 22358 mandates a methodology for setting speed limits for local areas. This measure is not feasible until the statute is changed.	
5.24	Require lower speeds during peak periods	Self explanatory.	No	The California Vehicle Code Sections 22357 and 22358 mandates methodology for setting speed limits for local areas. This measure is not feasible until the statute is changed.	
5.25	On-street parking restrictions	Restrict on-street parking where appropriate.	Yes		State, Counties, and Cities

Section 108 (f) 6. Fringe and Transportation Corridor Parking Facilities Serving Multiple Occupancy Vehicle Programs or Transit Service					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
6.1	Park-and-ride lots	Develop, design, and implement new park-and-ride facilities in locations where they are needed.	Yes		CTCs, Transit Operators, SCRRA
6.2	Park-and-ride lots serving perimeter counties	Specific to a locality.	Yes		CTCs, Transit Operators, SCRRA

Section 108 (f) 7. Programs to Limit or Restrict Vehicle Use in Downtown Areas or Other Areas of Emission Concentration Particularly During Periods of Peak Use					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
7.1	Off-peak goods movement	Restrict truck deliveries by time or place in order to minimize traffic congestion during peak periods.	Yes		PierPass A non-profit organization of marine terminal operators at the Ports of Los Angeles and Long Beach.
7.2	Truck restrictions during peak periods	Restrict truck travel during peak periods in order to minimize traffic congestion.	Yes		See Measure 7.1
7.3	Involve school districts to encourage walking/bicycling to school	Decrease vehicle emissions due to school trips by reducing these trips through education and out-reach programs.	Yes		School Districts

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 7. Programs to Limit or Restrict Vehicle Use in Downtown Areas or Other Areas of Emission Concentration Particularly During Periods of Peak Use					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
7.4	Adjust school hours so they do not coincide with peak traffic periods and ozone seasons	Measure to reduce travel during peak periods and ozone-contributing periods in the early morning.	No	School hours are dictated by many variables, including overcrowding and year-round schooling. This measure is not feasible.	
7.5	Area-wide tax for parking	Reduce driving by limiting parking through pricing measures.	Yes		Counties, Cities
7.6	Increase parking fees	Reduce driving by limiting parking through pricing measures.	No	Attorney General ruled AQMD lacks authority to implement this measure.	
7.7	Graduated pricing starting with highest in Central Business District	Charge the most for parking in the central business or other high volume areas in a city to discourage vehicle travel in these areas.	Yes		Market Driven
7.8	Buy parking lots and convert to other land use	Limit parking by converting available parking to other land uses to discourage driving.	Yes		Counties and Cities
7.9	Limit the number of parking spaces at commercial airlines to support mass transit	Reduce airport travel by limits on parking at airports.	No	Regulatory agencies do not have the legal authority to make local land use decisions. It is at the discretion of the regional or local airport authority to make local land use decisions pertaining to airports. Additionally, It is necessary to have significant mass transit available at airports before this measure can be implemented.	

Section 108 (f) 7. Programs to Limit or Restrict Vehicle Use in Downtown Areas or Other Areas of Emission Concentration Particularly During Periods of Peak Use					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
7.10	No Central Business District (CBD) vehicles unless LEV or alt fuel or electric	Define high-use area and ticket any vehicles present unless they are low emitting, alternative fueled or electric.	No	The Legislature significantly reduced authority to implement indirect source control measures through revisions to the Health & Safety Code (40717.6, 40717.8, and 40717.9).	
7.11	Auto restricted zones	No vehicles allowed in certain areas where high emissions, congestion or contribution to ozone problems.	Yes		Counties and Cities
7.12	Incentives to increase density around transit centers	Lower travel by increasing residential and commercial density in areas near transit.	Yes		Counties and Cities
7.13	Land use/air quality guidelines	Guidelines for development that contributes to air quality goals.	Yes		ARB, AQMD,SCAG
7.14	Cash incentives to foster jobs/housing balance	Specific to locality – encouraged by California Clean Air Plan.	No	No dedicated source of funding for this measure.	
7.15	Trip reduction oriented development	Land use decisions that encourage trip reductions.	Yes		Counties, Cities, CTCs
7.16	Transit oriented development	Land use decisions that encourage walkable communities and multi-modal transit systems.	Yes		Counties, Cities, CTCs
7.17	Sustainable development	Land use decisions that create equitable standards of living to satisfy the basic needs of all peoples, all while taking the steps to avoid further environmental degradation.	Yes		Counties, Cities, CTCs

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 8. Programs For the Provision of All Forms of High-Occupancy, Shared-Ride Services					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
8.1*	Financial Incentives, Including Zero-Bus Fares	Provide financial incentives or other benefits, such as free or subsidized bus passes and cash payments for not driving, in lieu of parking spaces for employees who do not drive to the workplace.	Yes		AQMD, Employer
8.2	Internet ride matching services	Provide match-lists, route info, hours and contact information over the internet to assist individuals in joining or developing carpools.	Yes		CTCs, SCAG
8.3*	Preferential parking for carpoolers	Provide free, covered, near-building or similar incentives to carpoolers.	Yes		AQMD, Employer
8.4*	Credits and incentives for carpoolers	Self-explanatory – form depends on locality.	Yes		AQMD, Employer
8.5*	Employers provide vehicles to carpoolers for running errands or emergencies	Having vehicles available for workday errands makes it easier to go to work without one.	Yes		AQMD, Employer
8.6	Subscription services	Free van services to provide transportation for the elderly, handicapped or other individuals who have no access to transportation.	Yes		County, Employer
8.7	School car pools	Self explanatory and voluntary	No	Not economically feasible and insufficient resources available for implementation.	
8.8*	Guaranteed ride home	Self explanatory.	Yes		AQMD, Employer

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Section 108 (f) 8. Programs For the Provision of All Forms of High-Occupancy, Shared-Ride Services					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
8.9	**Transit Voucher Program**	**Transit vouchers for elderly and low income commuters.**	**Yes**		**CTCs, SCAG**

Section 108 (f) 9. Programs to Limit Portions of Road Surfaces or Certain Sections of the Metropolitan Area to the Use of Non-Motorized Vehicles or Pedestrian Use, Both as to Time and Place					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
9.1	Establish Auto-Free Zones and pedestrian malls	Establish auto free zones and pedestrian malls where appropriate.	Yes		Counties and Cities
9.2	Encouragement of pedestrian travel	This measure involves encouraging the use of pedestrian travel as an alternative to automobile travel. Pedestrian travel is quite feasible for short shopping, business, or school trips.	Yes		CTCs, Counties, Cities, SCAG
9.3	Bicycle/Pedestrian Program	Fund high priority projects in countywide plans consistent with funding availability.	Yes		CTCs, Counties, and Cities
9.4	Close certain roads for use by non-motorized traffic	During special events, weekends, or certain times of the day, close some roads to all but non-motorized traffic.	Yes		Counties, and Cities

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 9. Programs to Limit Portions of Road Surfaces or Certain Sections of the Metropolitan Area to the Use of Non-Motorized Vehicles or Pedestrian Use, Both as to Time and Place					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
9.5	Encouragement of bicycle travel	Promotion of bicycle travel to reduce automobile use and improve air quality. Bikeway system planning, routes for inter-city bike trips to help bicyclists avoid other, less safe facilities. Another area for potential actions is the development and distribution of educational materials, regarding bicycle use and safety.	Yes		SCAG, CTCs, Counties, and Cities
9.6	Free bikes	Provide free bikes in the manner of Boulder, CO. Simple utilitarian bikes that can be used throughout the metro area and dropped off at destination for use by anyone desiring use.	No	Evidence suggests that bicycle theft is a problem in other programs and renders the measure technically and economically infeasible.	
9.7*	Cash rebates for bikes	Provide financial incentives to purchase bicycles and thereby encourage use.	Yes		Employer
9.8	Close streets for special events for use by bikes and pedestrians	Self Explanatory.	Yes		Counties and Cities
9.9	Use condemned dirt roads for bike trails	Self Explanatory.	No	Not applicable because there are no condemned dirt roads in the region.	

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Section 108 (f) 10. Programs for Secure Bicycle Storage Facilities and Other Facilities, Including Bicycle Lanes, for the Convenience and Protection of Bicyclists, in Both Public and Private Areas					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
10.1*	Bike racks at work sites	Self Explanatory.	Yes		AQMD, Employer
10.2	Bike racks on buses	Bike racks would be placed on a to-be-determined number of buses to increase bicycle travel.	Yes		CTCs, Transit Operators, SCRRA
10.3	Regional bike parking	Bike Transit Centers	Yes		CTCs
10.4	Development of bicycle travel facilities	Encourages a variety of capital improvements to increase bicycle use. Off-street bikeways where high-speed roadways preclude safe bicycling. Clearly mark travel facilities with signs and provide adequate maintenance.	Yes		CTCs, Transit Operators, SCRRA
10.5	Expedite bicycle projects from RTP	Create bicycle and pedestrian master plan and build out at an accelerated rate to achieve benefits in time for attainment deadline.	Yes		SCAG, CTCs, Counties, Cities
10.6	Provide bike/pedestrian facilities safety patrols	Self Explanatory.	Yes		Counties and Cities
10.7	Inclusion of bicycle lanes on thoroughfare projects	Self Explanatory.	Yes		State, Counties, and Cities
10.8	Bicycle lanes on arterial and frontage roads	Self Explanatory.	Yes		State, Counties, and Cities
10.9	Bicycle route lighting	Self Explanatory.	Yes		State, Counties, Cities

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 11. Programs to Control Extended Idling of Vehicles					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
11.1	Limit excessive car dealership vehicle starts	Require car dealers to limit the starting of vehicles for sale on their lot(s) to once every two weeks. Presently, a number of new and used car dealers start their vehicles daily to avoid battery failure and assure smooth start-ups for customer test drives.	No	This measure was investigated by the AQMD and it was determined that in contrast to colder climates where vehicles are started on a daily basis, vehicles in the South Coast started much less frequently. For this reason it was determined not to be technically feasible.	
11.2	Encourage limitations on vehicle idling	Encourage limitations to limit extended idling operations.	Yes		ARB
11.3	Turn off engines while stalled in traffic	Public outreach or police-enforced program.	No	This measure raises safety and congestion concerns. No clear demonstration of air quality emissions benefits.	
11.4	Outlaw idling in parking lots	Self-explanatory and police enforced program.	No	Enforcement of idle restrictions is a low priority for police relative to their other missions. The cost effectiveness of this measure has not been demonstrated. It is not economically feasible.	
11.5	Reduce idling at drive-throughs; ban drive-throughs	Mandate no idling or do not allow drive-through windows during ozone season.	No	No clear demonstration of air quality emissions benefits. This measure is not economically feasible.	

Section 108 (f) 11. Programs to Control Extended Idling of Vehicles					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
11.6	Promote use of pony engines	Use special battery engines to keep air conditioning and other truck systems working while truck not in use.	Yes		ARB
11.7	Idle restrictions at airport curbsides	Self-explanatory and police enforced.	Yes		Airport authority
11.8	**Truck Stop Electrification**	**Provide electric charging stations for at truck stops to power heating/AC units and other on-board equipment.**	**Yes**		**ARB**

Section 108 (f) 12. Program to Reduce Motor Vehicle Emissions Consistent with Title II, Which Are Caused by Extreme Cold Start Conditions	
Not applicable. The definition of an "extreme cold start" specifies temperatures below 20 degrees Fahrenheit.	Not applicable in the South Coast - No extreme cold start conditions

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 13. Employer-sponsored programs to permit flexible work schedules					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
13.1*	Alternative work schedules	Enables workers to choose their own working hours within certain constraints. Flextime provides the opportunity for employees to use public transit, ridesharing, and other Nonmotorized transportation. A related strategy, staggered work hours, is designed to reduce congestion in the vicinity of the workplace. Alternative workweeks have been implemented extensively by large private and public employers.	Yes		AQMD, Employer
13.2*	Modifications of work schedules	Implement alternate work schedules that flex the scheduled shift time for employees. Encourage the use of flexible or staggered work hours to promote off-peak driving and accommodate the use of transit and carpooling.	Yes		AQMD, Employer
13.3*	Telecommunications-Telecommuting/Teleconferencing	Encourage the use of telecommuting-telecommuting/teleconferencing in place of motor vehicle use where appropriate.	Yes		AQMD, Employer

* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*

Section 108 (f) 14. Programs and Ordinances to facilitate Non-automotive travel, provision to and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
14.1	Areawide public awareness programs	This measure focuses on conducting ongoing public awareness programs throughout the year to provide the public with information on air pollution and encourage changes in driving behavior and transportation mode use.	Yes		AQMD
14.2	Special event controls	This measure would require new and existing owners/operators of the special event centers to reduce mobile source emissions generated by their events. A list of optional strategies would be available that reduce mobile source emissions. The definition of "special event center" could be developed through the rule development process.	Yes		Counties, Cities, Special Event Operators
14.3	Land Use/development alternatives	This measure includes encouraging land use patterns, which support public transit and other alternative modes of transportation. In general, this measure would also encourage land use patterns designed to reduce travel distances between related land uses	Yes		ARB, SCAG, AQMD, Counties, Cities
14.4	Voluntary No-Drive Day programs	Conduct voluntary No-Drive Day programs during the ozone season through media and employer based public awareness activities.	Yes		CTCs
14.5[**]	New Development Air Quality Impact Evaluation	Evaluate air quality impacts of new development and recommend or require mitigation for significant adverse impacts.	Yes		AQMD, Counties, Cities, CEQA Lead Agencies

[**] *AQMD and SCAG recommend mitigation as commenting agencies on new development projects; cities and counties require mitigation under their discretionary authority as lead agency.*

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 14. Programs and Ordinances to facilitate Non-automotive travel, provision to and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
14.6	Transportation for Livable Communities (TLC)/Housing Incentive program	Program provides planning grants, technical assistance, and capital grants to help cities and Nonprofit agencies define and implement transportation projects that support community plans including increased housing near transit.	Yes		SCAG, State
14.7	Incentives to increase density around transit centers	Lower travel by increasing residential and commercial density in areas near transit.	Yes		Counties, Cities, CTCs
14.8	Incentives for cities with good development practices	Provide financial or other incentive to local cities that practice air quality-sensitive development.	Yes		Counties, Cities
14.9	Increase state gas tax	Self Explanatory.	No	Need state legislation.	
14.10	**Pay-As-You-Drive Insurance**	**Self Explanatory.**	**No**	**Need state legislation.** **No clear demonstration of air quality emission benefits so does not advance attainment date..**	

Section 108 (f) 15. Programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other Non-motorized means of transportation when commercially feasible and in the public interest					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
15.1*	Encouragement of pedestrian travel	Promote public awareness and use of walking as an alternative to the motor vehicle.	Yes		AQMD, SCAG, CTCs, Employer
15.2	Pedestrian and bicycle overpasses where safety dictates	Ongoing implementation as development occurs.	Yes		Counties, Cities

Section 108 (f) 16. Program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
16.1	Counties assess ten dollar license plate fee to fund repair/replacement program for high-emitters	Self explanatory.	Yes		ARB, BAR**
16.2	Buy vehicles older than 1975	Self explanatory.	Yes		ARB, AQMD***
16.3	Demolish impounded vehicles that are high emitters	Self explanatory.	No	Not economically feasible.	

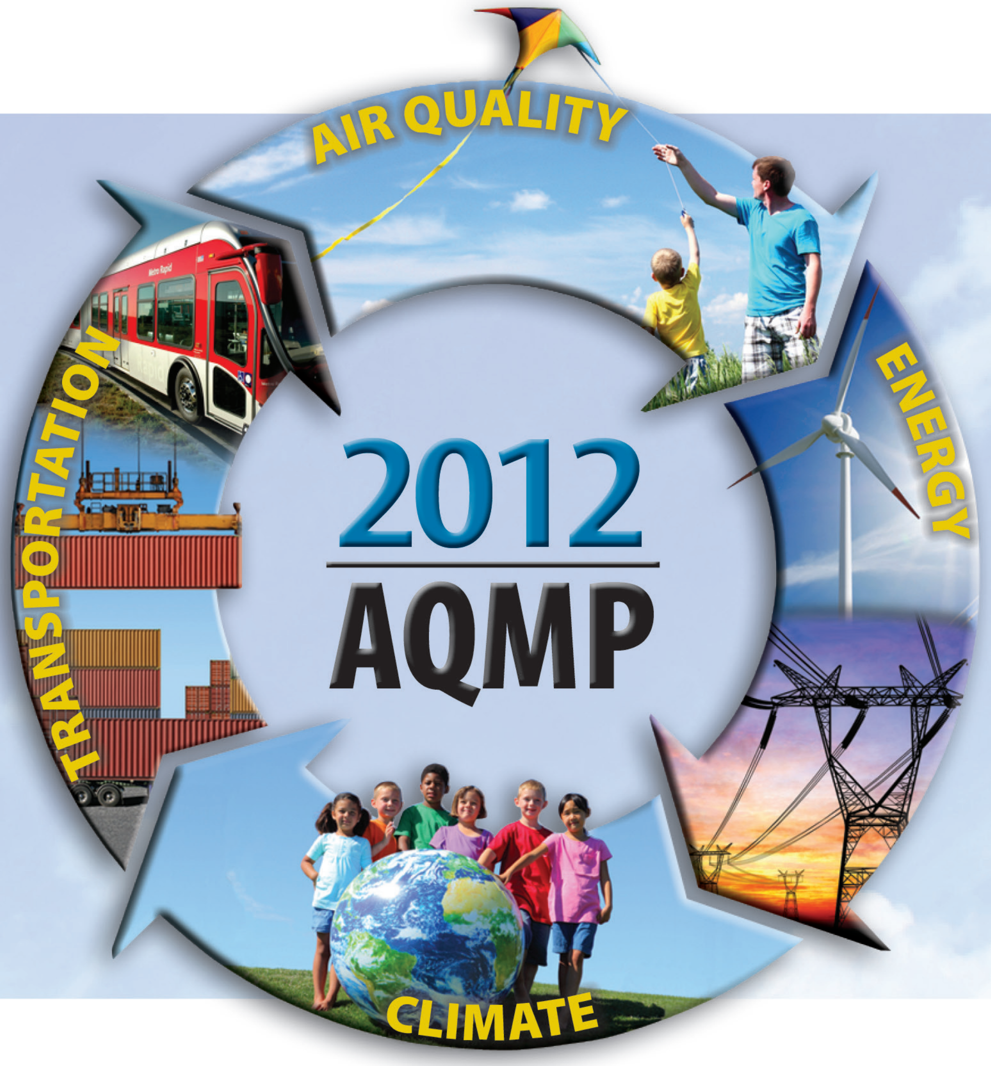
* *This measure relates to AQMD Rule 2202, On-Road Motor Vehicle Mitigation Options. Administered by AQMD, Rule 2202 provides a menu of options for employers in choosing how they will comply. Individual employers implement the mitigation option(s) that they have chosen.*
*** Similar program administered with different funding source as part of smog check.*
**** Voluntary car scrapping programs to generate credits.*

Attachment B: 2012 South Coast PM2.5 AQMP Reasonably Available Control Measure (RACM) Analysis - TCMs

Section 108 (f) 16. Program to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks					
Measure #	**Measure Title**	**Description**	**Has It Been Implemented**	**Reasoned Justification for Not Implementing Measure**	**Implementing Agency or Agencies**
16.4	Do whatever is necessary to allow cities to remove the engines of high emitting vehicles (pre-1980) that are abandoned and to be auctioned	Self explanatory.	No	Not economically feasible.	
16.5	Accelerated retirement program	Identify high emitting vehicle age groups and develop a program to remove them from use.	Yes		ARB, AQMD

Appendix V

Air Quality Management Plan



Modeling and Attainment Demonstrations

February 2013

South Coast Air Quality Management District

Cleaning the air that we breathe...™

South Coast AQMD

FINAL 2012 AQMP
APPENDIX V

MODELING AND ATTAINMENT DEMONSTRATIONS

FEBRUARY 2013

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CHAPTER 1

MODELING OVERVIEW

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INTRODUCTION

This appendix to the Final 2012 AQMP provides the details of the modeling attainment demonstrations presented in Chapter 5 of the main document. The federal Clean Air Act (CAA) sets forth specific requirements to use air quality simulation modeling techniques to estimate future air quality in areas that do not meet the air quality standards. This Final 2012 AQMP provides the future year attainment demonstration for the 24-hour average PM2.5 standard and additional analyses to update future year projections of the annual PM2.5 and 8-hour ozone standards.

The South Coast Air Basin (Basin) is currently designated nonattainment for PM2.5, ozone (8-hours), and PM10. On April 28, 2010, CARB forwarded the District's request to U.S. EPA to redesignate the Basin as attainment for PM10. Air quality monitoring data measured from 2005 through 2007 indicated that the standard had been achieved and that the Basin has not experienced any violations of the 24-hour average PM10 standard, except during a few exceptional events. Future year projections of PM10 provided in the 2007 AQMP and the updated attainment demonstration included in the redesignation request provide the basis for a PM10 maintenance plan for the Basin. EPA's final approval of the redesignation request is currently pending.

The 2007 modeling attainment demonstrations served as an update of the 2003 AQMP ozone and PM10 plans for the South Coast Air Basin and other portions of the Southeast Desert Modified Nonattainment Area that are under the District's jurisdiction and were submitted as part of the California State Implementation Plan (SIP). The Final 2007 AQMP provided attainment demonstrations for 8-hour ozone, PM2.5, and PM10. This plan provides the attainment demonstration to address the 2006 revision to the 24-hour PM2.5 standard which reduced the level from 65 $\mu g/m^3$ to the current 35 $\mu g/m^3$. This analysis reflects the updated baseline and future year emissions inventories, estimated revisions to the attainment demonstration methodology, new technical information and enhanced air quality modeling techniques, and the control strategy provided in Chapter 4 and Appendix IV of the Final 2012 AQMP.

Note that the baseline adjustment deriving from emissions reductions from mobile source incentive programs is not yet reflected in the modeling results presented in this chapter. It is expected that controlled 24-hour PM2.5 design values will decrease approximately 0.2 - 0.3 $\mu g/m^3$ when these adjustments are included in the model, primarily associated with ambient ammonium nitrate reductions. The Final 2012 AQMP modeling results will fully reflect the impact of this baseline adjustment.

Background

The Basin is currently designated nonattainment for PM2.5, and extreme nonattainment for ozone. The District's goal is to develop an integrated control strategy which: 1) ensures that ambient air quality standards for all criteria pollutants are met by the established deadlines in the federal Clean Air Act (CAA); and 2) achieves an expeditious rate of reduction towards the state air quality standards. The overall control strategy is designed so that efforts to achieve the standard for one criteria pollutant do not slow or counteract efforts to achieve the standard for another. A two-step modeling process, consistent with the approach used in the 2007 AQMP, has been conducted for the Final 2012 AQMP. First, future year 24-hour average PM2.5 are simulated for 2014, 2017 and 2019 to determine the earliest possible date for attainment. (If attainment cannot be demonstrated by 2014, U.S. EPA can grant up to an additional 5-years to demonstrate attainment of the 24-hour standard. However, the length of the extension is contingent upon the earliest year beyond 2014 that attainment can be demonstrated implementing all feasible control measures).

Concurrently, simulations are also conducted to confirm that the annual average PM2.5 concentrations will meet the 15 $\mu g/m^3$ standard by 2014, and demonstrate progress in following years. The update to the annual PM2.5 modeling is not intended to replace the approved modeling attainment demonstration submitted in the 2007 AQMP. The updated modeling is included to provide insight into the level of compliance with the current standard in future years, and provide a first glance at the impact that proposed revisions to lower the standard will have on attainment status. U.S. EPA recently proposed revisions to the federal annual PM2.5 standard that will lower the standard to a value between 12 and 13 $\mu g/m^3$. While the exact attainment date has not been published, the proposed rule will likely provide 5 years after designation to demonstrate attainment of new the annual standard. As with the current 24-hour PM2.5 standard, U.S. EPA can grant up to an additional 5-years to demonstrate attainment of the annual standard. That would set an attainment date no later than 2023. The annual PM2.5 simulations presented in this section for model years beyond 2014 are included to demonstrate the continued progress towards meeting the range of the new federal standard by the early 2020's.

Finally, the future year 8-hour average ozone emissions control strategy builds upon the PM2.5 strategy to demonstrate attainment of the federal 8-hour average ozone standard in 2024. There is no federal requirement to update the current ozone attainment demonstration at this time; however an update to the 8-hour average ozone SIP that demonstrates attainment of the 75 ppb standard is scheduled to be submitted no later than June 2015. The deadline for the Basin to attain the 75 ppb standard is likely to be 2032, 8-years after the attainment date for the previous 80 ppb federal standard in 2024. It is critical to conduct preliminary analyses to assess the current control strategy given the extent of required emissions reductions needed to meet the 80 ppb standard in 2024.

Model Selection

During the development of the 2003 AQMP (SCAQMD, 2003), the District convened a panel of seven experts to independently review the regional air quality modeling conducted for ozone and PM10. The consensus of the panel was for the District to move to more current state-of-the-art dispersion platforms and chemistry modules. At that time, the model selected for the 2007 AQMP ozone attainment demonstrations was the Comprehensive Air Quality Model with Extensions (CAMx) (Environ, 2006), using SAPRC99 chemistry. For PM2.5, the 2007 AQMP used the CAMx "one atmosphere" approach which coupled CB-IV gas phased chemistry and a static two-mode particle size aerosol module as the particulate modeling platform. The CAMx "one atmosphere" chemistry approach better preserved mass consistency taking advantage of an advanced dispersion platform.

In the 2007 AQMP, CAMx coupled with the SAPRC99 chemistry was simulated to demonstrate attainment of the federal ozone standard. A total of 36 days were simulated covering 6 ozone episode periods from which 19 days meeting performance criteria were selected for inclusion in the attainment demonstration. Future year ozone projections were developed using the CAMx/SAPRC99 couple supported by MM5 meteorological data fields and day specific emissions inventories.

The 2007 AQMP PM2.5 attainment demonstration incorporated the CAMx/CB-IV chemistry and aerosol modules together with the MM5 (Grell, 1994) meteorological fields. The PM2.5 analyses relied on average week day and weekend day emissions profiles that were adjusted for monthly averaged temperature and humidity. The annual and episodic PM2.5 demonstrations were based on 365 days of particulate simulation. It is important to note that PM2.5 and ozone attainment demonstrations were run independently due to differences in the computational requirements resulting from separate modeling domains and definitions of vertical structure.

In keeping with the recommendations of the expert panel as well as the Scientific Technical Peer Modeling Review Committee, the Final 2012 AQMP has continued to move forward to incorporate current state-of-the-art modeling platforms to conduct regional modeling analyses in support of the PM2.5 attainment demonstrations and ozone update. The Final 2012 AQMP PM2.5 attainment demonstration has been developed using the U.S. EPA supported Community Multiscale Air Quality (CMAQ) version 4.7.1 (EPA, 2010) air quality modeling platform with SAPRC99 chemistry (Carter, 2000), and the Weather Research and Forecasting model (WRF) version 3.3 meteorological fields (UCAR, 2011). (Comprehensive descriptions of the CMAQ modeling system are provided by U.S. EPA at their SCRAM website: http://www.epa.gov/scram001/. Additional descriptions of the SAPRC99 chemistry module are provided at the UCR website: http://www.engr.ucr.edu/~carter/SAPRC/. Documentation of the NCAR WRF model is available from UCAR website: http://www.wrf-model.org/). Supporting PM2.5 and ozone simulations were also conducted using the most current, publicly available version of CAMx, version 5.3 (Environ, 2011) which also used SAPRC99 chemistry and WRF meteorology. The model analyses were conducted on an expanded domain, with increased resolution in the vertical structure for a 4 x 4 km grid size.

MODELING METHODOLOGY

Design Values

EPA guidance (EPA, 2007) recommends the use of multiple year averages of design values, where appropriate, to dampen the effects of single year anomalies to the air quality trend due to factors such as adverse or favorable meteorology or radical changes in the local emissions profile. The trend in the Basin 24-hour PM2.5 design values, determined from routinely monitored Federal Reference Monitoring (FRM), from 2001 through 2011 (Figure V-1-1) depicts sharp reductions in concentrations over the period. The 24-hour PM2.5 design value for 2001 was 76 $\mu g/m^3$ while the 2008 design value (based on data from 2006, 2007 and 2008) is 53 $\mu g/m^3$. Furthermore, the most current design value computed for 2011 has been reduced to 38 $\mu g/m^3$. The annual PM2.5 design value has demonstrated a reduction of 13.6 $\mu g/m^3$ over the 10-year period from 2001 through 2011. In each case, the trend in PM2.5 levels is steadily moving in the direction of air quality improvement.

The trend of Basin ozone design values is presented in Figure V-1-2. The design values have averaged a reduction of approximately three parts per billion over the 14-year period; however the most recent design value (107 PPB) continues to exceed the 1997 8-hour ozone standard by 34 percent and the 2006 ozone standard by 43 percent.

In its modeling guidance, U.S. EPA has recommended that a multiple year weighted design value be used in attainment demonstrations. It is reasonable to use a representative design value that is not fixed in a multiple year average that overly reflects data that are not consistent with the current air quality trend or unusual weather. The PM2.5 attainment demonstrations presented in the 2007 AQMP relied on 2005 design values based on monitoring data between 2003 and 2005. In general, the 2005 design value was more consistent with the monitoring data observed in 2004, the center year in the design value calculation. The 2007 AQMP attainment demonstrations were anchored to a 2005 emissions data set and particulate speciation profiles obtained from an extensive monitoring program conducted over the course of 2005. Had the 2006 PM2.5 data been available for inclusion in the analysis, the revised weighted annual design value centered around 2005 (including data from 2004 through 2006) would be 22.7 $\mu g/m^3$, essentially the same value as the 2005 design of 22.6 $\mu g/m^3$.

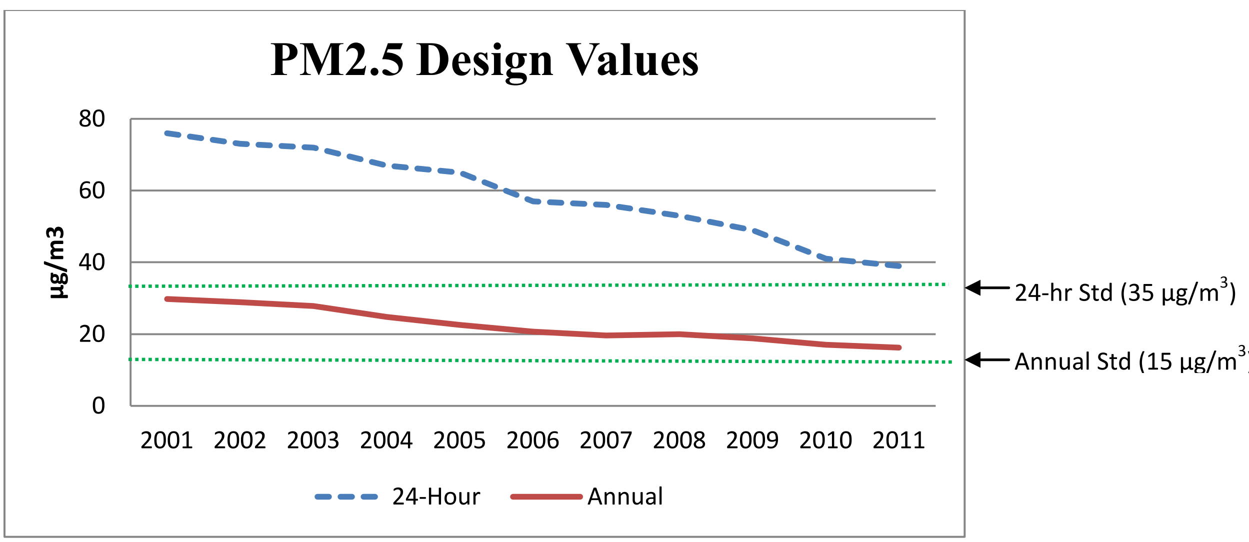

FIGURE V-1-1

South Coast Air Basin 24-Hour Average and Annual PM2.5 Design Values
(*Each value represents the 3-year average of the highest annual average PM2.5 concentration*).
The dotted lines represent 24-hr and annual standards, respectively.

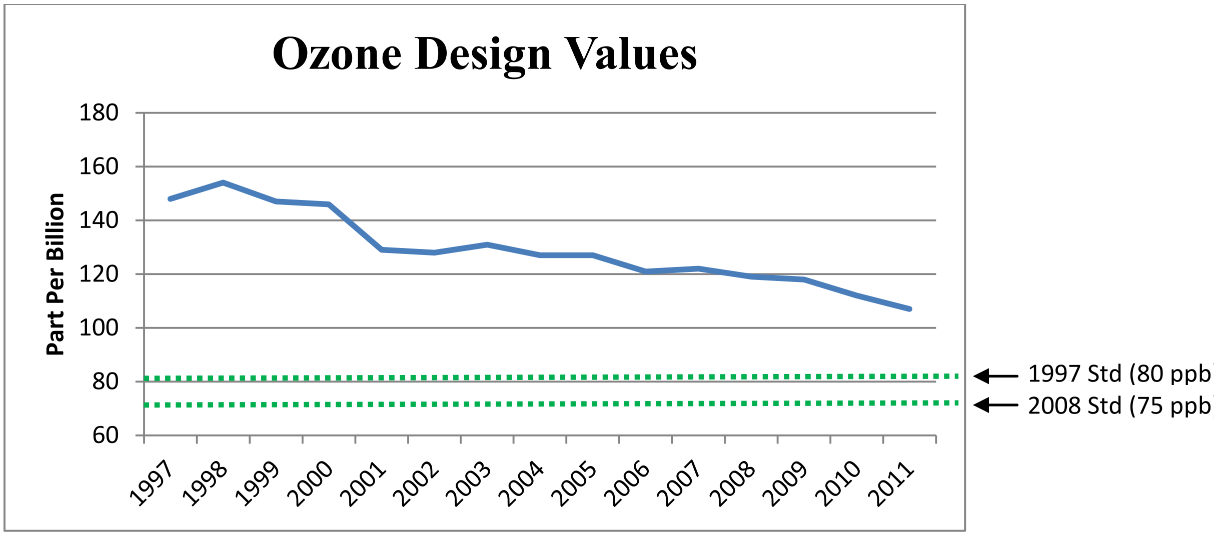

FIGURE V-1-2

South Coast Air Basin 8-Hour Average Ozone Design Values
(*Each value represents the 3-year average of the 4th highest 8-Hour Average Ozone concentration*)

The Final 2012 AQMP relies on a set of 5-years of monitored particulate data centered on 2008, the base year selected for the emissions inventory development and the anchor year for the future year PM2.5 projections. In July, 2010, U.S. EPA proposed revisions to the PM2.5 24-hour average modeling attainment demonstration guidance (EPA, 2011). In the 2007 AQMP attainment demonstrations, maximum quarterly concentrations equal to or less than the yearly 24-hour average design value were incorporated in the future year design projection. Since the 24-hour attainment demonstration used the 2005 design value, the future year design projection was based on 3-years of quarterly PM2.5 data observed from 2003 through 2005. A total of 12 quarterly design values were used in the projection of the 2015 attainment demonstration.

The new guidance suggests using 5-years of data, but instead of directly using quarterly calculated design values, the procedure requires the top eight daily PM2.5 concentrations days in each quarter to reconstruct the annual 98th percentile values. The logic in the analysis is twofold. First, by selecting the top eight values in each quarter, the 98th percentile concentration is guaranteed to be included in the calculation. Second, the analysis projects future year concentrations for each of the 32 days in a year (160 days over 5-years) to test the response of future year PM2.5 to the proposed control strategy. Since the 32 days in each year include different meteorological and particulate species profiles, it is expected that those individual days will respond independently to the projected the future year emissions profile and that a new distribution of PM2.5 concentrations will result. The methodology uses the projected air quality for the 32 days in each year to build a new annual 24-hour 98^{th} percentile concentration, not necessarily occurring on the same day exhibiting the 98^{th} percentile in the base year. The five years of projected 98^{th} percentile concentrations are weighted to create a new future year 24-hour PM2.5 design value to test attainment of the standard. Overall, the process is more robust in that the analysis is examining the impact of control strategy implementation on 10 times the number of days, covering a wider variety of potential meteorology and emissions combinations.

It is important to note that the use of the quarterly design values for a 5-year period centered around 2008 were also used in the projection of the future year annual average PM2.5 concentrations. The revised PM2.5 guidance did not modify the procedures used to calculate the future year annual average PM2.5 concentrations. The future year design value reflects the weighted quarterly average concentration calculated from the projections of 5-years of days (20 quarters).

The weighted 2008 24-hour and annual PM2.5 8-hour ozone design values for the Basin are presented in Chapters 5, 6, and 7 of this appendix, respectively.

Relative Response Factors and Future Year Design Values

To bridge the gap between air quality model output evaluation and applicability to the health based air quality standards, EPA guidance has proposed the use of relative response factors (RRF). The RRF concept was first used in the 2007 AQMP modeling attainment demonstrations. The RRF is simply a ratio of future year predicted air quality with the control strategy fully implemented to the simulated air quality in the base year. The mechanics of the attainment demonstration are pollutant and averaging period specific. For 24-hour PM2.5, the top 10 percentile of modeled concentrations in each quarter of the simulation year are used to determine the quarterly RRF. For the annual average PM2.5, the quarterly average RRFs are used for the future year projections. For the 8-hour average ozone simulations (to be further discussed in Chapter 10 of this document) the aggregated response of several episode days to the implementation of the control strategy are used to develop an averaged RRF for projecting a future year design value. Simply stated, the future year design value is estimated by multiplying the non-dimensional RRF to the base year design value. Thus, the simulated improvement in air quality, based on multiple meteorological episodes, is translated to a simple metric that directly determines compliance of the standard. Equations V-1 and V-2 summarize the calculation.

Equation V-1.

RRF = Future-Year Model Prediction / Base-Year Model Prediction.

Equation V-2.

Attainment Demonstration = RRF X Design Value $\leq$ Air Quality Standard.

The modeling analyses described above use the RRF and design value approach to demonstrate future year attainment of the standards.

Regional Modeling

The Final 2012 AQMP employs the CMAQ air quality modeling platform with SAPRC99 chemistry and WRF meteorology as the primary tool used to demonstrate future year attainment of the 24-hour average PM2.5 standard. Unlike the 2007 AQMP attainment demonstrations, PM2.5 and ozone were modeled jointly in one year-long simulation covering 366 days and 8784 hours. Predicted daily maximum values of 24-hour PM2.5 and 8-hour ozone were calculated from the respective running 24-hour and 8-hour average simulated concentrations.

The Final 2012 AQMP modeling attainment demonstrations using the CMAQ platform were conducted using a vastly expanded modeling domain compared with the analysis conducted for the 2007 AQMP modeling attainment demonstration. The simulations were conducted using a Lambert Conformal grid projection where the western boundary of the domain was extended to 084 UTM, over 100 miles west of the ports of Los Angeles and Long Beach. The eastern boundary extended beyond the Colorado river, while the northern and southern boundaries of the domain extend to the San Joaquin Valley and the Northern portions of Mexico (3543 UTM). The grid size has been reduced from 5 x 5 kilometers to 4 x 4 kilometers, and the vertical resolution has been increased to 18 layers. Figure V-1-1 depicts the modeling domain which includes a grid of 154 cells from west to east and 102 cells from south to north.

The final WRF simulated meteorological fields were generated for the identical domain, layer structure and grid size. The vertical structure of the modeling domain was increased to 18 layers after conducting several optimizing simulations. The WRF simulations were initialized from NCEP analyses and run for 4-day increments with 1-day spinup. Four dimensional data assimilation (FDDA) was conducted with vertical sounding and surface measurements. The base WRF simulation was simulated using a vertical structure that included 30 layers extending from the surface to 19 km. A systematic analysis of the impact of layer collapsing from 30 layers to a lesser number was conducted to optimize the number of levels that would best retain the WRF meteorological characterization yet provide enhanced resolution for the CMAQ air quality simulation.

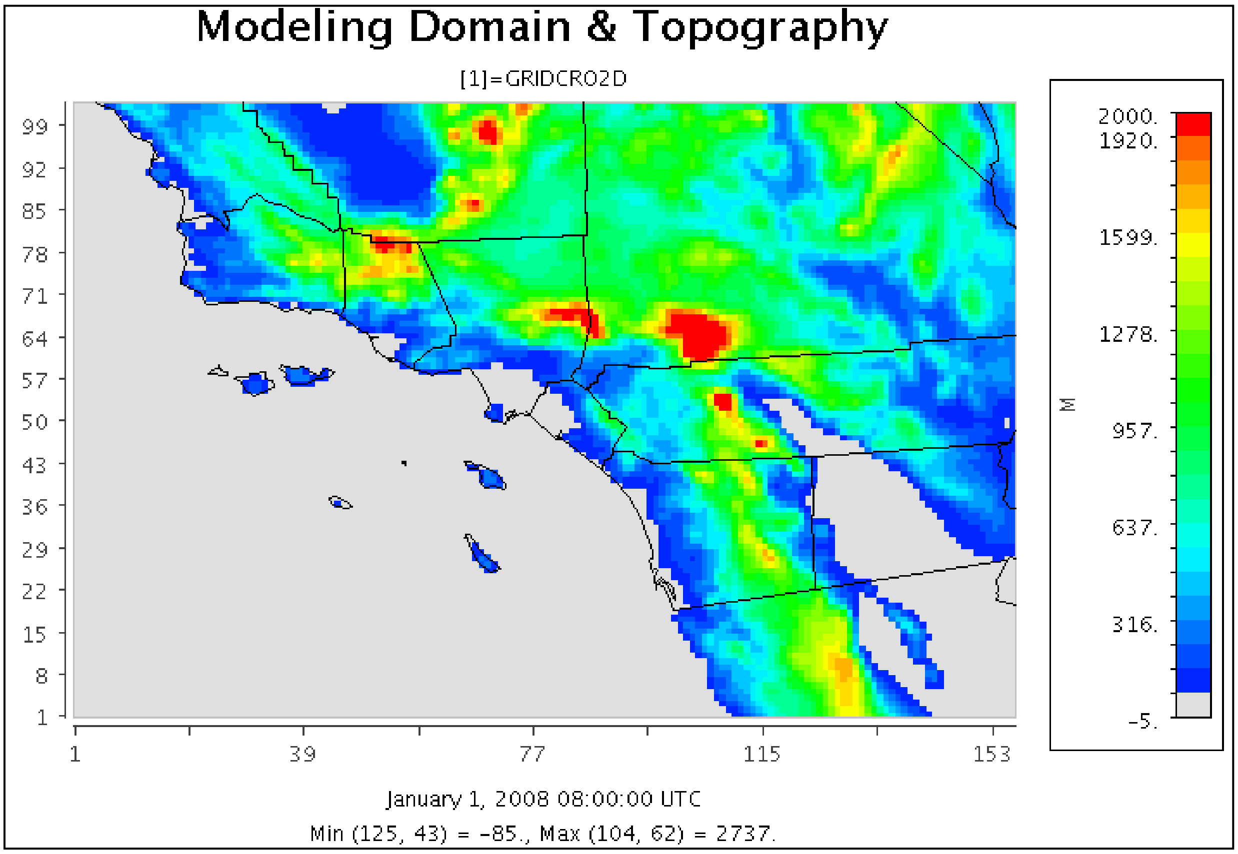

FIGURE V-1-3

2012 AQMP Regional Modeling Domain

Lateral and vertical boundary conditions were designated using an "U.S. EPA clean boundary profile." The analysis tested the use of MOZART: Model of Ozone and Related Chemical Tracers, (Horowitz, 2003), global chemical simulation model output to specify the lateral and vertical boundary conditions used for the CMAQ modeling. Grid scale matching using MOZART at 60 x 60 km compared with the CMAQ 4 x 4 km grid introduced significant uncertainty to the boundary concentration profiles and subsequent regional simulations. Background simulations including the MOZART boundary specification while excluding anthropogenic emissions depicted large variations in background concentrations. Discussions conducted at the Scientific Technical Modeling Peer Review Advisory Group suggested that a finer scale MOZART output might dampen the variable impact to the regional air quality simulations. While this recommendation was acknowledged, the resources and time requirements needed to generate new global modeling output were prohibitive. The final simulations reverted to the more stable clean boundary assumption.

The atmospheric chemistry package used in the CMAQ simulations relied on SAPRC99 gas phase chemistry coupled with Regional Acid Deposition Model (Stockwell, 1990) aqueous chemical mechanism, AE5 aerosol chemistry, and SOAP secondary organic chemistry with the Euler Backward Iterative (EBI) gas phase chemistry solver. The aerosol size distribution algorithm utilized a tri-modal distribution to represent nuclei, fine and coarse particles. The analysis was also conducted using the CAMx modeling platform using the "one atmosphere" approach comprised of the SAPRC99 gas phase chemistry and a static two-mode particle size aerosol module as the particulate modeling platform. Parallel testing was conducted to evaluate the CMAQ performance against CAMx and the results indicated that the two model/chemistry packages performance were similar. The CAMx results are provided as a component of the weight of evidence discussion and are presented as an attachment to this document.

Weight of Evidence

PM2.5 modeling guidance strongly recommends the use of corroborating evidence to support the future year attainment demonstration. The weight of evidence demonstration for the Final 2012 AQMP includes brief discussions of the observed 24-hour PM2.5 levels, emissions trends, and future year PM2.5 predictions.

UNCERTAINTIES ASSOCIATED WITH THE TECHNICAL ANALYSIS

As with any plan update, there are uncertainties associated with the technical analysis. The following paragraphs describe the primary contributors to such uncertainties as well as some of the safeguards built in to the air quality planning process to manage and control such uncertainties.

Demographic and Growth Projections

Uncertainties exist in the demographic and growth projections for the future years. As projections are made to longer periods (i.e., over ten or more years), the uncertainty of the projections become greater. Examples of activities that may contribute to these types of uncertainties include the rate and the type of new sources locating in the Basin and their geographic distribution, future year residential construction, military base reuse and their air quality impact, and economic conditions.

Ambient Air Quality Monitoring Data

Generally, ambient air quality measurements are accurate to within plus or minus half of a unit of measurement (e.g., for ozone usually reported in units of parts-per-hundred million (pphm) would be accurate to within ±0.5 pphm or ±5 ppb). Due to this uncertainty and associated rounding conventions, the Basin's 8-hour attainment status based on ambient monitoring data would be achieved if all ozone monitors reported ozone concentration levels less than or equal to 84 ppb. Similar uncertainty is observed in particulate data measurements and laboratory analysis. For example, PM2.5 is comprised of six primary constituents ($NH4^+$, NO3, $SO4^-$, OC, EC and crustal), as well as bonded water and total mass. Each of the primary species has individual uncertainty associated with the laboratory analysis procedure used to analyze concentration, the type of filter media to collect the sample and the total mass collected can be affected by minor changes in the volumetric flow that fall within the approved instrument calibration range. As a consequence, the sum of the total species may not add up to or may exceed the filter measured mass.

Emissions Inventory

While significant improvements have been realized in mobile source emissions models, uncertainties continue to exist in the mobile source emissions inventory estimates. EMFAC2011 (CARB, 2011) on-road mobile source emission estimates have improved with each new EMFAC release. On-road mobile source emissions have inherent uncertainties with the current methodologies used to estimate vehicle miles traveled, the impacts of fuel additives such as ethanol, and day-of-week diurnal profiles of traffic volume. Stationary (or point) source emission estimates have less associated uncertainties compared to area source emission estimates. Major stationary sources report emissions annually whereas minor stationary and area source emissions are, in general, estimated based on a top down approach that relies on production, usage or activity information. Area source emissions including paved road dust and fugitive dust have significant uncertainties in the estimation of particulate ($PM_{2.5}$) emissions due to the methodologies used for estimation, temporal loading and weather impacts.

Air Quality and Meteorological Models

The air quality models used for ozone and particulate air quality analysis are state-of-the-art, comprehensive 3-dimensional models that utilize 3-dimensional meteorological models, complex chemical mechanisms that accurately simulate ambient reactions of pollutants, and sophisticated numerical methods to solve complex mathematical equations that lead to the prediction of ambient air quality concentrations. While air quality models progressively became more sophisticated in employing improved chemical reaction modules that more accurately simulate the complex ambient chemical reaction mechanisms of the various pollutants, such improved modules are still based on limited experimental data which carry associated uncertainties. In order to predict ambient air quality concentrations, air quality models rely on the application of sophisticated numerical methods to solve complex mathematical equations that govern the highly complex physical and chemical processes that also have associated uncertainties. Layer averaging of model output reduces the sensitivity of the model to changing patterns in the vertical structure.

Are There Any Safeguards Against Uncertainties?

Yes. While completely eliminating uncertainties is an impossible task, there are a number of features and practices built into the air quality planning process that manage and control such uncertainties and preserve the integrity of an air quality management plan.

The concerns regarding uncertainties in the technical analysis are reduced with future AQMP revisions. Each AQMP revision employs the best available technical information. Under state law, the AQMP revision process is a dynamic process with revisions occurring every three years. The AQMP revision represents a "snapshot in time" providing the progress achieved since the previous AQMP revision and efforts still needed in order to attain air quality standards.

Under the federal Clean Air Act, a state implementation plan (SIP) is prepared for each criteria pollutant. The SIP is not updated on a routine basis under the federal Clean Air Act. However, the federal Clean Air Act recognizes that uncertainties do exist and provides a safeguard if a nonattainment area does not meet an applicable milestone or attain federal air quality standards by their applicable dates. Contingency (or backstop) measures are required in the AQMP and must be developed into regulations such that they will take effect if a nonattainment area does not meet an applicable milestone or attainment date. In addition, federal sanctions may be imposed until an area meets applicable milestone targets.

In September 2006, U.S. EPA released an updated guidance document on the use of modeled results to demonstrate attainment of the federal ozone, PM2.5 and regional haze air quality standards. The guidance document recognized that there will be uncertainties with the modeling analysis and recommends supplemental analysis or weight of evidence discussion that corroborates the modeling attainment analysis where attainment is likely, even if the modeled results are inconclusive. Table V-1-1, is taken directly from the modeling guidance document to illustrate the value of supplemental analyses. Where possible, the U.S. EPA recommends that at least one "mid-course" review of air quality, emissions and modeled data be conducted. A second review, shortly before the attainment date, should be conducted also. Statistical trend analyses of monitored data can also provide support for assessing the likelihood for future year attainment. The District will undertake such actions at the appropriate times.

DOCUMENT ORGANIZATION

This document provides the federal attainment demonstration for 24-hour PM2.5 and additional analyses for annual PM2.5 and ozone. Chapter 2 provides the Modeling Protocol which summarizes the key elements that have been revised relative to the 2007 AQMP Modeling protocol. Chapter 3 provides a discussion of the meteorological modeling, including model performance and the impact of modifications to the land usage profiles. Chapter 4 provides a brief summary of the modeling emissions, including characterization of the daily/diurnal emissions profiles and OGV emissions. Chapter 5 provides the 24-hour PM2.5 attainment demonstration meeting the 2014 attainment date. The chapter includes a characterization of the particulate species profile, discussion of the revised attainment demonstration methodology, and selected future year particulate impacts. A series of alternative emissions simulations are also presented to test the sensitivity of the proposed control strategy and to simulate the impacts of CEQA alternatives to the proposed plan. Chapter 6 provides an update to projected annual PM2.5 concentrations for the different future year emissions scenarios. Similarly, Chapter 7 will provide an update to the future year 8-hour ozone projections based on the CMAQ modeling analyses. The ozone analysis includes discussions of the representativeness of the 2008 meteorological year, base-year modeling performance, and projections of future year concentrations for baseline emissions as well as the implementation of the short-term control strategy. The ozone analysis will also provide updated isopleth analyses and a discussion of future year carrying capacities for the current and proposed ozone standards. As with the particulate analyses, weight of evidence discussions for ozone will be incorporated in Chapter 5. Chapter 8 provides a brief summary of the analysis.

Table V-1-2 lists the Attachments to this document. CAMx simulation analyses will be included as an attachment in the final document.

TABLE V-1-1

Guidelines for Weight of Evidence Determinations (U.S. EPA, 2006)

Results of Modeled Attainment Test			Supplemental Analyses
Ozone	Annual PM2.5	24-Hour PM2.5	
Future Design Value < 82 ppb, all monitoring sites	Future Design Value < 14.5 μg/m^3, all monitoring sites	Future Design Value < 62 μg/m^3, all monitoring sites	Basic supplemental analyses should be completed to confirm the outcome of the modeled attainment test
Future Design Value 82 - 87 ppb, at one or more sites/grid cells	Future Design Value 14.5 – 15.5 μg/m^3, at one or more sites/grid cells	Future Design Value 62 – 67 μg/m^3, at one or more sites/grid cells	A weight of evidence demonstration should be conducted to determine if aggregate supplemental analyses support the modeled attainment test
Future Design Value > 87 ppb, at one or more sites/grid cells	Future Design Value > 15.5 μg/m^3, at one or more sites/grid cells	Future Design Value > 67 μg/m^3, at one or more sites/grid cells	More qualitative results are less likely to support a conclusion differing from the outcome of the modeled attainment test.

TABLE V-1-2

Attachments

Number	Description
	References
Attachment-1	WRF METSTAT Model Graphical Performance Statistics
Attachment-2	Final CEPA Source Level Emissions Reduction Summary for 2014: Annual Average Inventory
Attachment-3	Final CEPA Source Level Emissions Reduction Summary for 2023: Annual Average Inventory
Attachment-4	Quarterly CMAQ 24-Hour PM2.5 Model Performance
Attachment-5	CAMx Modeling
Attachment-6	Relative Contributions of Precursor Emissions Reductions to Simulate Controlled Future Year 24-Hour PM2.5 Concentrations
Attachment-7	Time Series of Observed Vs. Predicted 8-Hour Ozone
Attachment-8	2023 8-Hour Ozone Isopleths

CHAPTER 2

MODELING PROTOCOL

Background

Final 2012 AQMP Modeling Protocol

BACKGROUND

One of the basic requirements of a modeling attainment demonstration is the development of a comprehensive modeling protocol that defines the scope of the regional modeling analyses including the attainment demonstration methodology, modeling and chemical platforms employed, emission inventories and physical characteristics of the domain simulated. The protocol also defines the methodology to assess model performance and the selection of the periods to be simulated. The 2007 AQMP provided a comprehensive discussion of the modeling protocol used as guidance in the development of the ozone, PM2.5, and PM10 modeling attainment demonstrations. The 2007 AQMP Modeling Protocol for Ozone and Particulate Matter Modeling in Support of the South Coast Air Quality Management District 2007 Air Quality Plan Update which is provided as Attachment-3 in Appendix V of that document serves as the foundation of the Final 2012 AQMP modeling protocol. Modifications made to that protocol to address the requirements of the Final 2012 AQMP attainment demonstrations are presented in this chapter.

The 2007 AQMP modeling protocol was finalized in May of 2006, prior to the release of U.S. EPA's "Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of the Air Quality Goals for Ozone, PM2.5, and Regional Haze." Together, the two guidance documents steered the development of the 2007 ozone and PM2.5 attainment demonstrations that have since been approved by U.S. EPA in the California SIP. In a letter dated June 28, 2011, U.S. EPA issued a revision to the modeling attainment demonstration methodology for 24-hour PM2.5 entitled "Update to the 24 Hour PM2.5 NAAQS Modeled Attainment Test." The revision outlined an overhaul to the structure of the attainment demonstration but did not propose any modifications to the underlying regional modeling analyses. The revised guidance was referenced in the updated 24-hour PM2.5 implementation guidance "Implementation Guidance for the 2006 24-Hour Fine Particle (PM2.5) National Ambient Air Quality Standard" dated March 2, 2012.

FINAL 2012 AQMP MODELING PROTOCOL

Table V-2-1 provides a side-by-side comparison of the Final 2012 AQMP and 2007 AQMP modeling protocols. The differences between the modeling structure focus on a limited number of areas. In general, changes to emissions inventories, future-year simulations and episode selection evaluation are specific to the base year selected and the level of the non-attainment designation. As such, these changes are expected to occur as part of each modeling update. The more substantive changes to the Final 2012 AQMP protocol reflect the use of CMAQ as the primary modeling platform, WRF as the meteorological modeling platform and the changes to the size of the modeling region, vertical structure and grid size.

For this set of modeling analyses, CMAQ was selected as the primary dispersion modeling platform. One element in the decision to use CMAQ as the primary modeling platform was the fact that it was a publicly available model with numerous computational features and ongoing support in the modeling community. When evaluated for possible use in the attainment demonstration, both CMAQ and CAMx exhibited similar model performance in predicting 24-hour and annual PM2.5 levels. CMAQ however tended to predict monitored ozone concentrations with higher accuracy than the CAMx simulations. The migration to WRF from MM5 as the primary meteorology modeling tool follows its ongoing use as the mainstay in weather forecasting by the NWS, and its continuing development and support by NOAA and U.S. EPA.

The most significant changes to the modeling analyses in the Final 2012 AQMP, compared with that defined in 2007 AQMP, occur in the size of the domain, reduced grid size and increased vertical structure. First and foremost, both PM2.5 and ozone will be simulated together using the same domain specification. The size of the domain has been expanded 65 km further west to attempt to incorporate clean boundaries into the modeling region, and 40 km to the south to include a greater percentage of northern Mexico emissions. Moreover, the grid size has been reduced from 5 x 5 km to 4 x 4 km. The reduced grid size better enabled the merging of the statewide emissions inventory which is set at the 4 km grid scale based on a Lambert Conformal projection. Table V-2-2 provides the characteristics of the modeling domain and Figure V-1-1 provides a comparison of the Final 2012 AQMP modeling to the PM2.5 and ozone modeling domains simulated in the 2007 AQMP attainment demonstrations.

TABLE V-2-1

Summary of Final 2012 AQMP Model Selection and Modeling Protocol

2012 AQMP	2007 AQMP Element
24-Hour PM2.5 and Annual Dispersion Platform: CMAQ (CAMx : weight of evidence discussion) Chemistry: SAPRC99 with tri-modal aerosol distribution SMAT/Sandwich approach	*PM10/PM2.5 Annual and Episodic* Dispersion Platform: CAMx Chemistry: AERO-LT with CB-IV Enhanced Fine/ Coarse scheme with CB-IV Optional One Atmosphere Aerosol chemistry
Ozone Dispersion Platform: CMAQ Chemistry: SAPRC99	*Ozone* Dispersion Platform: CAMx Chemistry: SAPRC99
Domain/ Coordinates Ozone and PM: Expanded SCOS97 Meteorology, Emissions and Model application: Lambert Conformal Grid: 4 Km X 4 Km Ozone: 18 layers PM2.5: 18 layers	*Domain/ Coordinates* Ozone: SCOS97, PM10/2.5 SCAQS87 Meteorology, Emissions and Model application: Lambert Conformal Grid: 5 Km X 5 Km Ozone: 16 layers PM10/2.5: 8 layers

Emissions Inventories
• 2008 Base year
• Day-Specific Emissions
• Shipping emissions split into 2layers
• EMFAC2011
  ○ 3- modules
  ○ Modified DTIM
• Adjustments to fugitive PM2.5 Paved road EPA with CA modifications
• Day-Specific Biogenic emissions
• Revised Mexican emissions profile
	Emissions Inventories
	• 2002 Base year
	• Enhanced aircraft/airport and shipping inventories
	• Updates for Ports of Los Angeles and Long Beach
	• EMFAC2007
	  ○ gross adjustments
	  ○ “focused” inventories
	  ○ Final public model
	• Adjustments to fugitive PM10/PM2.5 categories

TABLE V-2-1 (Continued)

Summary of Final 2012 AQMP Model Selection and Modeling Protocol

<table>
<tr><th>2012 AQMP</th><th>2007 AQMP Element</th></tr>
<tr><td><u>Meteorology</u>

• WRF and MM5 initialized with NCEP data with FDDA</td><td><u>Meteorology</u>

• MM5 with FDDA
• Hybrid MM5/CALMET
• MM5 initialized using NCEP data</td></tr>
<tr><td><u>Future Year Projections</u>

PM2.5/Ozone
• 2014
• 2017
• 2019
• 2023
• 2030
• 2035</td><td><u>Future Year Projections</u>

Ozone
• 2017 (Coachella)
• 2023

PM2.5/PM10
• 2014
• 2015 (PM10)
• 2020</td></tr>
<tr><td><u>Air Quality Model Performance</u>

PM2.5 Quarterly statistics at speciation sites:

• Averages, normalized bias and normalized error
• Graphical analyses:
Scatter plots, time series, soccer plots
• Weight of Evidence Analysis

<u>Ozone</u>

• Assess model performance based on both 1-hour and 8-hour statistics:
Normalized gross bias
Normalized gross error
Peak prediction accuracy
• 60 ppb threshold (both indices)</td><td><u>Air Quality Model Performance</u>

Ozone

• Assess model performance based on both 1-hour and 8-hour statistics
• 60 ppb threshold (both indices)
• Weight of Evidence Analysis
• Mid-Course simulations

<u>PM2.5 (annual and episodic)</u>

• Base statistics at speciation sites
• Weight of evidence analysis
• Mid-Course simulations
2009
2012</td></tr>
</table>

TABLE V-2-2

Final 2012 AQMP Modeling Domain

Projection	Lambert Conformal Projection
Latitude of Origin	37 N
Modeling Domain	156 x 102 x 18
Vertical Layer Structure	Variable up to 50 hPa (mb)
Central Meridian	120.5 W
Standard Parallel	30 N, 60 N
Horizontal Grid Size	4 km x 4 km
Southwest Origin	(-84 km, -552km)

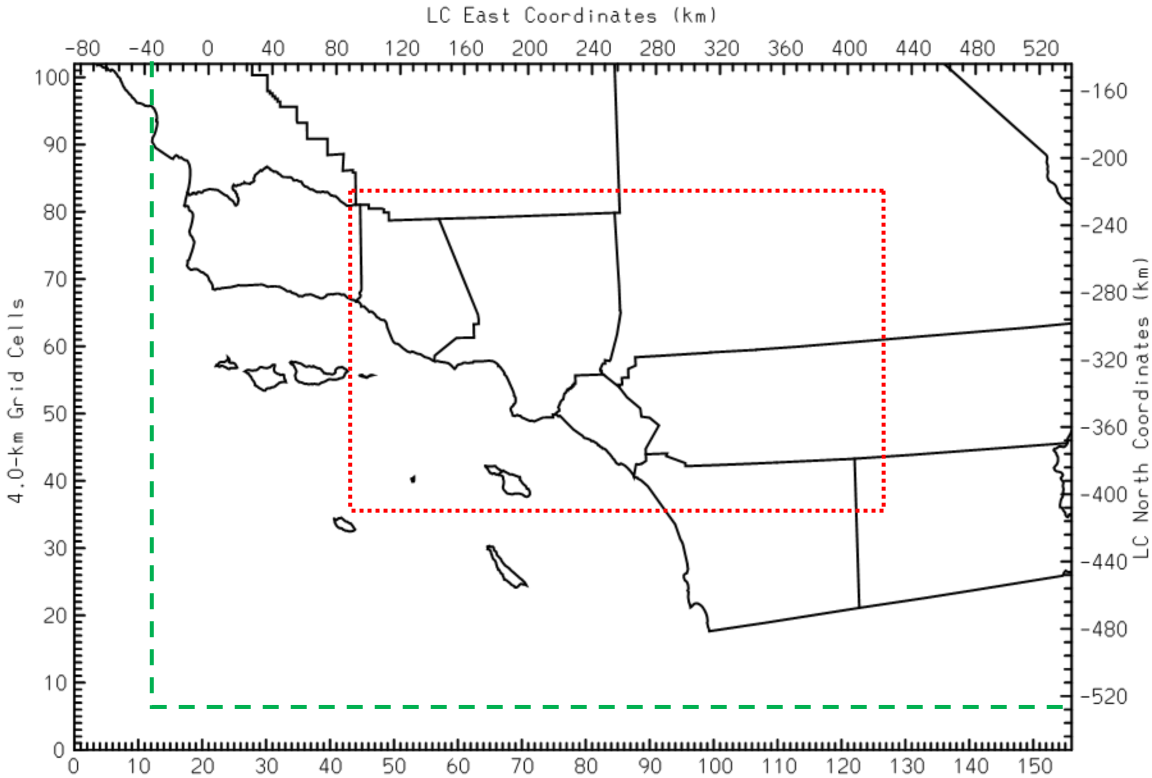

FIGURE V-2-1

Comparison of Regional Modeling Domains: Red Dotted: SCAQS87-- 2007 AQMP PM2.5, Green Dashed: SCOS97-- 2007 AQMP Ozone, Black (Outer): 2012 AQMP

One clear benefit from the modification to the grid size was the smoother coupling of the meteorological modeling field development. The WRF analyses are initialized from NECP model output at 36 km grid level, then scaled downward based on a 3:1 scaling ratio to a 12 km grid inner-modeling domain covering most of California to set the regional meteorological boundary conditions for the 4 km grid modeling domain. Finally, the layer structure in the vertical domain for the modeling region has been increased to 18 layers from the previous 16 layers used for the 2007 AQMP ozone simulations, and from the eight layers used in the CAMx PM2.5 attainment demonstration simulations. Table V-2-3 provides a definition of the 18 layer vertical structure used in the air quality simulations. Also listed is the corresponding 30 layer structure of the WRF modeling vertical domain that matches the CMAQ domain at the top height.

By and large, the greatest impact to the modeling analyses resulting from the changes summarized in the protocol and in Table V-2-2 is the impact on the computational requirements to simulate a year's air quality. Since PM2.5 is common to all multi-pollutant analyses, the Final 2012 AQMP simulations required 8 times the computational resources to complete a simulation compared with the 2007 AQMP PM2.5 attainment demonstration. Figure V-2-2 depicts a typical model simulation configuration of the computation system. A total of 15 servers and 200 CPU's were used in the simulations.

TABLE V-2-3

Final 2012 AQMP Modeling Vertical Layer Structure

WRF Layer Index	Mid-Point Height (m)		CMAQ Layer Index	Mid-Point Height (m)
30	19268		15	19268
29	17355			
28	15755			
27	14337		14	14337
26	13028			
25	11791			
24	10598			
23	9429			
22	8271		13	8271
21	7118			
20	5994			
19	4992			
18	4153			
17	3449		12	3449
16	2858			
15	2361			
14	1944		11	1944
13	1595			
12	1302			
11	1057			
10	851		10	851
9	681		9	681
8	538		8	538
7	418		7	418
6	318		6	318
5	235		5	235
4	165		4	165
3	107		3	107
2	59		2	59
1	18		1	18

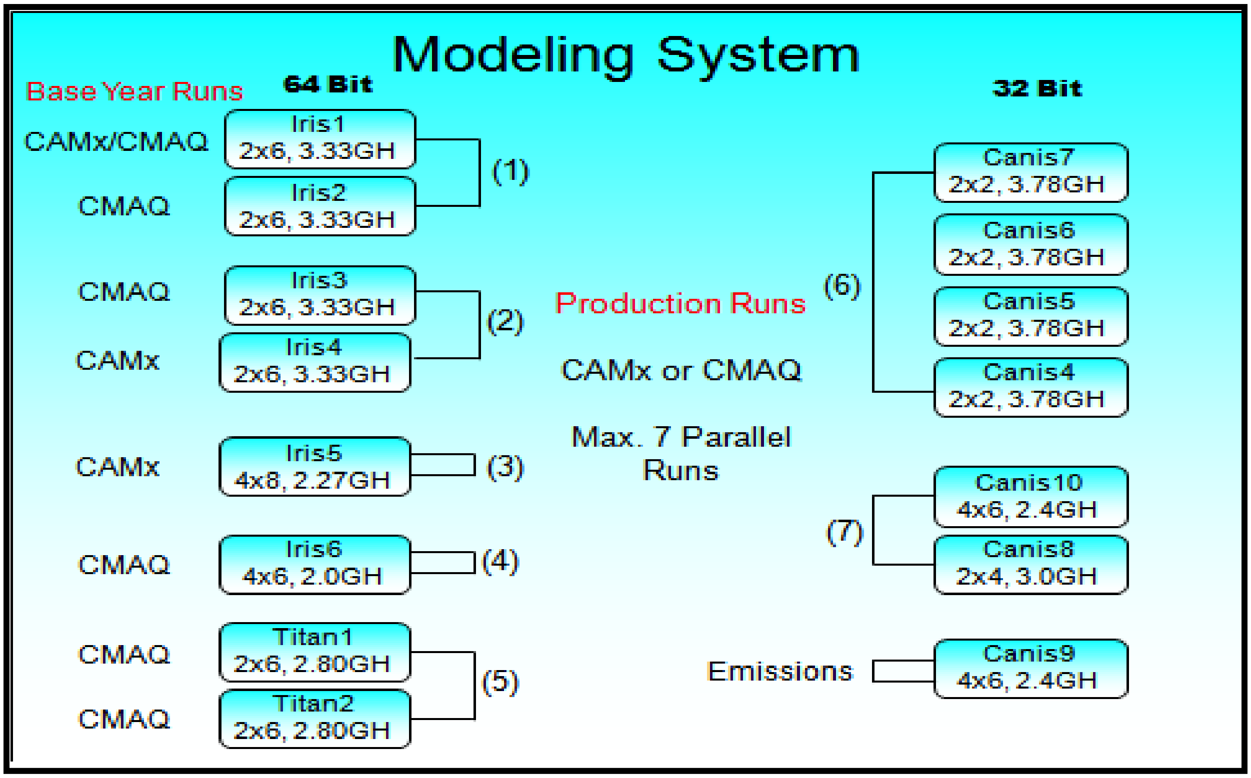

FIGURE V-2-2

Typical CMAQ/CAMx Modeling Simulation Configuration

CHAPTER 3

METEOROLOGICAL MODELING AND SENSITIVITY ANALYSES

Overview

Meteorological Modeling Configuration

Sensitivity Tests for Numerical Parameterization

Land Use Representation

Statistical Performance Evaluation

Sensitivity Tests

OVERVIEW

This chapter provides a description of the meteorological modeling that serves as the foundation of the Final 2012 AQMP modeling analysis. As previously discussed, the Final 2012 AQMP regional modeling relied on WRF model applications for 2008. The previous 2007 AQMP attainment demonstrations relied on National Center for Atmospheric Research (NCAR)/Penn State University (PSU) Mesoscale Model 5 (MM5) meteorological fields. The migration to WRF was based on two factors: First, WRF is the state-of-the-art meteorological forecast model used by the NWS and scientific community. It is under continual review and benefits from updates to critical modeling parameters. Second, MM5 is no-longer supported as a regional meteorological model although it is still posted at the U.S EPA SCRAM website. In moving to a new meteorological model, several analyses were conducted to compare WRF and MM5 meteorological fields to confirm the portability of the CMAQ modeling system to the new model. This chapter describes the meteorological model, the comparison between WFR and MM5, selection of the vertical stability parameterization, land use, and initial and boundary conditions used in the 24-hour PM2.5 attainment demonstration and companion annual PM.5 and 8-hour ozone updates.

METEOROLOGICAL MODELING CONFIGURATION

WRF was employed to produce meteorological fields for chemical transport models. The WRF is a 3-D prognostic model that solves the Navier-Stokes' equation, accounts for thermodynamics, conserves mass, and incorporates radiative energy transfer. WRF has been applied to a wide range of phenomena, such as regional climate, monsoons, cyclones, mesoscale fronts, land-sea breezes and mountain-valley circulations. Among two platforms available in WRF – Advanced Research WRF (ARW) and Non-hydrostatic Mesoscale Model (NMM), ARW was chosen for the current modeling analyses.

WRF simulations were conducted with three nested domains of which grid resolutions were 36, 12 and 4 km. The innermost domain has 163 by 115 grid points in abscissa and ordinate, respectively, which spans 652 km by 460 km in east-west and north-south directions, respectively. Geographically, the domain encompasses the greater Los Angeles and suburban areas, its surrounding mountains, and seas off the coast of the Basin as shown in Figure V-3-1. The relative locations and sizes of the three nested grids are given in Figure V-3-1 as well. The model employed 30 layers vertically with the lowest computational layer being approximately 18 m above ground level (agl) and the top layer at 50 hPa. Note that default modeling top height is 50 hPa in WRF, while that in MM5 is 100 hPa. The National Center for Environmental Prediction (NCEP) North American Model (NAM) model output (Grid 212, 40 km grid spacing), together with vertical soundings and surface measurements, were used to compile initial and boundary values for the outermost domain as well as for the Four Dimensional Data Assimilation (FDDA) to WRF. The cloud radiation, and simple ice cloud physics were chosen for simulations after carefully considering various available options in WRF. Kain-Fritsch cumulus schemes were employed to the outer two domains, while no cumulus parameterization was used for the innermost domain. The selections of PBL and LSM schemes are discussed further in the next section.

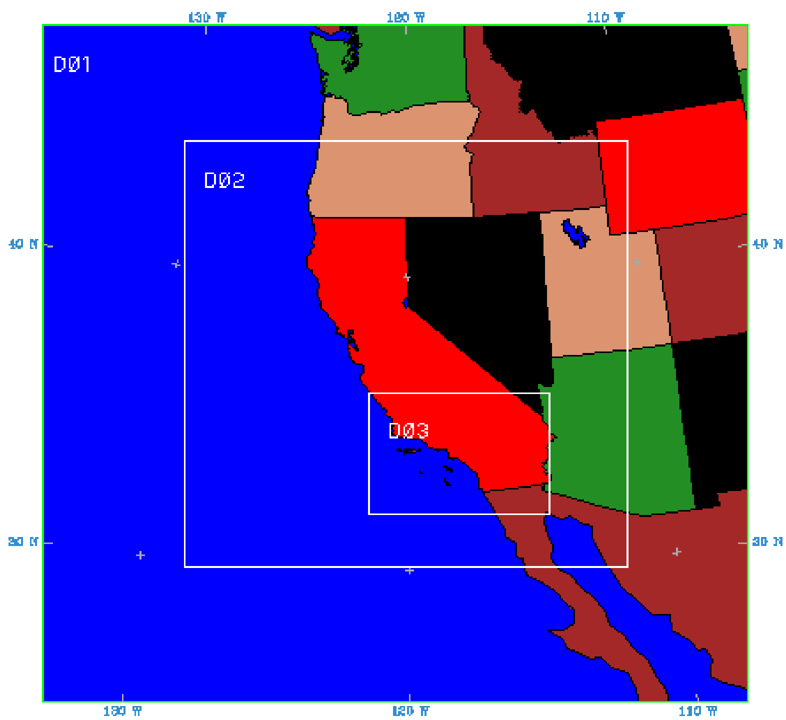

FIGURE V-3-1

Three nested modeling domains employed in the WRF simulations.

SENSITIVITY TESTS FOR NUMERICAL PARAMETERIZATIONS

Modeling Framework: MM5 vs. WRF

MM5 is a mesoscale meteorological model that has been applied to wide variety of phenomena and wide spectrum of geographical and climatological situations, until it was officially replaced by WRF. As evident from the development history, WRF shares a fundamental platform with MM5. MM5 uses terrain following sigma-coordinate, while WRF uses a vertical coordinate that is a hybrid of terrain following z* and pressure coordinate. Both MM5 and WRF use a non-hydrostatic equation. A hydrostatic version of MM5 is available only till MM5 version 2. The 2007 AQMP used MM5 version 3 non-hydrostatic model, while a hybrid approach using objective analysis from observations was evaluated as a weight of evidence. WRF provides similar parameterizations to those available in MM5, and more new schemes have been developed and updated constantly. Among them, we chose numerical schemes that are similar to those available in MM5 framework. In terms of planetary boundary layer (PBL) schemes, the Yon-Sei University (YSU) (Hong, 1996) scheme is a continuation, but the updated version of Medium Range Forecast (MRF) scheme and Mellor-Yamada-Janjic (MYJ) (Janjic, 2002) turblent kinetic energy (TKE) scheme (Janjic, 1994) is a continuation of ETA meteorological forecast model scheme in MM5. The comparison presented in Figures V-3-2 and V-3-3 was simulated with MM5-MRF and WRF-YSU schemes. For continuity, the dates used in the simulation comparison were the primary 8-hour ozone modeling episodes evaluated in the 2007 AQMP.

Five-layer thermal diffusion scheme (also referred as ‘slab’) was used in both simulations. The two models were applied to the periods of July 14-18, August 2-8, and August 25-29, 2005, which were among highest ozone episodes that were identified and tested extensively in the 2007 AQMP. The statistical measures presented in the Figures are averages of the simulation period per episode. For example, the July simulations includes the period of July 14-18 so that it had 120 pair of hourly data, while the August episodes covered August 2-9 and 25-30 respectively. All three statistical measures should be zero in a perfect situation, therefore, the smaller the sum of the error measures were, the better the model performed against given observations. The locations of National Weather Services (NWS) METAR measurements used as the baseline for evaluations in addition to the District’s routine monitoring station data are given in Figure V-3-4.

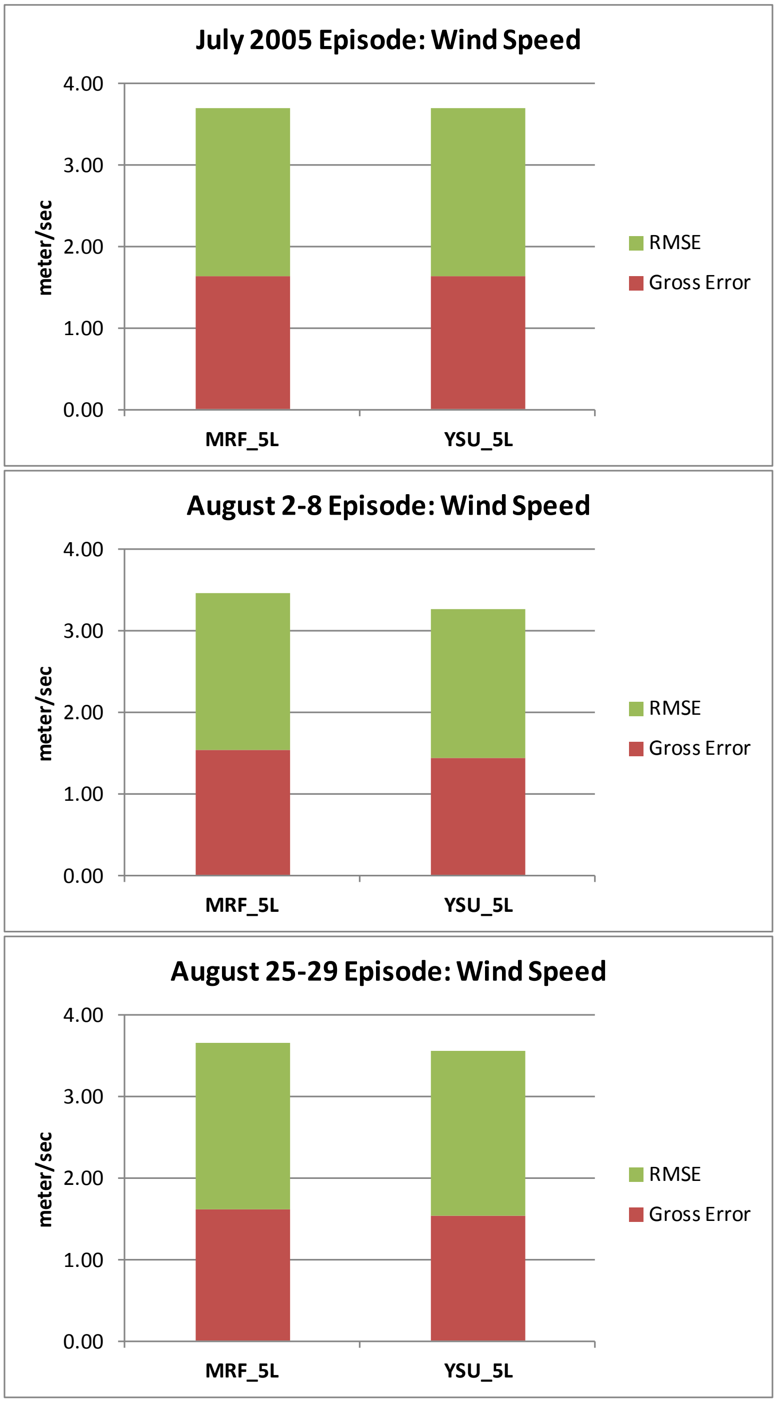

FIGURE V-3-2

RMSE, gross error and bias of near surface wind speeds simulated with MM5 and WRF. MM5 is noted as MRF and WRF is noted as YSU, respectively, followed by the selected PBL scheme.

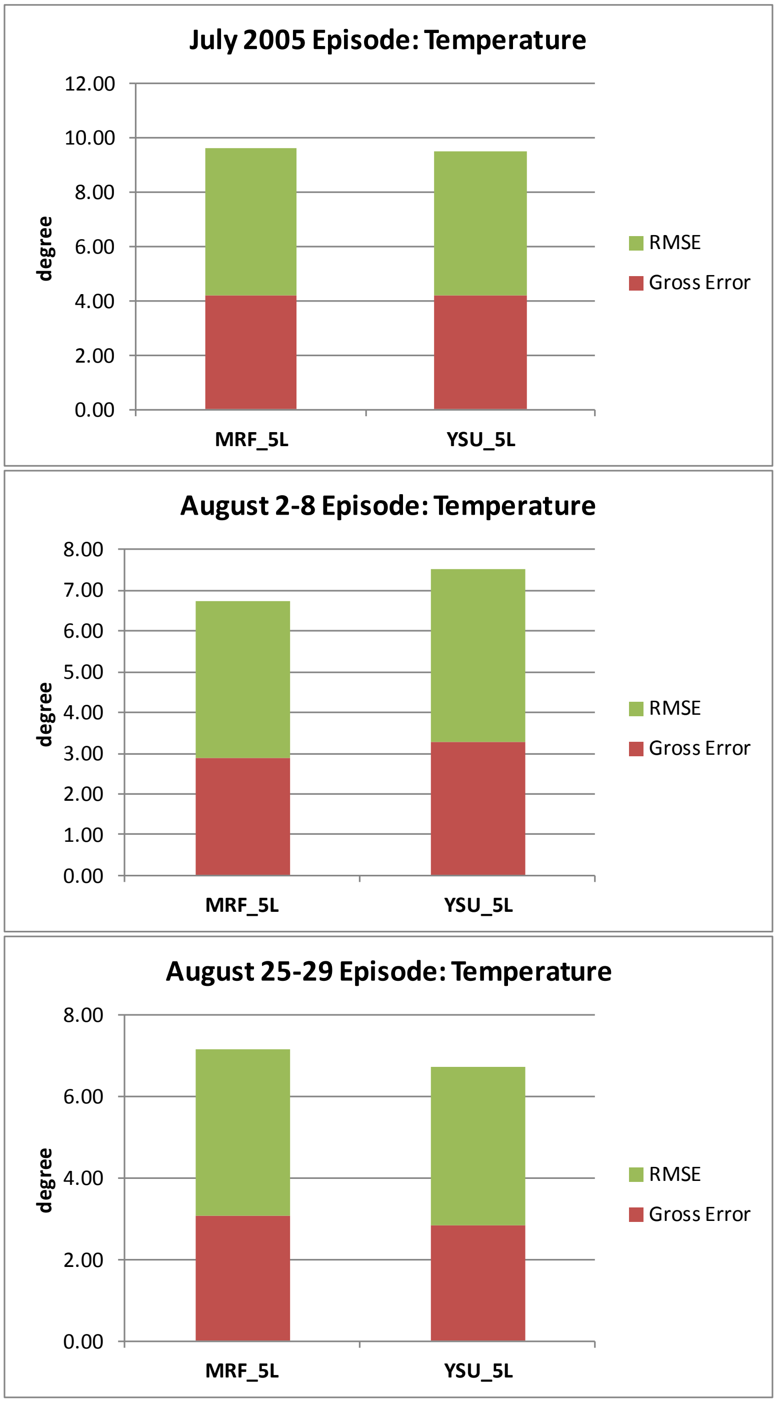

FIGURE V-3-3

RMSE, gross error and bias of near surface temperature simulated with MM5 and WRF. MM5 is noted as MRF and WRF is noted as YSU, respectively, followed by the selected PBL scheme.

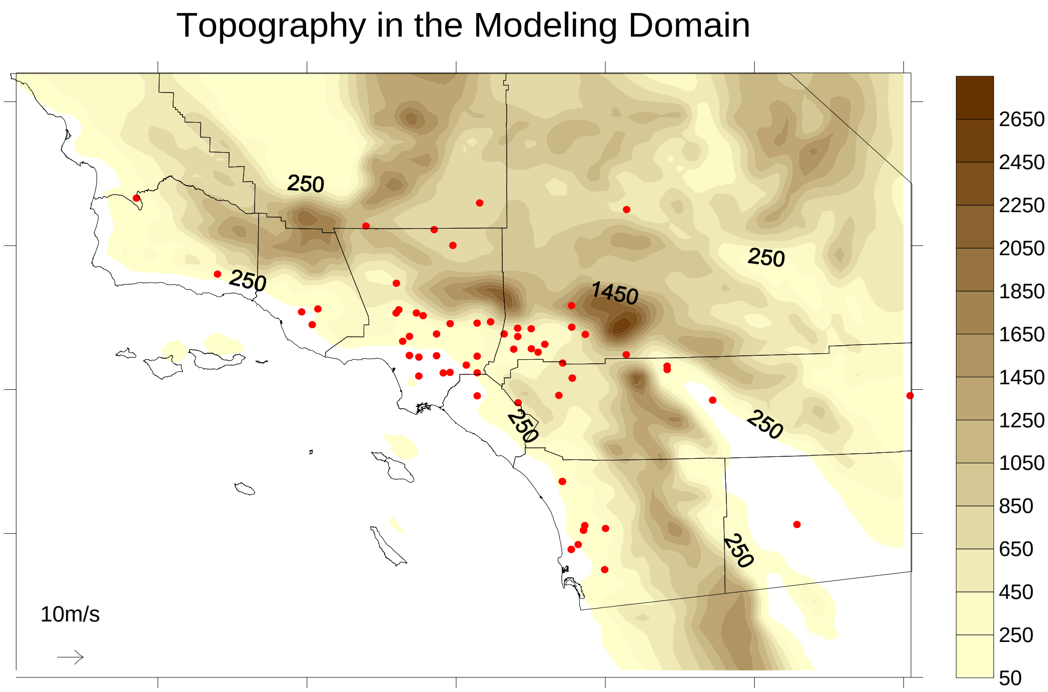

FIGURE V-3-4

NWS METAR stations within the innermost modeling domain.

As evident in Figures V-3-2 and V-3-3, the performance varies from case to case. In terms of wind prediction, the MM5 model with the MRF PBL scheme outperformed in the July episode, while the opposite occurred in the August 2-8 case. The difference became more distinctive in the temperature predictions. This was partly caused by the fact that a scalar variable responds to a mixing scheme more directly than a vector variable which is a combination of complex force functions. WRF represented with the YSU scheme showed far smaller errors in the latter August case, yet, it showed almost 20% larger error in the early August case. This result suggested that, even though modeling performance varies from case to case, no systematic bias existed in WRF or MM5 simulations applied in Southern California.

PBL Parameterization

WRF, like its predecessor MM5, is a community model for which source code is open to the general public such that improvements to an existing scheme or a new scheme are constantly introduced. This leads to multiple options for physical processes, dynamics, and numerical solutions. WRF version 3.3 provides 11 schemes for the PBL and four different Land Surface Models (LSM's) for application with air quality models. Each scheme has advantages and disadvantages in simulating specific phenomenon, weather conditions and geographic regions. In addition to numerical schemes, another question is the level of data assimilation to be conducted in the retrospective modeling. Four dimensional data assimilation is a common tool to enhance modeling performance.

It has to be kept in mind that the observations used in the data assimilation should not be used to evaluate the performance of the modeling to avoid auto-correlation with the data of which signal is already embedded in the modeled field. Also, measurement data is not free of error. Different monitoring networks have different measurement protocols that include different measurement heights, averaging time periods, time stamps, etc. Given that data is highly sensitive to measurement height, especially in the surface layer, special attention is required to prepare and use surface measurements. At the same time, while data assimilation generally improves modeling performance, a strong nudging is undesirable since the nudging term is not part of fundamental governing equations and therefore, it introduces imbalance in the physics and dynamics fields.

Therefore, considering the complexity and importance of the modeling configuration, we conducted a series of sensitivity tests to optimize the configuration for the Basin. The tests included the performance of numerical parameterizations, the level of data assimilation, and the validity of measurements to evaluate the modeling performances. In terms of numerical schemes, we primarily focused on PBL and LSM, given that the majority of emissions and related air pollution episodes occur below the atmospheric boundary layer. The PBL schemes tested in this study were YSU and Mellor-Yamada-Janjic (MYJ) schemes from WRF and the Blackadar scheme from MM5. The MRF/YSU scheme has 1st order closure with a non-local mixing term to accommodate large eddies developed during convective periods (Hong and Pan, 1996). During the nocturnal stable period, the YSU scheme goes back to the local approach using traditional K-theory.

MYJ has the parameterization of turbulence for both the PBL and the free atmosphere that is represented as a nonsingular implementation of the Mellor-Yamada Level 2.5 turbulence closure model. The TKE production/dissipation differential equation is solved iteratively, and the empirical constants have been revised based on Janjic (1994, 2002). A TKE based scheme has an advantage of having the explicitly predicted TKE, which is later utilized in retrieving boundary layer depth and formulating the effects of urban morphology.

Blackadar is a non-local mixing scheme that quantifies the vertical eddy fluxes of heat, moisture, and momentum using a hybrid non-local and first-order closure. For nocturnal periods, wherein the atmospheric stratification is usually stable or at most marginally unstable, a first-order closure is used; here the eddy transfer coefficient K is a function of the Richardson number. For the free convection regime, the vertical convective transfer of heat, moisture and momentum is not determined by local gradients, but by the thermal structure of the whole mixed layer and the surface heat flux. Accordingly, the vertical exchanges are realized between the lowest layer and each level of the mixed layer, instead of between adjacent layers as assumed in the K-theory. The mixing intensity is defined as the fraction of mass exchanged per unit time between the surface layer and other PBL layers. It is directly related to the heat flux at the top of the surface layer and the vertically integrated potential temperature difference between the surface layer and the top of the mixed layer (Blackadar 1979; Zhang and Anthes 1982) .

The performances of PBL schemes were compared against METAR surface meteorological measurements at the site depicted in Figure V-3-4. As discussed in the previous section, YSU is the continuation of MRF of the MM5 model and MYJ is a successor of ETA scheme available in MM5. Blackadar scheme showed the least amount of gross error and RMSE in wind speed predictions. No significant difference existed among the other PBL schemes (Figure V-3-5). For temperature prediction, the ETA scheme showed inferior performance as denoted by the largest errors (Figure V-3-5b). The two WRF schemes – non-local K-theory (YSU) and the local TKE scheme (MYJ) essentially yielded the same result. Yet, considering low computational cast of the YSU scheme and discontinuation of Blackadar scheme in WRF, YSU was chosen as a default PBL scheme for the current attainment demonstration.

Land Surface Model

Three land surface models (LSM) were considered for WRF modeling: the five-layer thermal diffusion scheme (‘slab’ model), and the Noah and Pleim-Xiu schemes (Pleim, 1994). The slab model is the simplest among the three. It calculates soil temperature as a result of thermal diffusion between layers, which are defined at the depths of 0.01, 0.02, 0.04, 0.08, and 0.16 m with the deepest layer being a fixed substrate. The Noah scheme predicts the soil temperature and moisture prognostically in four layers (Chen and Dudhia, 2001).

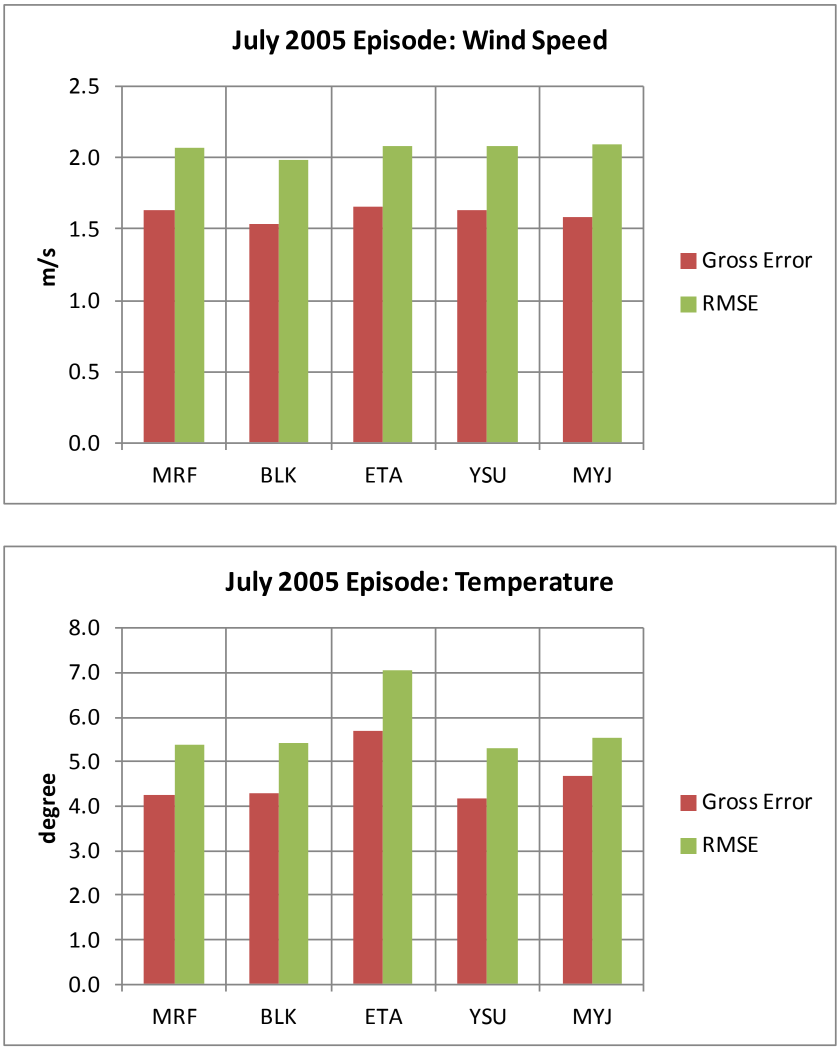

FIGURE V-3-5

Gross errors and RMSE's of (a) 10 m wind and (b) 2 m temperature from different PBL parameterizations applied to 2005 July Ozone episode. The errors are averages over the entire simulation period and monitoring stations.

By comparison to the effect of using different PBL schemes, modifications to the LSM caused significant responses in near surface variables. First, wind was generally over-predicted during the daytime and under-predicted during the nighttime. The difference between the two schemes was signified during the nocturnal stable period, which occurred in temperature predictions as well. As for wind, the Noah showed a better agreement with observations (Figure V-3-6a), while temperature prediction was worse (Figure V-3-6b). The 5-layer slab model agreed better with the measurements, as evident in the warmer surface temperature fields and the convective boundary layer predicted to be deeper in the Noah scheme (Figure V-3-6c).

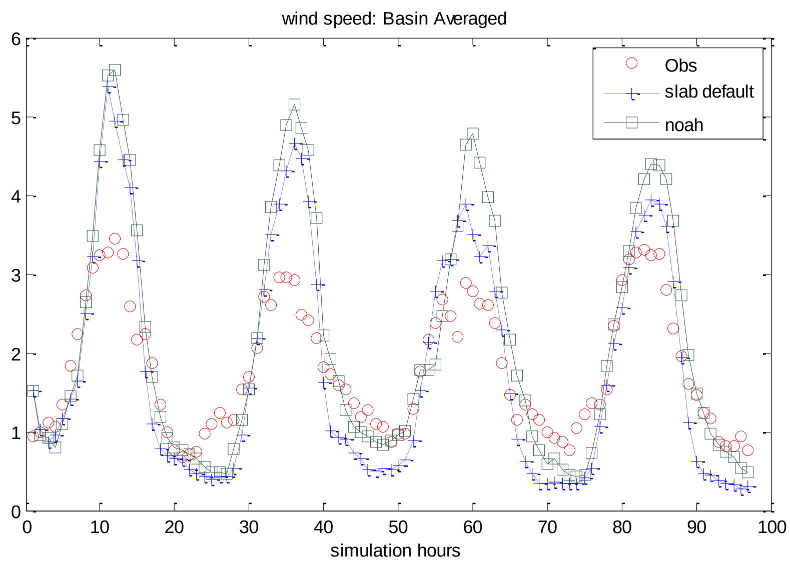

FIGURE V-3-6a

Time series of Basin-wide averaged wind speeds simulated with five-layer thermal diffusion (referred as 'slab' in the inset) and Noah land surface scheme for July 14-17, 2005.

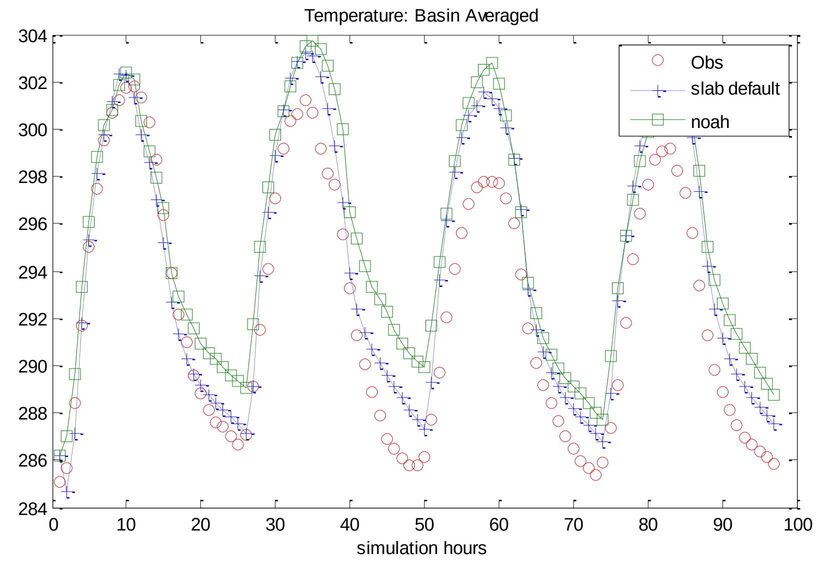

FIGURE V-3-6b

Time series of Basin-wide averaged temperature simulated with five-layer thermal diffusion (referred as 'slab' in the inset) and Noah land surface scheme for July 14-17, 2005.

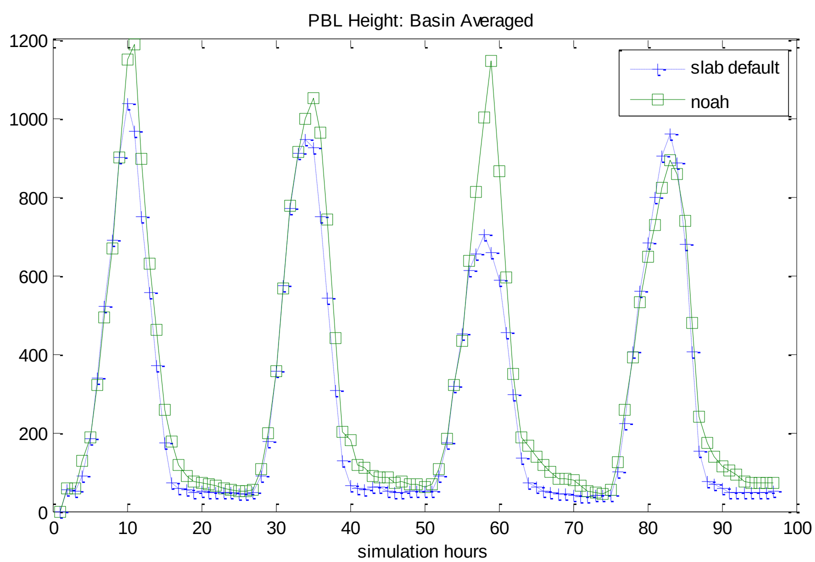

FIGURE V-3-6c

Time series of Basin-wide averaged mixed layer depth simulated with five-layer thermal diffusion (referred as 'slab' in the inset) and Noah land surface scheme for July 14-17, 2005.

Considering the notable performance differences in the land surface schemes, the choice of LSM was inconclusive since the one that perfomed better with respect to winds showed larger deviations in temperature. Therfore, we applied the two meteorological fields to the chemical transport model, CMAQ, to evaluate the effects on dispersion. The relatively inert characteristics of carbon monoxide (CO) make it suitable to evaluate transport only. CO concentrations predicted by CMAQ with two different meteorological fields were compared (Figure V-3-7). While differences existed in meteorological fields, the impact on dispersion was relatively small. For a six-day period from July 14 to July 19, 2005, the two schemes showed almost equivalent performance with the only exceptions in the high value range. The slab model predicted higher concentrations, which was, in part, attributed to the shallow mixing in the model relative to the Noah scheme.

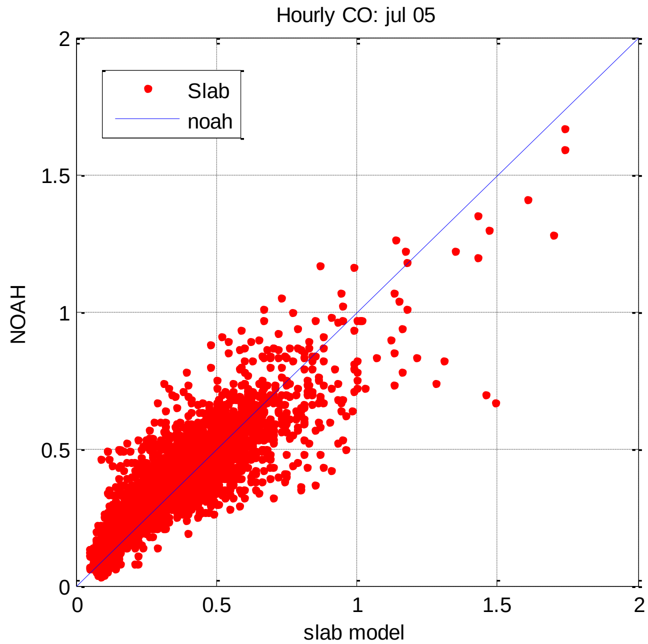

FIGURE V-3-7

Scatter plot of 1-hour CO concentrations simulated with the slab and the Noah scheme over the period of July 14-19, 2005.

Initial Guess Field

Global Forecast System (GFS) and North American Model (NAM), both widely used operational weather forecast models were evaluated to be used as initial guess fields for WRF. We used WRF and subsequent chemical transport modeling in the retrospective mode in the attainment demonstrations such that 3-D analysis fields were available. Therefore, analysis fields were chosen over direct forecast model output, unless a block of missing data occurred. In such case, forecast fields were used to replace the gap. The analysis fields were complied to be used as the initial value, the lateral boundary value and 3-D analysis nudging fields. In our application, the NAM provided fields compared well with the GFS fields (Figure 8). Given the fact that synoptic forcing becomes more important during winter months than in summer in Southern California, the same experiments were repeated for a month of December 2008. The performance of the two tests was essentially identical, so the NAM analysis field was selected as the primary initial guess field.

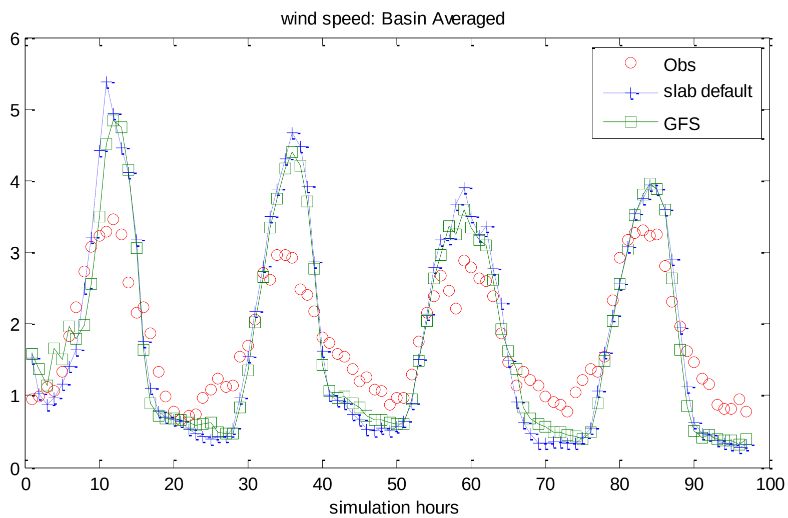

FIGURE V-3-8a

Time series of Basin-wide averaged wind speed simulated with initial guess fields from GFS and NAM for July 14-17, 2005.

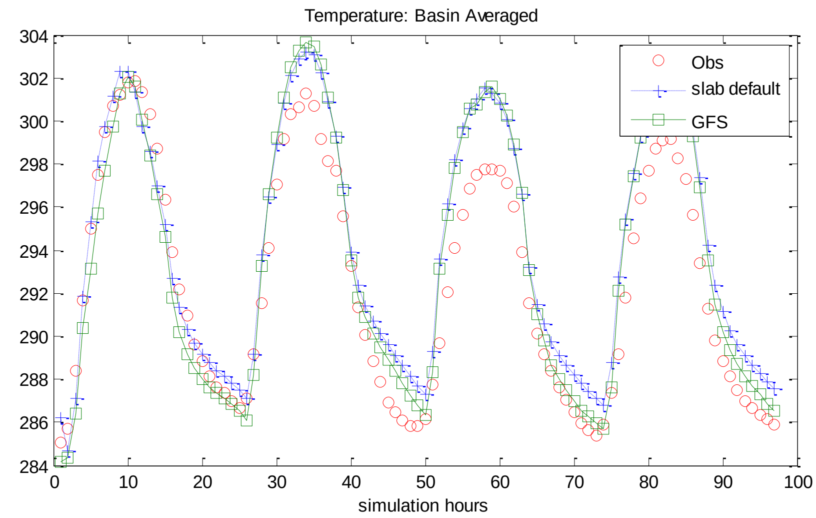

Figure V-3-8b

Time series of Basin-wide averaged temperature simulated with initial guess fields from GFS and NAM for July 14-17, 2005.

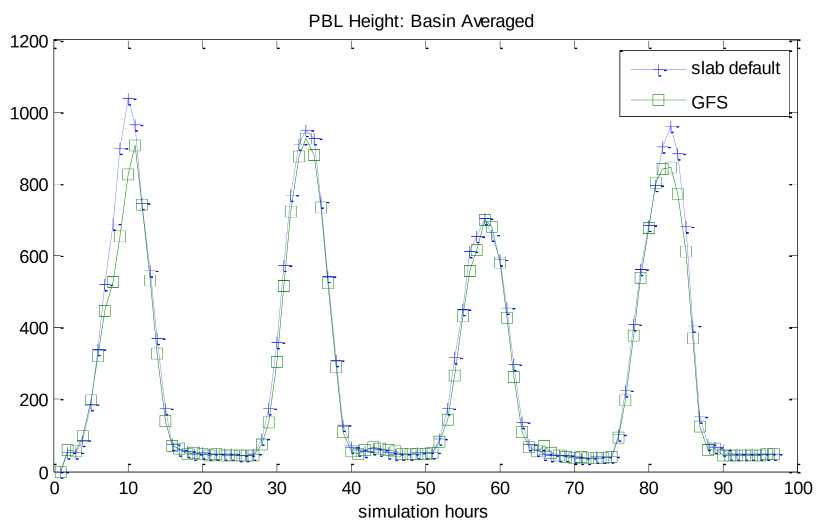

FIGURE V-3-8a

Time series of Basin-wide averaged temperature simulated with initial guess fields from GFS and NAM for July 14-17, 2005.

LAND USE REPRESENTATION

The land use databases available in WRF are the U.S. Geological Society (USGS) default and the Moderate Resolution Imaging Spectroradiometer (MODIS) satellite based dataset (NASA, 2012). The USGS dataset has been the default dataset for mesoscale modeling for MM5, a predecessor to WRF. While it is a ready-to-use off-the shelf database, some data representations are several-decades old and consequently do not reflect changes in the areas that have experienced rapid development in recent years. The South Coast Air Basin, especially in parts of Riverside, San Bernardino and the San Fernando Valley areas, have experienced rapid development in the last decade that turned shrub and grassland into suburban housing units and impervious land cover. Accordingly, the location and extent of urban representation is often inaccurate in the Basin. Figure V-3-9 presents the land use distribution in the innermost modeling domain. The urban category represented in dark red is confined to near downtown Los Angeles and appears at a few more spots in Orange, Riverside and San Bernardino Counties.

The majority of open space depicted in the USGS data base between urbanized Los Angeles and Riverside counties has been presented as land use category 7, 8, and 9 which are, respectively, grass, shrub, and mixed shrub/grassland (Table V-3-1). Comparing with land cover retrieved from USGS Land Use Land Cover database 2001 (Figure V-3-10), medium and low intensity developed categories identified in the recent database almost did not exist in the USGS default data. These changes in the recent years are further evident in Figure V-3-11, which are retrieved from NOAA southern coastal land cover land use (2000).

The satellite based dataset provides the most up-to-date land use representation which reflects the recent changes discussed above. The MODIS based land use given in Figure V-3-12 shows an expanded size and shape of urban use compared to Figure V-3-9. Table V-3-2 provides the MODIS index legend. Yet, while the shape and location of “urban” built-up area differs between the satellite-based and USGS dataset, both provide only a single category that represents urban built-up areas for use in the in WRF modeling. The single category specification of urban land use may not adequately characterize the diversity that exists in the “urban” area, ranging from high rises in downtown commercial districts to single story houses in suburban residential areas. According to Grimmond and Oke (1999), the surface roughness length in a residential neighborhood in San Gabriel is approximately 7 m, while that of a metropolitan downtown area in Vancouver is approximately 20 m. The surface roughness length assigned to “urban” in default WRF model is 0.8 m, which is valid only in an area in which building height is approximately 8 m, essentially the height of a two- to three-story building.

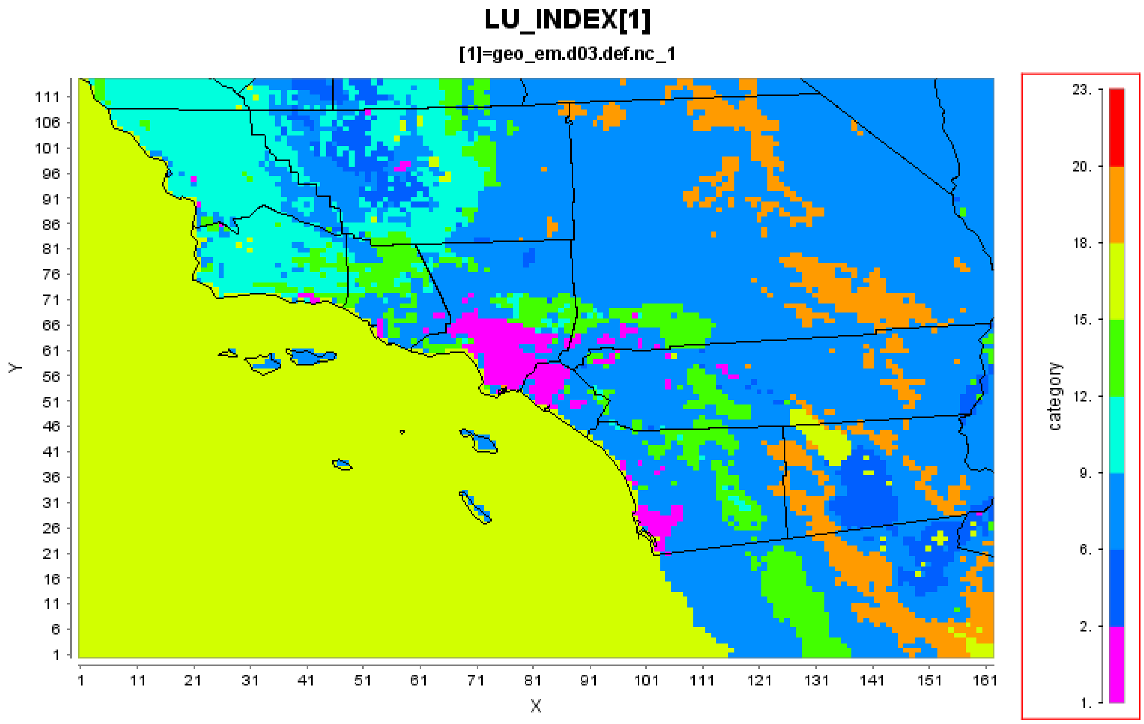

FIGURE V-3-9

Land use distribution based on USGS 24 category.

(*The legend index is given in Table V-3-1*).

This is hardly applicable to a downtown high rise district or a suburban residential neighborhood. Therefore, a need was recognized to introduce a new category that distinguishes suburban neighborhood from downtown commercial districts. The Final 2012 AQMP introduced a new category, “suburban” to reduce the gap between the highly impervious commercial area and a suburban housing neighborhood that has altered surface energy balance by artificially introducing irrigation and imperviousness. The ‘urban’ category was assigned with a higher surface roughness length of 1.5 m instead of the default 0.8 m to better characterize the impacts of taller buildings (e.g., high rise skyscrapers) in a commercial district. The ‘suburban’ category was assigned a 0.7 m roughness length considering most suburban housing is single to double story. The location and extent of the new suburban category is depicted in Figure V-3-13.

TABLE V-3-1

USGS 24-category Land Use Categories

Land Use	Land Use Description
1	Urban and Built-up Land
2	Dryland Cropland and Pasture
3	Irrigated Cropland and Pasture
4	Mixed Dryland/Irrigated Cropland and Pasture
5	Cropland/Grassland Mosaic
6	Cropland/Woodland Mosaic
7	Grassland
8	Shrubland
9	Mixed Shrubland/Grassland
10	Savanna
11	Deciduous Broadleaf Forest
12	Deciduous Needleleaf Forest
13	Evergreen Broadleaf
14	Evergreen Needleleaf
15	Mixed Forest
16	Water Bodies
17	Herbaceous Wetland
18	Wooden Wetland
19	Barren or Sparsely Vegetated
20	Herbaceous Tundra
21	Wooded Tundra
22	Mixed Tundra
23	Bare Ground Tundra
24	Snow or Ice

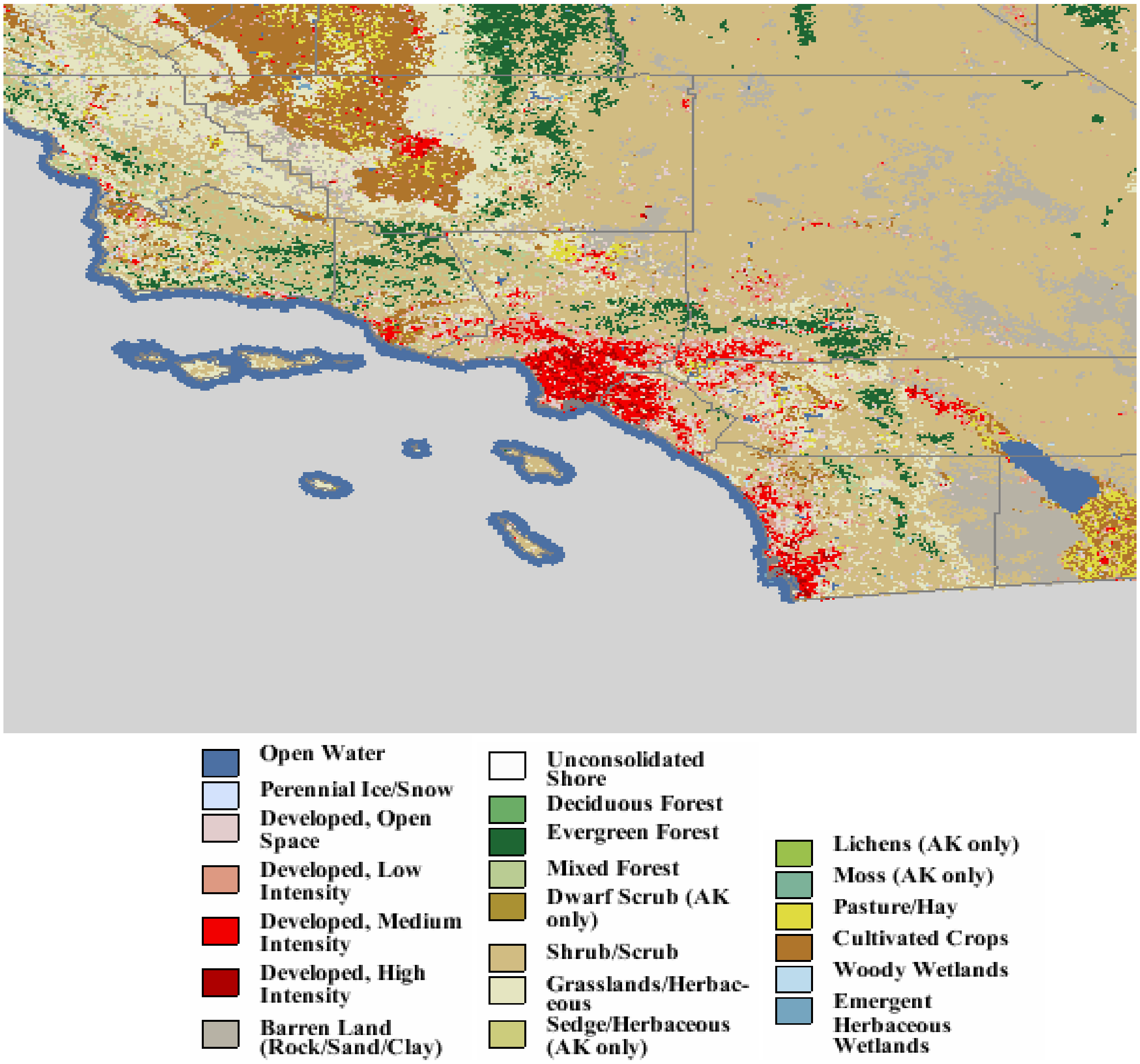

FIGURE V-3-10

Land use land cover data 2001 from USGS.

FIGURE V-3-11

NOAA Southern Coastal California Land Cover/Land Use 2000

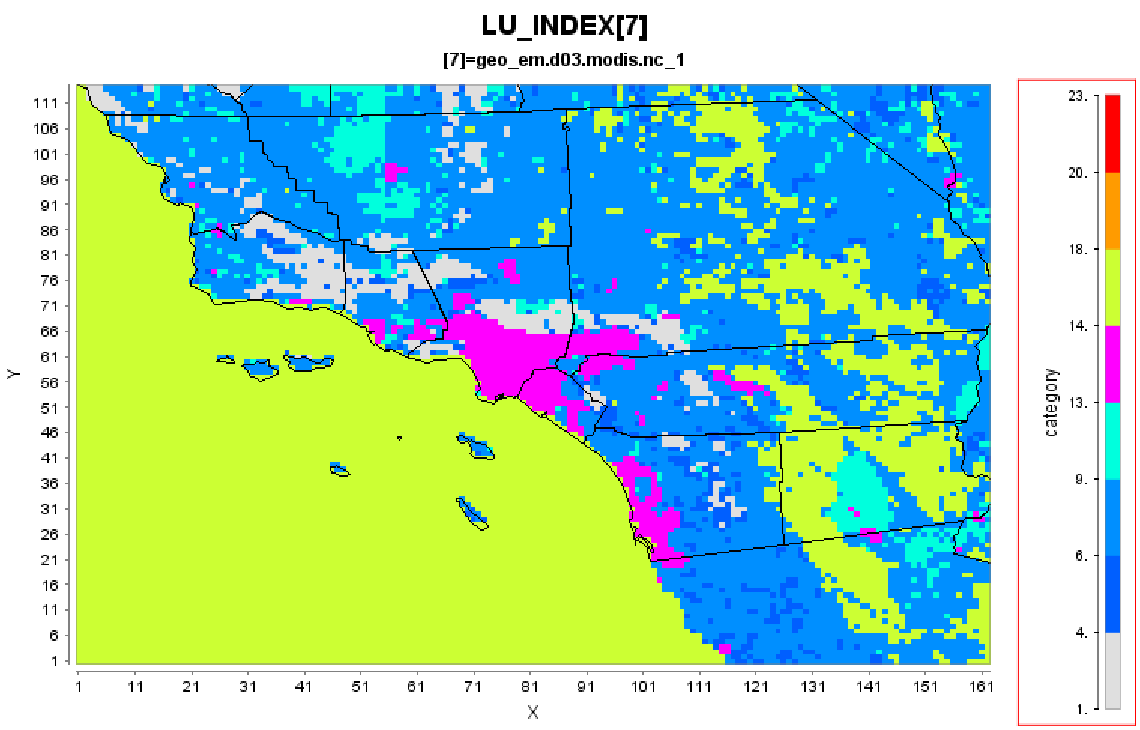

FIGURE V-3-12

Land use distribution based on MODIS satellite database

TABLE V-3-2

IGBP-Modified MODIS 20-category Land Use Categories

Land Use Category	Land Use Description
1	Evergreen Needleleaf Forest
2	Evergreen Broadleaf Forest
3	Deciduous Needleleaf Forest
4	Deciduous Broadleaf Forest
5	Mixed Forests
6	Closed Shrublands
7	Open Shrublands
8	Woody Savannas
9	Savannas
10	Grasslands
11	Permanent Wetlands
12	Croplands
13	Urban and Built-Up
14	Cropland/Natural Vegetation Mosaic
15	Snow and Ice
16	Barren or Sparsely Vegetated
17	Water
18	Wooded Tundra
19	Mixed Tundra
20	Barren Tundra

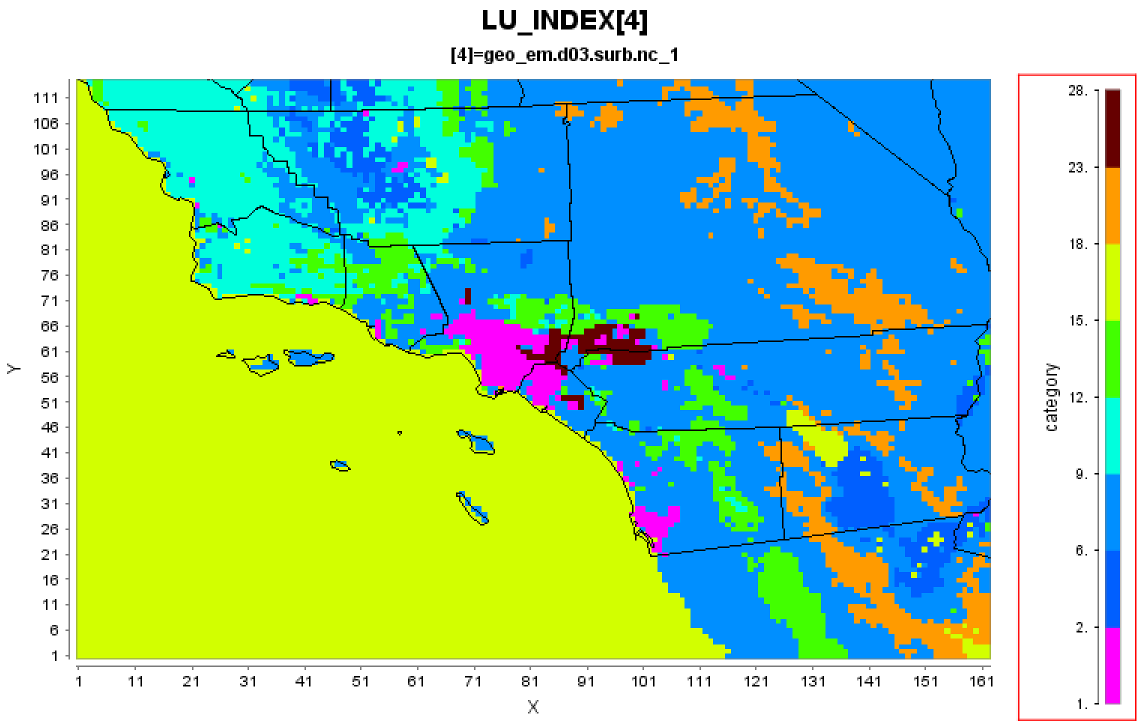

FIGURE V-3-13

USGS 24 land use category with added suburban category which was marked in dark brown color

In general, the updated land use showed better agreement with observations (Figure V-3-14). Over-prediction of wind was evident during the daytime when the slab model was used with the USGS default land use. This was significantly improved with the updated suburban land use. Neither temperature nor PBL show as large an improvement as seen in the winds. Compared to the Noah land surface model, the slab model showed weaker wind speed, lower temperature and consequently lower mixed layer depth during the daytime, which was consistent to the discussions presented in the previous section and Figure V-3-6. The difference between the two Noah simulations – one with the default UGSG and the other with MODIS data was induced by land use difference. The expanded urban category in the MODIS based data exerted larger amount of surface friction which resulted in weaker wind speed. This effect occurred in the slab model with suburban simulation, as well. The Noah-MODIS was distinctively differently in nocturnal temperature. The Noah-MODIS simulated warmer nocturnal condition, which is partly due to the urban heat island effect. Interestingly, this nocturnal warm temperature did not agree well with measurements. Such warmer nocturnal temperatures did not exist in the slab-suburban run. The discrepancy between the simulations appears to have resulted more from the numerical scheme (Noah vs. slab) selected rather than land use changes. Overall, the slab model outperformed Noah scheme.

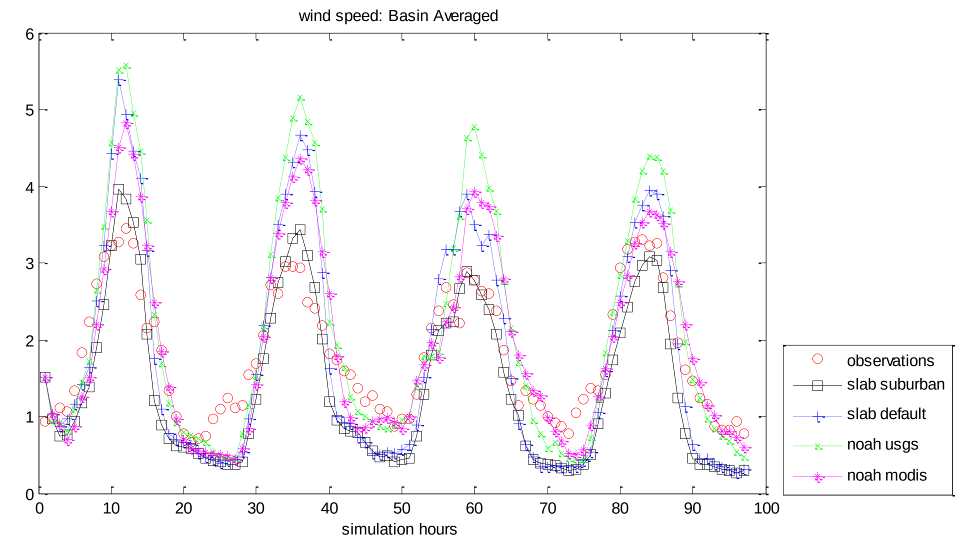

FIGURE V-3-14a

Time series of Basin-wide averaged wind speed for July 14-17, 2005.

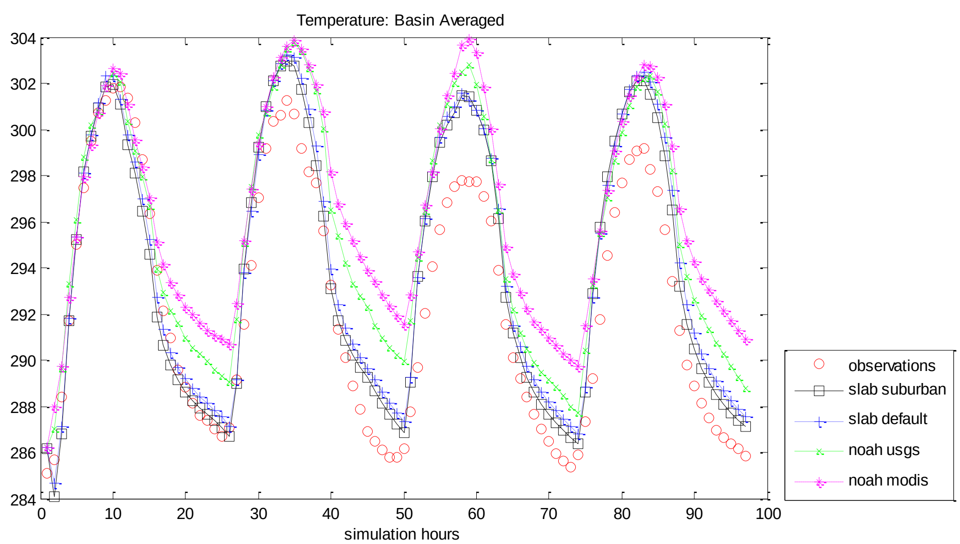

FIGURE V-3-14b

Time series of Basin-wide averaged temperature for July 14-17, 2005.

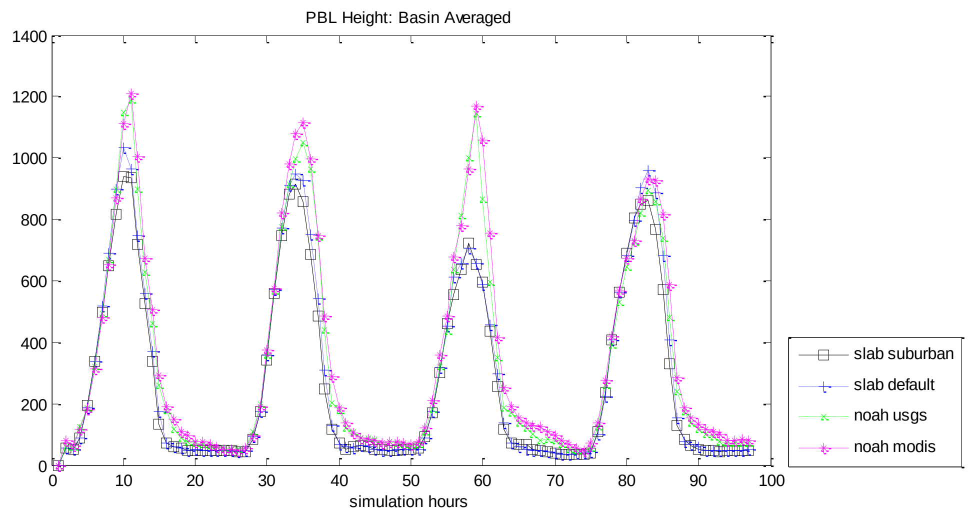

FIGURE V-3-14c

Time series of Basin-wide averaged mixed layer depth for July 14-17, 2005.

STATISTICAL PERFORMANCE EVALUATION

A set of statistical variables were generated using the METSTAT software to evaluate the WRF modeling performance quantitatively. The list of statistical parameters included bias, gross error and root mean square error and the Index of Agreement (IOA). The IOA was calculated following the approach of Willmont (1981). This metric condenses all the differences between model estimates and observations within a given analysis region and for a given time period (hourly and daily) into one statistical quantity. It is the ratio of the total RMSE to the sum of two differences – between each prediction and the observed mean, and each observation and the observed mean. The index of agreement has a theoretical range of 0 to 1; with a score of 1 suggesting perfect agreement.

The graphical presentation of the WRF performance evaluation for the month of June 2008 is depicted in Figure V-3-15. Shown in the figure are bias, RMSE and index of agreement for near surface wind, temperature and water vapor mixing ratio. Briefly, temperature prediction accuracy was high with an IOA greater than 0.9. The wind speed bias was nominally directed towards lower predicted speeds with a mean IOA on the order of 0.7. Wind direction was reasonably captured on the majority of days with bias falling within 15-30 degrees on average. The WRF humidity simulations depicted a tendency to overestimate vapor content with a moderate degree of diurnal variability. The humidity IOA averaged approximately 0.5 for the June period.

The METSTAT WRF evaluation compares well to the MM5 meteorological fields generated for the 2007 AQMP attainment demonstrations. In general average IOA estimates are slightly higher for the Final 2012 AQMP WRF simulation. Gross error in the temperature prediction is approximately half of the 2007 MM5 estimates and wind speed error is approximately the same, but with the WRF tendency to be slightly under-predicted where the MM5 simulations were over-estimated. Both models exhibited IOAs of approximately 0.5 for the prediction of water vapor (absolute humidity).

Overall, the daily WRF simulation for 2008 provided representative meteorological fields that well characterized the observed conditions. These fields were used directly in the CMAQ joint particulate and ozone simulations. The fall and winter month's graphical and statistical meteorological characterization of the wind, temperature and humidity fields are presented in Attachment 1 to this document.

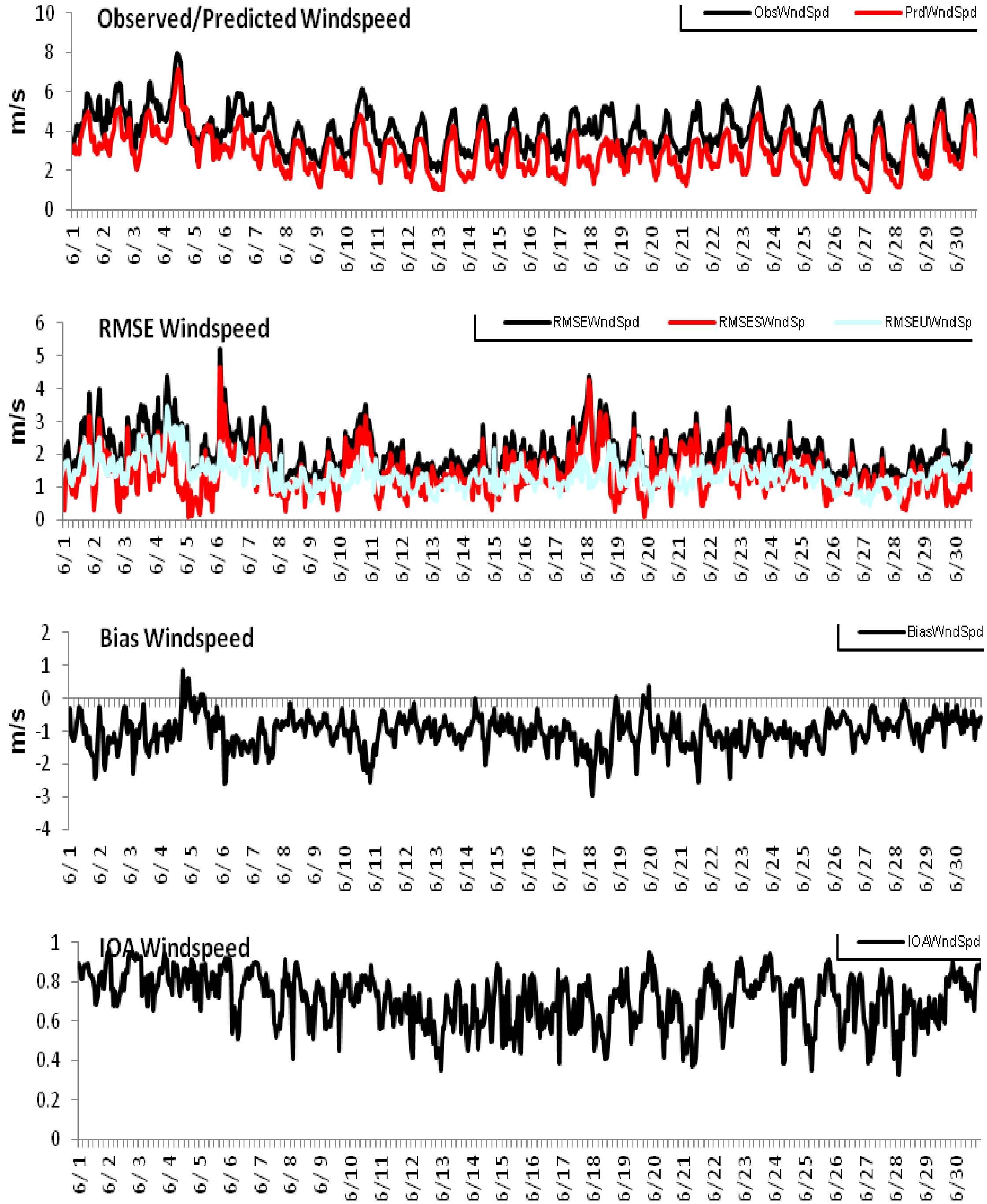

FIGURE V-3-15a

Time series of Basin-wide averaged wind speed error, bias and IOA for June, 2008.

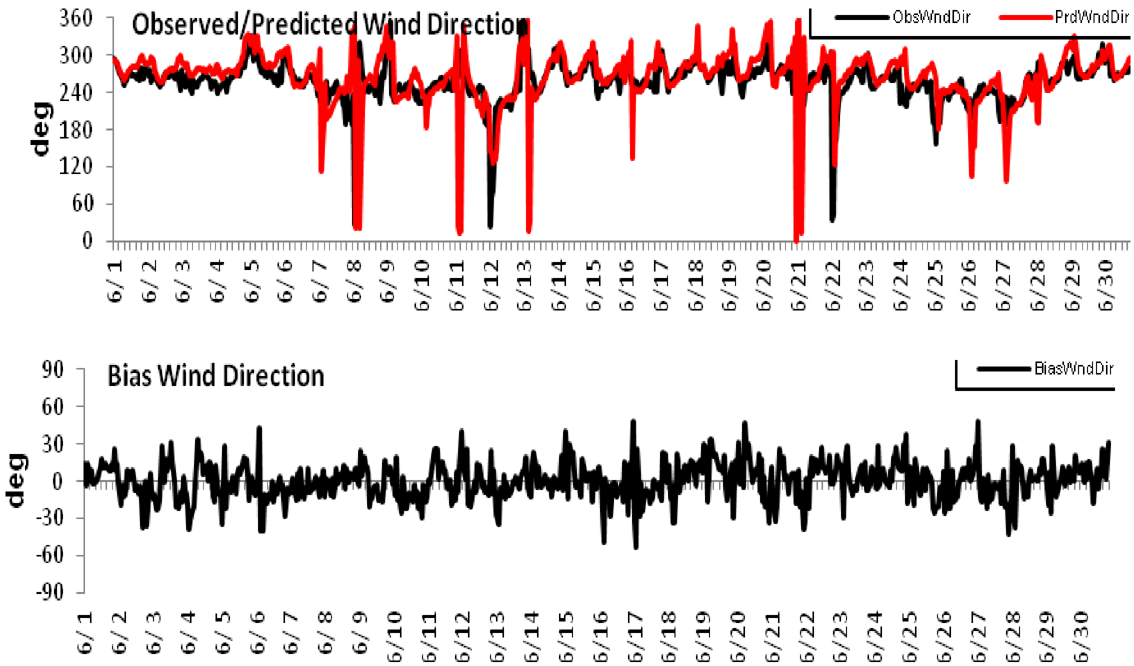

FIGURE V-3-15b

Time series of Basin-wide averaged wind direction and bias for June, 2008.

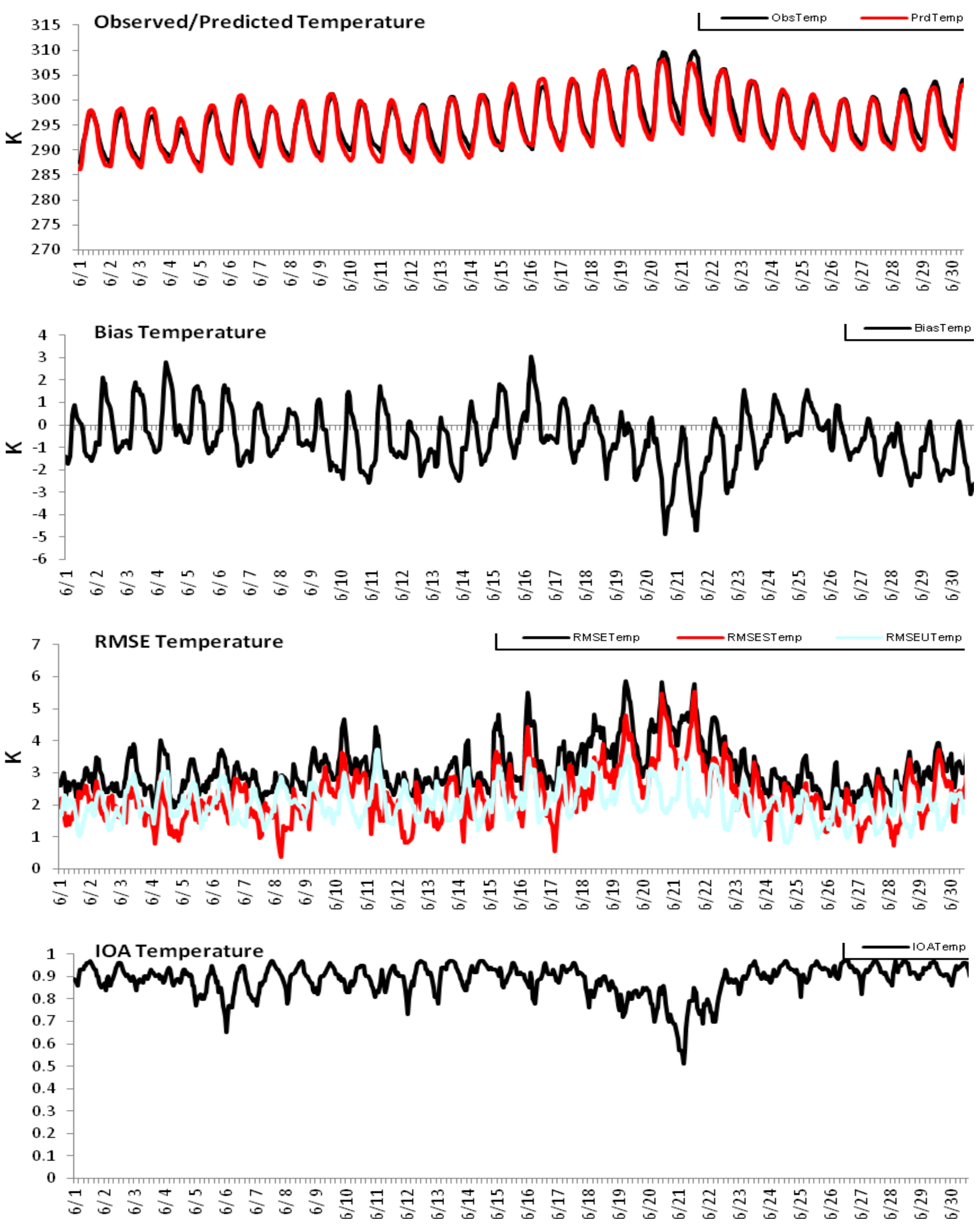

FIGURE V-3-15c

Time series of Basin-wide averaged temperature error, bias and IOA for June, 2008.

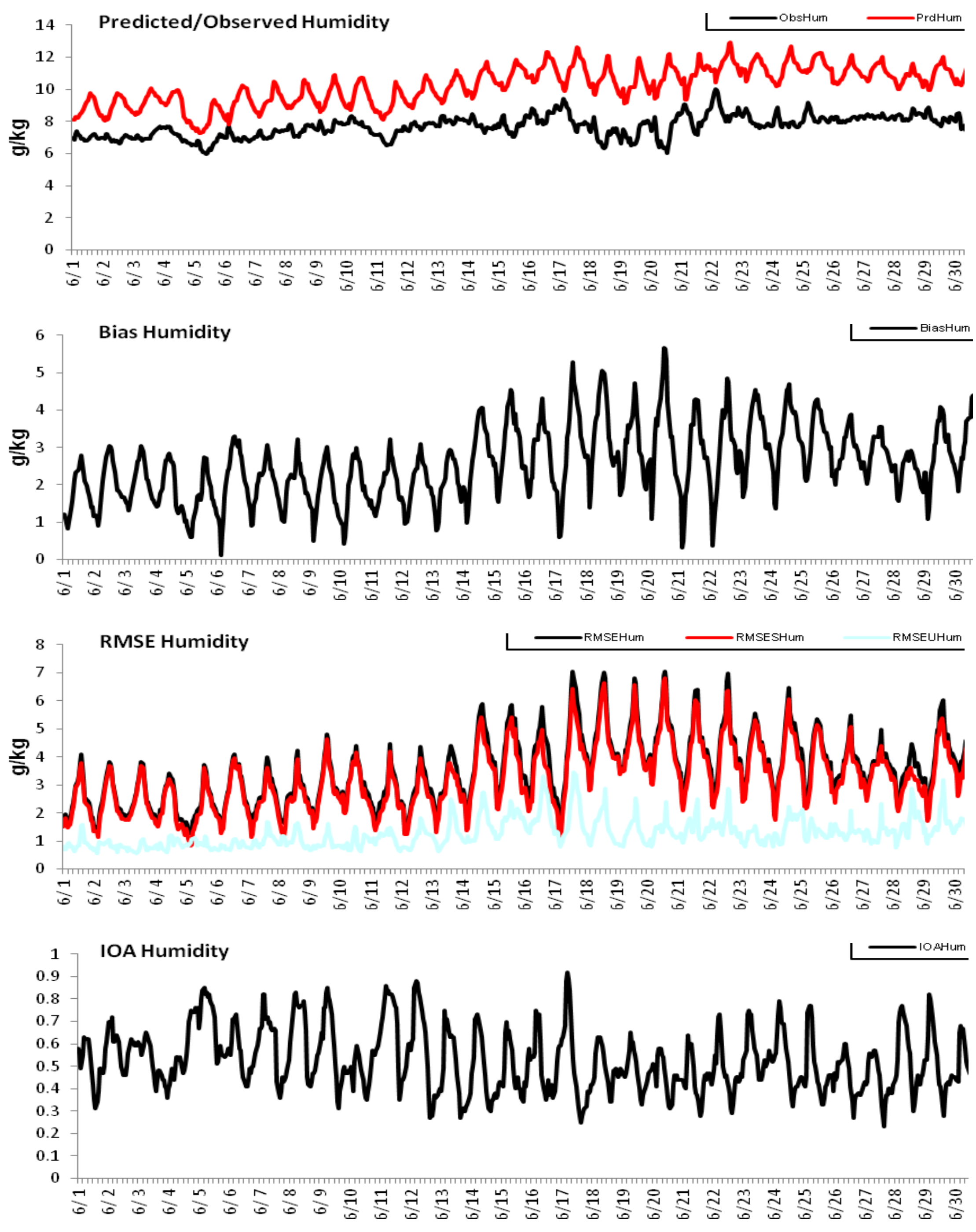

FIGURE V-3-15d

Time series of Basin-wide averaged humidity error, bias and IOA for June, 2008.

SENSITIVITY TESTS

A series of sensitivity tests were conducted to ensure the best performance of CMAQ. They include an inter-comparison of modeling platforms, the effect of lateral boundary values, vertical computational layer collapsing, the performance of vertical mixing schemes, and mass conservation. Among them, given the significance of the tests, the modeling platform inter-comparison and the effect of lateral boundary values are discussed here in detail.

Modeling Platform Inter-Comparison: CMAQ vs. CAMx

Comprehensive Air Quality Model with extensions (CAMx), including its predecessor Urban Airshed Model (UAM) (EPA, 1990) has been applied to many air pollution episodes in California and has demonstrated its capability as a tool for attainment demonstration successfully. The District employed CAMx for the attainment demonstration in the 2007 AQMP. On the contrary, CMAQ has not been used for a regulatory purpose in the state of California nor in the Basin before. Still, it has been widely applied in other states in a regulatory context. Its large user community enables a robust evaluation of existing schemes and a fast adaption of newly developed parameterizations in the CMAQ framework. In this context, we intended to ensure that CMAQ provides the performance equal to or better than the one demonstrated in the 2007 AQMP. The options used in CMAQ were SAPRC99 chemical mechanism, Euler Backward Iterative (EBI) chemical solver, aero5 aerosol module, Piecewise Parabolic Method (PPM) advection scheme in both horizontal and vertical direction, and Asymmetric Convective Model version-2 (ACM2) vertical diffusion scheme. CAMx was configured to have the same chemical mechanism, chemistry solver, and advection and diffusion schemes.

The maximum 8-hour ozone recorded during the period from June 1st to August 31st of 2008 was 131 ppb recorded at Crestline (Figure V-3-16). The basin-wide maximum concentrations typically occur at Crestline, while Santa Clarita, Glendora, and San Bernardino valleys supplant Crestline as the maximum station when meteorological conditions favor it. In general, CMAQ reproduced the day-to-day variation reasonably well except for a few days at the end of June and the beginning of July in which a large high bias was evident. (CMAQ ozone simulation performance is discussed at length in Chapter 7). These high bias cases are further discussed in the following section. Comparing the two models, CAMx showed significantly lower predictions over the entire period. The bias was distinctive throughout the Basin as well, though the bias tended to increase in the eastern Basin. The Crestline site showed over 20 ppb differences at times, while the difference was rarely over 20 ppb at the Anaheim location. Subsequent analysis indicated no involvement of systematic or nonsystematic errors in the input data and modeling configurations. In terms of performance statics, CMAQ yielded better agreement with observations.

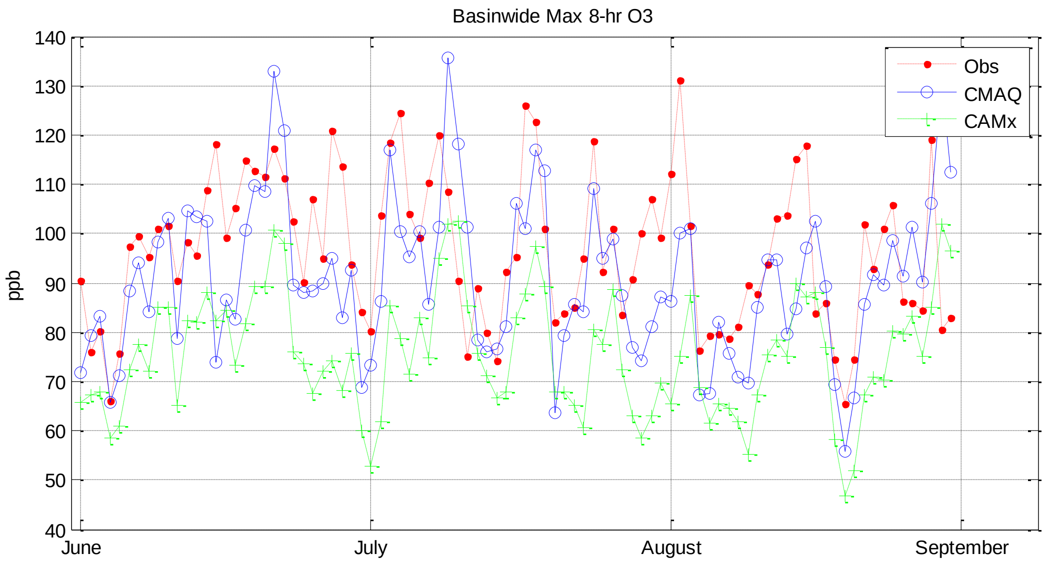

FIGURE V-3-16

Basin-wide maximum 8-hr ozone during the period of June 1 to August 31, 2008.

Lateral Boundary Values

Given the importance of lateral boundary values and the uncertainties associated with them, a set of lateral boundary values were tested using CMAQ. They were (1) global chemical model results, (2) U.S. EPA clean boundary values, and (3) climatological profiles retrieved from a special measurement campaign conducted in the Basin. Global chemical transport models, such as the Model for OZone and Related chemical Tracers (MOZART), GEOS-Chem, Regional Air Quality Modeling System (RAQMS), are increasing in their use to drive regional air quality model simulation (Bey, 2001) Among them, MOZART was used in the current study due to the availability of its output for the modeling year 2008 and accessibility to its interface processor that converts the MOZART output to CMAQ chemical species and format. The clean boundary values were the same ones employed in the 2007 AQMP. The details were provided in Table V-4-7, Appendix V of the 2007 AQMP (SCAQMD, 2007). Aircraft measurements were taken during a campaign conducted covering periods of 2009 and 2010 along the coast of Southern California, extending offshore out to 100 miles over the ocean. The campaign was designed to have approximately two flights per month; the data were complied into a climatological profile of ozone and photochemical oxidants (Baxter et al, 2010).

The boundary values retrieved from MOZART are illustrated in Figures V-3-17 through V-3-19. The values were averaged along the northern, southern, eastern and western perimeters of the modeling domain to characterize the general behavior of MOZART along the lateral boundaries. Among the four sides, the east boundary showed the highest concentrations which reflect anthropogenic emissions from the Basin. The vertical variation of ozone set the lowest values in the upper boundary layer, gradually increasing in concentration with height to a maximum concentration at the model top layer. Note that the model top layer is 50 hPa (approximately 20 km) in the lower stratospheric ozone layer. CO and NO2 had the highest concentration within the boundary layer due to anthropogenic emissions at the ground level.

Through the first 10-layers, the U.S. EPA clean boundary ozone concentration split the MOZART extracted west and east values, while CO and NO2 from the clean boundary were higher than the MOZART. The climatological profiles compiled from aircraft measurements are presented in Figure V-3-20. A layer of high ozone exists around 600 m above ground level, which corresponded to the height of the sea breeze return flow. The return flow contained high levels of photochemical oxidants that were produced in the Basin during the daytime. This air mass, like the residual layer, stayed inert due to decoupling from surface emissions. This mechanism resulted in the high ozone peak aloft above the marine layer. Easterly winds measured by a radar wind profiler supported a multiple layer structure and the location of the return flow (Baxter et al, 2010). Note that the profile was taken at an Oxnard airport which is located by the shore. Figure V-3-20 suggested that seasonal variation from month to month was evident, but not significant. Therefore, the average profile for the period of May through September was selected and digitized into the modeling grids (Figure V-3-21).

The differences among the lateral boundary values were the largest in the free atmosphere and geographically near the boundaries. Figure V-3-22 illustrates the large differences aloft and the downward mixing to the surface level. The influence of ozone fumigation to ground level near the center of the Basin was several ppb in concentration as shown in Figure V-3-23. The MOZART-retrieved and aircraft-based runs predicted higher surface ozone than the clean boundary, which was attributed to the higher concentration aloft that was entrained into the lower boundary layer via convection.

The western boundary appeared to be set far enough offshore to minimize spurious influence of the boundary values transported into the Basin. Despite the large differences between the MOZART and the aircraft boundaries, surface ozone from the two simulations were almost identical (Figure V-3-23).

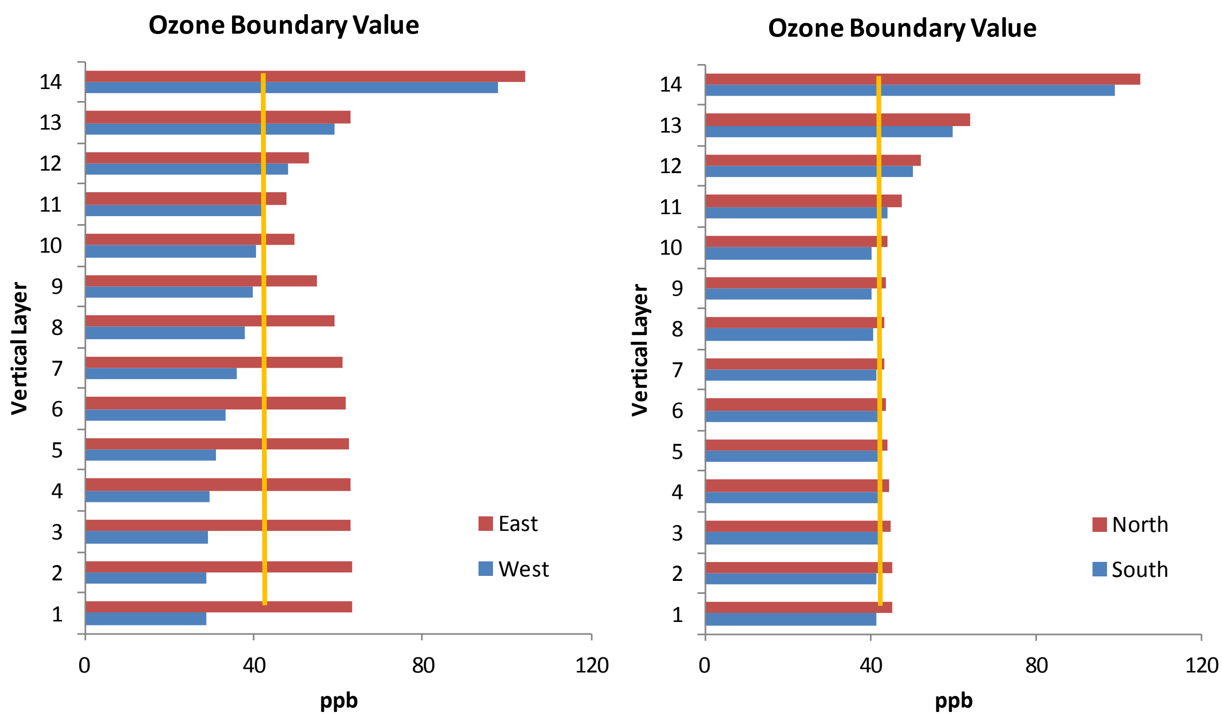

FIGURE V-3-17

Vertical profiles of Ozone from MOZART in a 15 layer structure. The values were averaged over the perimeter in the given direction at a given layer. The top layer corresponds to the modeling top. The solid yellow line represents the clean boundary value.

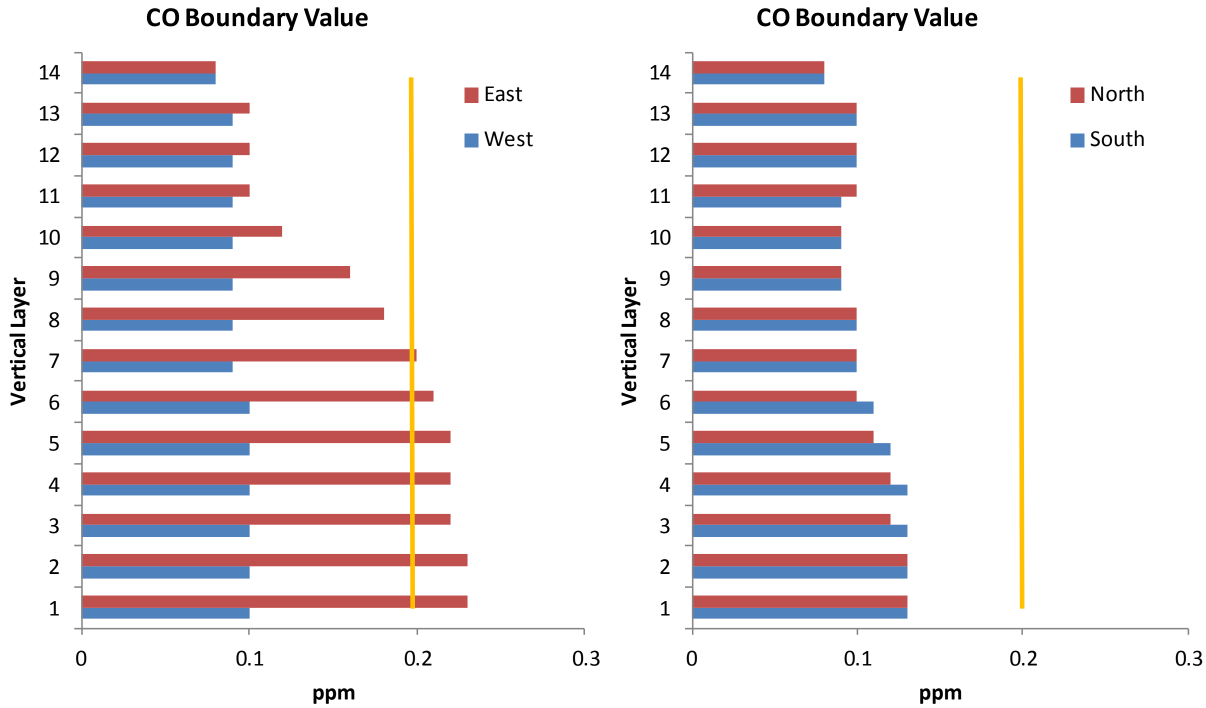

FIGURE V-3-18

Vertical profiles of CO from MOZART in a 15 layer structure. The values were averaged over the perimeter in the given direction at a given layer. The top layer corresponds to the modeling top. The solid yellow line represents the clean boundary value.

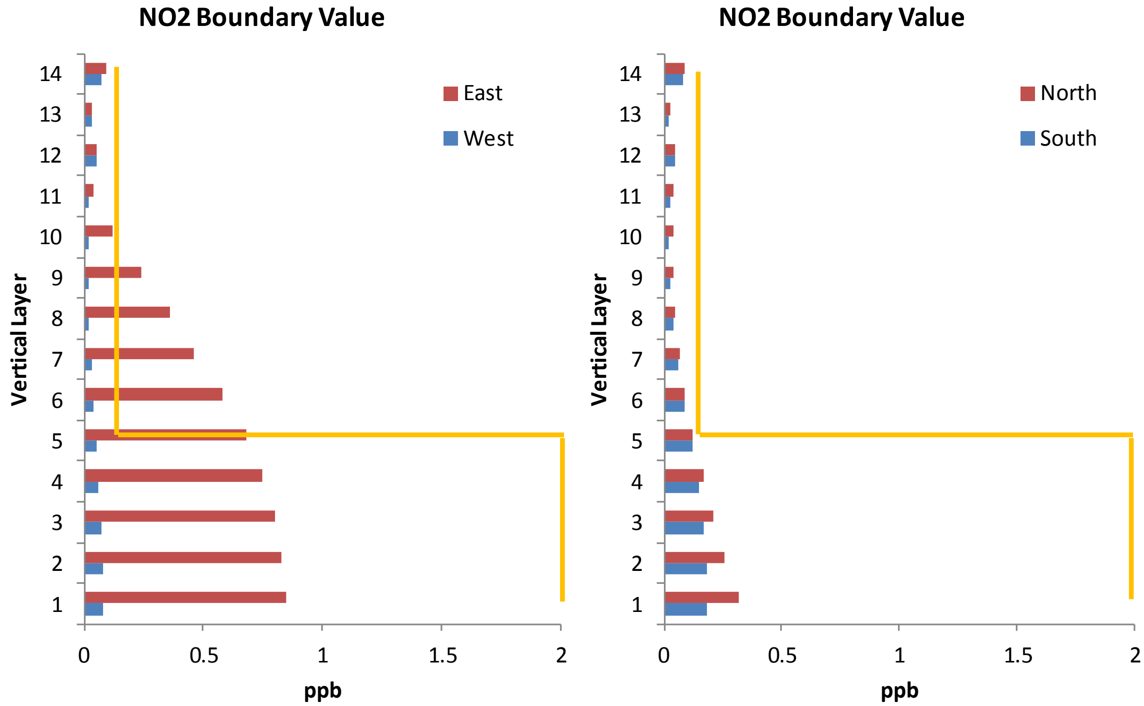

FIGURE V-3-19

Vertical profiles of NO2 from MOZART in a 15 layer structure. The values were averaged over the perimeter in the given direction at a given layer. The top layer corresponds to the modeling top. The solid yellow line represents the clean boundary value.

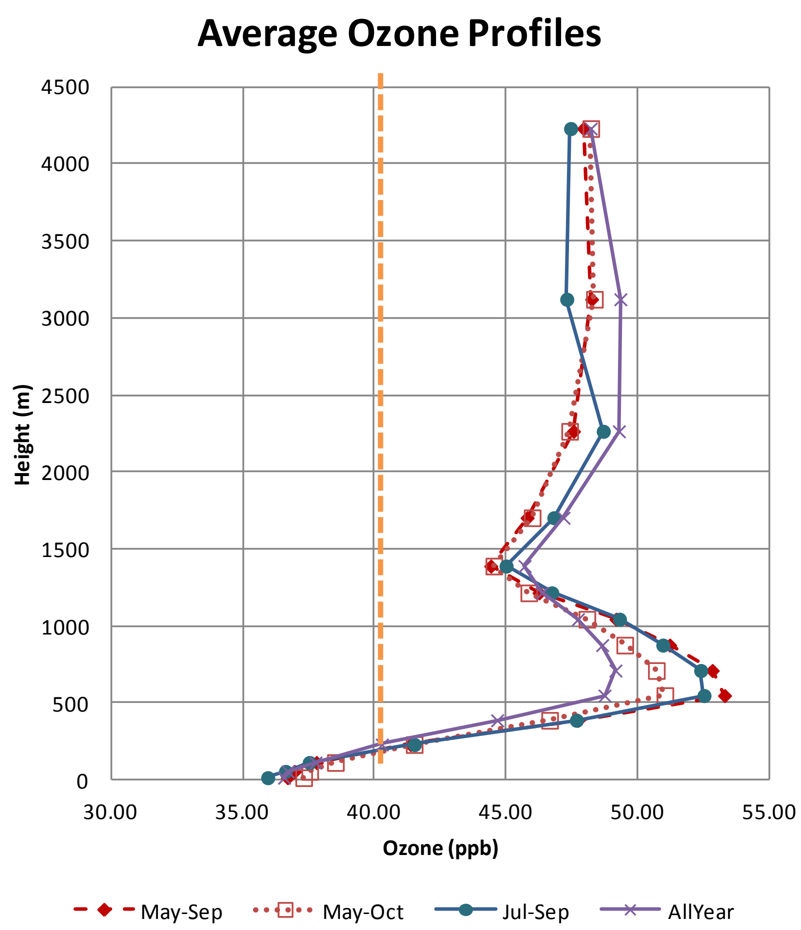

FIGURE V-3-20

Climatological Ozone profiles compiled from the aircraft measurements. The clean boundary value is given as broken yellow line for comparison.

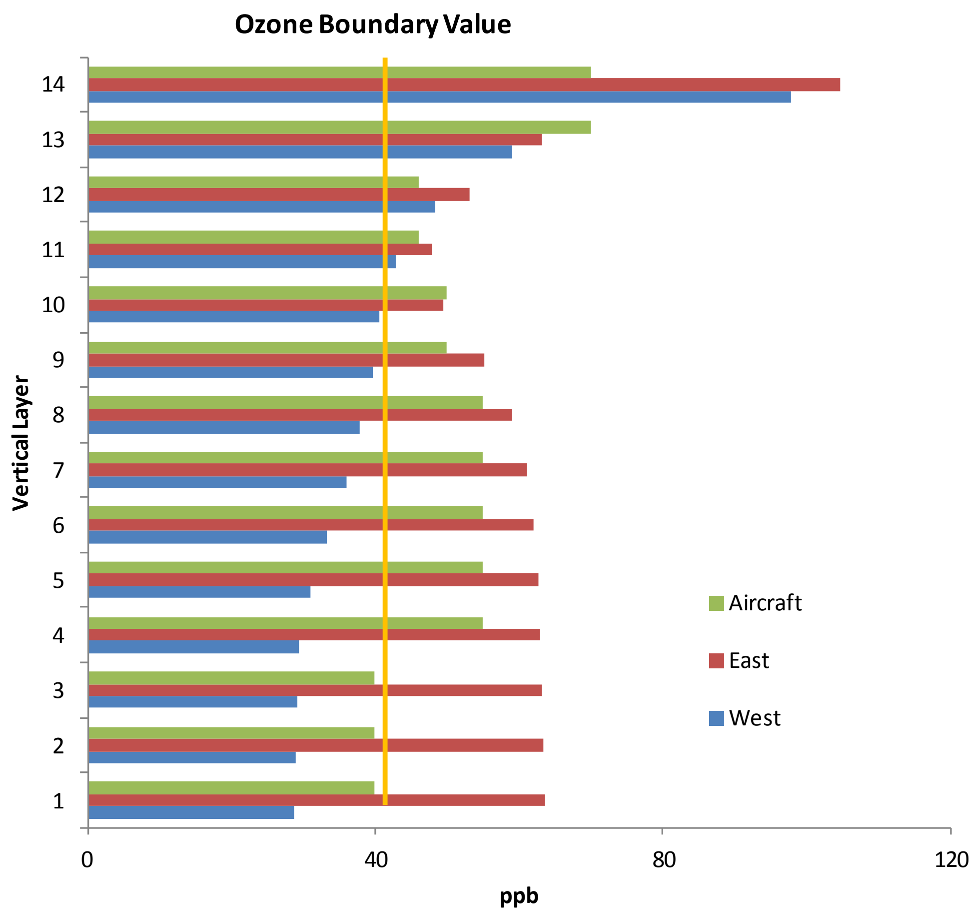

FIGURE V-3-21

The comparison of MOZART and aircraft-measurement based boundary values digitized in the 15 layer modeling grid. The clean boundary values are presented in yellow solid line.

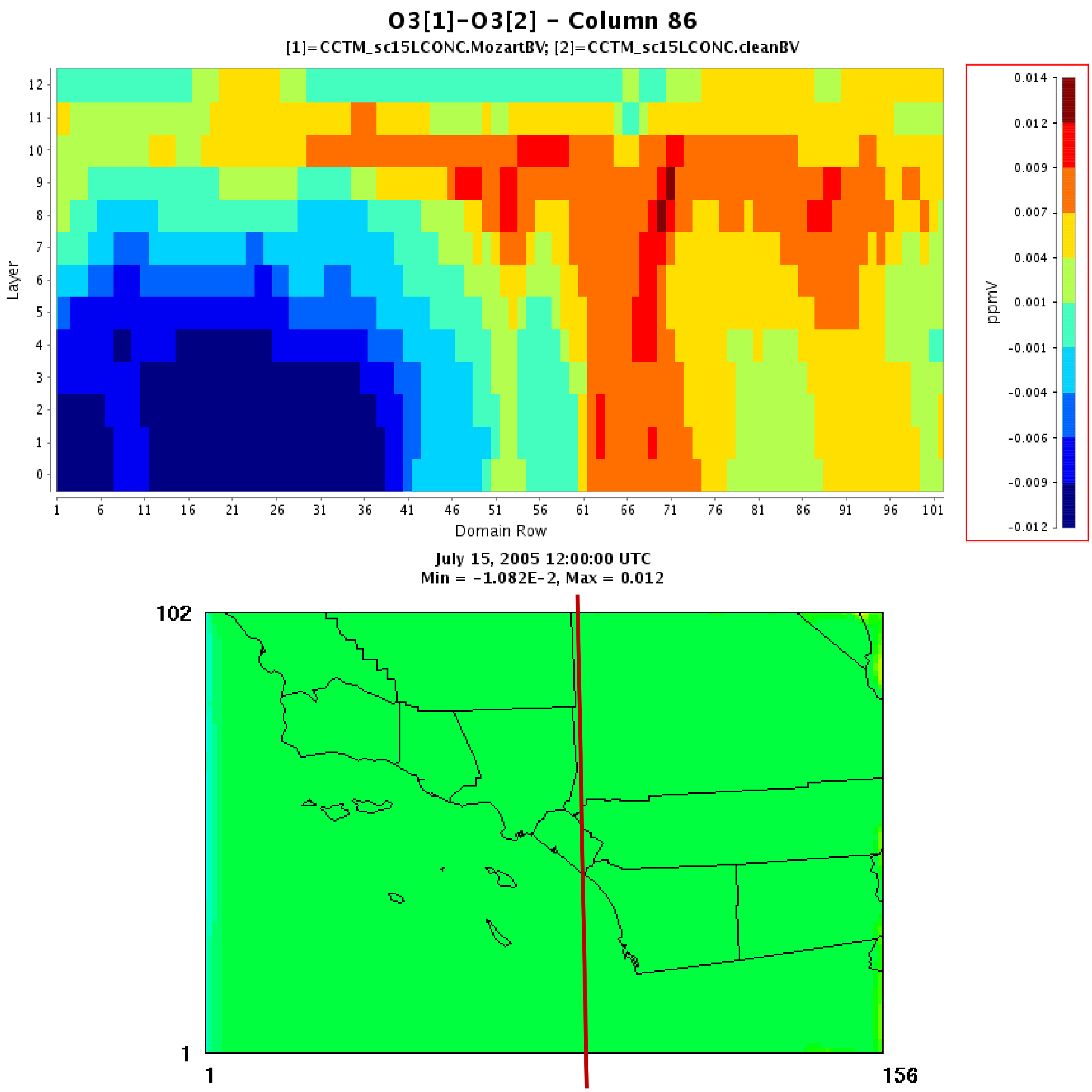

FIGURE V-3-22

A vertical cross-section of 1-hr ozone differences between MOZART and the clean boundary values along the red line indicated in the lower plot.

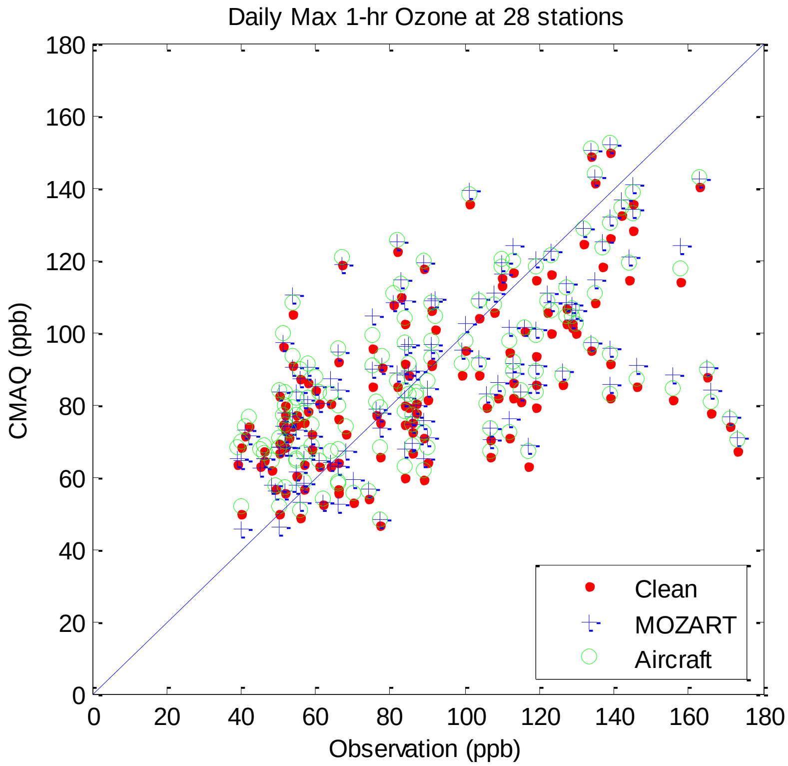

FIGURE V-3-23

Scatter plot of simulated and observed 1-hour maximum ozone within the Basin.

The impact of the boundary contribution was further analyzed to explore its possible role in the over-predictions identified in Figure V-3-16. The daily MOZART boundaries, shown in Figure V-3-24, contained values that were as high as 110 ppb. These are compared with published and simulated Basin summer boundary ozone values less than 50 ppb. Note that MOZART (version 4), used in the current study, was based on GEOS-5 meteorological fields. The high boundary concentrations extracted from MOZART on June 21st and July 9th coincided with the simulated high-bias episodic ozone peaks in Figure V-3-16. A set of sensitivity simulations were generated including only biogenic emissions and both clean boundary conditions and MOZART defined boundaries. A comparison of the simulation results is shown in Figure V-3-25. The higher MOZART background values seriously impacted regional ozone formation, particularly on the July 9th episode. Also, the simulation including MOZART with biogenic emissions illustrated a decreasing trend over the three month period, which was less evident in the clean boundary simulation. The general decreasing trend was expected to reflect lower biogenic emissions and deeper midsummer mixing of the atmosphere.

The spurious behavior of MOZART was partly attributed to the way the global model was applied to the CMAQ. Due to computational limitations, the CMAQ model used a single domain, but was not configured in a nested way. This abrupt scaling down from a global model to a fine scale regional grid appears to have impacted the spatially allocated background concentrations characteristic of urban emissions profiles. As a consequence, higher levels of background ozone introduced over the northern boundary resulted in erroneously higher projected surface ozone concentrations.

Figure V-3-26 presents the scatter plot of the simulations conducted using the MOZART and clean boundary assumptions. The clean boundary assumption was able to eliminate many of the severely over predicted data points that appeared in the upper portion of the one-to-one mapping line. Accordingly, the clean boundary assumption was chosen as the default lateral boundary value.

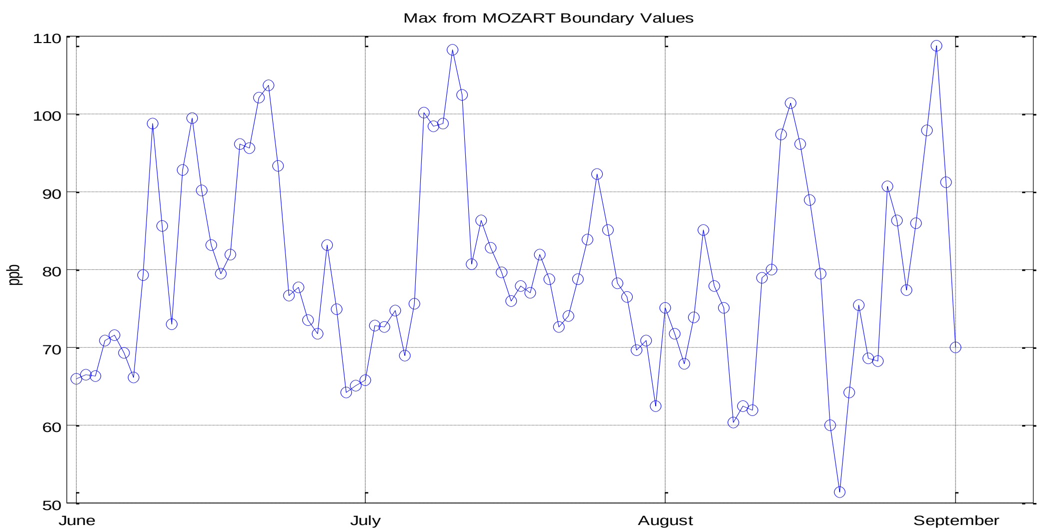

FIGURE V-3-24

Daily Maximum 1-hour ozone along the lateral boundaries from MOZART.

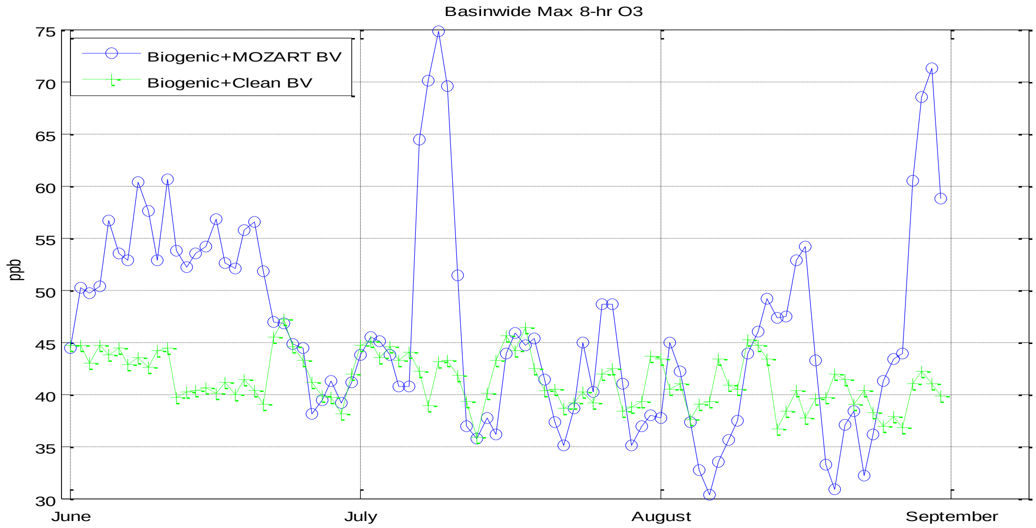

FIGURE V-3-25

Maximum 8-hr ozone simulated with MOZART boundary values (blue solid line with open circle) and the clean boundary (green broken line with plus mark).

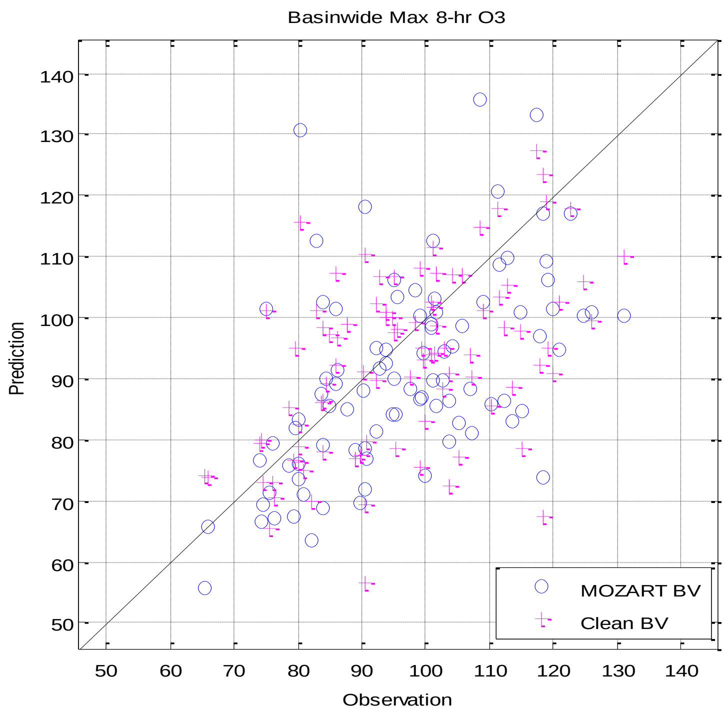

FIGURE V-3-26

Basin maximum 8-hour ozone simulated with MOZART and the clean boundary values

CHAPTER 4

MODELING EMISSIONS, BOUNDARY, AND INITIAL CONDITIONS

Modeling Emissions Inventory

Inventory Profile

California Environment Quality Act (CEQA) Alternative Emissions

Boundary and Initial Conditions

MODELING EMISSIONS INVENTORY

Table V-4-1 provides the baseline and controlled modeling emissions inventories used in the attainment demonstration and alternative analyses. The CMAQ simulations were based on the annual average inventory, with adjustments made for weekly and daily temperature variations. A brief characterization of the annual day emissions used for the modeling analysis follows. An extensive discussion of the overall emissions inventory is summarized in Appendix III of the Final 2012 AQMP.

INVENTORY PROFILE

Baseline modeling inventories for the historical year 2008 and the future years 2014, 2017, 2019, 2023, 2030 and 2035 are discussed in this section. The baseline emissions projection assumes no further emission controls. These projections reflect the emissions resulting from increases in population and vehicle miles traveled (VMT), as well as the implementation of all adopted rules and regulations up through June 2012. The controlled emission projections reflect the benefits of implementation of the Final 2012 AQMP control measures relative to future baseline emissions. Detailed descriptions of the control measures are provided in Chapter 4 and Appendix IV of the Final 2012 AQMP.

Appendix III contains emission summary reports by source category for the historical base year and future baseline scenarios used in this modeling analysis. Attachments 2 and 3 of this appendix contain the Controlled Emission Projection Algorithm (CEPA) emissions summary report by source category for the future (2014 and 2023) controlled scenarios for the annual average emissions inventory. It should be noted that the inventories reported here may be slightly different than those reported in the Final 2012 AQMP (Chapter 3) and Appendix III, since the inventories used for modeling reflect day-specific conditions. Day specific point, mobile and area emissions inventories were generated for each day in the 2008 base year. Mobile source emissions were temperature corrected by grid cell using a VMT weighted scheme. County-wide area source emissions were temperature corrected and gridded using the spatial emissions surrogate profiles developed for the Final 2012 AQMP.

Day specific modeling emissions inventories were generated for each day in 2008 for the CMAQ (and CAMx) simulations. Mobile source emissions were generated using CARB's EMFAC2011 emissions factors coupled with SCAG's traffic analysis zone data. Off-road emissions were calculated using CARB's off road model. It is important to note that both EMFAC2011 and the off-road models were modified to account for

CARB's emissions estimation methodology changes reflecting the 2010 adoption of the CARB on-road heavy duty vehicle and off-road mobile source rules. The on-road mobile source emission data incorporate day specific ambient temperature input to correct for evaporative emissions.

TABLE V-4-1

Annual Average Day Emissions Inventory (tons/day)

Year	VOC	NOX	CO	SOX	PM2.5	NH3
(a) Baseline						
2008	593	754	2880	54	80	109
2014	451	506	2095	18	70	103
2017	427	442	1862	18	70	100
2019	414	394	1708	18	70	98
2023	406	322	1584	18	70	97
2030	407	283	1502	20	72	98
2035	386	279	1473	22	72	98
(b) Controlled						
2014	451	490	2095	18	58*	103
2023	400	296	1584	18	70	97

* Winter episodic day emissions reductions

Annual Emissions Profiles

Day specific emissions were generated for all days in 2008. Figure V-4-1 illustrates the total CO and NOx emissions contained in the modeling domain for each day in 2008. CO emissions are indicative of the on-road mobile source inventory while NOx further incorporates signatures of stationary and off-road emissions. Note that the emissions totals in tons per day are roughly double the totals presented in Table V-4-1. This is because the values in Table V-4-1 represent basin-wide total emissions while those in Figure V-4-1 is the total from the modeling domain. The profile clearly depicts a changing emissions pattern with two distinct cycles represented: a weekly cycle, illustrated by Sunday through Saturday peaks and valleys, and day-to-day variations in emissions within the weekly cycle. Figure V-4-1 also includes emissions from 2008 wild fires that occurred in the modeling domain.

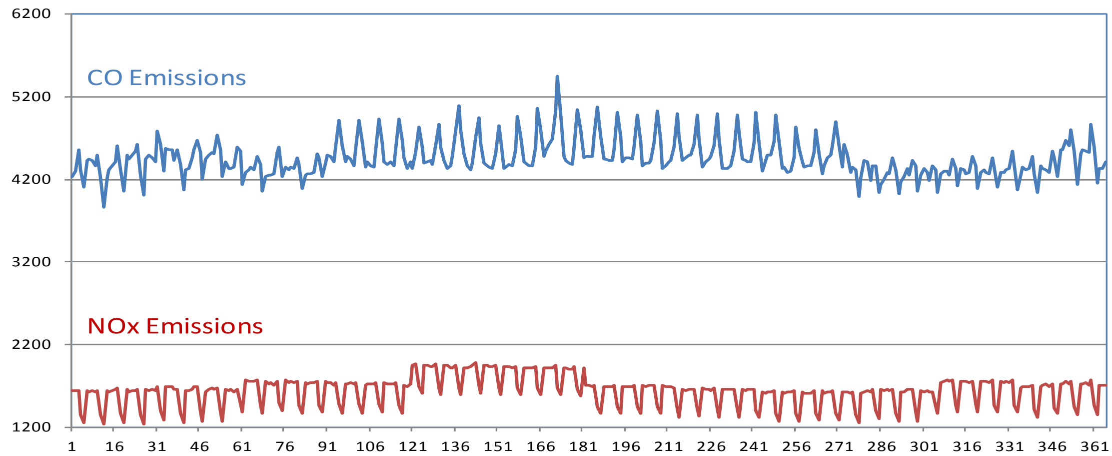

FIGURE V-4-1

2008 daily CO and NOx emissions in the modeling domain.

Diurnal Emissions Profiles

Where applicable, point, area and off-road mobile sources were adjusted to a day-of-week throughput profile consisting of a Monday-Friday, Saturday and Sunday schedule. Figure V-4-2 depicts the day-of-week and hour-of-day NOx emissions patterns for stationary, on-road, and off-road sources with ocean going vessels (OGVs) independently represented. The peak emissions occur mid-week (Tuesday through Thursday) while emissions on Saturday and Sunday decrease by about 30 percent. Based on CALTRANS data, NOx emissions from heavy-duty vehicles are reduced by more than 60 percent on Saturdays with further reductions occurring on Sundays. Increases in off-road mobile source activities (e.g. pleasure craft and recreational vehicles) account for the bulk of the VOC increase on both Saturdays and Sundays.

Monday and Friday are transitional days with on-road emissions slightly lower than mid-week with slightly modified diurnal profiles. Off-road emissions are relatively consistent throughout the week whereby weekend reductions in some off-road categories (e.g. construction) are replaced by weekend activity emissions (e.g. recreational vehicles and boats). In general, OGV emissions are constant with shipping activities ongoing as a function of arrivals and departures. The largest stationary source contributions (e.g.

refineries, power generation and residential combustion) represent daily usage and do not vary much over the course of the week.

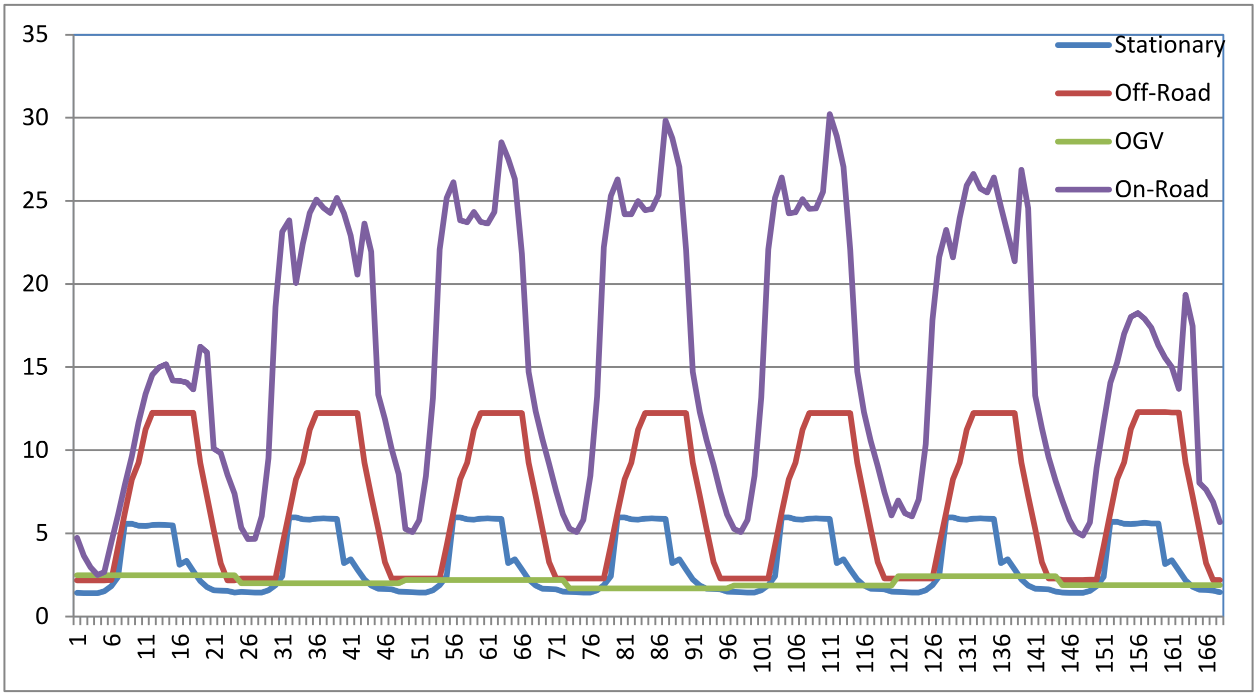

FIGURE V-4-2

Diurnal NOx emissions (tons per hour) in the modeling domain: Sunday - Saturday.

Spatial Distribution

Figures V-4-3 through V-4-6 provide the spatial distribution of NOx emissions for the stationary (including area sources), OGV, off-road and on-road categories. Areas sources in the modeling domain are typically assigned to a surrogate distribution profile (maintained by CARB) to allocate the daily emissions. Area source NOx emissions are included in the stationary source projection depicted in Figure V-4-3.

Paved and Unpaved Road Dust Emissions

U.S. EPA recently revised its AP-42 methodology to estimate paved road dust whereby the new method removed the factor addressing tire and break ware (to address potential double counting) but retained a California usage profile and adjustments for rain and silt loading (CARB, 2013)..

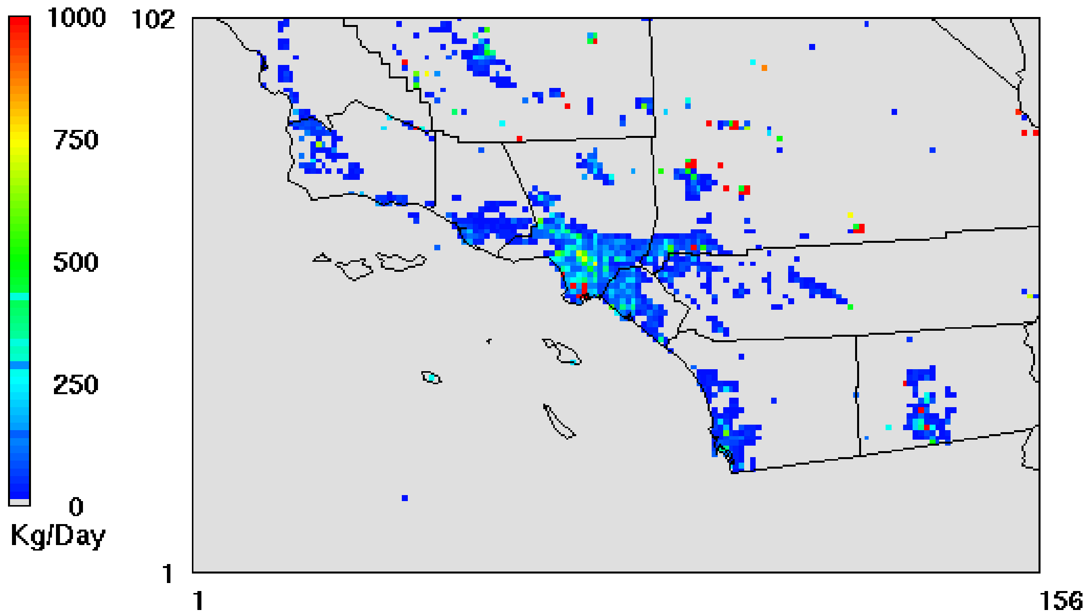

FIGURE V-4-3

Stationary source NOx emissions (Kg per day) in the modeling domain

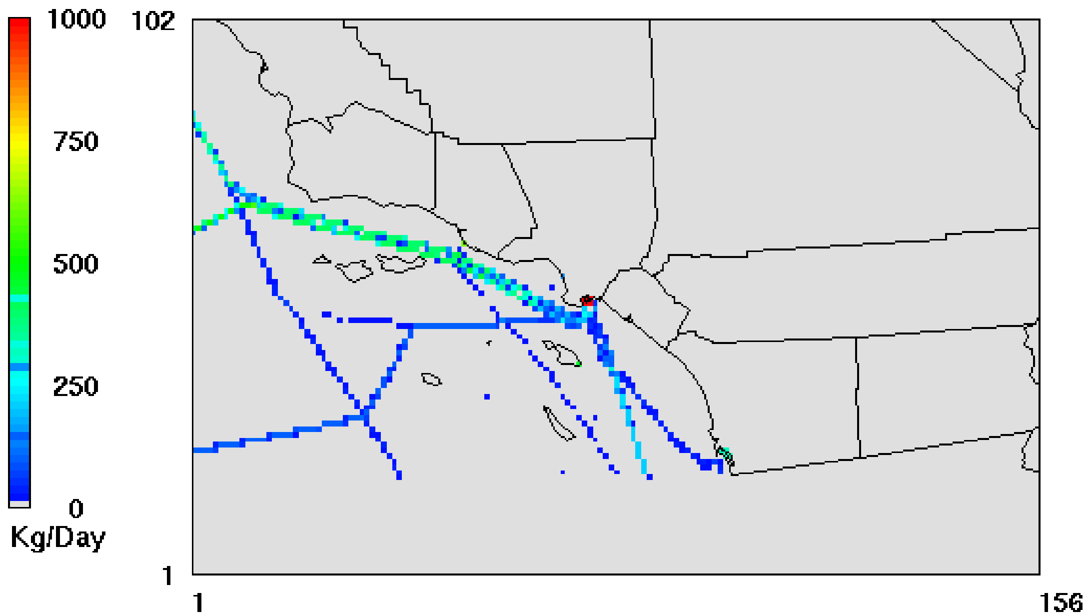

FIGURE V-4-4

OGV NOx emissions (Kg per day) in the modeling domain

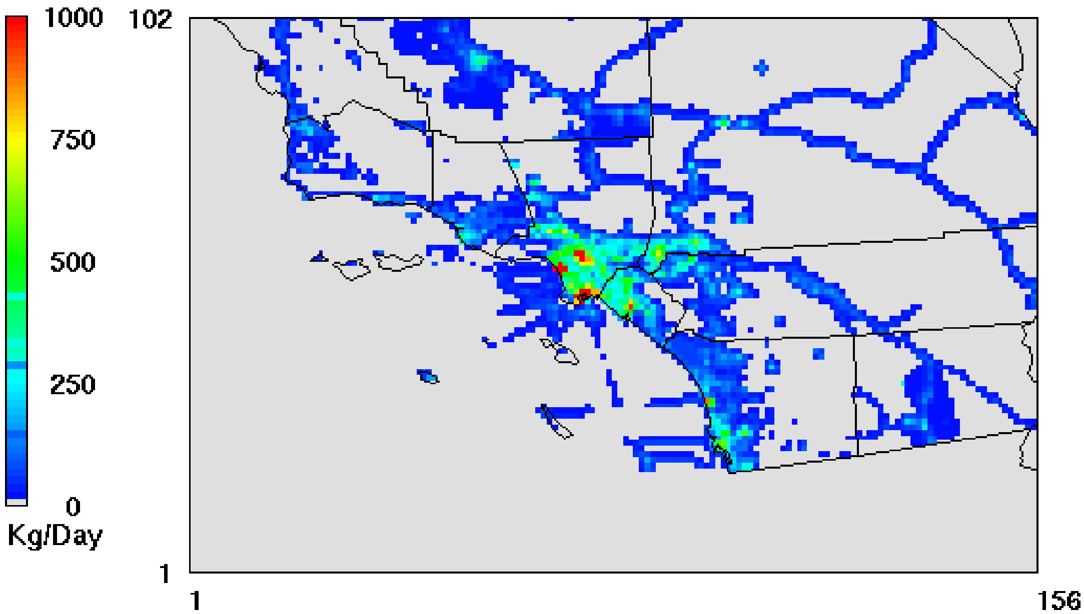

FIGURE V-4-5

Off-Road NOx emissions (Kg per day) in the modeling domain

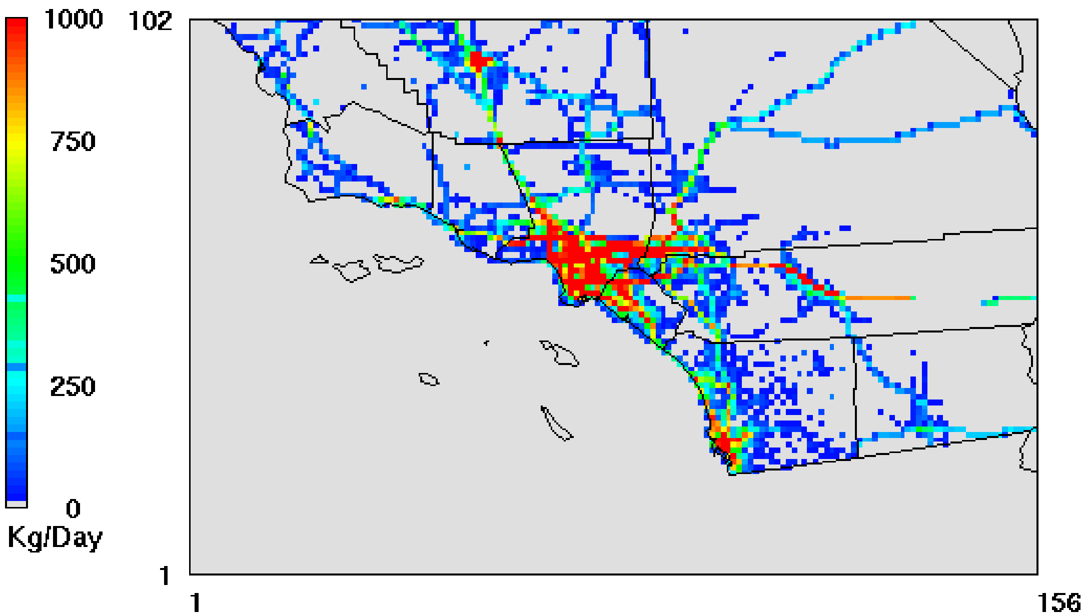

FIGURE V-4-6

On-Road NOx emissions (Kg per day) in the modeling domain

In addition, the base year paved road dust emissions are a function of VMT. As with the three preceding AQMPs, paved road dust emissions were adjusted to reflect a cap on emissions growth for high VMT road types in future years. Based on CARB's latest assessment (California Air Resources Board. 2012. Miscellaneous Process Methodology 7.9, Entrained Paved Road Travel, Paved Road Dust. July), the Final 2012 AQMP continued this type of adjustment by leaving paved road dust constant on all roads unless there was a change in centerline miles; any emission change in future years would be calculated using the ratio of future-to-current centerline miles (see Appendix III, Table III-2-6).

Unpaved road dust was allocated based on GIS land use profiles.

Ammonia Inventory Adjustments

Selected revisions were made to the spatial distribution and emissions categories defining the ammonia inventory. In general, the total ammonia in the inventory was reduced from 119 TPD in the 2007 AQMP inventory to 109 TPD in the Final 2012 AQMP. Shifts in ammonia emissions occurred in several categories with livestock; fertilizer and on-road emission lowered, being partially offset by increases in the industrial and composting sectors. Table V-4-2 provides a summary comparison of the 2002 and 2008 ammonia inventories form the 2007 AQMP and the Final 2012 AQMP.

TABLE V-4-2

Annual Average Day Ammonia Emissions Inventory (tons/day)

Source Category	2007 AQMP	Final 2012 AQMP
	2002 Inventory	**2008 Inventory**
Livestock	26	18.6
Soil	1.4	1.8
Domestic	25.1	25.1
Landfill	1.1	3.6
Composting	9.7	17.8
Fertilizer	6.1	1.5
Sewage Treatment	0.1	0.2
Wood Combustion		0.1
Industrial	13.2	20.2
On-Road Mobile	36.1	19.9
Off-Road Mobile		0.1
Total	118.8	108.9

Biogenic Emissions

Daily biogenic VOC emissions inventories were developed by CARB using the Model of Emissions of Gases and Aerosols from Nature (MEGAN) emissions model (Wiedenmeyr, 2007). The biogenic inventories were calibrated based on spatially resolved daily temperature. Figure V-4-7 provides the daily total emissions of isoprene and terpenes, measured in millions of moles, for the modeling domain. The trend shows higher emissions for the spring and summer months with several peaks occurring in May and later June when temperatures in Southern California were unseasonably high. The areas with the greatest contribution to the biogenic emissions inventory are depicted by the color lime green in the general land use characterization provided in Chapter 3 (Figure V-3-9).

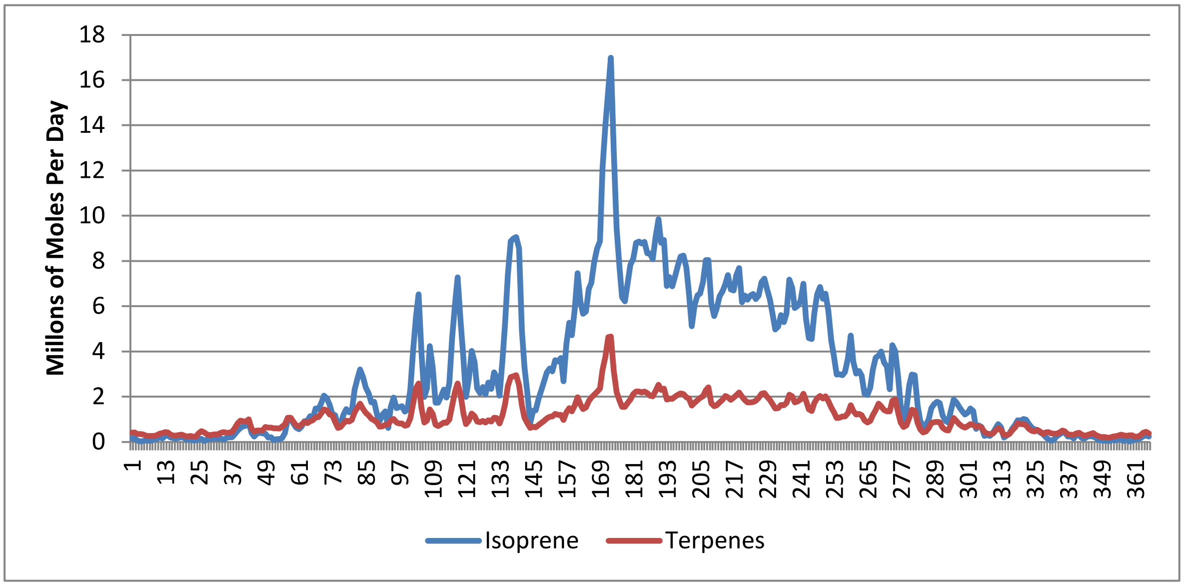

FIGURE V-4-7

2008 daily biogenic VOC emissions in the modeling domain:
Depicted are Isoprene and terpenes (millions of moles per day).

Ocean Going Vessels

During 2008, OGV emissions, most notably SOx, varied significantly over the course of the year. Compliance with CARB's marine vessel low sulfur fuel rule was challenged in the courts. As a consequence OGV emissions varied from a relatively low value (approximately 15 TPD) to emissions in excess of 40 TPD when compliance was not enforced and bunker fuel was in use. Figure V-4-8 depicts the vessel weighted profile of OGV SOx emissions estimated from the schedule of rule enforcement during 2008 in the compliance zone waters 24-nautical miles offshore of the Ports of Los Angeles and Long Beach. The time series accounts for port vessel arrivals and departures by day-of-week, month of year, and vessel tonnage category. The general emissions profile depicted in Figure V-4-8 was used with adjustments to the total SOx tonnage to generate the gridded SOx OGV emissions for modeling.

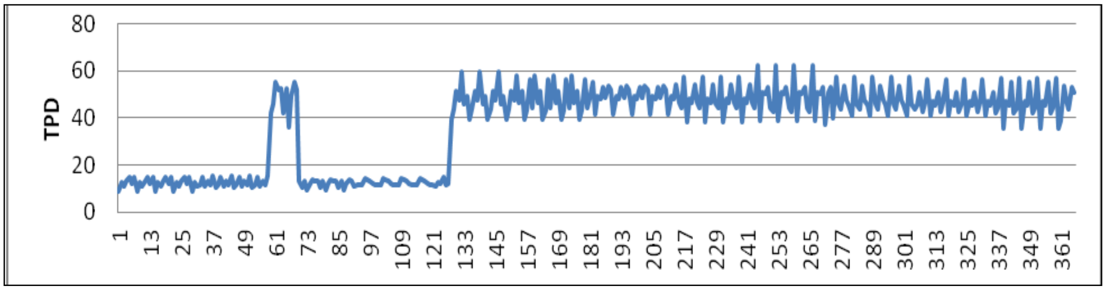

FIGURE V-4-8

2008 daily vessel weighted OGV SOx emissions in the modeling domain.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ALTERNATIVE EMISSIONS

As part of the CEQA requirements for project assessment, the analysis must consider alternatives to the proposed project and hence alternative emissions scenarios. The Final 2012 AQMP has identified three viable alternatives to the proposed plan to achieve attainment of the federal 24-hour PM2.5 standard within the prescribed time frame. The first alternative is a 2019 no-project alternative which relies on rules and regulations already in place to reduce baseline emissions to a level sufficient to attain the standard by 2019. The second alternative requires local emissions to be controlled nearby the design site in Mira Loma for a 2017 attainment year. The controls include tighter forecast triggers for restrictions on wood burning in fireplaces and woodstoves as well as open burning, and incentive-based accelerated local heavy duty truck clean up. The third alternative targets regional acceleration of heavy duty truck NOx reductions by 2017 as a replacement to the local control program. Table V-4-3 provides the CEQA alternate emissions scenarios simulated for the Program Environmental Impact Report.

BOUNDARY AND INITIAL CONDITIONS

As discussed in Chapters 2 and 3, the initial concept for establishing boundary conditions for the regional modeling analyses focused on using global chemical simulation model output to define key species concentrations at the edge of the modeling domain. MOZART was selected to provide the characterization. However after evaluation it was discontinued in favor of using an U.S. EPA “clean boundary” US EPA (1991) approach that has been incorporated in previous attainment demonstrations.

Table V-4-4 summarizes the boundary profile concentrations used in the regional simulations. The boundary conditions were adjusted to match the ROG SAPRC profile. Initial conditions were established from ambient data monitored at AQMD and other district stations in their respective monitoring networks. For the future year scenarios, the boundary, region top and ambient air quality concentrations were adjusted to reflect projected emissions reductions from the 2008 base-year.

TABLE V-4-3

CEQA Alternatives Annual Average Day Emissions Inventory (tons/day)

Year	**VOC**	**NOX**	**CO**	**SOX**	**PM2.5**	**NH3**
(a) Alternative 1	No Project Alternative					
2014	451	506	2095	18	70	103
2019	415	405	1716	18	70	99
(b) Alternative 2	localized PM Control					
2014	451	506	2095	18	63	103
2017	425	451	1867	18	63	97
(c) Alternative 3	Greater Reliance on NOx Reductions					
2014	451	506	2095	18	65	103
2017	420	416	1816	18	61	101
(a) Alternative 4	PM2.5 Control Strategy Only					
2014	451	506	2095	18	58	103
2017	427	452	1867	18	58	101

TABLE V-4-4

Boundary Profile Concentrations (ppb)

SAPRC99 Species	(ppb)	SAPRC99 Species	(ppb)
HCHO	0.930	ARO1	0.210
CCHO	0.530	ARO2	0.070
RCHO	0.250	OLE1	0.180
ISOP	0.020	OLE2	e-13
MEOH	0.100		
ETOH	0.050	O3	40.0
ETHE	0.180	CO	200.
ALK1	2.500		
ALK2	2.300	NO	0.100
ALK3	0.930	NO2 (surf)	2.000
ALK4	e-13	NO2 (aloft)	0.100
ALK5	e-13		

CHAPTER 5

FEDERAL 24-HOUR PM2.5 ATTAINMENT DEMONSTRATION PLAN

Introduction

24-Hour PM2.5 Sampling

Performance Evaluation

24-Hour PM2.5 Modeling Approach

Future Air Quality

CEQA Alternate Simulations

Weight of Evidence

Summary and Control Strategy Choices

INTRODUCTION

The attainment demonstration presented in this chapter is applicable to the federal 24-hour PM2.5 standard. The annual PM2.5 attainment demonstration provided in the 2007 AQMP was approved by U.S. EPA on September 30, 2011. An update of the model simulation results for the annual PM2.5 standard is presented in Chapter 6.

The initial sections of this chapter describe the PM2.5 Federal Reference Method (FRM) monitoring data and sampling network, the historical trend of 24-hour PM2.5 design values, revisions to the speciated monitoring attainment test (SMAT) and Sandwich data analyses, and the CMAQ modeling methodology. The subsequent sections of this chapter provide the 24-hour PM2.5 attainment demonstration, the unmonitored area analysis, and supporting weight of evidence analyses.

24-HOUR PM2.5 SAMPLING

PM2.5 FRM Sampling

The district maintains a sampling network of Federal Reference Method (FRM) PM2.5 at 20 sites throughout the Basin and Coachella Valley. This network is supplemented by Federal Equivalent Method (FEM) continuous PM2.5 monitors at a subset of these locations to provide data for public reporting and for forecasting algorithms. The FRM samplers are designated as the primary samplers, and thus FRM data is used for design value calculations and the attainment demonstration.

Speciated PM2.5 Sampling.

The District adopted a Multi-Channel Fine Particulate (MCFP) sampling system for the PTEP monitoring program in 1995, and the TEP 2000 program in 1998-1999. New PM samplers, speciated air sampling system (SASS) samplers, were deployed for two years at ten sites in the Basin to conduct the Multiple Air Toxics Exposure Study III (MATES III) beginning in April, 2004 (SCAQMD, 2008). The SASS sampler collects PM2.5 particles on 47mm quartz and Teflon filters simultaneously within the same sampler for 24-hour duration for subsequent laboratory chemical analysis. After the MATES III study, PM speciation sampling was changed from a one-in-three day to a one-in-six day schedule, and reduced to four permanent speciation-sampling sites. However, a monitoring campaign at multiple sites in the Port area included PM2.5 speciation in the 2007-2008 timeframe. Furthermore, an enhanced speciation campaign in 2009 returned to the one-in-three day schedule at seven sites for one year only.

PM2.5 speciation data measured as individual species at six sites in the District air-monitoring network during 2008 provided the PM2.5 chemical characterization for evaluation and validation of the CMAQ annual and episodic modeling. The six sites include the historical PM2.5 maximum location (Riverside-Rubidoux), the stations experiencing many of the highest county concentrations (among the 4-county jurisdiction including Fontana, North Long Beach and Anaheim) and monitoring in locations influenced by goods movement (South Long Beach) and mobile source impacts (Central Los Angeles). It is important to note that the close proximity of Mira Loma to Rubidoux and the common in-Basin airflow and transport patterns enables the use of the Rubidoux speciation data as representative of particulate speciation at Mira Loma. Both sites are directly downwind of the dairy production areas of Chino and the warehouse distribution centers located in the northwestern corner of Riverside County. Speciated data monitored at the selected sites for 2006-2007 and 2009-2010 were analyzed to corroborate the applicability of using the 2008 profiles. PM2.5 mass, ions, organic and elemental carbon, and metals, for a total of 43 chemical species, were analyzed from a one-in-six day sampling schedule at 6 sites.

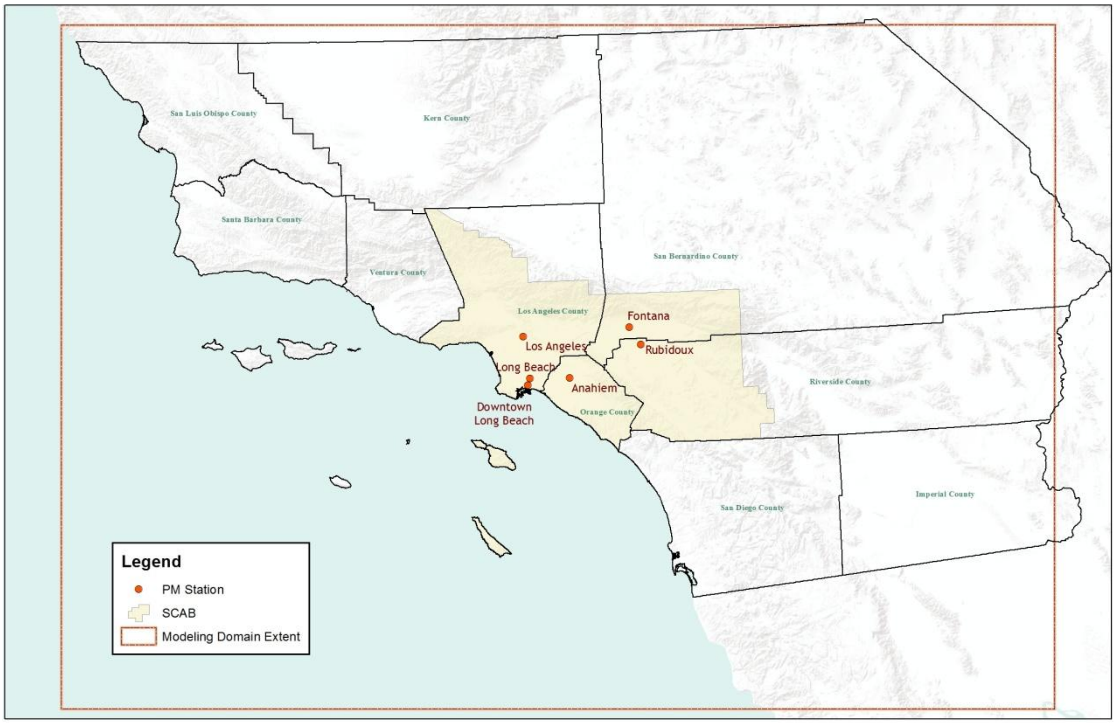

FIGURE V-5-1

SASS Sampling Sites in the Basin

2008 PM2.5 speciation data measured by the SASS sampler is used to derive the species fractions that are required for the PM2.5 attainment demonstration. U.S. EPA's PM2.5 modeling guidance recommends calculating future year PM2.5 design values by multiplying quarterly, species specific RRFs to the base year speciated design values for each quarter for each monitoring site. Base year design values are determined from the FRM mass data, however the FRM filters are not chemically speciated. Therefore, the guidance document recommends multiplying the species fractions that are measured in a speciation sampler such as the SASS to the FRM mass data to derive chemically speciated design values for the FRM data. In the following sections, 24-hour and annual average species concentrations measured by the SASS sampler are summarized and the chemically speciated FRM data are derived for the future year design value calculations.

As previously described in Chapter 1, U.S. EPA recently updated the 24-hour PM2.5 attainment test, replacing Section 5.2 of the 2007 PM2.5 modeling guidance. The new guidance recommends using the 8 highest days of FRM data per quarter for each year for each FRM site for calculation of the daily design values to ensure that the 98th percentile concentration day for the year is included in the analysis. This resulted in 32 days of FRM data for each year for each site. Tables V-5-1 through V-5-7 list the 2008 FRM data subset included as a component of the attainment analysis. Data from 2006, 2007, 2009 and 2010 complete the data requirement for the revised attainment test. In total, 160 days of data at each site are included in the calculation. Table V-5-8 provides the 5-year weighted 24-hour PM2.5 design vales for the seven sites evaluated. The weighting scheme centered on 2008 is as follows: 1/3 weight for 2008; 2/9 weight each for 2007 and 2009, and 1/9 weight each for 2006 and 2010.

In some cases, the FRM and SASS monitoring locations do not overlap. (The FRM network has 21 stations where the SASS network size has varied in time, being limited to 6 sites in 2008). Five of the SASS sites are co-located with the FRM sites. The Downtown Long Beach SASS site was located near the South Long Beach FRM. Similarly, the Mira Loma FRM design site is located in the upwind adjacent grid cell to the Rubidoux SASS sampler. The PM2.5 guidance document recommends estimating speciated concentrations from a nearby speciation monitor when an FRM site does not have speciation data. Therefore, the Mira Loma FRM data is speciated using the Rubidoux SASS data and the South Long Beach FRM used the Downtown Long Beach speciation data.

TABLE V-5-1

2008 Eight Highest PM2.5 FRM Data for Each Quarter at Anaheim

	Q1	Q2	Q3	Q4
Highest	39.4	24.6	27.1	67.9
2nd Highest	39.2	19.1	21.4	47. 8
3rd Highest	31.2	19.1	21.4	43.8
4th Highest	28.3	18.1	19.2	41.6
5th Highest	27.6	17.9	19.0	41.0
6th Highest	24.8	17.3	18.6	39.8
7th Highest	23.8	16.9	18.1	38.6
8th Highest	22.4	15.9	17.3	37. 8

TABLE V-5-2

2008 Eight Highest PM2.5 FRM Data for Each Quarter at S. Long Beach

	Q1	Q2	Q3	Q4
Highest	37.1	19.9	24.1	60.9
2nd Highest	32.5	19.4	22.4	41.8
3rd Highest	29.2	19.2	22.1	39.6
4th Highest	27.9	18.7	20.9	38.2
5th Highest	26.9	18.6	20.8	36.6
6th Highest	21.4	17.8	20.2	36.4
7th Highest	19.9	17.4	20.1	35.4
8th Highest	19.3	17.2	19.4	31.8

TABLE V-5-3

2008 Eight Highest PM2.5 FRM Data for Each Quarter at N. Long Beach

	Q1	Q2	Q3	Q4
Highest	39.4	22.3	24. 9	57.2
2nd Highest	39.0	19.2	24.0	45.5
3rd Highest	31.2	18.9	23.2	41.5
4th Highest	30.9	18.8	20.8	39.8
5th Highest	29.5	18.0	20.3	38.9
6th Highest	28.4	17.9	19.7	36.2
7th Highest	22.5	17.0	19.4	33.5
8th Highest	22.1	16.6	19.1	32.4

TABLE V-5-4

2008 Eight Highest PM2.5 FRM Data for Each Quarter at Central Los Angeles

	Q1	Q2	Q3	Q4
Highest	38.1	24.8	43.8	78.4
2nd Highest	35. 8	24.0	40.4	59.9
3rd Highest	29.9	21.7	32.8	54. 6
4th Highest	26.0	21.4	30.9	50.0
5th Highest	26.0	20.7	29.1	40.6
6th Highest	25.2	20.3	27.0	40.0
7th Highest	25.2	20.1	24. 9	34.4
8th Highest	25.1	19.6	24.1	33.3

TABLE V-5-5

2008 Eight Highest PM2.5 FRM Data for Each Quarter at Fontana

	Q1	Q2	Q3	Q4
Highest	43.5	49.0	43.9	47.5
2nd Highest	36.2	24.9	32.1	47.1
3rd Highest	25.8	24.6	25.3	27.1
4th Highest	21.8	18.9	24.3	26.4
5th Highest	21.6	18.3	23.4	25.3
6th Highest	18.5	17.6	23.1	24.9
7th Highest	14.6	17.3	21.5	18.1
8th Highest	14.1	17.3	20.7	17.6

TABLE V-5-6

2008 Eight Highest PM2.5 FRM Data for Each Quarter at Mira Loma

	Q1	Q2	Q3	Q4
Highest	50.2	31.1	42.1	50.9
2nd Highest	47.1	25.8	33.9	46.9
3rd Highest	39.1	24.2	28.7	46.4
4th Highest	28.7	23.1	28.2	39.9
5th Highest	26.6	23.0	25.9	38.0
6th Highest	19.8	21.9	23.9	33.4
7th Highest	18.2	19.0	21.8	23.4
8th Highest	16.5	17.8	21.5	20. 7

TABLE V-5-7

2008 Eight Highest PM2.5 FRM Data for Each Quarter at Rubidoux

	Q1	Q2	Q3	Q4
Highest	48.0	31.3	53.3	57.7
2nd Highest	44.4	30.7	41.0	57.1
3rd Highest	40.3	30.4	34.0	41.5
4th Highest	37.0	29.8	32.8	40.0
5th Highest	36.3	29.3	31.0	40.0
6th Highest	34.9	29.0	30.9	38.1
7th Highest	34.2	28.3	28.6	36.2
8th Highest	32.0	28.3	25.8	31.7

TABLE V-5-8

2008 Weighted 24-Hour PM2.5 Design Values (µg/m^3)

Monitoring Site	24-Hour PM2.5 Design
Anaheim	35.0
Los Angeles	40.1
Fontana	45.6
North Long Beach	34.4
South Long Beach	33.4
Mira Loma	47.9
Rubidoux	44.1

The revised guidance updated the quarterly species fractions on "high" days, which are required for the 24-hour modeled attainment test. The new guidance recommends using the top 10% of days in each quarter as the "high" days, resulting in 4 days per quarter for the 2008 SASS data. Figures V-5-2 through V-5-7 depict the species breakdown from the average top 4 PM2.5 concentrations for each quarter for six sites in the Basin. The data show the unadjusted direct measurements of the chemical species at each site. In general, concentrations in the fourth or first quarter are higher than that of the other quarters and secondary ammonium, nitrate and sulfate can comprise about half of the total PM2.5 concentrations. They also show that organic carbon (OC) is the highest single component, which is also close to half of the total concentration in some quarters and sites.

OC as measured by a SASS sampler is believed to be highly uncertain with a mostly positive sampling artifact. The flow rate of the SASS sampler (6.7 lpm) used to collect OC is approximately 2.5 times lower than that of the FRM sampling system (16.7 lpm), which provides the official PM2.5 mass measurement. The slower flow rate in the SASS sampler reduces the pressure drop across the filter and increases the adsorption of organic vapor on the quartz filter medium. The FRM uses a Teflon filter for mass measurements which is much less subject to organic vapor adsorption. Therefore, the OC collected by the SASS sampler is higher than that collected by the FRM sampler, often leading to an overbalance of the sum of the PM2.5 species relative to FRM mass. There are also uncertainties in the measurements and the speciation analyses for all species; however, the greatest uncertainty in species concentration is associated with the measurement and analysis of OC.

U.S. EPA recommends estimating uncertain OC concentrations through an adjustment that is discussed as part of the "Sandwich" method in the 2007 AQMP and U.S. EPA's PM2.5 modeling guidance document (Frank, 2007). According to the "Sandwich" method, OC is estimated from the difference between the measured mass and the sum of all chemical species, water and a filter blank of 0.5 ug/m^3. The new species fractions for each quarter for each site are calculated by estimating OC, which are then applied to the 32 highest FRM data. Figures V-5-8 through V-5-13 depict the 2008 species fractional splits for the 6 primary components and water vapor for the six SASS sites after the "Sandwich" method was applied.

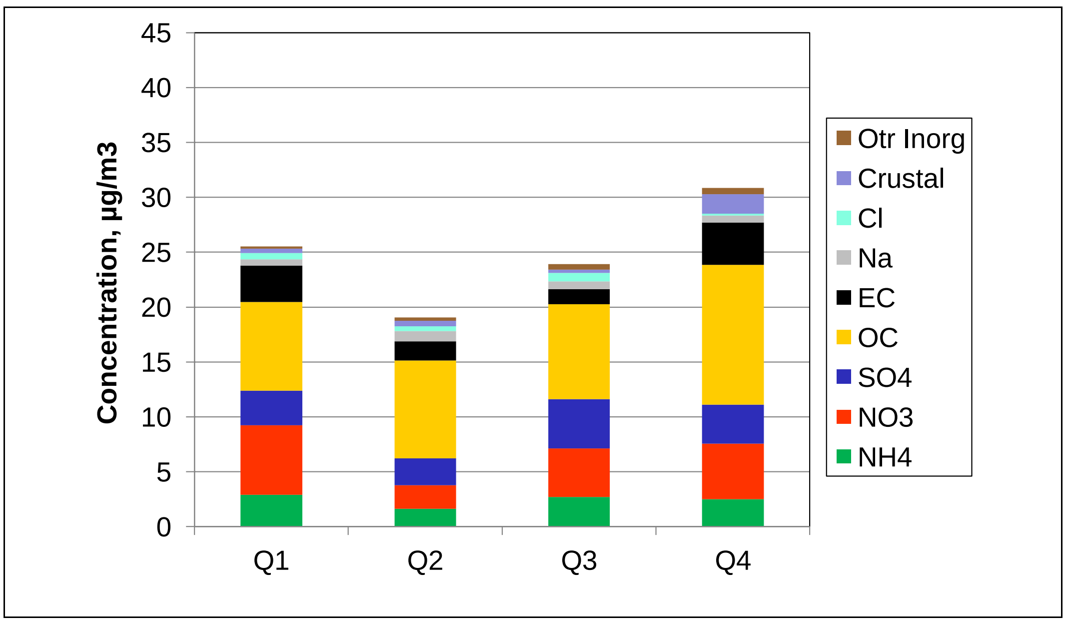

FIGURE V-5-2

2008 Anaheim Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

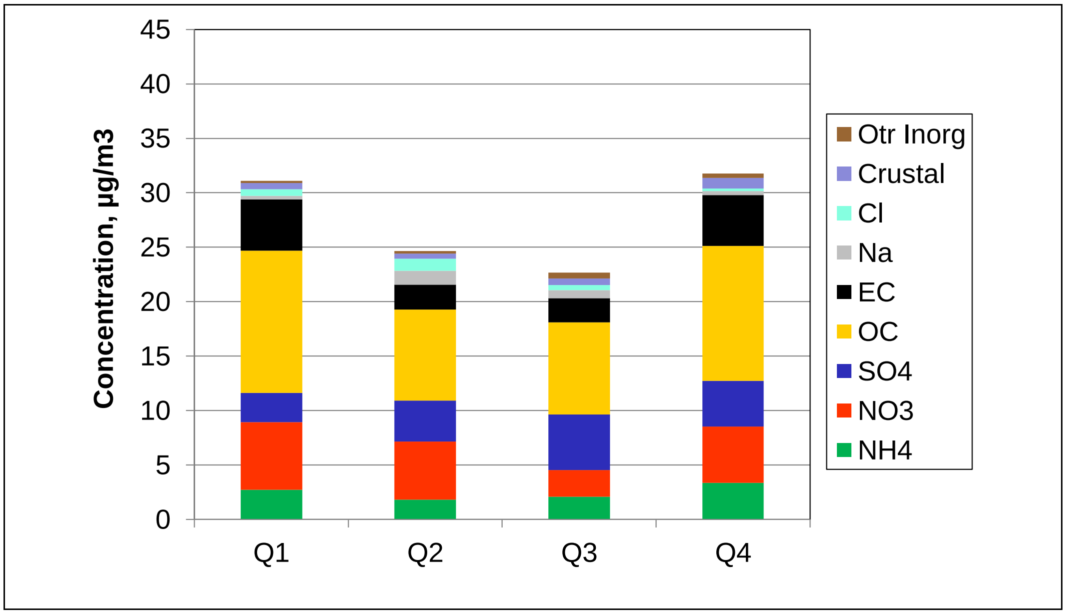

FIGURE V-5-3

2008 South Long Beach Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

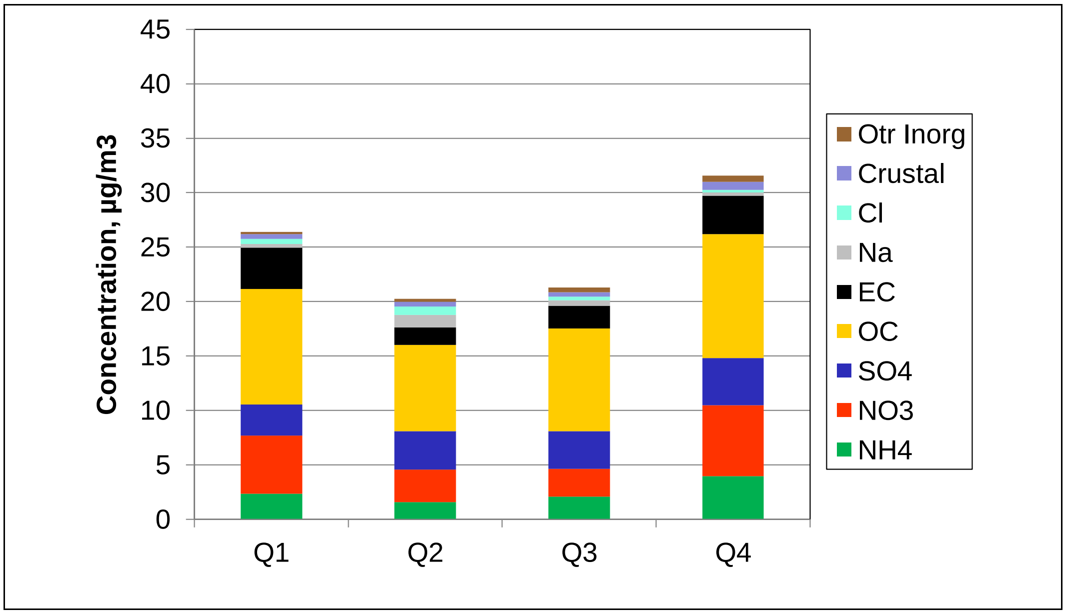

FIGURE V-5-4

2008 Long Beach Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

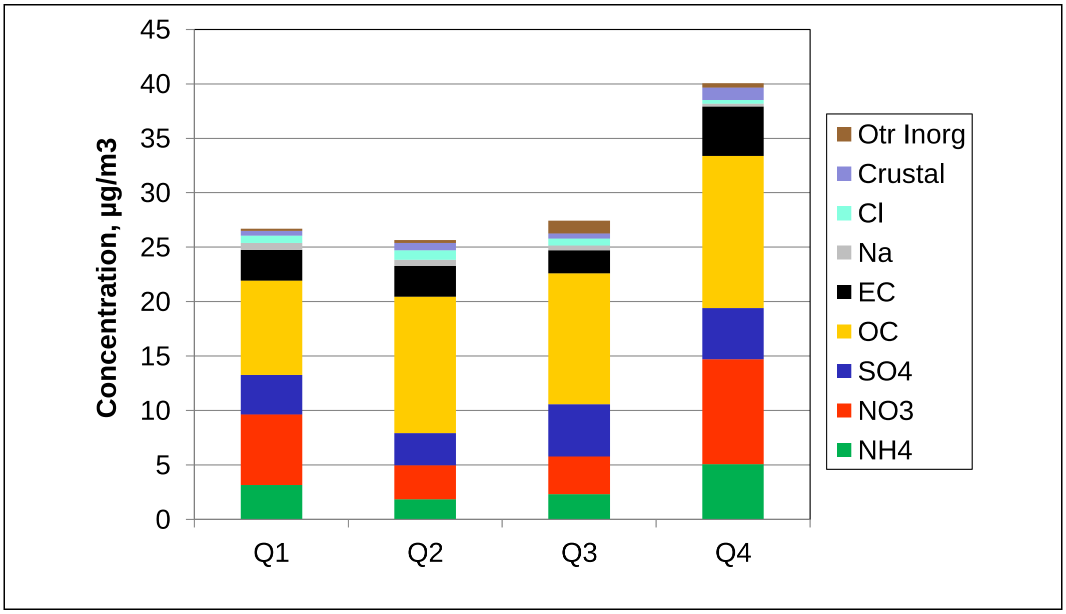

FIGURE V-5-5

2008 Los Angeles Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

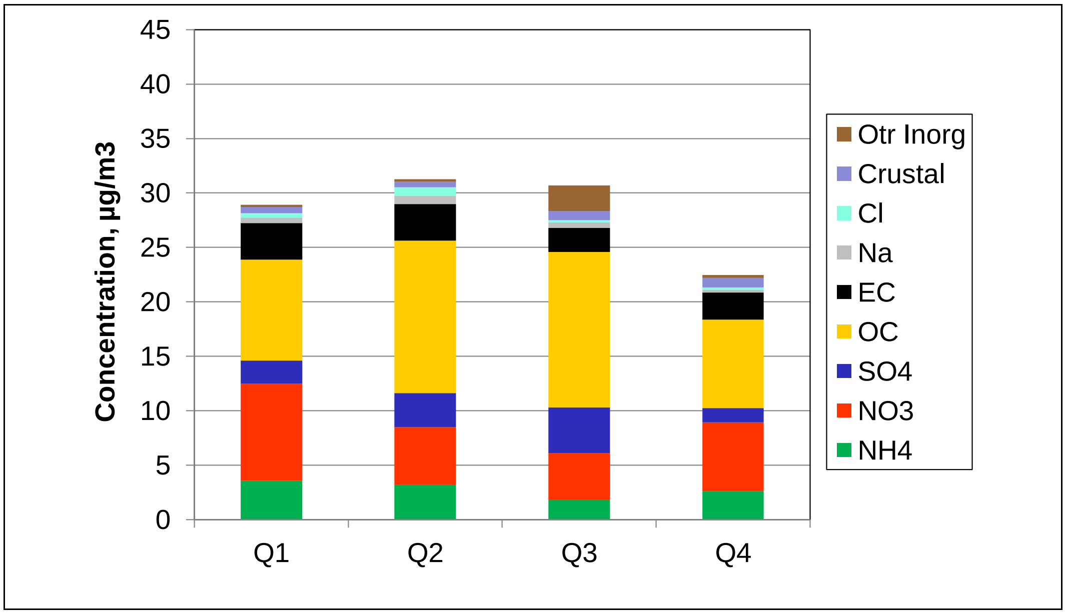

FIGURE V-5-6

2008 Fontana Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

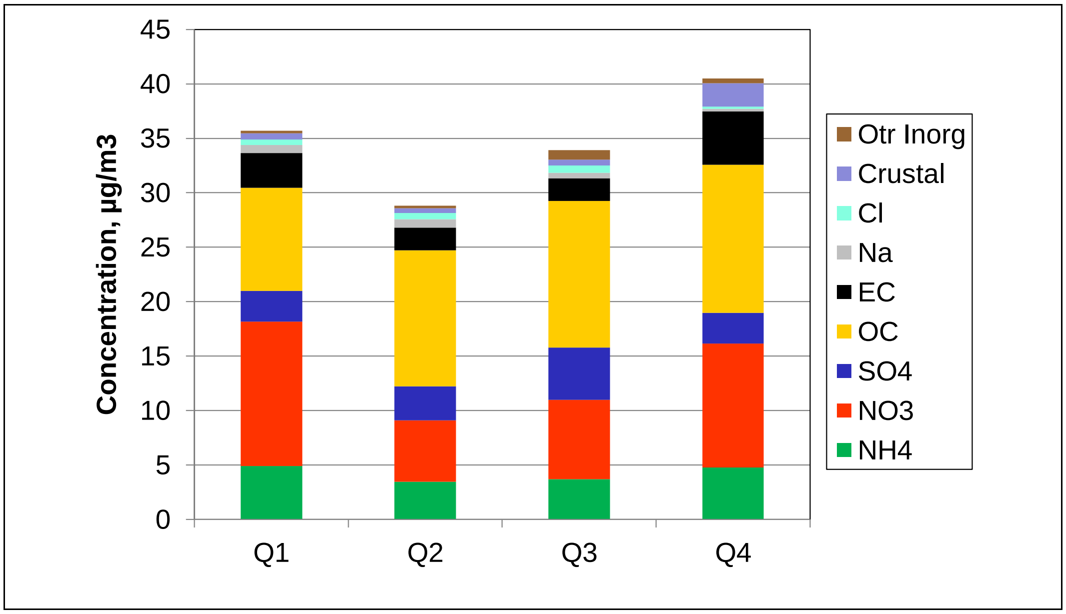

FIGURE V-5-7

2008 Rubidoux Top 4 24-Hr PM2.5 Quarterly Average Species Concentrations

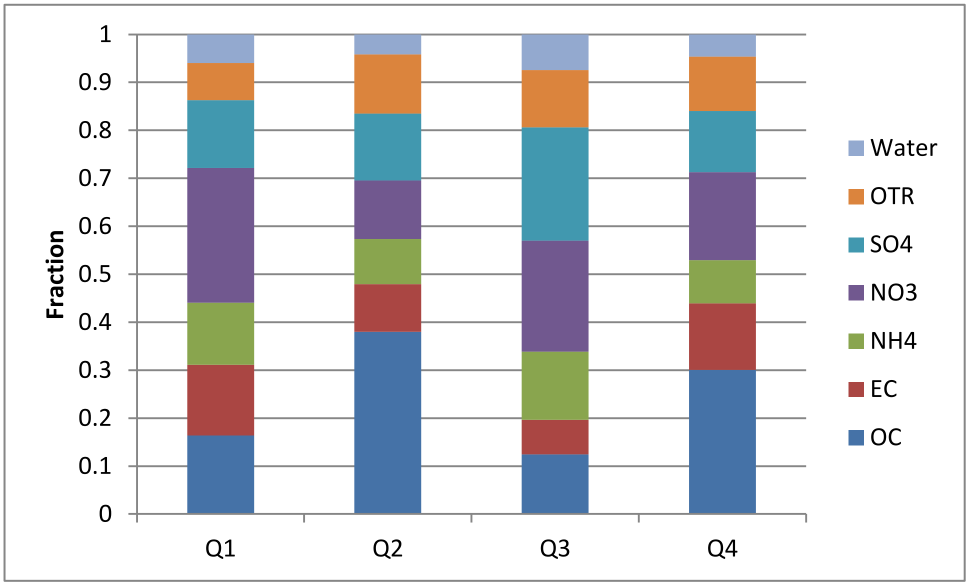

FIGURE V-5-8

2008 Anaheim 24-Hour PM2.5 species fractional splits after the Sandwich

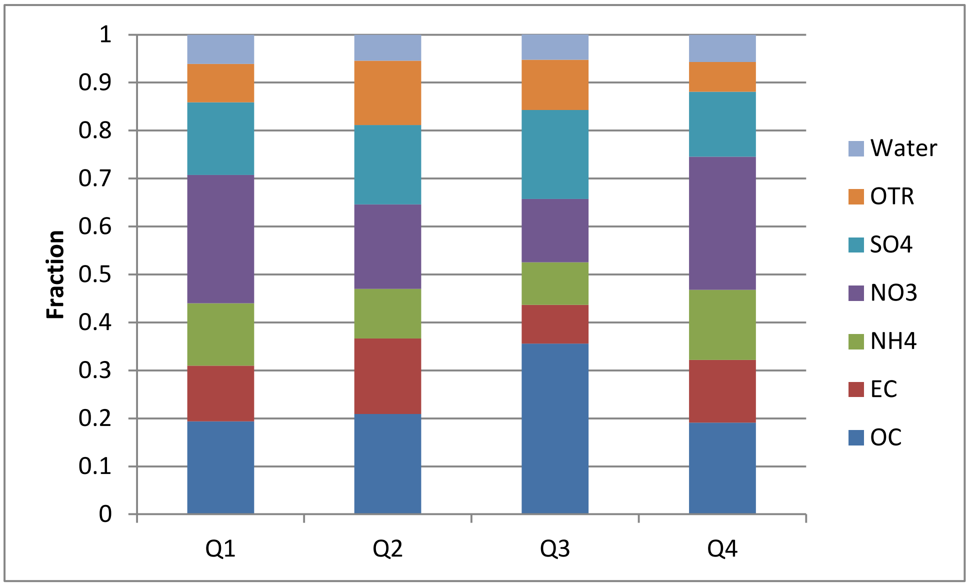

FIGURE V-5-9

2008 Los Angeles 24-Hour PM2.5 species fractional splits after the Sandwich

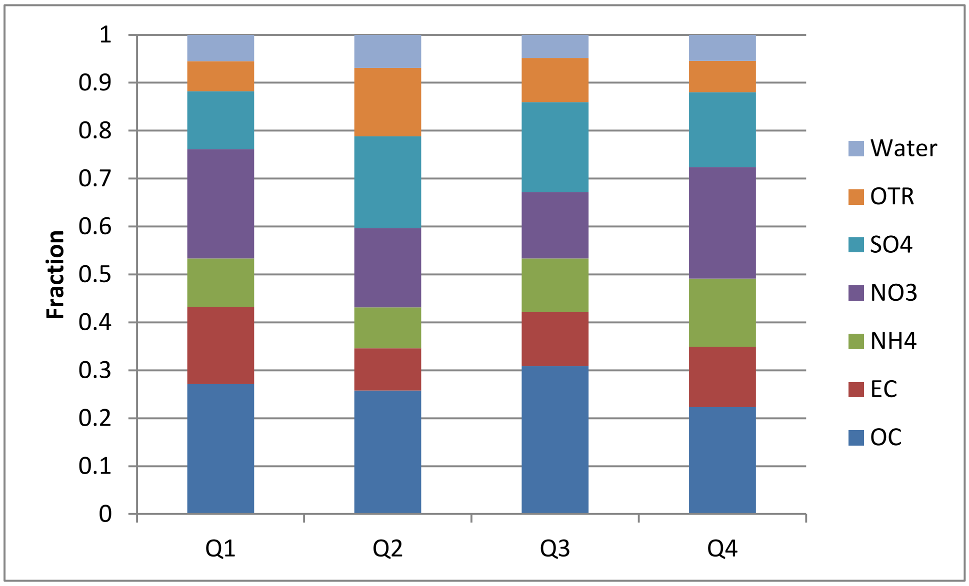

FIGURE V-5-10

2008 Long Beach 24-Hour PM2.5 species fractional splits after the Sandwich

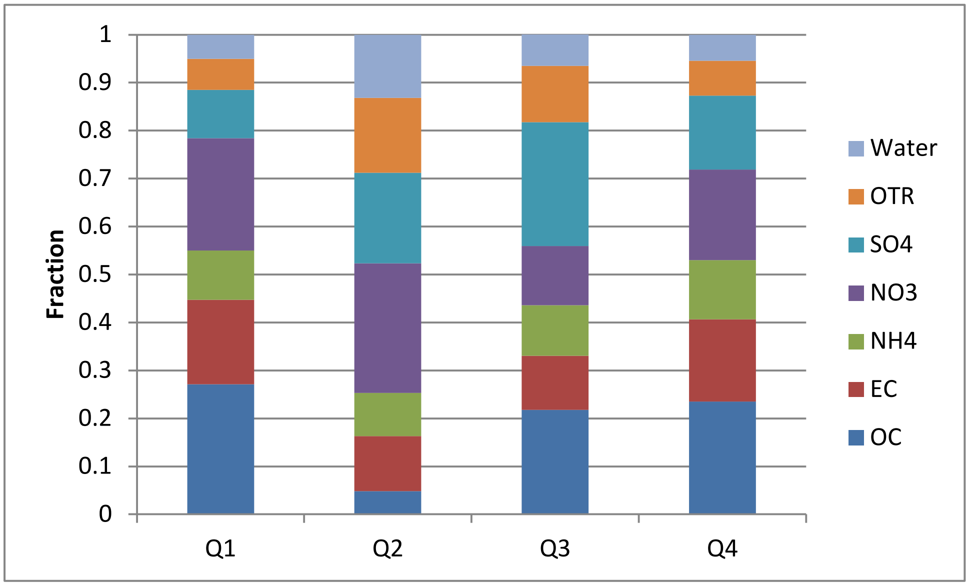

FIGURE V-5-11

2008 South Long Beach 24-Hour PM2.5 species fractional splits after the Sandwich

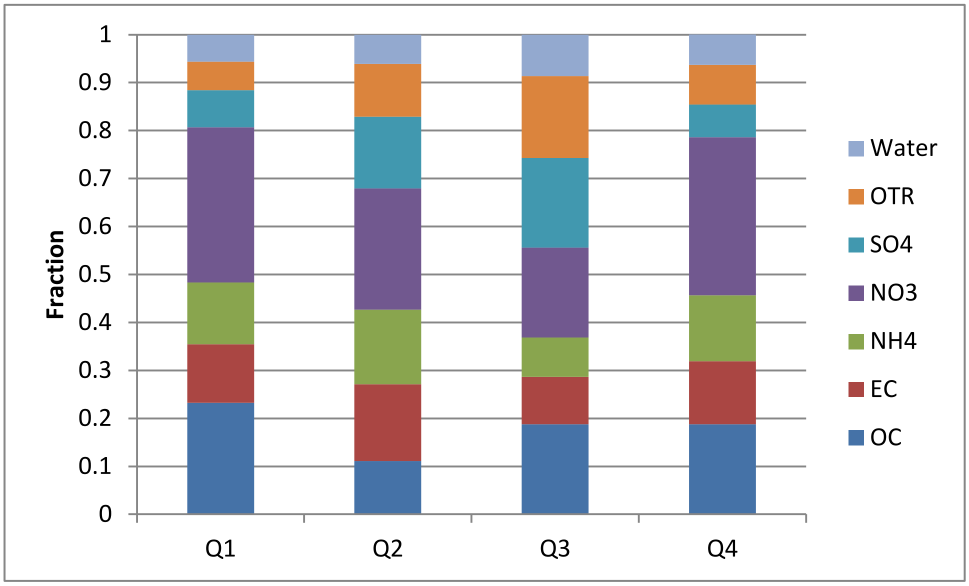

FIGURE V-5-12

2008 Fontana 24-Hour PM2.5 species fractional splits after the Sandwich

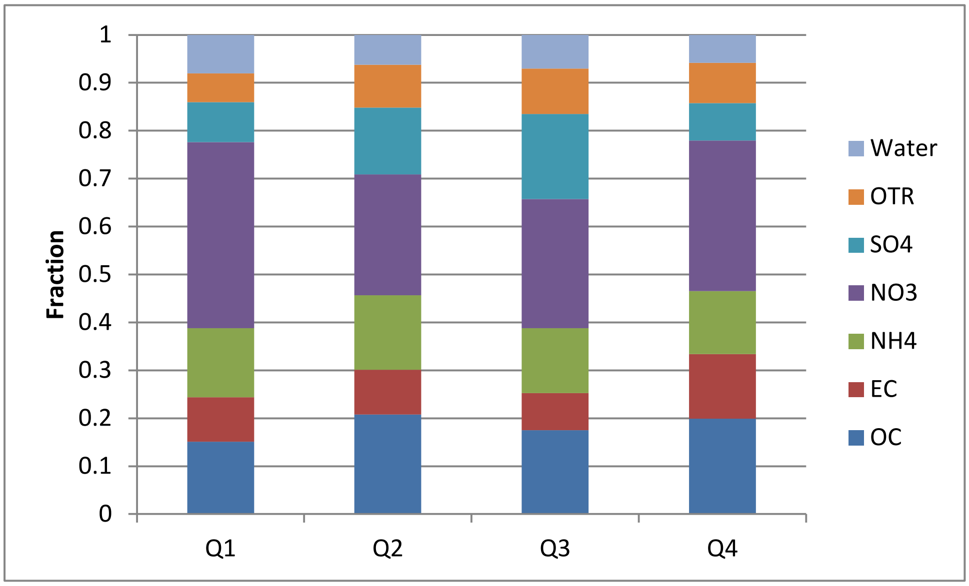

FIGURE V-5-13

2008 Rubidoux 24-Hour PM2.5 species fractional splits after the Sandwich

PERFORMANCE EVALUATION

EPA guidance assesses model performance on the ability to predict the PM2.5 component species and the total mass. No specific performance criteria thresholds are recommended in EPA's modeling guidance document. This is because the model uses relative response factors rather than direct predictions. Performance is evaluated by examining key statistics and graphical representations of the differences between model predicted concentrations and observations. The statistics examine model bias and error, while graphical representations of error, model prediction time series, and concentration scatter plots supplement the methods of model performance evaluation. The CMAQ modeling results presented for each station are based on the same "1-cell" basis.

PM2.5 Component Species Performance Evaluation

The CMAQ 2008 base-year 24-hour PM2.5 performance statistics are presented in Tables V-5-9 through V-5-15. The analysis includes predicted concentrations and observations for the six component species and total mass at the 6 SASS sites. (Note that the "others" category collectively includes crustal compounds-metals, sea salt, estimated water vapor and the filter blank). Also presented in the tables are estimates of bias and error for each component at each monitoring site. Quarterly statistics are provided in Attachment 4 to this document.

Figure V-5-14 provides a "soccer goal" graphical representation of error for model performance. Figures V-5-15 through Figure V-5-18 present the time series of model predicted vs. observations for each component at the SASS monitoring sites. Figure V-5-19 through Figure V-5-24 present the scatter-plots of prediction accuracy for each component at the SASS monitoring sites.

The three western Basin Los Angeles County sites analyzed had a total mass absolute prediction accuracy that exceeded 25 percent of the observed average. Prediction accuracy estimated for the three remaining sites measured approximately 20 percent or lower. In general, normalized bias was lowest for nitrate and highest for sulfate. The only systematic bias was evident for EC, whereby the tendency was to under predict observations.

One element observed during the 2008 simulation evaluation was that the eastern portion of the Basin predicted low concentrations of secondary aerosols when high wind "Santa Ana" conditions were observed. This generalized wind condition also impacted the western portion of the Basin but to a lesser extent. The days impacted by the high winds were clustered in the first and fourth quarters. Figure V-5-25 illustrates the frequency of the observed Santa Ana wind events.

Comparative Performance Evaluation: CAMx vs. CMAQ

While the 2012 AQMP 24-hour PM2.5 attainment demonstration is based upon regional air quality simulations using the CMAQ platform, it is useful to assess modeling performance of a companion tool such as CAMx to establish confidence in the analysis and lend support to the weight of evidence discussion in favor of accepting the attainment demonstration. Attachment 5 provides a direct comparison of simulated 24-hour PM2.5, by species, for the 2008, 2014 and 2014 controlled draft final inventory. The comparison shows good agreement between model applications and demonstrates that the attainment analysis is robust and can be replicated using an alternate simulation platform.

TABLE V-5-9

CMAQ 2008 Base Year Total Mass Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	15.67	14.45	-1.24	6.82	-0.37	2.51
Los Angeles	17.47	12.83	-4.65	8.79	-1.79	2.95
N. Long Beach	17.68	19.78	2.11	7.67	0.89	2.71
S. Long Beach	16.76	18.68	1.92	7.51	0.76	2.71
Fontana	17.43	22.05	4.62	9.41	1.42	3.08
Rubidoux	19.42	14.71	-4.69	9.10	-1.65	2.78

TABLE V-5-10

CMAQ 2008 Base Year Ammonium Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	1.48	1.78	0.30	0.56	0.20	0.38
Fontana	1.91	1.75	-0.17	0.76	-0.09	0.40
S. Long Beach	1.70	2.60	0.90	1.10	0.53	0.65
N. Long Beach	1.68	2.49	0.81	1.06	0.48	0.63
Los Angeles	1.82	2.34	0.52	0.95	0.28	0.52
Rubidoux	2.31	2.10	-0.20	0.99	-0.09	0.43

TABLE V-5-11

CMAQ 2008 Base Year Nitrate Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	2.92	3.49	0.57	1.42	0.20	0.49
Fontana	4.39	4.32	-0.07	2.12	-0.02	0.48
S. Long Beach	2.87	2.89	0.02	1.30	0.01	0.45
N. Long Beach	3.07	3.16	0.08	1.26	0.03	0.41
Los Angeles	3.26	4.66	1.40	2.10	0.43	0.65
Rubidoux	5.17	5.02	-0.14	2.44	-0.03	0.47

TABLE V-5-12

CMAQ 2008 Base Year Sulfate Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	2.50	1.76	-0.74	0.94	-0.30	0.38
Fontana	2.17	1.17	-1.00	1.03	-0.46	0.47
S. Long Beach	3.26	4.69	1.43	1.72	0.44	0.53
N. Long Beach	2.85	4.14	1.29	1.55	0.45	0.54
Los Angeles	2.69	2.22	-0.46	0.99	-0.17	0.37
Rubidoux	2.32	1.42	-0.90	1.12	-0.39	0.48

TABLE V-5-13

CMAQ 2008 Base Year Organic Carbon Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	2.52	2.60	0.08	0.78	0.03	0.31
Fontana	2.96	1.65	-1.30	1.31	-0.44	0.44
S. Long Beach	2.53	2.85	0.33	0.75	0.13	0.30
N. Long Beach	2.57	2.55	-0.02	0.61	-0.01	0.24
Los Angeles	3.12	4.83	1.70	1.82	0.55	0.58
Rubidoux	3.03	1.85	-1.18	1.23	-0.39	0.40

TABLE V-5-14

CMAQ 2008 Base Year Elemental Carbon Model Predictions (µg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	1.73	1.21	-0.53	0.73	-0.30	0.42
Fontana	2.21	1.02	-1.19	1.22	-0.54	0.55
S. Long Beach	2.28	1.83	-0.45	0.91	-0.20	0.40
N. Long Beach	2.06	1.57	-0.49	0.84	-0.24	0.41
Los Angeles	2.41	2.27	-0.14	0.61	-0.06	0.25
Rubidoux	2.15	1.14	-1.01	1.06	-0.47	0.49

TABLE V-5-15

CMAQ 2008 Base Year Others Predictions (μg/m^3)

Locations	Mean Observed	Mean Predicted	Mean Bias	Mean Error	Normalized Mean Bias	Normalized Mean Error
Anaheim	4.52	3.61	-0.92	2.39	-0.20	0.53
Fontana	3.83	2.92	-0.92	2.35	-0.24	0.61
S. Long Beach	5.04	4.92	-0.12	1.89	-0.02	0.38
N. Long Beach	4.53	4.77	0.25	2.19	0.05	0.48
Los Angeles	4.13	5.73	1.60	2.94	0.39	0.71
Rubidoux	4.44	3.18	-1.26	2.26	-0.28	0.51

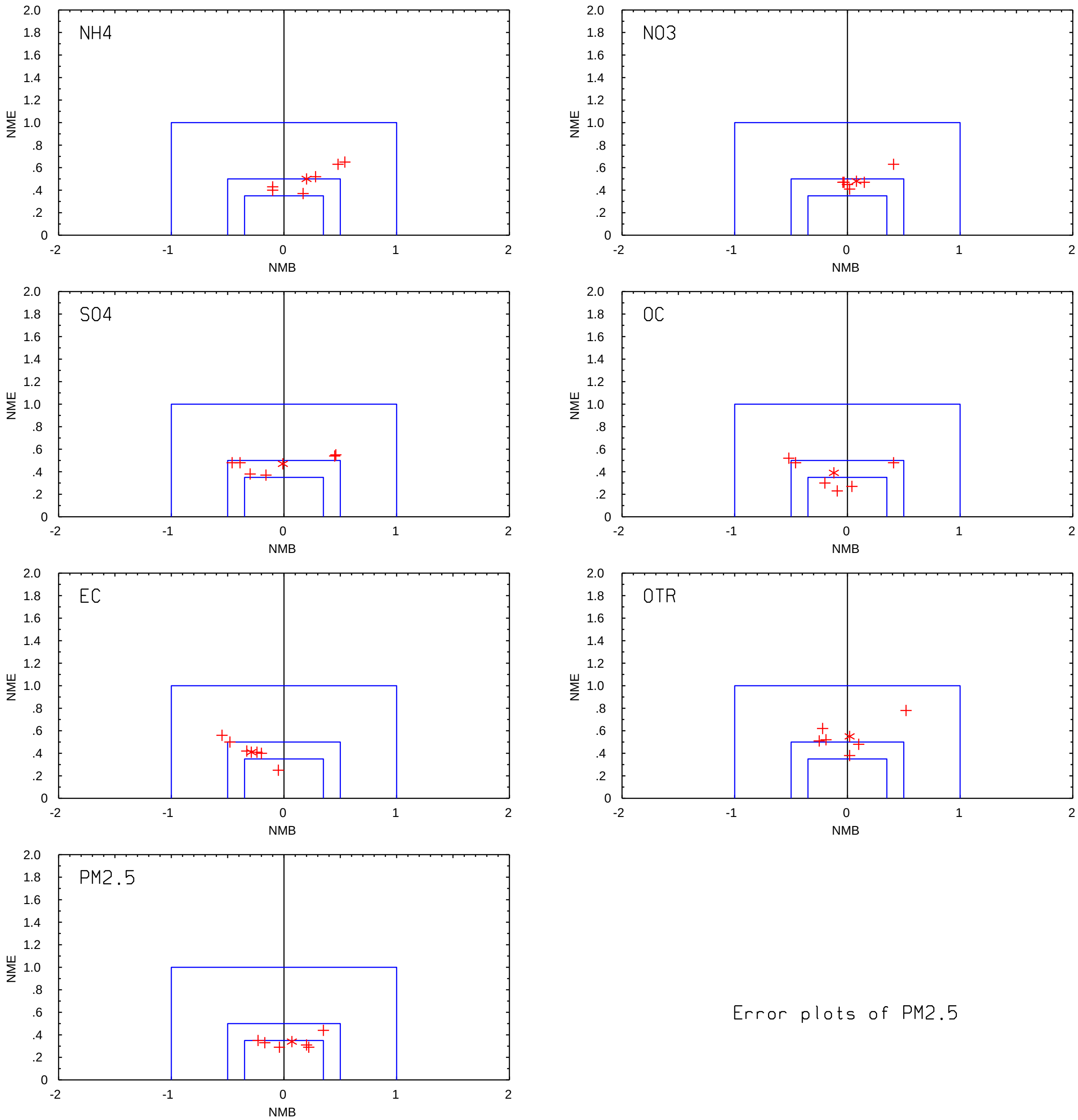

FIGURE V-5-12

2008 Base Year Soccer Plots of Annual Average Errors at the SASS Sampling Sites

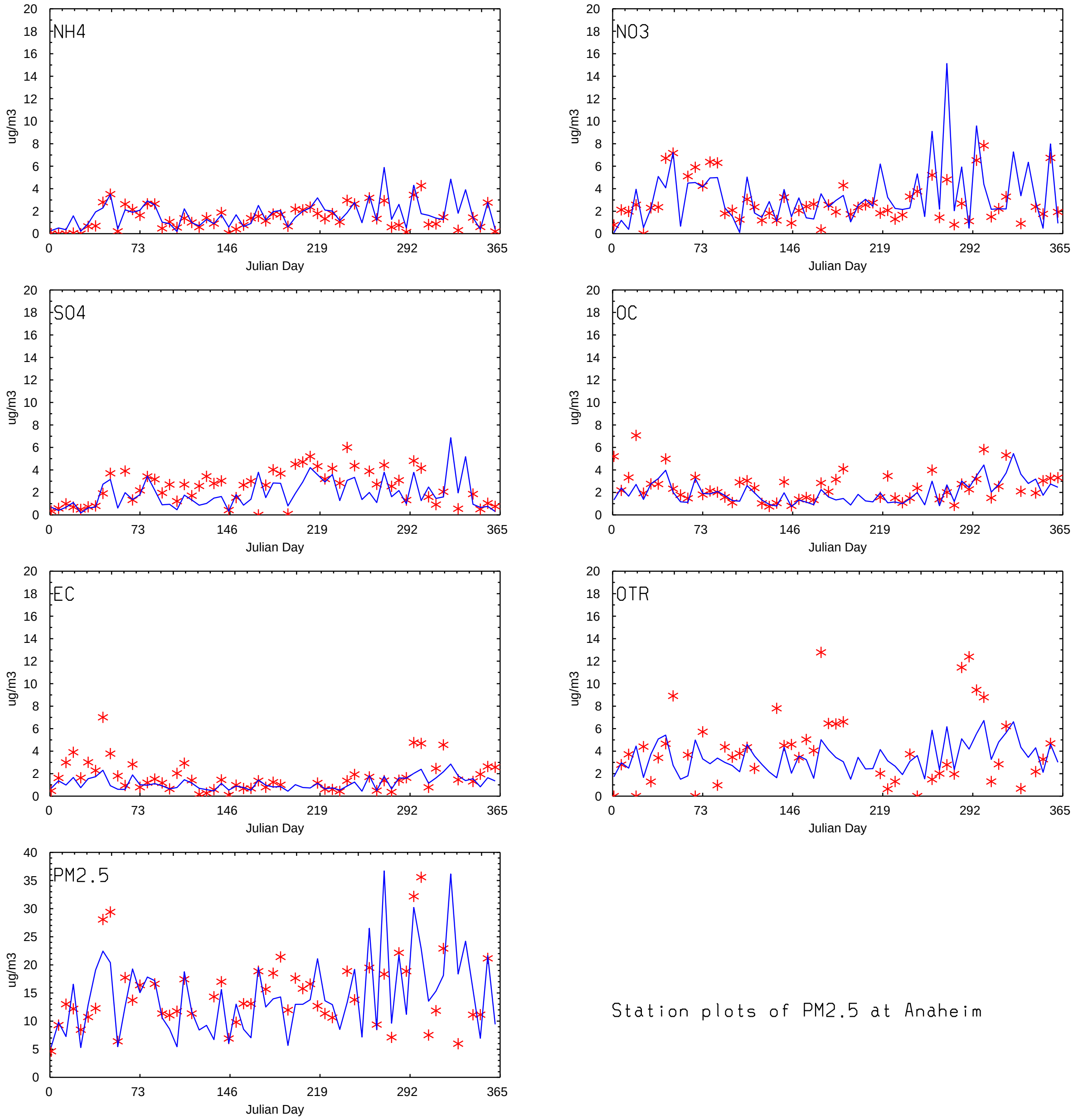

FIGURE V-5-13

2008 Base Year Time Series: Predicted vs. Observed at Anaheim

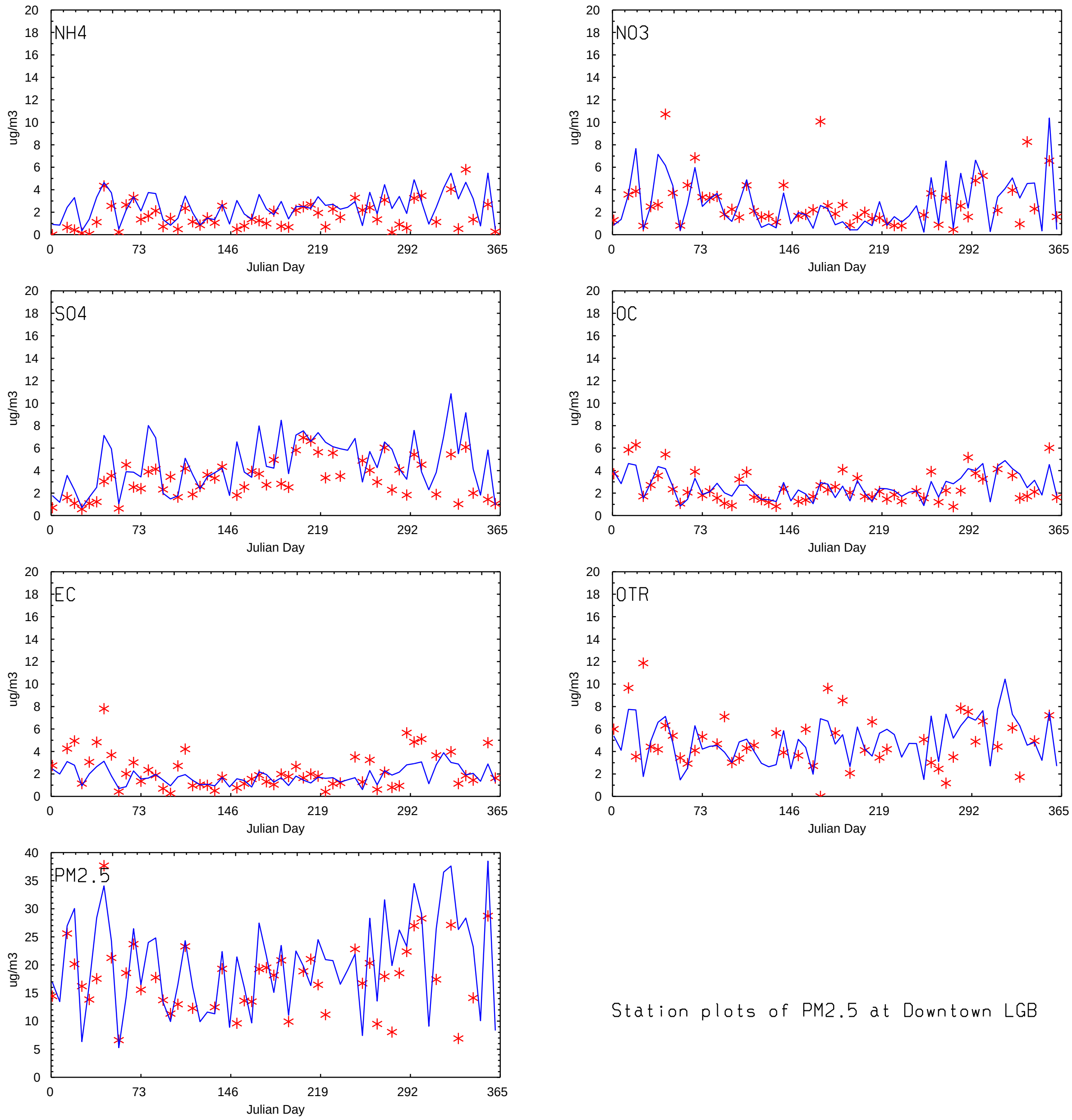

FIGURE V-5-14

2008 Base Year Time Series: Predicted vs. Observed at Downtown Long Beach

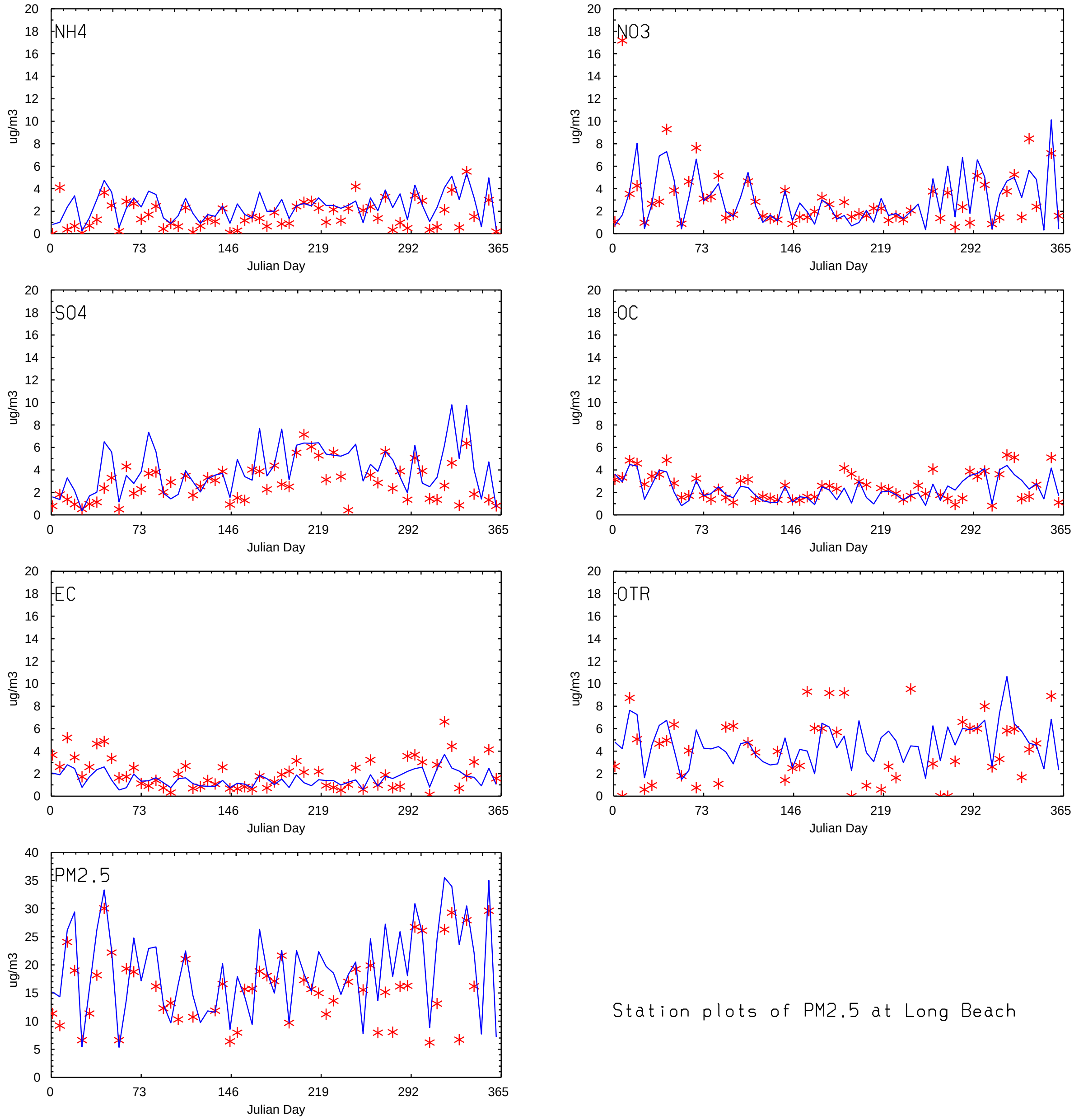

FIGURE V-5-15

2008 Base Year Time Series: Predicted vs. Observed at Long Beach

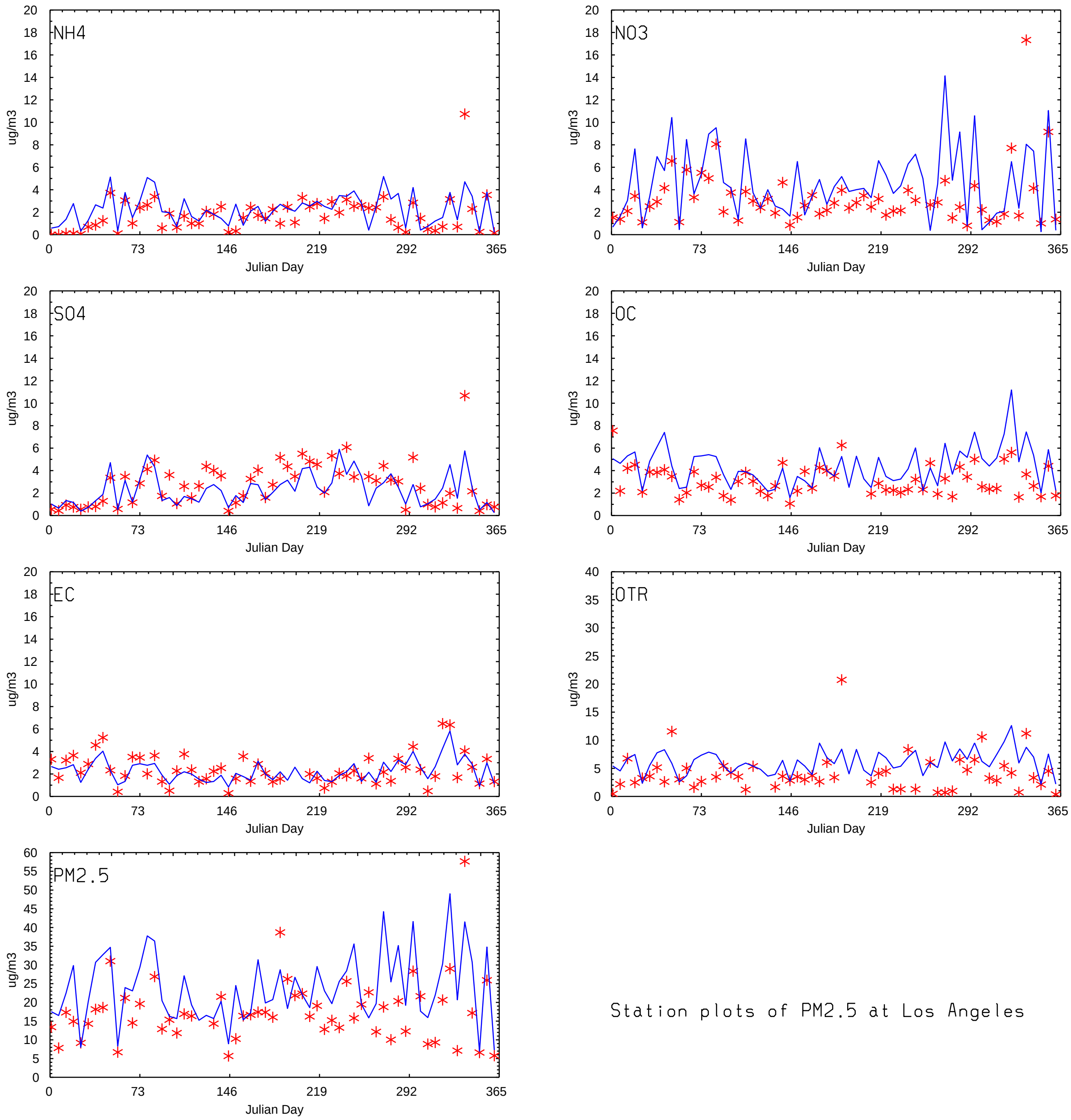

FIGURE V-5-16

2008 Base Year Time Series: Predicted vs. Observed at Los Angeles

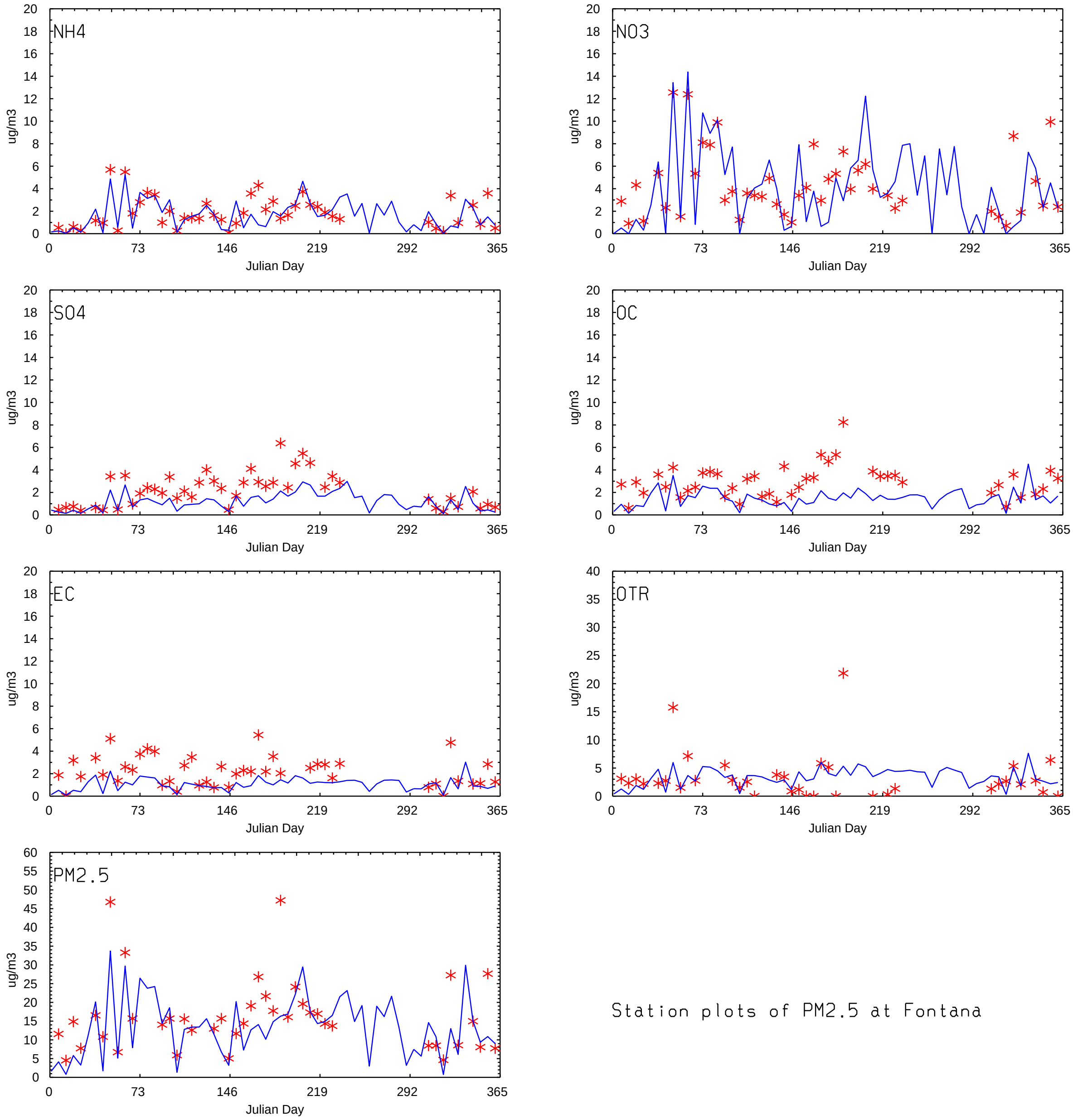

FIGURE V-5-17

2008 Base Year Time Series: Predicted vs. Observed at Fontana

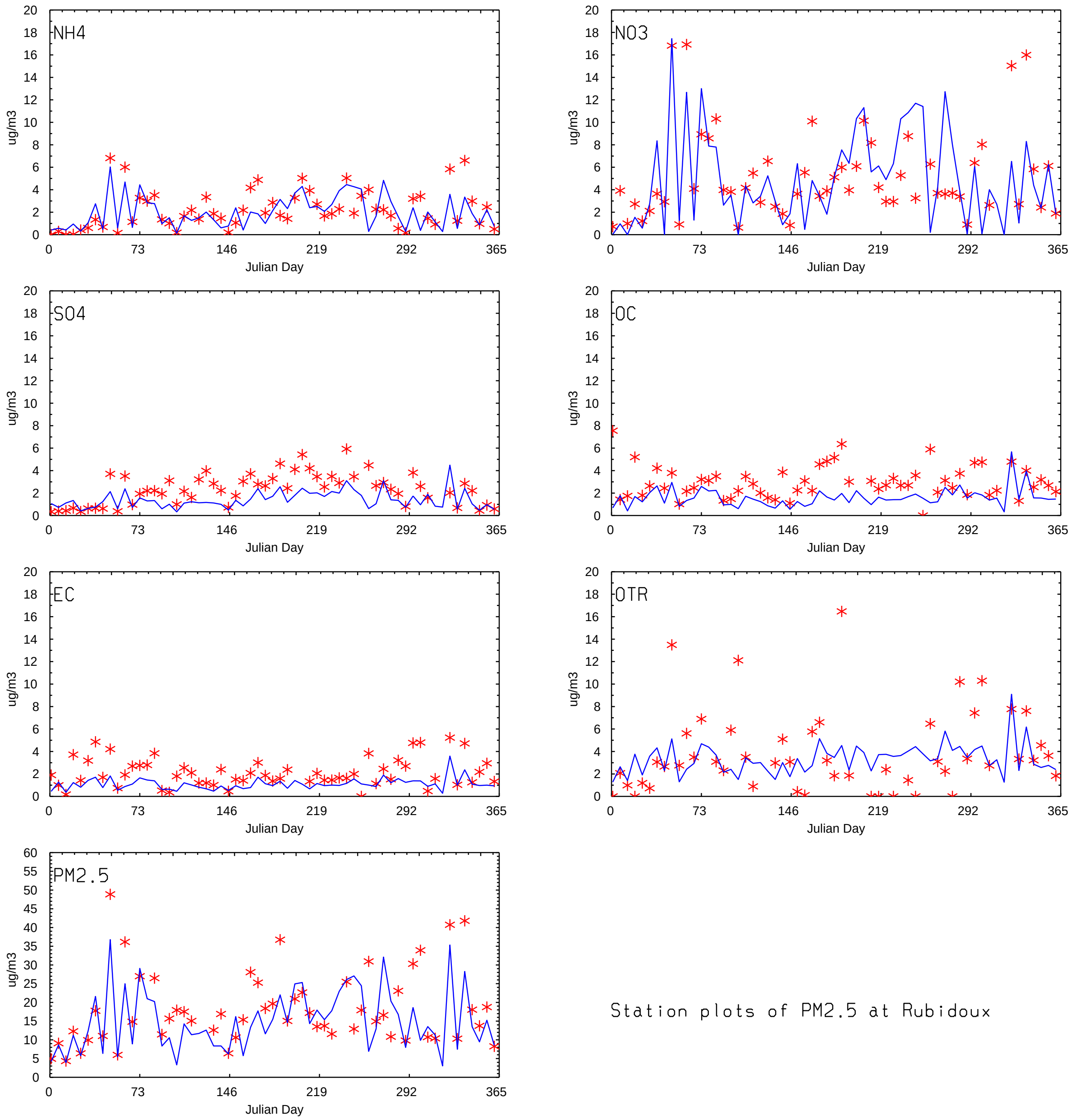

FIGURE V-5-18

2008 Base Year Time Series: Predicted vs. Observed at Rubidoux

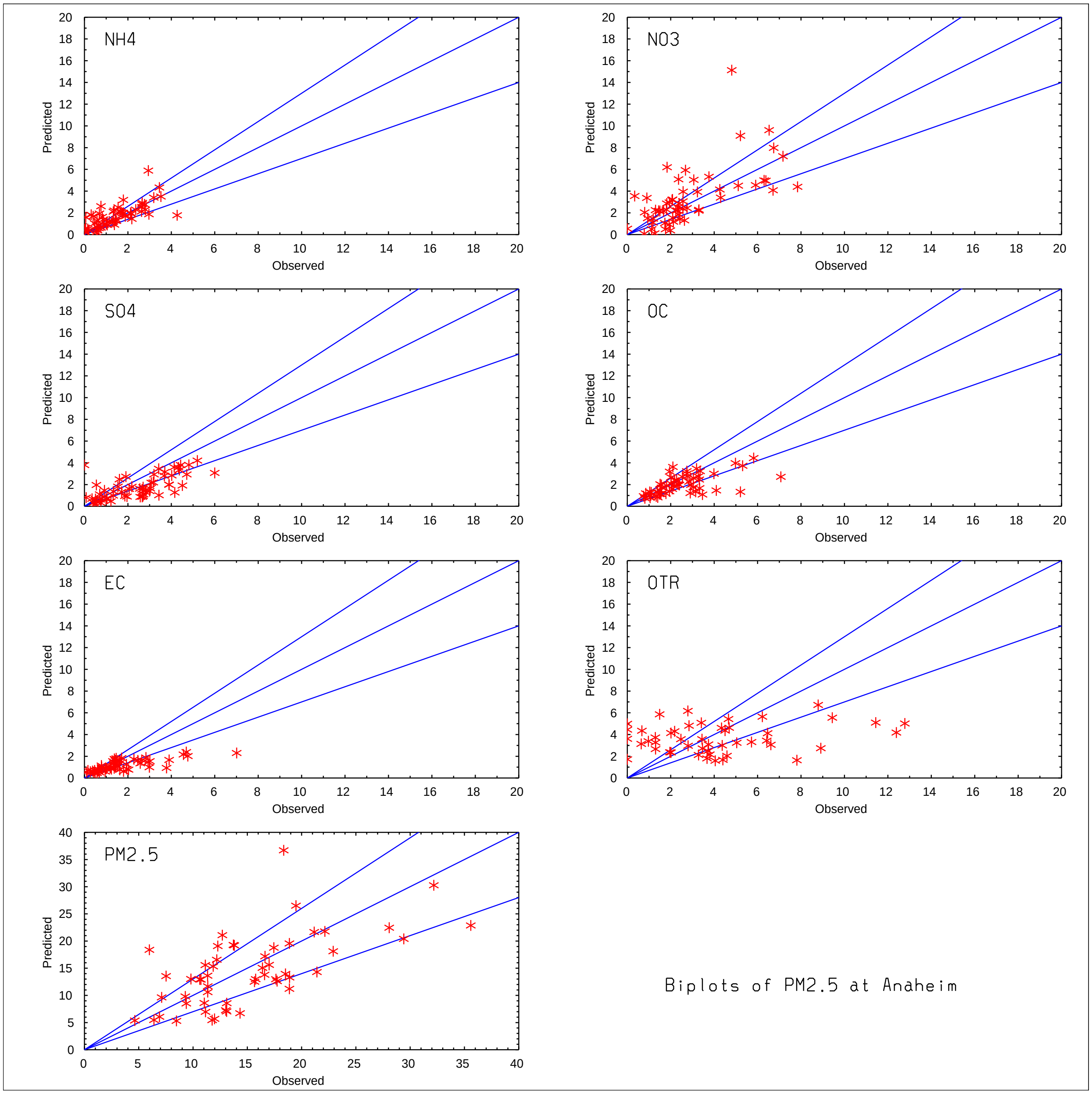

FIGURE V-5-19

2008 Base Year Bivariate Plots: Predicted vs. Observed at Anaheim

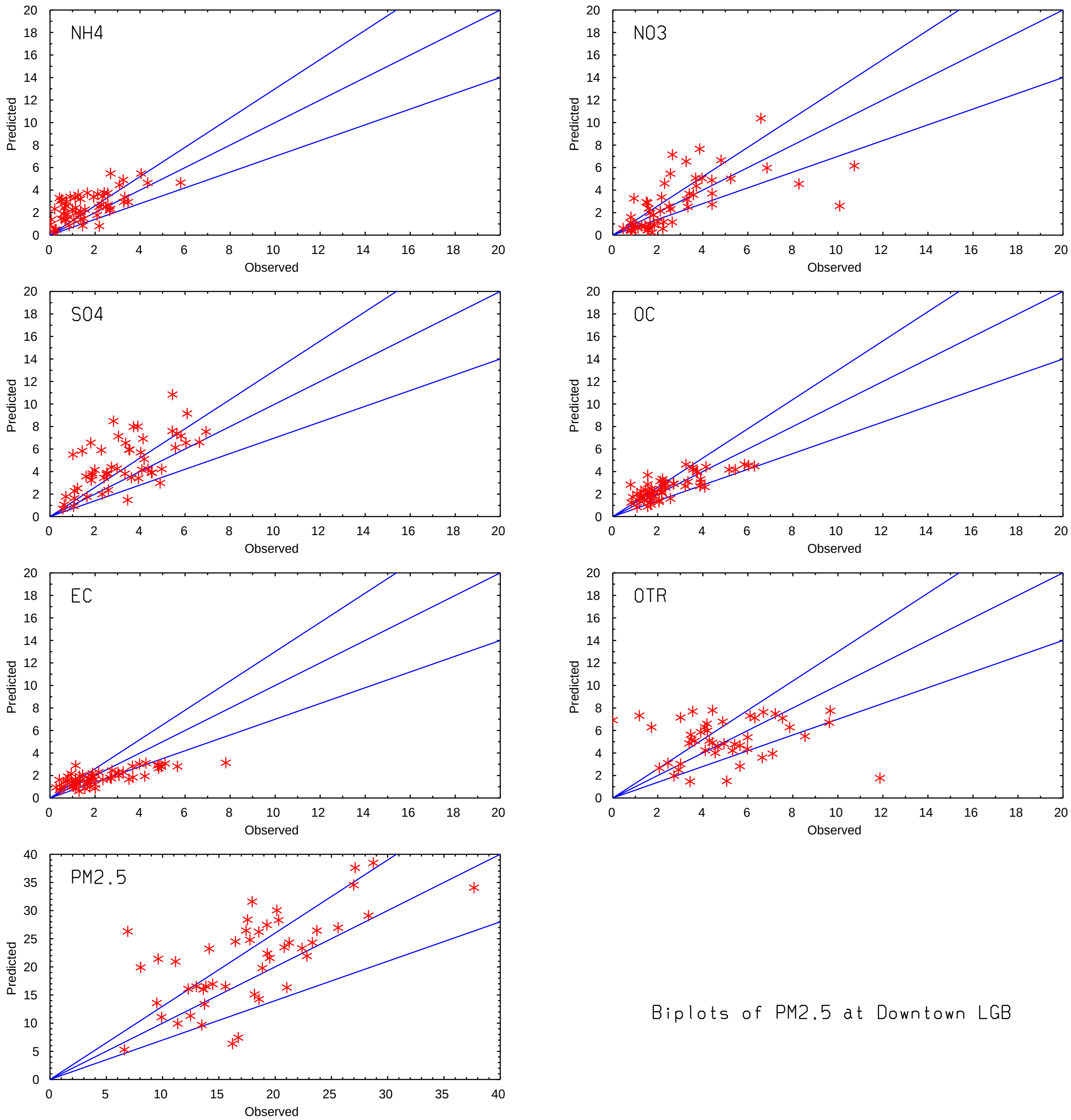

FIGURE V-5-20

2008 Base Year Bivariate Plots: Predicted vs. Observed at Downtown Long Beach

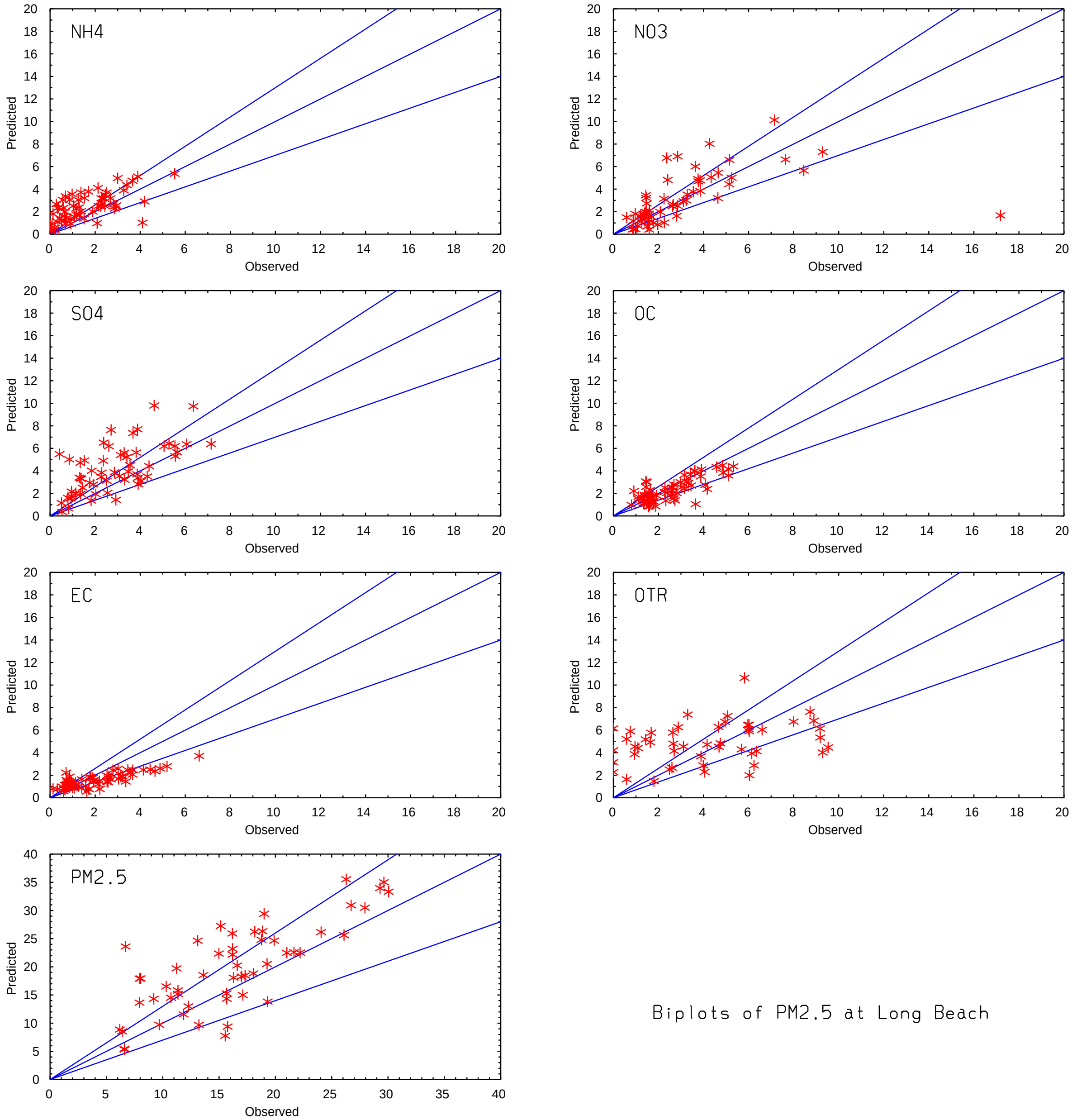

FIGURE V-5-21

2008 Base Year Bivariate Plots: Predicted vs. Observed at Long Beach

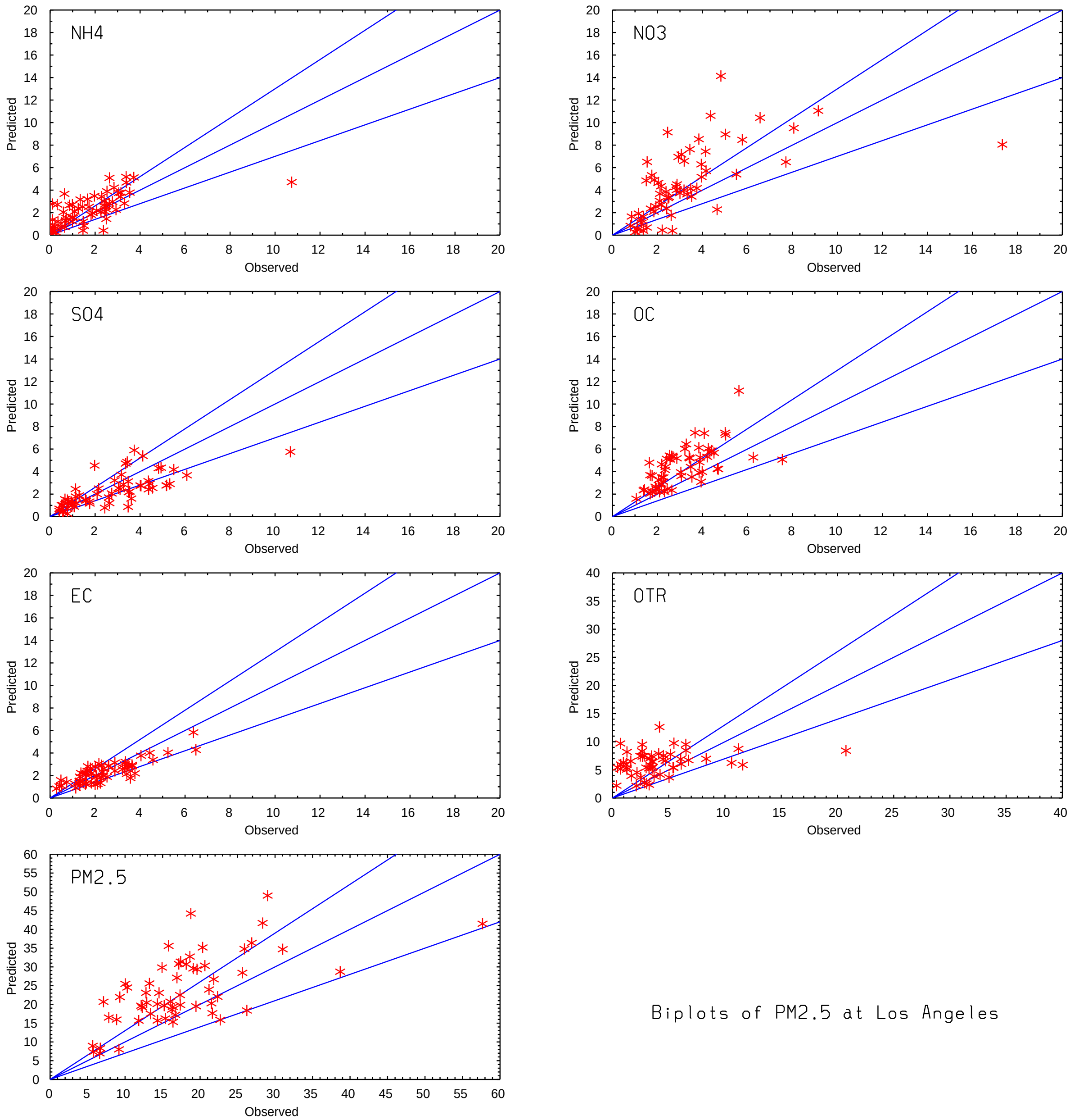

FIGURE V-5-22

2008 Base Year Bivariate Plots: Predicted vs. Observed at Los Angeles

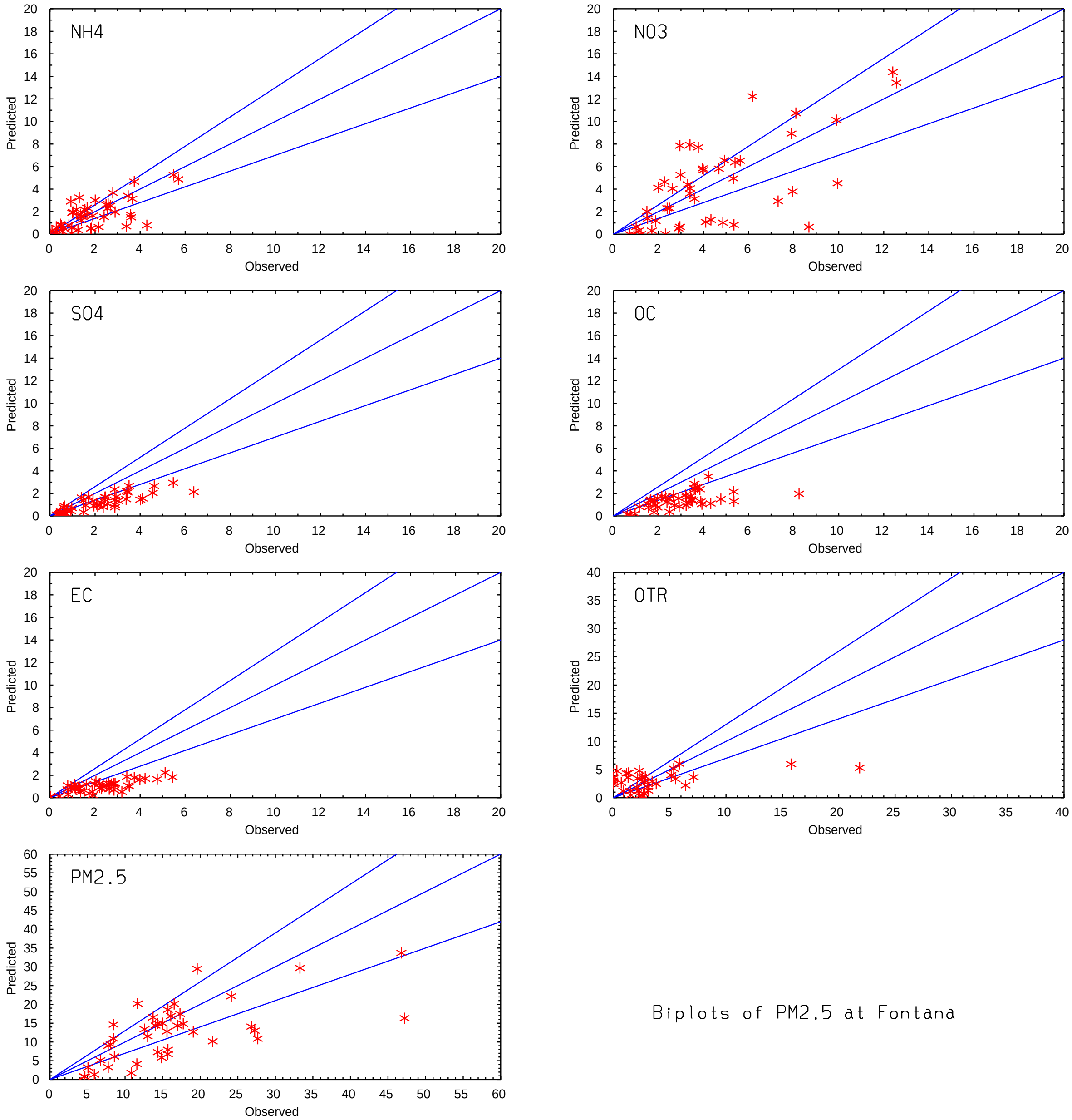

FIGURE V-5-23

2008 Base Year Bivariate Plots: Predicted vs. Observed at Fontana

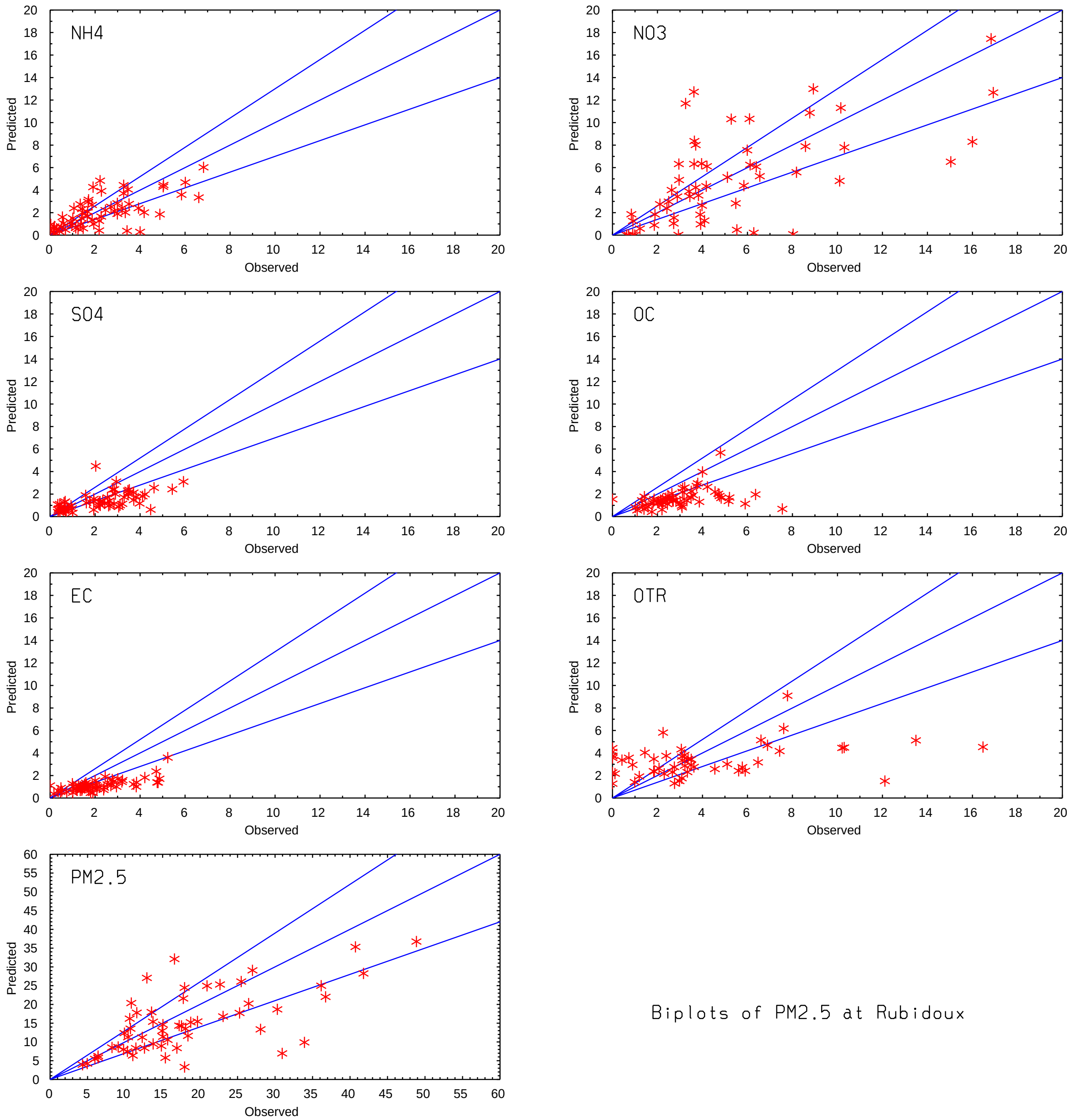

FIGURE V-5-24

2008 Base Year Bivariate Plots: Predicted vs. Observed at Rubidoux

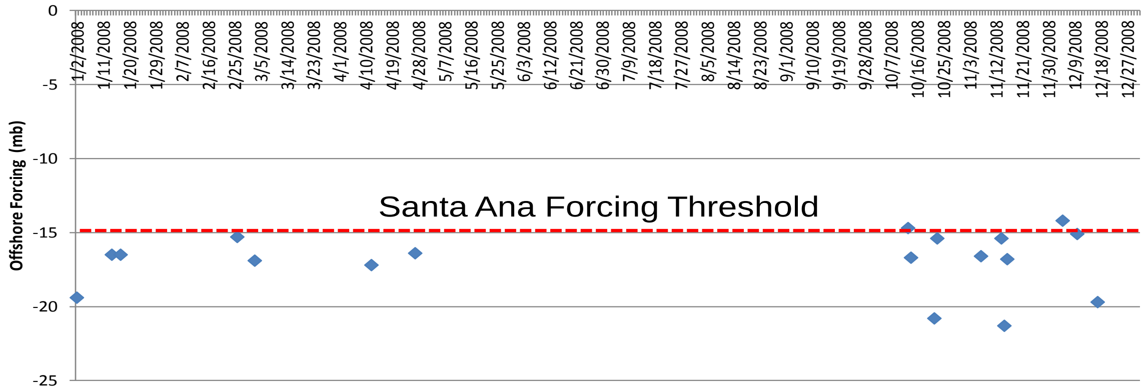

FIGURE V-5-25

2008 Frequency of Strong Santa Ana Wind Events

Annual Average SSI Mass Performance Evaluation

Table V-5-16 summarizes the performance of the CMAQ simulation in predicting annual average PM2.5 vs. FRM observed annual average mass at the monitoring network sites not having parallel SASS sampling. The goal of this analysis is to demonstrate that the model is consistent in the simulation of PM2.5 at the key sites and across the modeling domain. The general tendency of the simulation was to over-predict annual observed FRM PM2.5 in south central portion of metropolitan Los Angeles County and western San Gabriel Valley. Several sites in the east Basin tend to be under predicted, but by less than 30 percent. Burbank, Ontario, and Riverside Magnolia exhibited prediction accuracy within 10 percent of observations. It is important to remember that the attainment demonstration is based on a relative response factor and not direct future year simulated concentrations.

Base-Year Model Performance Stress Test Evaluation

EPA's modeling guidance as well as the Draft Modeling Protocol outline a series of basic stress tests that can be applied to the base case simulation to determine the level of sensitivity of model performance to key parameters defining the simulations. These stress tests include modifying the boundary conditions, and introducing gross changes in the meteorological and emissions profiles. The goal for these analyses is to see if any one factor is unduly biasing model performance and in doing so jeopardizing the validity of the analysis. Table V-5-17 summarizes the suite of performance stress tests applied to the CMAQ (and CAMx) PM2.5 simulations. Chapter 3 provides a summary of selected tests applied to the WRF meteorological model. The outcome of the CMAQ testing indicated that the model responded in an expected manner to the changes in simulation parameters and emissions profiles outlined in the stress tests.

TABLE V-5-16

CMAQ Predicted and FRM Observed 2008 Base-Year Annual Average PM2.5 (μg/m^3)

Location	Predicted	Observed	Prediction Accuracy
Azusa	9.9	14.1	-0.30
Burbank	15.1	14.1	0.07
Compton	18.7	15.5	0.21
Mira Loma	14.1	18.2	-0.23
Mission Viejo	9.6	10.4	-0.08
Ontario	17.3	15.8	0.09
Pasadena	14.8	12.9	0.15
Pico Rivera	16.3	15	0.09
Reseda	10.7	11.9	-0.10
Riverside Magnolia	14.2	13.4	0.06
San Bernardino	13.4	13.5	-0.01

TABLE V-5-17

Selected CMAQ PM2.5 Model Performance Stress Tests

Stress Test Methodology
Boundary conditions only: no anthropogenic emissions with and selected without biogenic emissions
1. Ultra Clean Boundaries
2. EPA Clean Boundaries
3. MOZART Boundaries
Boundary conditions and anthropogenic emissions: no biogenic emissions
Boundary conditions and anthropogenic emissions: 50% biogenic emissions
Shipping emissions split by layers
1. All layer 1
2. Zero layer 1, 100% layer 2
3. 30 % layer 1, 70% layer 2
No emissions in Orange County
No emissions from the Ports of Los Angeles and Long Beach
No livestock emissions
Eliminating all anthropogenic emissions from 49 cells surrounding Mira Loma
No prescribed fires and agricultural burning
Selected restrictions on fireplace/wood stove burning
1. No Riverside and San Bernardino Counties
2. No Basin burning

24-HOUR PM2.5 MODELING APPROACH

CMAQ simulations were conducted for each day in 2008. The simulations included 8784 consecutive hours from which daily 24-hour average PM2.5 concentrations (0000-2300 hours) were calculated. A set of RRFs were generated for each future year simulation. RRFs were generated for the ammonium ion (NH4), nitrate ion (NO3), sulfate ion (SO4), organic carbon (OC), elemental carbon (EC) and a combined grouping of crustal, sea salts and metals (Others). A total of 24 RRFs were generated for each future year simulation. Water vapor was determined using U.S. EPA's regression model approximation of the AIM model based on simulated concentrations of the ammonium, nitrate and sulfate ions (EPA, 2006).

Future year concentrations of the six component species were calculated by applying the model generated quarterly RRFs to the speciated 24-hour PM2.5 (FRM) data sorted by quarter for each of the five years used in the design value calculation. The 32 days in each year were then re-ranked to establish a new 98th percentile concentration. The resulting future year 98th percentile concentrations for the 5-years were subjected to weighted averaging for the attainment demonstration.

Future year PM2.5 24-hour average design values are presented for 2014, and 2019 to (1) demonstrate the future baseline concentrations if no further controls are implemented; (2) identify the amount of air quality improvement needed to advance the attainment date to 2014; and (3) confirm the attainment demonstration with implementation of the proposed PM2.5 control strategy.

FUTURE AIR QUALITY

Under the federal Clean Air Act, the Basin must comply with the federal PM2.5 air quality standards by December 2014 [Section 172(a)(2)(A)]. An extension of up-to five years (until 2019) could be granted if attainment cannot be demonstrated with implementation of all feasible measures to advance attainment.

A simulation of 2014 baseline emissions was conducted to assess the extent of the 24-hour PM2.5 problem in the Basin. The simulation used the projected emissions for 2014 which include all adopted control measures that will be implemented prior to and during 2014. The resulting 2014 future-year Basin design value (37.3 $\mu g/m^3$) failed to meet the federal standard of 35 $\mu g/m^3$. As a consequence additional controls are needed to attain the standard by 2014.

Simulation of the 2019 baseline emissions indicates that the Basin will attain the federal 24-hour PM2.5 standard in 2019 without additional controls. However, with the Final 2012 AQMP proposed PM2.5 control program in place, the 24-hour PM2.5 simulations project that the 2014 design value will be 34.3 $\mu g/m^3$, thus advancing the attainment date from 2019 to 2014.

Figure V-5-26 depicts future 24-hour PM2.5 air quality projections at the Basin design site (Mira Loma) and six other PM2.5 monitoring sites having comprehensive particulate species characterization. Shown in the figure are the baseline designs for 2008 along with projections for 2014 with and without proposed control measures in place. All of the sites with the exception of Mira Loma will meet the 24-hour PM2.5 standard by 2014 without additional control measures. With implementation of the proposed control measures, all sites in the Basin demonstrate attainment in 2014.

Table V-5-18 provides the RRFs developed from the 2008 base year and 2014 controlled simulations. Tables V-5-19 and V-5-20 provide the CMAQ/SMAT projected future year PM2.5 by component species for 2014 with (controlled) and without (base-line) proposed control measures implemented. Tables V-5-21, V-5-22 and V-5-23 provide the projected controlled future year 24-hour PM2.5 design values by component species for 2019, 2023 and 2030 Projected 24-hour PM2.5 (2019 and beyond) indicates that the Basin will remain in attainment with the standard, with the addition of the short term ozone measures but without the need for continued episodic controls being implemented.

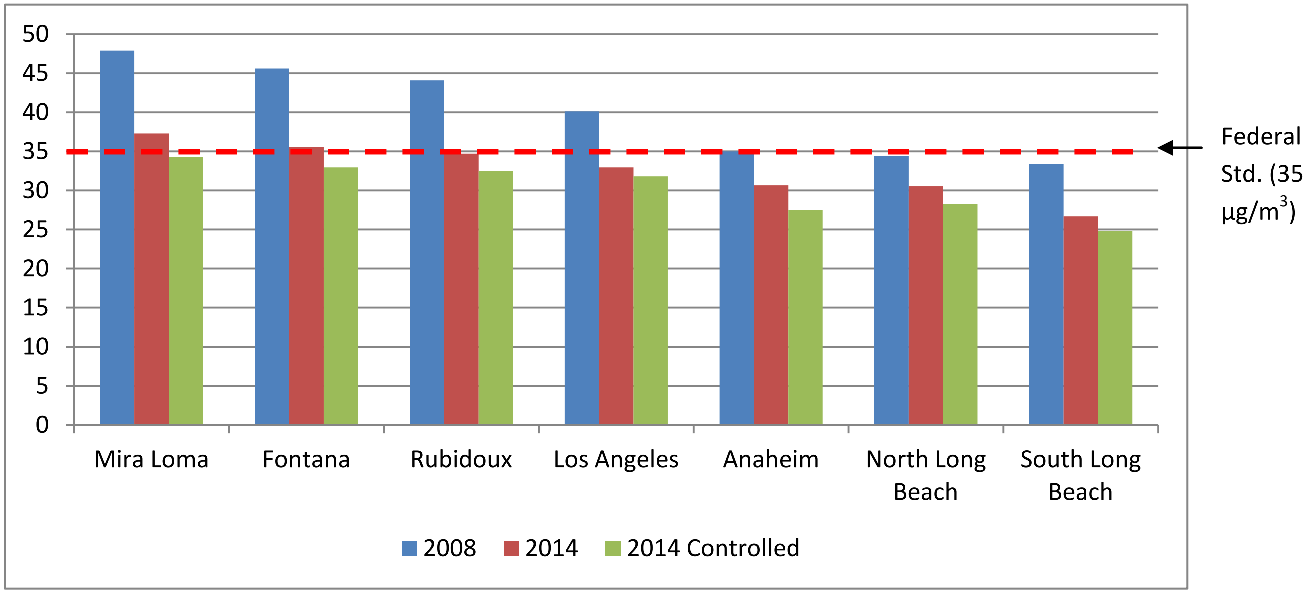

FIGURE V-5-26

Maximum 24-Hour Average PM2.5 Design Concentrations:
2008 Baseline, 2014 and 2014 Controlled

TABLE V-5-18

2014 Controlled Emissions RRFs

Station	Quarter	NH4	NO3	SO4	OC	EC	Others
Anaheim	Q1	0.81	0.95	0.48	0.65	0.52	0.87
	Q2	0.58	0.68	0.40	0.83	0.62	0.91
	Q3	0.67	0.76	0.42	0.84	0.62	0.91
	Q4	0.77	0.99	0.44	0.63	0.52	0.87
Los Angeles	Q1	0.87	0.99	0.58	0.75	0.56	0.93
	Q2	0.69	0.80	0.50	0.87	0.62	0.98
	Q3	0.71	0.83	0.49	0.88	0.62	0.98
	Q4	0.84	0.98	0.59	0.75	0.56	0.94
Fontana	Q1	0.82	0.87	0.55	0.65	0.56	0.92
	Q2	0.68	0.72	0.51	0.84	0.64	1.00
	Q3	0.63	0.68	0.46	0.84	0.64	0.97
	Q4	0.76	0.82	0.53	0.60	0.53	0.92
N. Long Beach	Q1	0.87	1.03	0.67	0.68	0.56	0.90
	Q2	0.69	0.80	0.62	0.80	0.64	0.91
	Q3	0.71	0.87	0.58	0.79	0.65	0.89
	Q4	0.81	0.97	0.66	0.65	0.55	0.90
Rubidoux	Q1	0.78	0.83	0.54	0.67	0.54	0.94
	Q2	0.62	0.65	0.49	0.86	0.61	1.03
	Q3	0.61	0.64	0.50	0.87	0.62	1.01
	Q4	0.79	0.84	0.59	0.63	0.52	0.93
S. Long Beach	Q1	0.83	1.02	0.59	0.68	0.53	0.88
	Q2	0.57	0.79	0.46	0.76	0.62	0.84
	Q3	0.70	0.89	0.55	0.78	0.63	0.89
	Q4	0.79	0.95	0.62	0.66	0.54	0.89

TABLE V-5-19

CMAQ 2014 24-hour PM2.5 Base-line Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	3.4	8.9	2.5	6.9	3.5	3.3	1.7	0.5	30.7
S. Long Beach	3.1	6.9	2.7	6.5	3.4	2.1	1.5	0.5	26.7
Fontana	4.7	12.0	2.0	7.3	3.7	3.2	2.2	0.5	35.6
N. Long Beach	3.6	8.5	3.2	7.4	3.4	2.1	1.9	0.5	30.5
Los Angeles	3.5	7.4	3.7	10.0	2.5	3.7	1.6	0.5	33.0
Mira Loma	5.3	14.5	2.0	6.4	2.9	3.0	2.7	0.5	37.3
Rubidoux	4.9	13.1	2.2	6.0	2.6	2.9	2.5	0.5	34.7

TABLE V-5-20

CMAQ 2014 24-hour PM2.5 Controlled Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	2. 9	7.5	2.2	6.6	2.8	3.5	1. 5	0.5	27.5
S. Long Beach	3.0	6.9	2.5	5.6	3.1	2.0	1.4	0.5	24.8
Fontana	4.7	11.8	1.9	5.3	3.3	3.5	2.1	0.5	32.9
N. Long Beach	3.8	8.2	3.4	5.8	2.8	2.1	1.7	0.5	28.3
Los Angeles	4.6	10.5	3.3	5.6	2.7	2.6	2.0	0.5	31.8
Mira Loma	4.9	12.8	2.0	5.6	2.9	3.2	2.3	0.5	34.3
Rubidoux	4.7	13.0	2.0	4.7	2.5	2.8	2.4	0.5	32.5

TABLE V-5-21

CMAQ 2019 24-hour PM2.5 Controlled Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	3.5	8.9	2.6	6.7	3.1	3.3	1.7	0.5	30.2
S. Long Beach	3.0	6.8	2.6	6.4	3.1	2.1	1.5	0.5	25.9
Fontana	4.4	11.1	2.0	7.0	3.4	3.5	2.1	0.5	33.9
N. Long Beach	3.9	8.6	3.4	7.0	2.9	2.2	1.8	0.5	30.3
Los Angeles	3.9	9.0	3.6	7.5	2.3	3.2	1.9	0.5	31.9
Mira Loma	4.7	12.4	2.1	6.8	3.2	3.6	2.1	0.5	35.4
Rubidoux	4.3	10.6	2.5	6.3	2.8	3.7	2.0	0.5	32.5

TABLE V-5-22

CMAQ 2023 24-hour PM2.5 Controlled Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	3.0	7.6	2.5	7.8	2.8	3.9	1.5	0.5	29.7
S. Long Beach	3.0	6.7	2.6	6.3	2.9	2.2	1.4	0.5	25.5
Fontana	3.9	9.5	2.2	7.6	3.2	3.2	1.8	0.5	32.0
N. Long Beach	3.9	8.6	3.4	6.9	2.7	2.3	1.7	0.5	30.0
Los Angeles	3.8	8.4	3.8	7.4	2.2	3.3	1.9	0.5	31.3
Mira Loma	4.2	10.6	2.3	6.9	3.1	3.9	2.2	0.5	33.7
Rubidoux	4.0	10.2	2.6	5.8	2.4	3.3	2.0	0.5	30.6

TABLE V-5-23

CMAQ 2030 24-hour PM2.5 Controlled Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	3.3	7.9	3.1	6.8	2.9	3.6	1.6	0.5	29.7
S. Long Beach	3.1	6.2	3.1	6.5	3.0	2.4	1.4	0.5	26.2
Fontana	3.7	8.8	2.5	7.9	3.2	3.4	1.4	0.5	31.7
N. Long Beach	3.9	8.4	3.6	7.0	2.7	2.4	1.8	0.5	30.3
Los Angeles	3.1	5.9	4.3	10.0	1.9	3.8	1.5	0.5	31.0
Mira Loma	4.0	9.8	2.6	7.2	3.1	4.2	1.9	0.5	33.4
Rubidoux	3.7	8.8	3.1	6.3	2.3	3.8	1.8	0.5	30.3

Spatial Projections of PM2.5 Design Values

Figure V-5-27 provides a Basin-wide perspective of the spatial extent of 24-hour PM2.5 levels in the base year 2008. Figures V-5-28 and V-5-29 show future predicted 24-hour design values in 2014 for base-line emissions and with the proposed control program in place. Several areas around the northwestern portion of Riverside and southwestern portion of San Bernardino Counties depict grid cells with weighted PM2.5 24-hour design values exceeding 35 µg/m^3 in 2008. By 2014, the number of grid cells with concentrations exceeding the federal standard is restricted to a small region surrounding the Mira Loma monitoring station in northwestern Riverside County. With the control program fully implemented in 2014, the Basin does not exhibit any grid cells exceeding the federal standard.

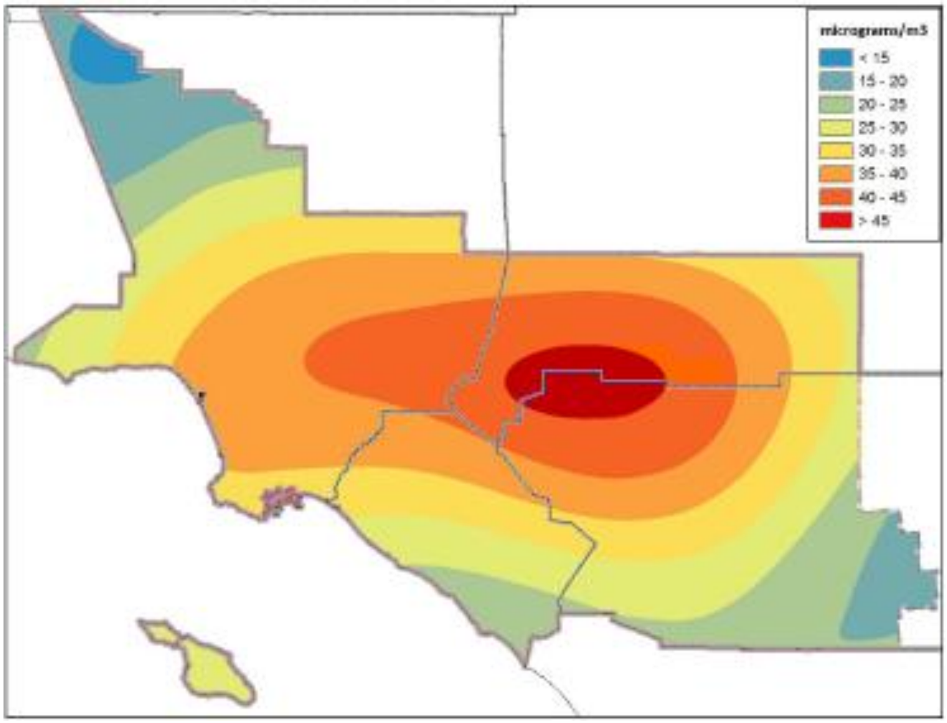

FIGURE V-5-27

2008 Base Year 24-Hour PM2.5 Design Concentrations (μg/m^3)

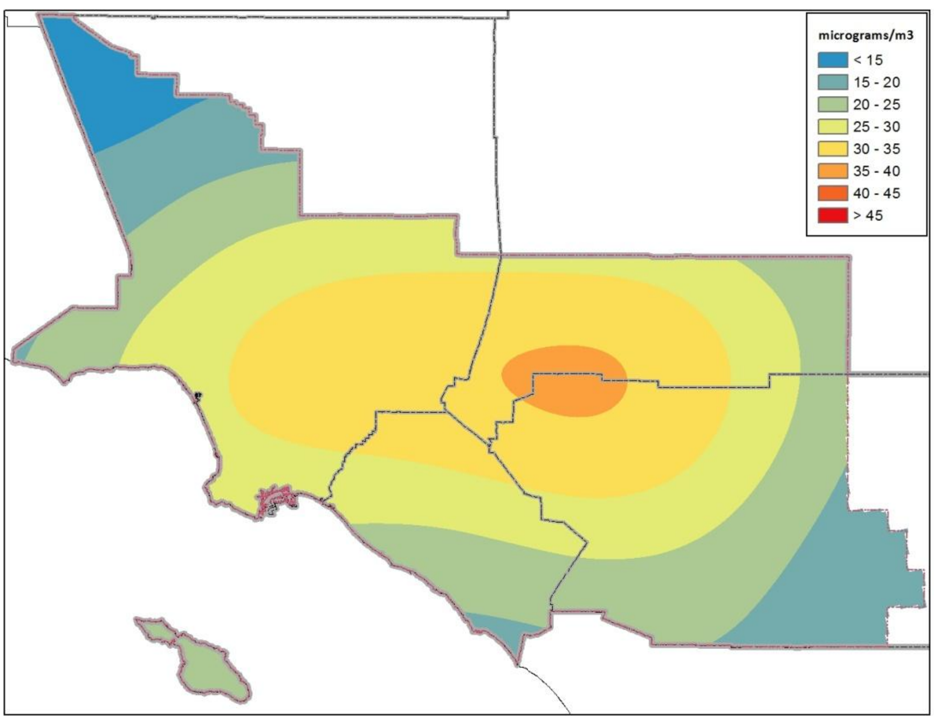

FIGURE V-5-28

2014 Baseline 24-Hour PM2.5 Design Concentrations (μg/m^3)

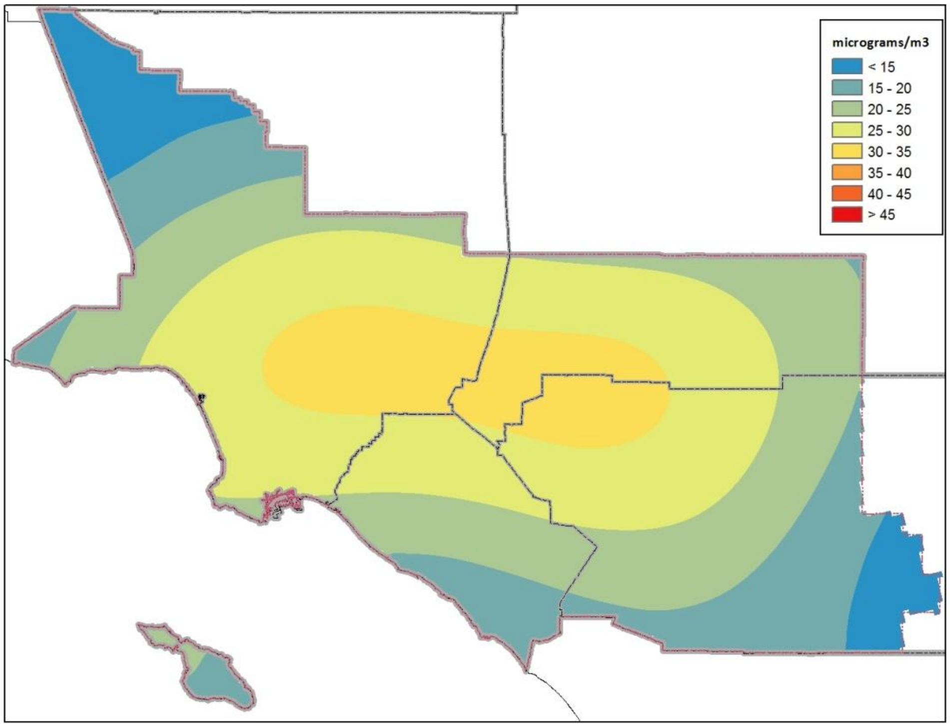

FIGURE V-5-29

2014 Controlled 24-Hour PM2.5 Design Concentrations (µg/m^3)

Unmonitored Area Analysis

U.S. EPA modeling guidance requires that the attainment demonstration include an analysis that confirms that all grid cells in the modeling domain meet the federal standard. This "unmonitored area analysis" is essential since speciation monitoring is conducted at a limited number of sites in the modeling domain. Variance in the species profiles at selected locations coupled with the differing responses to emissions control scenarios are expected to result in spatially variable impacts to PM2.5 air quality in any grid cell. As described earlier in this chapter, speciation profiles from SASS sites in adjacent or collocated grid cells are used in the formal attainment demonstration for Mira Loma and also South Long Beach. With interpolation of the SASS speciation profiles, attainment demonstrations can be directly conducted for the remaining grid cells where FRM mass data has been collected over the 5-year period (2006-2010). To date, no specific test has been proposed by U.S. EPA to address testing attainment at grid cells where no speciated and/or FRM data is available. The form of the revised attainment test adds complication in that it requires assessing the impacts for 32 days per year, for five years, at each unmonitored grid cell.

The methodology used to assess the unmonitored grid cell impact follows. First, a subset of the full modeling domain covering the Basin was selected for the analysis. The western most grid column (70) was aligned with coastal Los Angeles. The eastern most column (100) touched Banning Pass, the southern boundary was located in row 45 in Northern San Diego, and the northern most row (65) corresponding to the northern portion of the San Fernando Valley extending across the San Gabriel and San Bernardino Mts. A review of the 24-hour PM2.5 FRM data and design values from sites located outside of this inner domain indicated that concentrations were significantly lower than in those observed in the primary non-attainment portion of the Basin.

The next task included spatial interpolation (1/r) of the six SASS speciation splits to define the split profiles for each grid cell. The split percentages were then multiplied by the simulation derived RRFs, for each of the four seasons. FRM data, based on every third day sampling from 21 Basin monitoring sites were extracted from the U.S. EPA's AQS database for each year of the 5-year period. The highest 8 concentrations sampled in each quarter were selected to generate a data set that included 160 days. The data for each day were then interpolated throughout the inner-domain using a inverse distance weighted scheme (1/r) to develop a matrix of grid specific 24-hour PM2.5 concentrations for all 160 days. Note that extraction of data on a frequency of every third day was selected so that there was consistency in the numbers of FRM data samples used in the analysis. In general, the number of valid yearly samples using the third day extraction was between 100-150 days, and thus allowed the analysis to focus on the projected 3rd highest value (of the 32 days evaluated) in each year as the 98th percentile value.

The interpolated FRM data were then multiplied by the seasonally sorted, RRF-interpolated species fractions to project the future year 24-hr PM2.5 distribution for each of the five years. The attainment calculation then tested the weighted 5-year average 98th percentile concentration at each grid. Table V-5-24 provides a summary of the unmonitored area analysis. Listed are the top 15 projected grid cell center concentrations for the 2014 controlled scenario and the respective 2008 interpolated center grid concentration. The second set of columns provides the list of grid cells with the maximum projected 2014 controlled 24-hour PM2.5 design value modeled as if every grid in the Basin had Mira Loma's species profile. This calculation was conducted to test the distance weighted interpolation hypothesis and the impacts of varying species profiles and RRFs.

The interpolated 2008 grid center design values and 2014 projected determined from the unmonitored area analysis lined up closely with the station design values. The 2014 controlled maximum projected 24-hour PM2.5 design of 31.2 $\mu g/m^3$ occurred at the center of the Mira Loma grid cell (89,58). Since no cell in the modeling domain was projected to have a 2014 controlled design value above that of cell (89,58), the Basin passes the unmonitored area portion of the 24-hour PM2.5 attainment demonstration.

This analysis demonstrates that the relative response to the control program is more effective in the Eastern Basin while portions of the western Basin do not exhibit the equivalent response to the implementation of the proposed control strategy.

TABLE V-5-24

Unmonitored Area Analysis

Grid I	Grid J	Interpolated 2008 Design	Projected 2014 Controlled Design
89	58	44.3	31.2
95	61	40.8	30.4
90	61	42.3	29.8
91	58	41.1	29.6
89	59	40.9	29.3
90	58	40.3	29.3
94	61	39.4	29.3
92	58	40.3	29.2
92	57	40.0	29.2
87	59	41.2	29.1
88	58	40.4	29.1
91	57	39.9	29.1
89	61	41.3	29.0
90	59	40.0	29.0
91	59	39.7	29.0

CEQA ALTERNATIVE SIMULATIONS

Table V-5-25 presents the projected 24-hour PM2.5 design values for the 2014 baseline, 2014 controlled and three CEQA Alternative emissions scenarios. For a description of the alternative scenarios, please see the 2012 AQMP Program Environmental Impact Report (PEIR). All of the CEQA alternative simulations demonstrate attainment of the 24-hour PM2.5 federal standard.

TABLE V-5-25

CEQA Alternative Simulated 24-Hour PM2.5 Design Values

	2014	2014 Controlled	Alt-1: 2019	Alt-2: 2017	Alt-3: 2017
Mira Loma	37.3	34.3	33.6	34.5	35.0
Rubidoux	34.7	32.5	31.1	31.6	31.6
Fontana	35.6	32.9	33.1	33.7	32.4
Central LA	33.0	31.8	31.7	32.0	31.7
Anaheim	30.7	27.5	30.0	29.9	29.7
North Long Beach	30.5	28.3	30.2	30.1	30.0
South Long Beach	26.7	24.8	25.8	25.8	25.9

WEIGHT OF EVIDENCE

The weight of evidence discussion focuses on the historical trends of 24-hour PM2.5 concentrations and key precursor emissions to provide justification and confidence that the Basin will meet the federal standard by 2014.

Figure V-5-30 depicts the long term trend of observed Basin 24-hour average PM2.5 design values with the CMAQ projected design value for 2014. Also superimposed on the graph is the linear best fit trend line for the observed 24-hour average PM2.5 design values. The observed trend depicts a steady 49 percent decrease in observed design value concentrations between 2001 and 2011. The rate of improvement is just under 4 $\mu g/m^3$ per year. If the trend is extended beyond 2011, the projection suggests attainment of the PM2.5 24-hour standard in 2013, one year earlier than determined by the attainment demonstration. While the straight-line future year approximation may be optimistic, it offers insight to effectiveness of the ongoing control program and is consistent with the attainment demonstration.

Figures V-5-31 depicts the long term trend of Basin NOx emissions for the same period. Figure V-5-32 provides the corresponding emissions trend for directly emitted PM2.5. Base year NOx inventories for 2002 (from the 2007 AQMP) and 2008 experienced a 31 percent reduction while directly emitted PM2.5 experienced a 19 percent reduction over the 6-year period. The Basin 24-hour average PM2.5 design value experienced a concurrent 27 percent reduction between 2002 and 2008. The projected trend of NOx emissions indicates that this PM2.5 precursor associated with the formation of nitrate will continue to be reduced though 2019 by an additional 48 percent. Similarly, the projected trend of directly emitted PM2.5 shows a more moderate reduction of 13 percent through 2019. However, as discussed in the 2007 AQMP and in a later section of this chapter, directly emitted PM2.5 is a more effective contributor to ambient PM2.5 than NOx on a per ton emitted basis. While the projected NOx and direct PM2.5 emissions trends decrease at a reduced rate between 2012 and 2019, it is clearly evident that the overall significant reductions will continue to result in lower nitrate and direct particulate contributions to 24-hour PM2.5 design values.

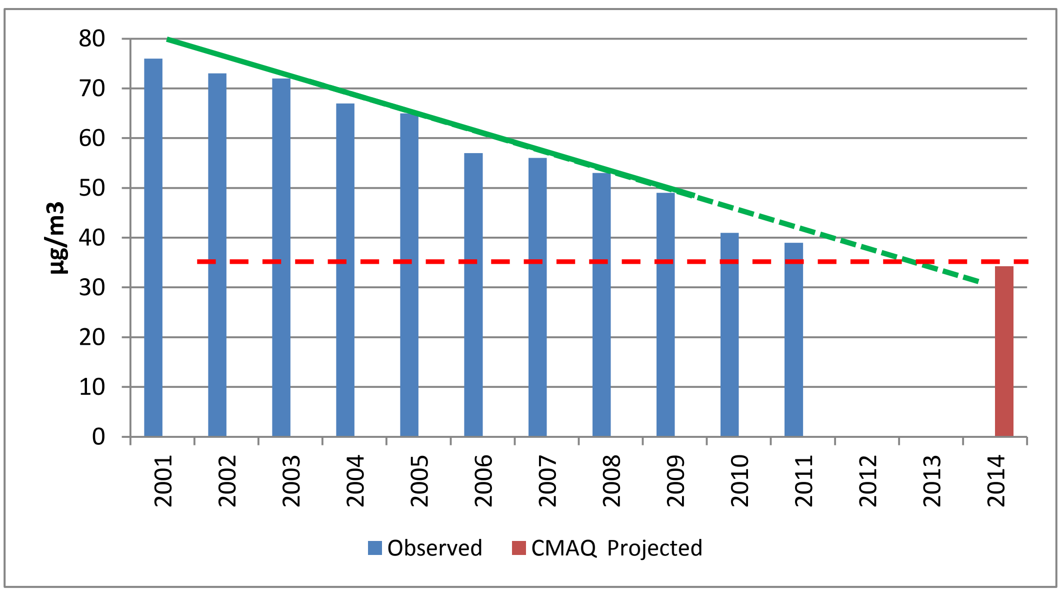

FIGURE V-5-30

Basin Observed and CMAQ Projected
Future Year PM2.5 Design Concentrations (µg/m^3)

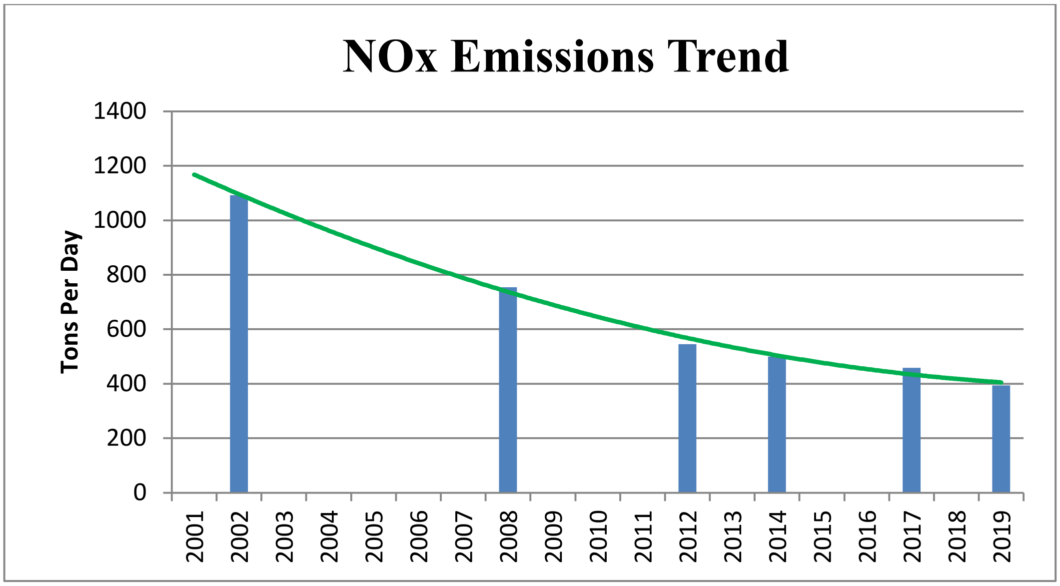

FIGURE V-5-31

Trend of Basin NOx Emissions

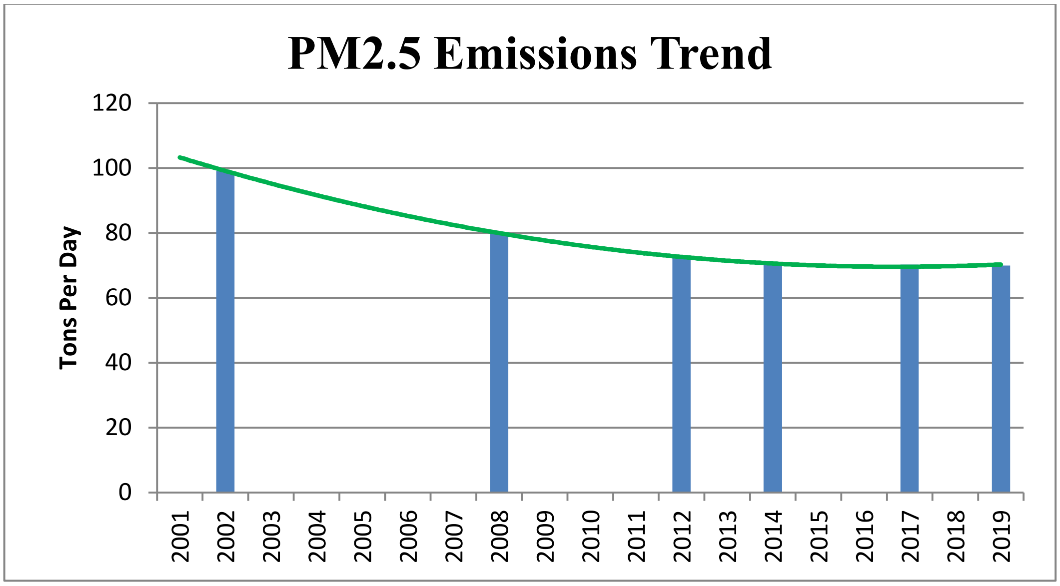

FIGURE V-5-32

Trend of Basin PM2.5 Emissions

SUMMARY AND CONTROL STRATEGY CHOICES

PM2.5 has five major emission types that contribute to the mass of the ambient aerosol including ammonia, NOx, SOx, VOC, and directly emitted PM2.5. Various combinations of reductions in these pollutants could all provide a path to clean air. The 24-hour PM2.5 attainment strategy presented in this Final 2012 AQMP relies on a dual approach to first demonstrate attainment of the federal standard by 2019 and then focuses on controls that will be most effective in reducing PM2.5 to accelerate attainment to the earliest date possible. The 2007 AQMP control measures that have been implemented will result in substantial reductions of SOx, direct PM2.5, VOC and NOx emissions. Newly proposed short-term measures, discussed in Chapter 4 and Appendix IV of the Final 2012 AQMP will provide additional regional emissions reductions targeting directly emitted PM2.5 and NOx.

It is useful to assess the relative value of per ton precursor emission reductions considering the resulting ambient microgram per cubic meter improvements in PM2.5 air quality. As presented in the weight of evidence discussion, trends of PM2.5 and NOx emissions suggest a direct response between lower emissions and improving air quality. The Final 2007 AQMP established a set of factors relating regional per ton precursor emissions reductions and the resulting ambient annual average PM2.5 improvements. The Final 2012 AQMP CMAQ simulations provided a similar set of factors, but this time based on improvements to 24-hour PM2.5 levels. The analysis determined that VOC emissions reductions have the lowest return in terms of micrograms per cubic meter PM2.5 reduced per ton of emissions reductions, about one third of that of NOx reductions. SOx emissions reductions were about 8 times more effective than NOx reductions. However, directly emitted PM2.5 emissions reductions were approximately 15 times more effective then NOx reductions. It is important to note that the contribution of ammonia emissions is embedded as a component of the SOx and NOx factors since ammonium nitrate and ammonium sulfate are the resultant particulate species formed in the atmosphere. Table V-5-26 summarizes the relative importance of precursor emissions reductions to the resulting 24-hour PM2.5 air quality improvements. (A comprehensive discussion of the emission reduction factors is presented in Attachment 8 of this document).

Emissions reductions from existing programs and implementation of the 2012 AQMP PM2.5 control measures will result in projected 24-hour PM2.5 concentrations that meet the federal standard by 2014 at all locations in the Basin. Basin-wide curtailment of wood burning and open burning when the PM2.5 air quality is projected to exceed 30 µg/m^3 in Mira Loma will effectively accelerate attainment at Mira Loma from 2019 to 2014.

TABLE V-5-26

Relative Contributions of Precursor Emissions Reductions to 2014 Simulated Controlled Future-Year 24-hour PM2.5 Concentrations

Precursor (TPD)	PM2.5 Component (µg/m^3)	Standardized Contribution to Mass
VOC	Organic Carbon	Factor of 0.3
NOx	Nitrate	Factor of 1
SOx	Sulfate	Factor of 7.8
PM2.5	Elemental Carbon & Others	Factor of 14.8

CHAPTER 6

ADDITIONAL ANALYSES: UPDATED ANNUAL PM2.5 SIMULATIONS

Introduction

Annual PM2.5 Modeling Approach

Annual PM2.5

Future Annual PM2.5 Air Quality

CEQA Alternative Simulations

INTRODUCTION

As a component of the Final 2012 AQMP, concurrent simulations were also conducted to update and assess progress towards the federal annual average PM2.5 standard given the new modeling platform and emissions inventory. This update provides a confirmation that the control strategy will continue to move air quality expeditiously towards attainment of the federal standards.

ANNUAL PM2.5 MODELING APPROACH

The Final 2012 AQMP annual PM2.5 modeling employs the same approach to estimating the future year annual PM2.5 levels as was described in the 2007 AQMP attainment demonstration. Future year PM2.5 annual average air quality is determined using site and species specific quarterly averaged RRFs applied to the weighted quarterly average 2008 PM2.5 design values per U.S. EPA guidance documents.

In this application, CMAQ was used to simulate 2008 base year, 2014 base-line, and 2014 controlled annual average PM2.5 concentrations in the Basin. Projections of the annual average concentrations rely on the use of quarterly averaged PM2.5 levels, Quarterly average speciation profiles, and RRFs determined from quarterly average model simulation results. As with the 24-hour PM2.5 analysis, this analysis uses a 5-year weighted design value centered around 2008 (Table V-6-1). The future year design values reflect the weighted quarterly average concentration calculated from the projections of 5-years of days (20 quarters).

TABLE V-6-1

2008 Weighted Annual PM2.5 Design Values* ($\mu g/m^3$)

Monitoring Site	Annual*
Anaheim	13.1
Los Angeles	15.4
Fontana	15.7
North Long Beach	13.6
South Long Beach	13.2
Mira Loma	18.6
Rubidoux	16.7

* Calculated based on quarterly observed data between 2006 – 2010

ANNUAL PM2.5

Annual average PM2.5 species concentrations at the six SASS sites are shown in Figure V-6-1. The lowest annual average PM2.5 concentration was observed at Anaheim and the highest annual average concentration was observed at Rubidoux. Sulfate shows small spatial variation, between 2 and 3 $\mu g/m^3$ at all sites. The highest sulfate concentration was observed at the South Long Beach and Long Beach sites. Ammonium and nitrate show the highest concentrations at Rubidoux and Fontana and the remaining sites show similar levels. Annual average concentrations also show that OC is the most abundant component, which is approximately equivalent to half of the total concentration. As measured by the SASS sampler, OC concentrations are believed to be uncertain as explained in Chapter 5 of this appendix.

Quarterly Average Data

As discussed in Chapter 5, U.S. EPA updated the 24-hour PM2.5 attainment test in June 2011. However, U.S. EPA has not recommended any updates to the annual PM2.5 attainment test described in Section 5.1 of the 2007 PM2.5 modeling guidance. Figures V-6-2 through V-6-7 show the 2008 unadjusted SASS data, processed for quarterly average concentrations from direct measurements of the chemical species at each site. In general, the third quarter is the highest at the inland sites of Fontana and Rubidoux. The sites in the western half of the Basin tend to have the highest average levels in the fourth quarter and to some extent the first quarter. With the exception of Fontana, the lowest observed average concentrations of PM2.5 were observed in the second quarter. In general, the second quarter tends to have the lowest concentrations due to spring storms and favorable atmospheric dispersion.

Secondary ammonium, nitrate and sulfate comprise between one-third and half of the total PM2.5 concentration. The species concentrations reflect seasonal weather patterns. Sulfate is highest in the third quarter and lowest in the first quarter while nitrate is highest in the first or fourth quarter and lowest in the second or third quarter. High nitrate concentrations in the fall or winter are caused by the favorable formation of ammonium nitrate under cool temperatures, high humidity and frequent nocturnal inversions. The higher values of sulfate typically occur under conditions of strong-elevated inversions and sea breeze transport toward inland, which is the characteristic of late spring and summer. The abundance of afternoon sunlight and the persistence of morning fog and low clouds trigger both homogeneous and heterogeneous sulfate formation reactions to produce secondary sulfate.

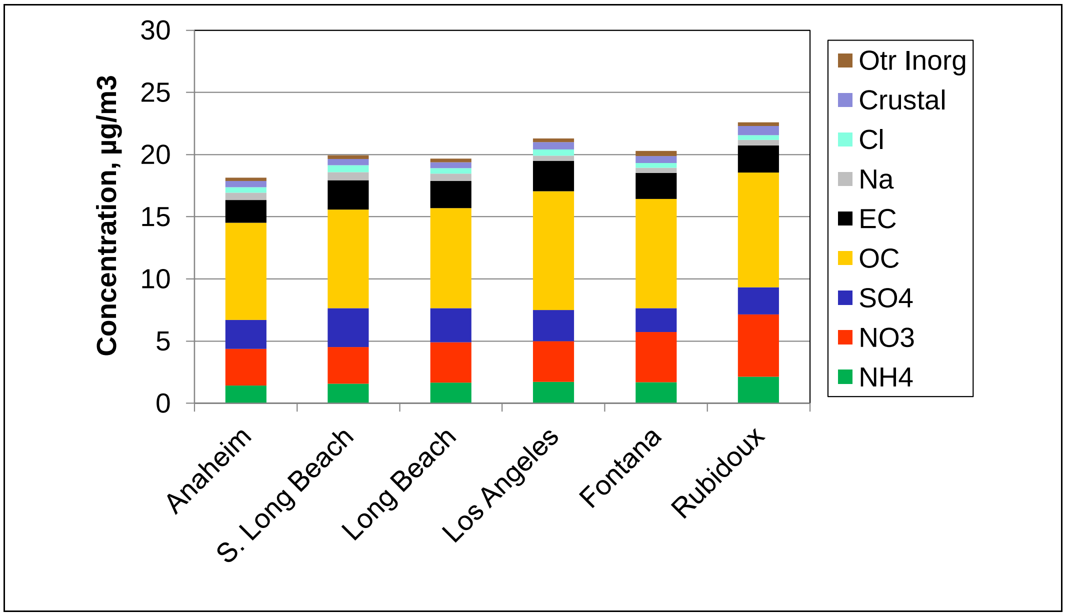

FIGURE V-6-1

Annual Average PM2.5 Species Concentrations at 6 SASS Sites (µg/m3)

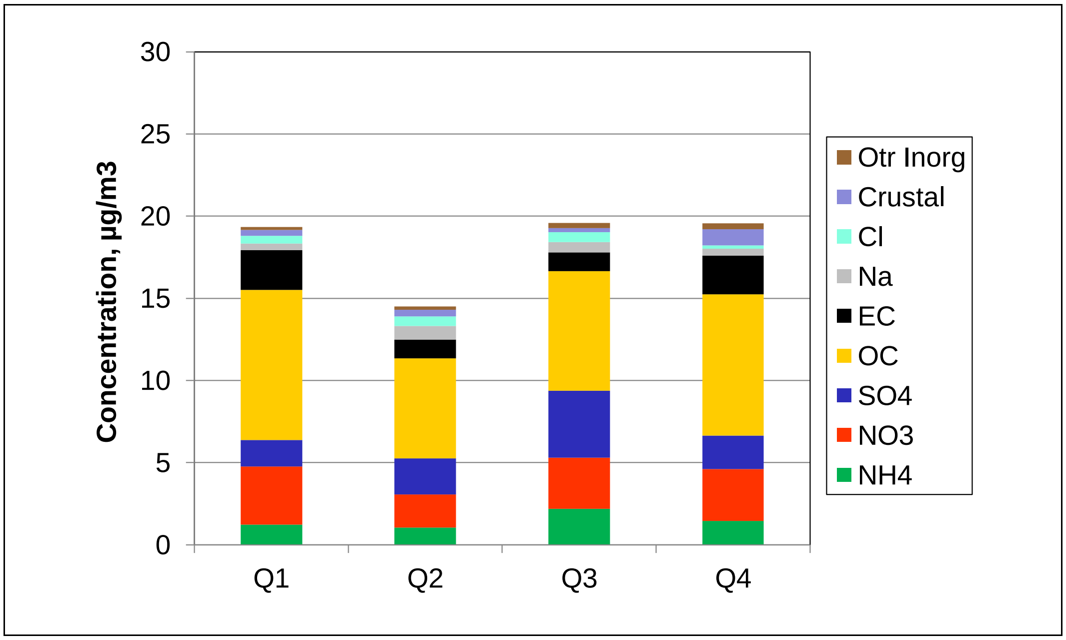

FIGURE V-6-2

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at Anaheim

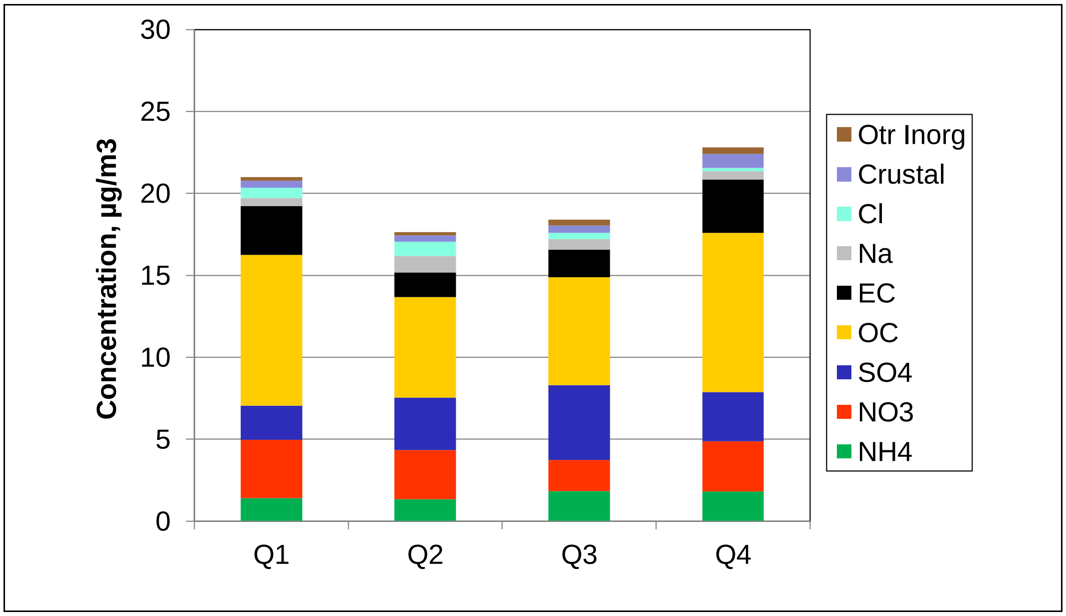

FIGURE V-6-3

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at South Long Beach

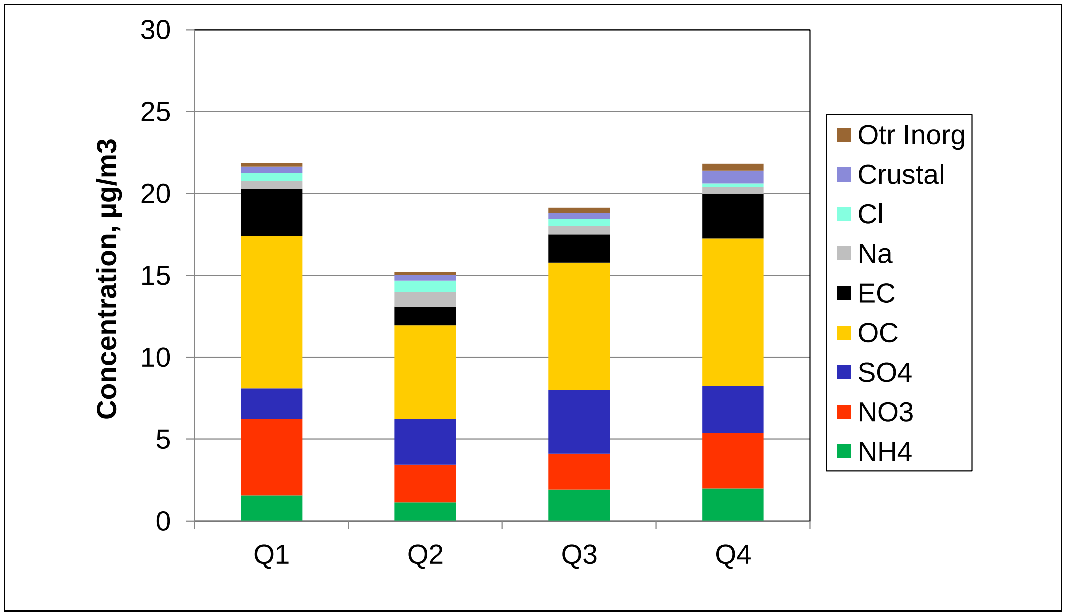

FIGURE V-6-4

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at Long Beach

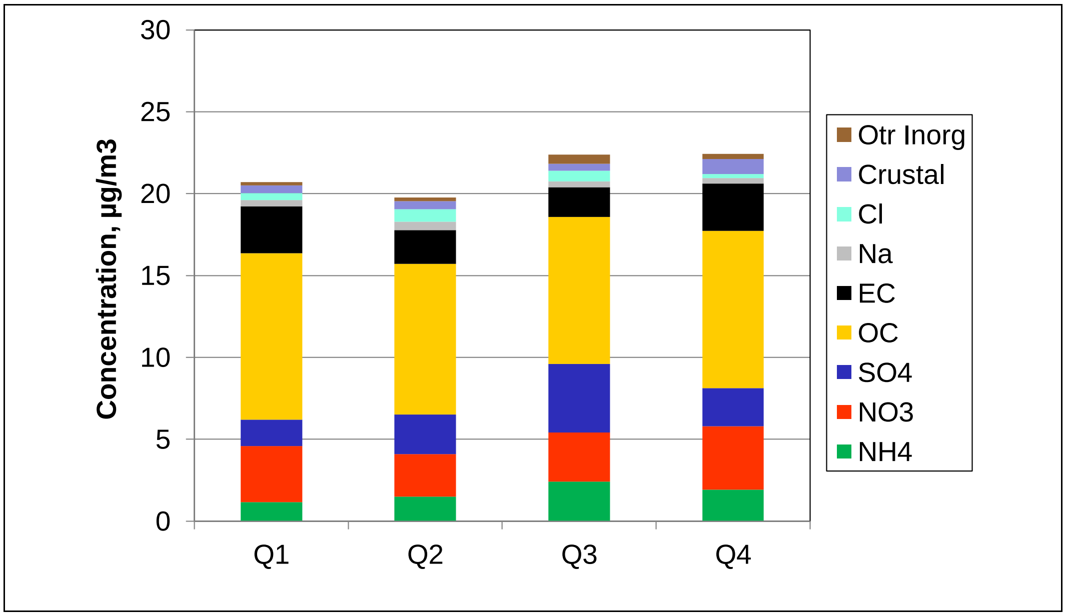

FIGURE V-6-5

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at Downtown Los Angeles

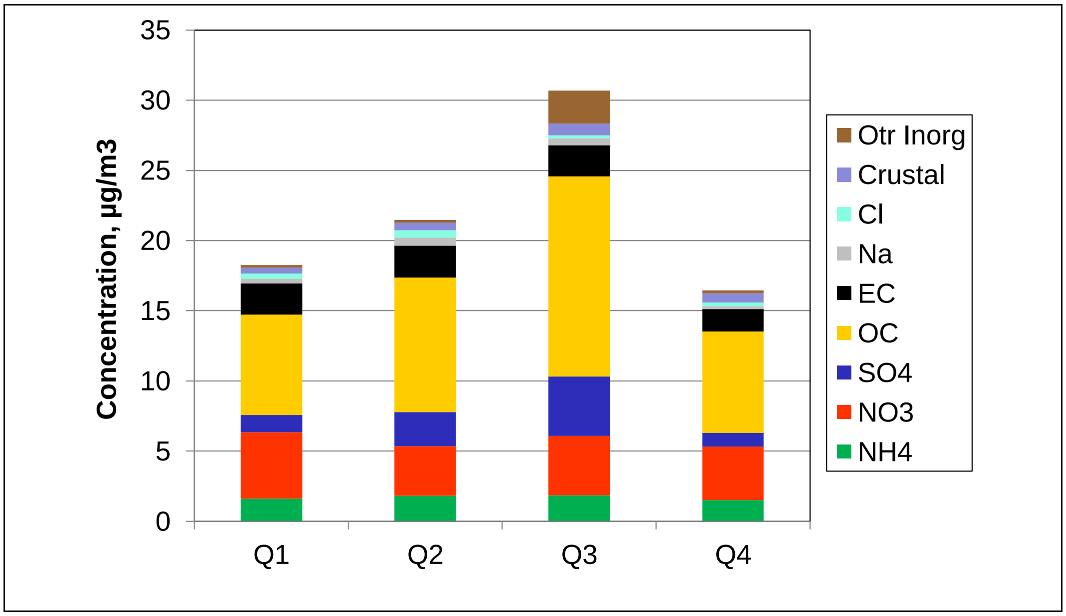

FIGURE V-6-6

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at Fontana

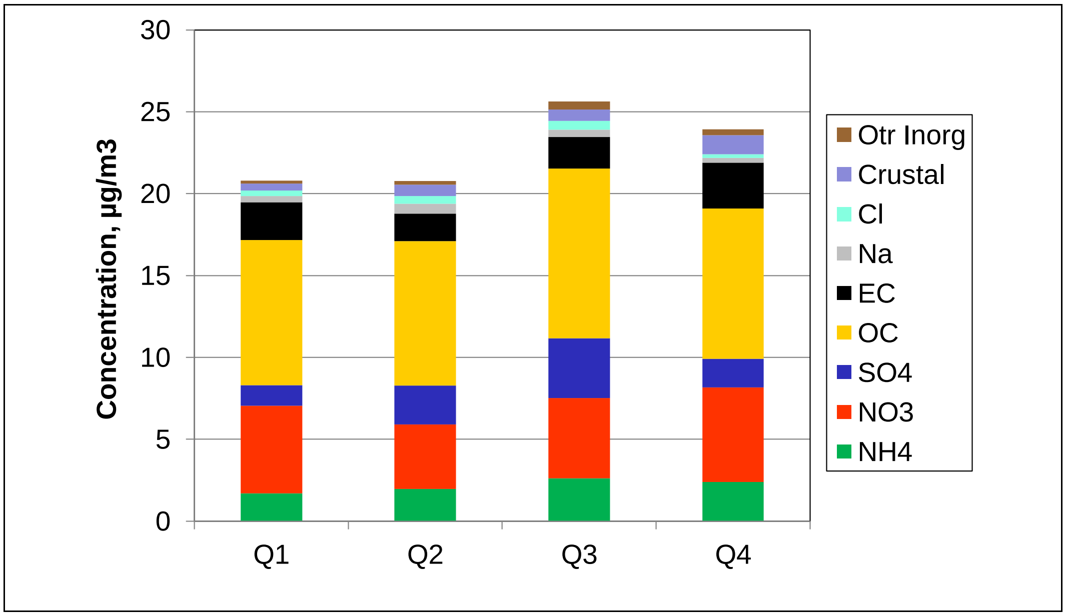

FIGURE V-6-7

PM2.5 Quarterly Average Species Concentrations (µg/m^3) at Rubidoux

OC comprises the greatest fraction of the mass measured in any quarter and any site and is approximately half of the total concentration in the first and fourth quarter due to poor dispersion from weak winds and low level inversions. However, OC concentrations measured with SASS sampler are believed to be highly uncertain and as a consequence are subject to the "Sandwich" method correction for component mass reconciliation. Figures V-6-8 through V-6-13 provide the corrected species fractions for each site and each quarter.

Table V-6-2 lists annual and 5-year weighted quarterly average design values at each of the six SASS sites covering the period 2006 through 2010. Table V-6-3 lists the "Sandwich" applied 5-year weighted quarterly speciation FRM data for each station. As expected, the annual fractional contributions to the quarterly mass at each site differed from the "top-4" average.

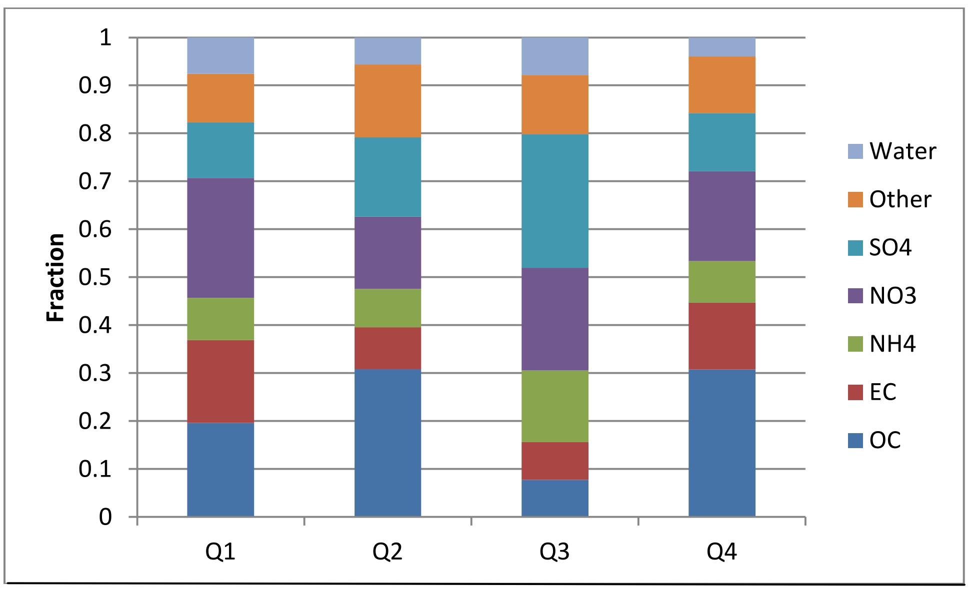

FIGURE V-6-8

2008 Anaheim quarterly PM2.5 species fractional splits after the "Sandwich" correction

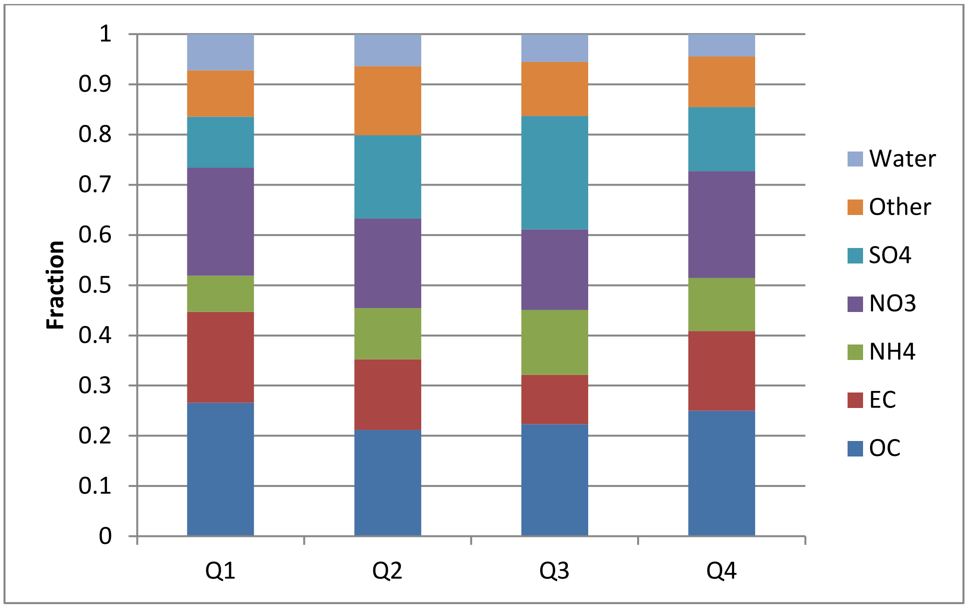

FIGURE V-6-9

2008 Los Angeles quarterly PM2.5 species fractional splits after the "Sandwich" correction

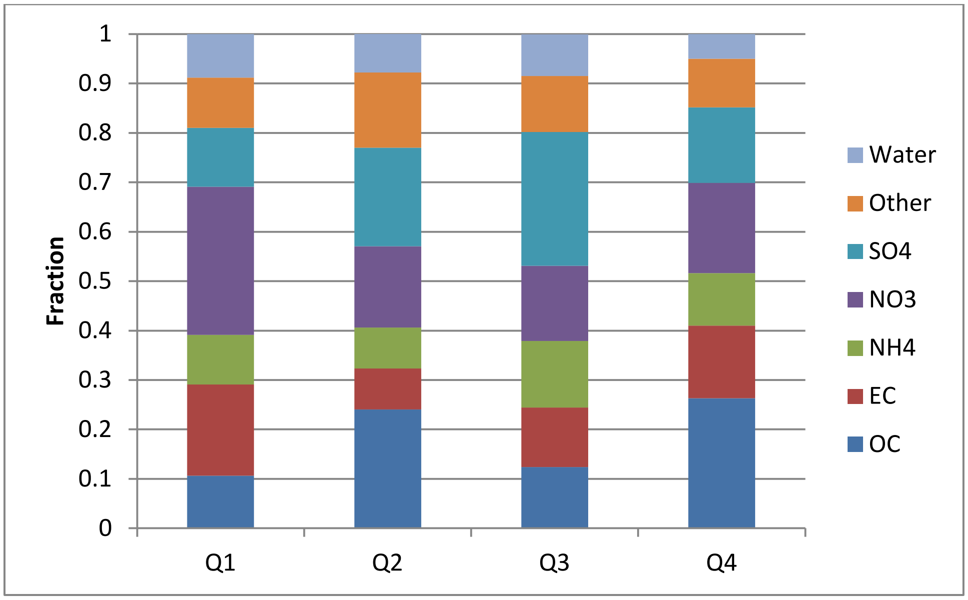

FIGURE V-6-10

2008 Long Beach quarterly PM2.5 species fractional splits after the "Sandwich" correction

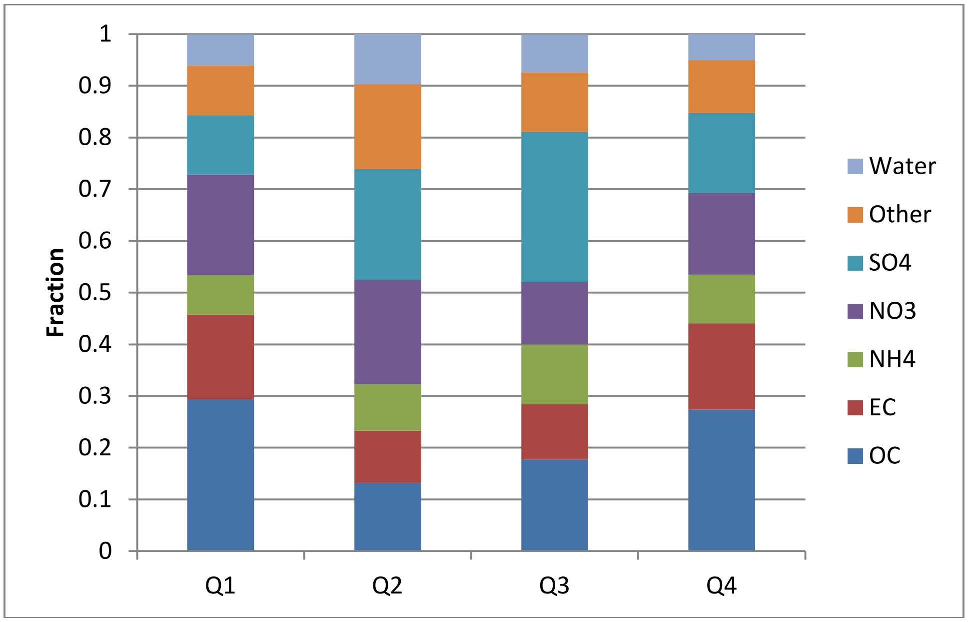

FIGURE V-6-11

2008 Downtown Long Beach quarterly PM2.5 species fractional splits after the “Sandwich” correction

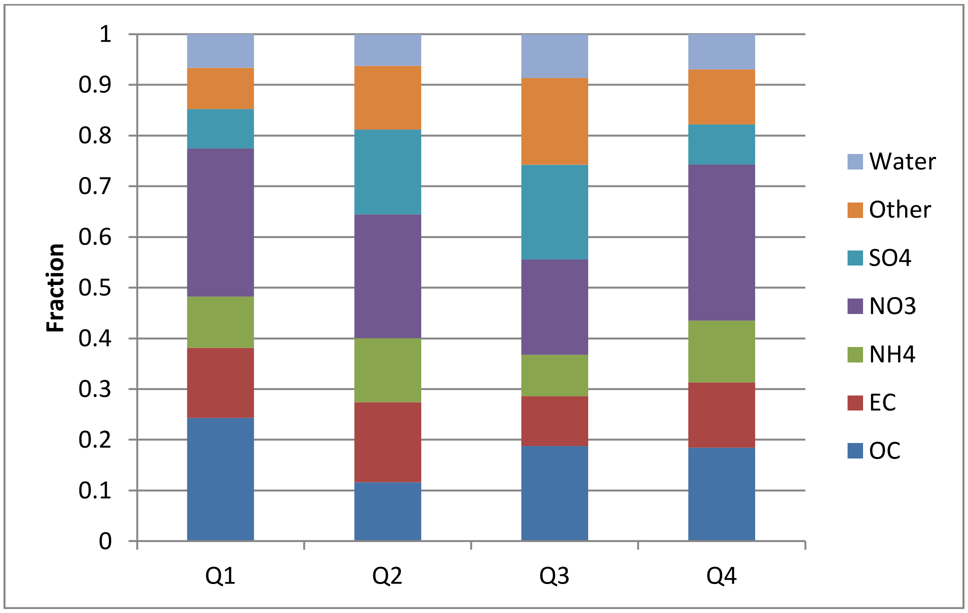

FIGURE V-6-12

2008 Fontana quarterly PM2.5 species fractional splits after the “Sandwich” correction

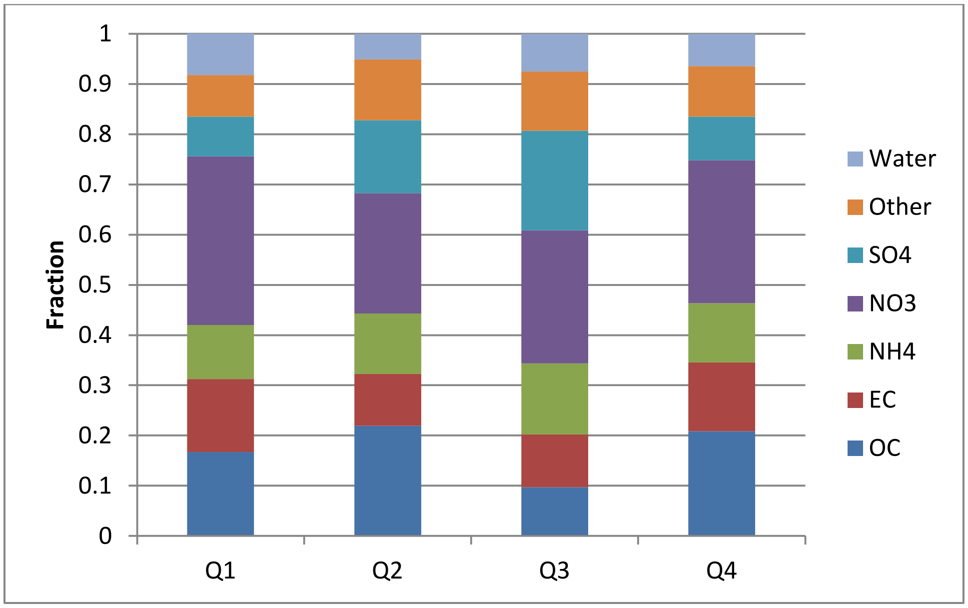

FIGURE V-6-13

2008 Rubidoux quarterly PM2.5 species fractional splits after the "Sandwich" correction

TABLE V-6-2

5-Year Weighted Annual and Quarterly PM2.5 Design Values (2006-2010)

Monitoring Site	Quarter 1 ($\mu g/m^3$)	Quarter 2 ($\mu g/m^3$)	Quarter 3 ($\mu g/m^3$)	Quarter 4 ($\mu g/m^3$)	Annual ($\mu g/m^3$)
Anaheim	13.00	11.10	12.11	16.23	13.11
S. Long Beach	12.90	11.53	12.55	15.70	13.17
Long Beach	13.81	11.81	12.46	16.45	13.63
Los Angeles	14.34	14.37	15.71	16.94	15.34
Fontana	13.77	16.21	16.98	16.18	15.79
Mira Loma	16.88	18.00	18.06	21.07	18.50
Rubidoux	14.96	18.13	16.47	17.22	16.70

TABLE V-6-3

"Sandwich" Applied Quarterly Speciated FRM Data

Site		Mass	OC	EC	NH4	NO3	SO4	OTR	Water	Blank
Anaheim	1q	13.00	2.45	2.16	1.10	3.13	1.45	1.26	0.97	0.50
Anaheim	2q	11.10	3.27	0.92	0.85	1.60	1.75	1.61	0.60	0.50
Anaheim	3q	12.11	0.90	0.91	1.74	2.48	3.24	1.43	0.92	0.50
Anaheim	4q	16.23	4.84	2.19	1.36	2.95	1.91	1.86	0.62	0.50
Los Angeles	1q	14.34	3.68	2.50	1.00	2.98	1.40	1.28	1.00	0.50
Los Angeles	2q	14.37	2.94	1.95	1.42	2.47	2.29	1.91	0.88	0.50
Los Angeles	3q	15.71	3.40	1.49	1.96	2.45	3.43	1.63	0.84	0.50
Los Angeles	4q	16.94	4.11	2.61	1.74	3.49	2.10	1.65	0.74	0.50
Long Beach	1q	13.81	1.42	2.45	1.34	3.99	1.58	1.35	1.18	0.50
Long Beach	2q	11.81	2.72	0.94	0.93	1.86	2.26	1.72	0.89	0.50
Long Beach	3q	12.46	1.48	1.44	1.61	1.82	3.24	1.35	1.01	0.50
Long Beach	4q	16.45	4.20	2.34	1.69	2.91	2.44	1.57	0.79	0.50
Downtown LGB	1q	12.90	3.64	2.03	0.95	2.41	1.42	1.20	0.74	0.50
Downtown LGB	2q	11.53	1.46	1.11	0.99	2.22	2.37	1.81	1.08	0.50
Downtown LGB	3q	12.55	2.14	1.29	1.39	1.45	3.50	1.39	0.88	0.50
Downtown LGB	4q	15.70	4.16	2.54	1.43	2.40	2.35	1.55	0.77	0.50
Fontana	1q	13.77	3.23	1.83	1.34	3.88	1.03	1.08	0.89	0.50
Fontana	2q	16.21	1.83	2.48	1.98	3.83	2.63	1.97	0.99	0.50
Fontana	3q	16.98	3.09	1.63	1.34	3.09	3.08	2.82	1.43	0.50
Fontana	4q	16.18	2.89	2.02	1.91	4.83	1.24	1.70	1.10	0.50
Rubidoux	1q	14.96	2.42	2.10	1.55	4.86	1.14	1.20	1.20	0.50
Rubidoux	2q	18.13	3.87	1.82	2.12	4.22	2.56	2.14	0.90	0.50
Rubidoux	3q	16.47	1.55	1.68	2.26	4.23	3.16	1.88	1.21	0.50
Rubidoux	4q	17.22	3.49	2.29	1.97	4.76	1.45	1.68	1.08	0.50
Mira Loma	1q	16.88	2.74	2.38	1.76	5.50	1.29	1.36	1.36	0.50
Mira Loma	2q	18.00	3.84	1.80	2.11	4.19	2.54	2.12	0.89	0.50
Mira Loma	3q	18.06	1.70	1.84	2.48	4.65	3.48	2.06	1.34	0.50
Mira Loma	4q	21.07	4.30	2.82	2.42	5.86	1.78	2.07	1.32	0.50

Figure V-6-14 presents the ratio of the 24-hour to annual PM2.5 fractional species contributions averaged for the six SASS sites. In general, the 24-hour PM2.5 "others" category is consistently a smaller percentage than the annual PM2.5 "others" for all seasons. However total mass for the 24-hour episodes "others" category is a factor of 1.9 higher in concentration than the annual value. In contrast, both ammonium and nitrate have higher fractions for the episodic 24-hour PM2.5 in all quarters except the third quarter when OC (primary and secondary) becomes the dominant constituent compared with the annual fraction. The episodic sulfate in the first quarter is a higher percentage than the annual but the ratio reverses for the final three quarters. This is consistent with the SOx OGV emissions profile presented in Chapter 4 of this appendix. On average, after the first quarter, daily SOx emissions increase dramatically so that the difference between episodic and a quarterly values for the annual PM2.5 show less contrast. Overall, the average concentrations of the top-4 average 24-hour PM2.5 concentrations for the secondary aerosol components were a factor of 2.4 higher than the quarterly annual concentrations. This illustrates the combined impact of secondary aerosol formation on episodic 24-hour PM2.5 levels.

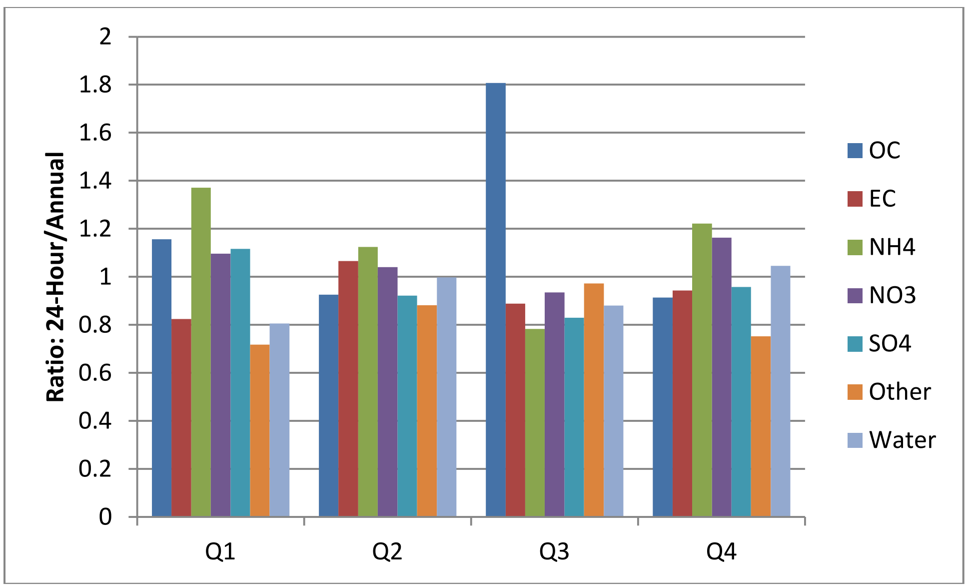

FIGURE V-6-14

2008 Six site SASS average quarterly ratio of 24-hour to annual species fractional contributions to PM2.5 after the "Sandwich" correction

FUTURE ANNUAL PM2.5 AIR QUALITY

The base-line projections for the annual state and federal standards are shown in Figure V-6-15. All areas will be in attainment of the federal annual standard (15 µg/m^3) by 2014. The base-line 2014 design value is projected to be 7 percent below the federal standard. However, as shown in Figure V-6-15, the Final 2012 AQMP does not achieve the California standard of 12 µg/m^3 by 2014. Additional controls would be needed to attain this state standard at the Mira Loma station.

Tables V-6-4 through V-6-7 provide the projected future year PM2.5 annual design values by component species for 2014, 2019, 2023 and 2030 with proposed controls implemented. Projected PM2.5 levels indicate that the Basin will remain in attainment with the current standard. U.S. EPA has proposed lowering the annual PM2.5 standard to a range between 12 and 13 µg/m^3. The latest attainment date for the Basin is likely to be 2023 (with a 5-year extension). Projected PM2.5 annual design concentrations for 2023 and 2030 are expected to be below the upper range of the new proposed standard, but would exceed the lower end of the range of 12 µg/m^3 without additional controls.

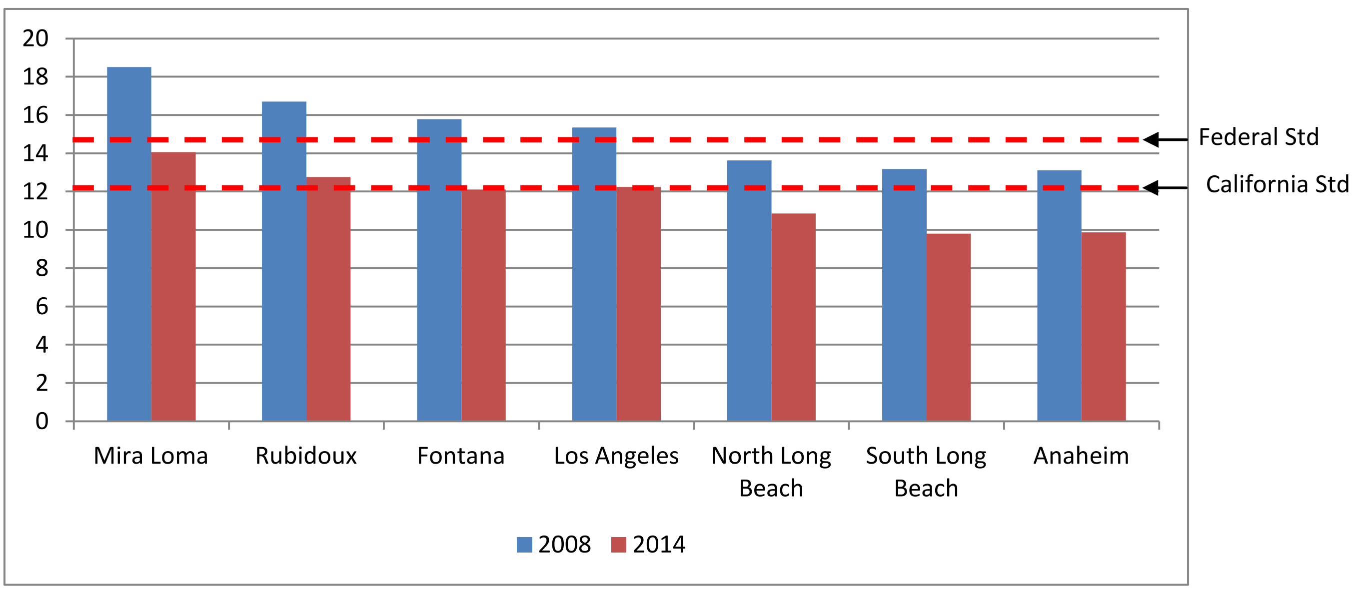

FIGURE V-6-15

Annual Average PM2.5 Design Concentrations: 2008 and 2014 Baseline

TABLE V-6-4

CMAQ 2014 Controlled Annual Design Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	0.8	2.1	1.0	2.1	0.9	1.4	0.5	0.5	9.2
S. Long Beach	0.8	2.0	1.2	2.0	1.0	1.3	0.7	0.5	9.4
Fontana	1.2	2.9	1.1	2.0	1.2	1.9	0.7	0.5	11.5
N. Long Beach	1.0	2.5	1.4	1.8	1.1	1.4	0.8	0.5	10.5
Los Angeles	1.2	2.5	1.4	2.9	1.3	1.6	0.7	0.5	11.9
Mira Loma	1.5	3.7	1.2	2.3	1.3	1.9	0.8	0.5	13.3
Rubidoux	1.4	3.3	1.3	2.2	1.2	1.7	0.7	0.5	12.1

TABLE V-6-5

CMAQ 2019 Controlled Annual Design Predictions (µg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	0.8	2.0	1.0	2.3	0.9	1.4	0.5	0.5	9.3
S. Long Beach	0.8	1.9	1.2	2.2	1.0	1.2	0.7	0.5	9.4
Fontana	1.1	2.6	1.3	2.3	1.2	1.8	0.7	0.5	11.4
N. Long Beach	1.0	2.4	1.4	1.9	1.1	1.3	0.8	0.5	10.4
Los Angeles	1.1	2.4	1.4	3.0	1.2	1.5	0.7	0.5	11.8
Mira Loma	1.4	3.3	1.4	2.6	1.3	2.0	0.8	0.5	13.3
Rubidoux	1.3	2.8	1.5	2.3	1.1	1.9	0.7	0.5	12.2

TABLE V-6-6

CMAQ 2023 Controlled Annual Design Predictions (μg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	0.7	1.7	1.1	2.2	0.8	1.5	0.5	0.5	9.0
S. Long Beach	0.8	1.8	1.2	2.2	0.9	1.3	0.6	0.5	9.2
Fontana	1.0	2.1	1.4	2.2	1.2	1.9	0.6	0.5	11.0
N. Long Beach	1.0	2.3	1.4	1.9	1.0	1.4	0.8	0.5	10.2
Los Angeles	1.0	2.1	1.5	3.0	1.1	1.6	0.6	0.5	11.4
Mira Loma	1.2	2.7	1.6	2.6	1.3	2.1	0.6	0.5	12.7
Rubidoux	1.2	2.3	1.7	2.3	1.1	2.0	0.6	0.5	11.7

TABLE V-6-7

CMAQ 2030 Controlled Annual Design Predictions (μg/m^3)

Locations	NH4	NO3	SO4	OC	EC	Others	Water	Blank	Mass
Anaheim	0.7	1.6	1.2	2.3	0.8	1.5	0.5	0.5	9.1
S. Long Beach	0.8	1.7	1.4	2.3	0.9	1.4	0.6	0.5	9.5
Fontana	1.0	1.9	1.6	2.3	1.2	2.1	0.7	0.5	11.3
N. Long Beach	1.0	2.1	1.6	1.9	1.0	1.4	0.7	0.5	10.2
Los Angeles	1.0	2.0	1.6	3.0	1.1	1.6	0.7	0.5	11.4
Mira Loma	1.2	2.4	1.8	2.7	1.3	2.3	0.7	0.5	13.0
Rubidoux	1.2	2.1	2.0	2.4	1.1	2.2	0.6	0.5	12.0

CEQA ALTERNATIVE SIMULATIONS

Table V-6-8 presents the projected annual PM2.5 design values for the 2014 controlled and three CEQA alternative emissions scenarios. Complete descriptions of the CEQA alternative scenarios can be found in the PEIR for the 2012 AQMP. All of the CEQA alternative simulations demonstrate attainment of the 24-hour PM2.5 federal standard.

TABLE V-6-8

CEQA Alternative Simulated Annual PM2.5 Design Values

	2014 Controlled	Alt-1: 2019	Alt-2: 2017	Alt-3: 2017
Anaheim	9.2	9.3	9.3	8.8
S. Long Beach	9.4	9.4	9.4	9.1
Fontana	11.5	11.4	11.4	10.7
N. Long Beach	10.5	10.4	10.4	10.1
Los Angeles	11.9	11.8	11.8	11.1
Mira Loma	13.3	13.3	13.0	12.4
Rubidoux	12.1	12.2	11.9	11.2

CHAPTER 7

ADDITIONAL ANALYSES: UPDATING 8-HOUR OZONE PROJECTIONS

Introduction

Ozone Representativeness

Base-Year Model Performance Evaluation

Ozone Modeling Approach

Future Ozone Air Quality

Looking Beyond 2023

INTRODUCTION

The 2007 AQMP provided a comprehensive 8-hour ozone analysis that demonstrated future year attainment of the 1997 federal ozone standard (80 ppb) by 2023 with implementation of short-term measures and CAA Section 182(e)(5) long term emissions reductions. The analysis concluded that NOx emissions needed to be reduced approximately 76 percent and VOC emissions reduced approximately 22 percent from the 2023 baseline in order to demonstrate attainment. The 2023 baseline VOC and NOx summer planning emissions inventories included 536 and 506 TPD, respectively.

As presented in Chapter 3 of the Final 2012 AQMP, 2023 baseline emissions of both precursor pollutants are estimated to be lower than those 2023 baseline established in the 2007 AQMP. The Final 2012 AQMP baseline VOC and NOx summer planning emissions for 2023 have been revised to 438 and 319 TPD, respectively. The emissions revision incorporated changes made to the on-road truck and off-road equipment categories resulting from recent CARB rulemaking. The new emissions inventory also reflects the impact of the economic slowdown and revisions to regional growth estimates. As a consequence, it is important to revisit the baseline projections for 2023 to investigate what impact the inventory revision had on the ozone attainment demonstration and equally important, what is the impact to the size of the proposed long term NOx emissions reduction commitment.

OZONE REPRESENTATIVENESS

As a component of the PM2.5 attainment demonstration, the CMAQ modeling provided Basin-wide ozone air quality simulations for each hour in 2008. Past ozone attainment demonstrations evaluated a set of days characterized by restrictive meteorology or episodes occurring during concurrent intensive field programs. Of great importance, these episode periods needed to be rated in terms of how representative they were relative to the ozone standard being evaluated. For the now revoked 1-hour ozone standard, the attainment demonstration focused on a limited number of days closely matching the annual design value. Typically, the analysis addressed less than 5 days of simulations. The 2007 AQMP was the first to address the 8-hour ozone standard and the use of RRFs in the future year ozone projection. To provide a robust characterization of the RRFs for use in the attainment demonstration, the analysis simulated 36 days. The ozone modeling guidance recommends that a minimum of 5-days of simulations meeting modeling acceptance criteria are used in a future year RRF calculation, but also recommends incorporating as many days as possible to fully capture both the meteorological variations in the ozone season and the response to different daily emissions profiles.

This update to the future year ozone projection focuses on 91 days of ozone air quality observed during June through August 2008. During this period, seven well defined multiday ozone episodes occurred in the Basin with 75 total days having daily Basin-wide maximum concentrations of 80 ppb or higher. More importantly, when assessed for a normalized meteorological ozone episode potential using a regression based weighting covering 30-years of data (1998-2010), as summarized in the 2003 AQMP, 8 days during the 2008 period were ranked above the 95th percentile in the long term distribution of potentials, and another 19 were ranked between the 90th and 94th percentile.

Figure V-7-1 depicts the time series of the daily Basin maximum and the Crestline (the Basin design station) daily maximum 8-hour ozone air quality during the three month period in 2008. The seven primary meteorological episodes which occur primarily between mid June and August are highlighted in the figure. It is important to note that the analysis not only focused on the seven periods or Crestline specifically. All station days meeting the acceptance criteria for calculating a daily RRF were included in the analysis. Several locations in the San Bernardino and Riverside Valleys exhibit similar transport and daily patterns of ozone formation as Crestline. The peak Basin 2008 8-hour average ozone concentration was observed at Santa Clarita on August 2nd with a value of 131 ppb along a distinctly different transport route.

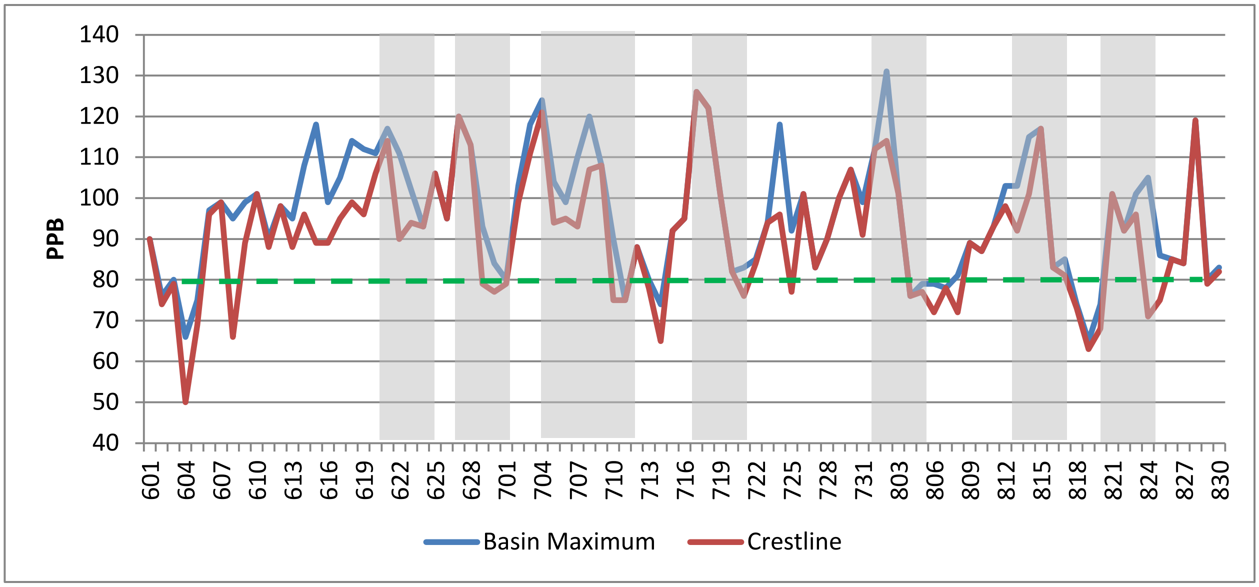

FIGURE V-7-1

Observed Basin and Crestline Daily Maximum 8-Hr Average Ozone Concentrations: June 1 through August 31, 2008. (Shaded areas indicate multiple day regional ozone episodes).

Overall, the 91 day period provides a robust description of the 2008 ozone-meteorological season. Table V-7-1 lists the number of days each Basin station exceeded the 8-hour ozone standard during the June through August 2008 period. Also listed in Table V-7-1 are the 2008, 5-year weighted design values used in the future year ozone projections.

TABLE V-7-1

2008 Basin Weighted Design Values* and Number of Days Daily Maximum Concentrations Exceeded 80 ppb

Station	2008 5-Year Weighted Design (ppb)	Number of Days in 2008 with Observed 8-Hr Average Maximum Ozone > 80 ppb
Azusa	94	16
Burbank	88	10
Reseda	94	16
Pomona	97	19
Pasadena	90	7
Santa Clarita	101	41
Glendora	106	26
Rubidoux	101	39
Perris	104	47
Lake Elsinore	99	39
Banning Airport	102	49
Upland	106	31
Crestline	116	66
Fontana	107	36
San Bernardino	109	46
Redlands	109	50

*Stations having design values greater than 80 ppb

BASE-YEAR OZONE MODEL PERFOMANCE EVALUATION

For the CMAQ performance evaluation the modeling domain is separated into nine sub-regions or zones. Figure V-7-2 depicts the sub-regional zones used for base-year simulation performance. The different zones present unique air quality profiles. In previous ozone modeling attainment demonstrations using a smaller modeling domain, the number and size of the zones were different. Seven zones represented the Basin and portions of Ventura County, the Mojave Desert and the Coachella Valley.

For the current analysis the Basin is represented by three of the zones: Zone 3 – the San Fernando Valley, Zone 4 – the Eastern San Gabriel, Riverside and San Bernardino Valleys, and Zone 5 – the Los Angeles and Orange County emissions source areas. Of the three areas, Zone 4 represents the Basin maximum ozone concentrations and the primary downwind impact zone. As such, the priority in evaluating model performance is focused on Zone 4. Zone 9 includes the Coachella Valley portion of the Salton Sea Air Basin.

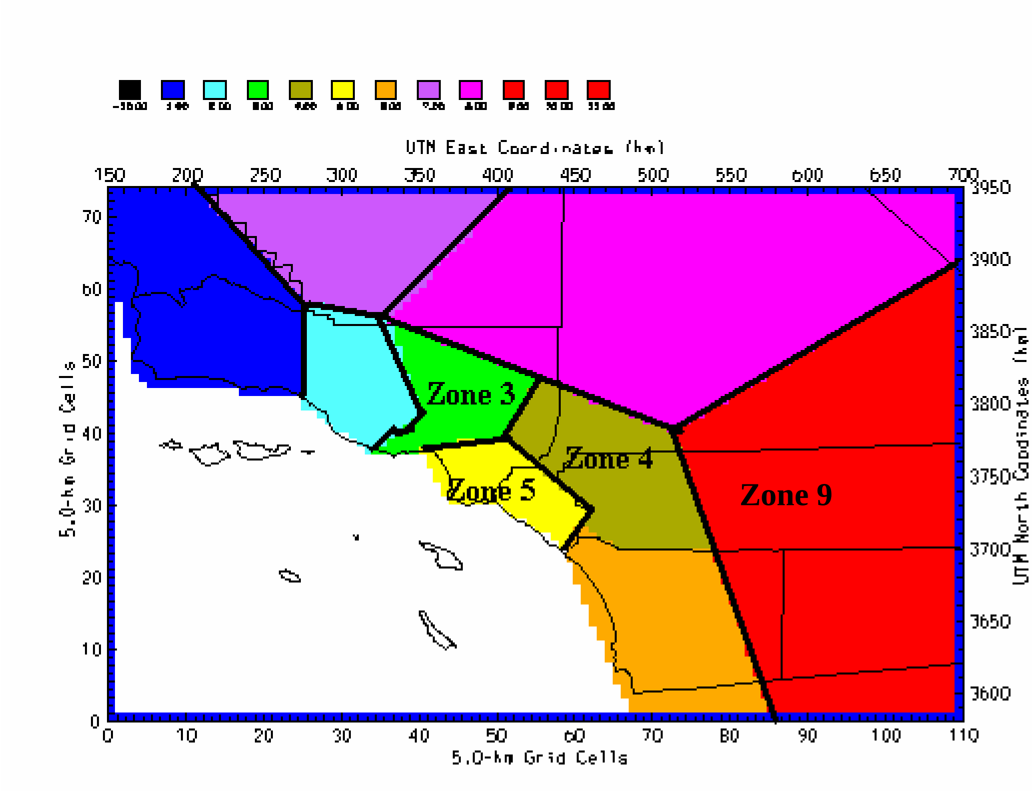

FIGURE V-7-2

Performance Evaluation Zones

Statistical Evaluation

The statistics used to evaluate 1-hour average CMAQ ozone performance do not change from previous AQMPs and include the following:

Statistic for O_3	Criteria (%)	Comparison Basis
Normalized Gross Bias	≤ ±15	Paired in space and time
Normalized Gross Error	≤ 35	Paired in space (+2 grid cells) and time
Peak Prediction Accuracy	≤ ± 20	Unpaired in space and time

The same statistics are applied to the 8-hour average ozone.

The base year average regional model performance for June through August 2008 for Zones 3, 4, and 5 are presented in Tables V-7-2 to V-7-7 for days when Basin maximum 8-hour ozone levels were at least 85 ppb. Base year 8-hour ozone performance statistics for Zone 9 in the downwind Coachella Valley portions of the Salton Sea Air Basin are provided in Table V-7-8. Performance statistics are presented for observed concentrations of 60 ppb or greater. Data for 1- and 8-hour average ozone concentrations for the sub regional peak concentrations are both provided in the tables.

The CMAQ ozone simulations generally meet the 1-hour average unpaired peak and normalized error model performance goal in all three zones on most days. Normalized bias tended to be negative, particularly in June. Zone-5 however showed a tendency for over prediction in all three months. Zone 4 displayed the best unpaired peak performance with 54 out of 58 days meeting the 20 percent criteria. Unpaired peak performance in Zones 3 and 5 lagged, with only 76 and 79 percent of the days meeting the criteria. Overall, the 8-hour average evaluation was slightly better, however observed 8-hour ozone did not exceed the 60 ppb threshold for inclusion in the analysis on more days in Zone 5.

TABLE V-7-2

June 2008 Base Year 1-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	Zone 3					Zone 4					Zone 5				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
601	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
602	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
603	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
604	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
605	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
606	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
607	106	77.7	0.73	-26	26	113	106.4	0.94	-10	12	80	84.6	1.06	2	14
608	97	100.6	1.04	2	17	119	124.4	1.05	-4	14	64	96.7	1.51	34	34
609	123	81.3	0.66	-23	23	114	100.5	0.88	-16	18	84	85.1	1.01	1	11
610	123	97.5	0.79	-3	9	105	113.6	1.08	0	10	85	86.5	1.02	11	13
611	95	96.8	1.02	12	13	105	110.4	1.05	-6	10	65	77.7	1.20	8	10
612	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
613	95	101.8	1.07	9	11	113	117.2	1.04	8	15	70	82.2	1.17	6	9
614	102	97.8	0.96	12	13	117	117.7	1.01	0	13	78	84.3	1.08	10	11
612	123	91.1	0.74	-7	12	119	111.4	0.94	-12	13	96	98	1.02	6	12
616	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
617	111	84.8	0.76	-30	30	123	88.3	0.72	-35	35	83	70.6	0.85	-25	26
618	116	100.7	0.87	-19	25	122	97.9	0.80	-37	39	94	79.3	0.84	-14	17
619	87	92	1.06	-17	25	162	123.2	0.76	-18	20	118	106.9	0.91	0	22
620	95	108.1	1.14	5	18	152	135.8	0.89	-2	18	110	111.1	1.01	11	15
621	111	98.2	0.88	-10	20	176	128.9	0.73	-13	16	114	106.3	0.93	0	13
622	122	106.9	0.88	-19	20	156	149.9	0.96	-1	19	107	115.1	1.08	4	12
623	123	92.6	0.75	-29	29	123	135.9	1.10	11	21	107	121.9	1.14	13	19
624	123	79.2	0.64	-27	27	111	99.4	0.90	-9	12	78	75.1	0.96	-10	15
625	105	90.9	0.87	-1	10	111	109.7	0.99	1	19	61	78.3	1.28	21	21
626	86	92.7	1.08	0	8	122	109.6	0.90	-8	16	65	75.2	1.16	1	8
627	88	104.6	1.19	21	21	103	114	1.11	2	19	67	80.9	1.21	13	13
628	93	81.7	0.88	-5	7	133	120.9	0.91	-7	17	67	82.9	1.24	4	11
629	88	82.4	0.94	-7	10	130	111.3	0.86	-21	21	92	80.8	0.88	-9	11

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-3

July 2008 Base Year 1-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	Zone 3					Zone 4					Zone 5				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
701	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
702	127	87.5	0.69	-12	14	124	106.8	0.86	-12	15	81	84.7	1.05	6	10
703	138	90.6	0.66	-20	21	149	143.6	0.96	2	16	100	98.6	0.99	4	18
704	110	79.9	0.73	-27	27	150	137.6	0.92	-17	21	116	97.9	0.84	-19	20
705	111	95.7	0.86	-5	23	116	122.8	1.06	-2	19	103	94.9	0.92	3	19
706	107	104.1	0.97	-7	11	110	125.8	1.14	12	18	94	107.1	1.14	23	23
707	105	106.3	1.01	-12	13	128	102.1	0.80	-25	26	85	95.7	1.13	14	15
708	123	109.5	0.89	-9	14	138	104.5	0.76	-17	19	70	81.4	1.16	12	12
709	113	104.9	0.93	-1	13	132	149.2	1.13	13	29	65	103.8	1.60	32	32
710	97	114.2	1.18	21	23	121	130.4	1.08	13	33	---	---	---	---	---
711	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
712	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
713	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
714	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
715	92	84.9	0.92	-2	16	108	102.7	0.95	-2	13	65	77.8	1.20	14	14
716	101	92.1	0.91	-1	16	114	125.2	1.10	7	17	62	90.9	1.47	24	24
717	116	82.7	0.71	-17	23	140	114.2	0.82	0	13	66	77.5	1.17	12	14
718	113	101.9	0.90	-12	20	144	138.1	0.96	11	18	67	95.1	1.42	32	32
719	111	97.4	0.88	3	9	120	131.9	1.10	13	18	78	99.9	1.28	30	30
720	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
721	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
722	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
723	93	96.2	1.03	16	16	110	120.2	1.09	2	13	65	87.6	1.35	16	17
724	128	123.1	0.96	10	15	139	144	1.04	10	20	84	93.4	1.11	16	17
725	103	98.6	0.96	-5	15	122	123.2	1.01	7	18	71	104.4	1.47	35	35
726	96	92.3	0.96	2	17	117	125.4	1.07	14	20	69	84.2	1.22	12	12
727	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
728	80	80.2	1.00	-2	9	99	96.3	0.97	-7	14	---	---	---	---	---
729	81	90.4	1.12	8	9	108	98.7	0.91	-6	15	---	---	---	---	---
730	101	97.1	0.96	5	12	119	110.6	0.93	-5	13	---	---	---	---	---
731	109	105.4	0.97	-4	8	121	107.3	0.89	-8	13	76	83.2	1.09	-3	7

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-4

August 2008 Base Year 1-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	Zone 3					Zone 4					Zone 5				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
801	131	104.1	0.79	-14	16	138	121.5	0.88	-9	13	93	93.2	1.00	9	15
802	150	102.1	0.68	-25	26	141	148.7	1.05	1	22	104	107.1	1.03	15	18
803	110	99	0.90	-6	10	114	125.3	1.10	4	13	94	101.2	1.08	13	13
804	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
805	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
806	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
807	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
808	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
809	88	74.5	0.85	-10	10	110	92.8	0.84	-3	10	62	69.2	1.12	-11	11
810	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
811	94	93.6	1.00	13	17	110	126.4	1.15	11	19	60	88.7	1.48	18	18
812	122	98.7	0.81	-7	13	126	119.4	0.95	-2	15	75	87	1.16	4	11
813	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
814	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
815	102	99.2	0.97	0	6	131	115.9	0.88	-8	15	60	73.5	1.23	-15	15
816	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
817	82	78.8	0.96	-4	7	105	106.8	1.02	2	13	72	76.1	1.06	1	7
818	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
819	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
820	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
821	95	91	0.96	2	12	110	116.9	1.06	20	28	---	---	---	---	---
822	82	87.4	1.07	12	12	106	125	1.18	17	25	---	---	---	---	---
823	78	104.4	1.34	17	19	125	123.6	0.99	1	17	87	96.1	1.10	8	13
824	92	106.6	1.16	0	13	137	130.1	0.95	-7	22	99	116.8	1.18	25	27
825	108	97	0.90	6	22	112	120.3	1.07	11	21	79	94.8	1.20	18	18
826	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
827	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
828	117	95.1	0.81	-6	9	131	119.3	0.91	-11	14	66	79.6	1.21	10	10
829	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
830	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
831	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-5

June 2008 Base Year 8-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	Zone 3					Zone 4					Zone 5				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
601	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
602	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
603	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
604	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
605	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
606	87.5	63.9	0.73	-24	24	96.1	90.2	0.94	-14	2	70.4	76.2	1.08	2	15
607	84.5	83.6	0.99	1	16	99.6	92.9	0.93	-10	4	---	---	---	---	---
608	95.2	67.5	0.71	-21	21	92.5	78	0.84	-22	8	68.4	70.6	1.03	-6	8
609	101	86.2	0.85	4	7	88	94	1.07	-3	1	68.2	75.3	1.1	7	7
610	75.5	80.9	1.07	13	13	101.5	94.3	0.93	-13	3	58.2	67.3	1.16	---	---
611	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
612	78.5	85.6	1.09	11	11	98.2	99.1	1.01	3	6	---	---	---	---	---
613	86.2	90.4	1.05	13	13	95.5	97.9	1.03	-4	6	64.1	75.4	1.18	11	11
614	100.9	77	0.76	-6	12	108.9	101	0.93	-15	2	82.4	83	1.01	4	6
612	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
616	99.1	73.6	0.74	-25	25	98	75.5	0.77	-40	25	71	62.7	0.88	-38	38
617	93.6	76.2	0.81	-18	20	105.2	77.2	0.73	-40	25	80.2	68.7	0.86	-15	17
618	61.9	74.2	1.2	0	12	114.9	96	0.84	-22	10	82.9	97.8	1.18	2	9
619	74.8	86.1	1.15	9	9	111.1	105.3	0.95	-6	6	93.9	98.5	1.05	14	15
620	79.8	74.4	0.93	-10	10	111.6	103.4	0.93	-15	4	104.2	94.5	0.91	-2	8
621	95.1	78.5	0.83	-18	18	117.2	127.3	1.09	-4	5	92.4	97.6	1.06	4	8
622	92.2	77.6	0.84	-23	23	111.4	117.9	1.06	5	10	90.1	99	1.1	13	17
623	102.6	64.8	0.63	-26	26	94.8	88.2	0.93	-17	5	64.8	65	1	-14	14
624	82.6	76.5	0.93	-5	7	90.2	91	1.01	-13	7	---	---	---	---	---
625	79.1	77.1	0.97	-2	5	106.9	93.8	0.88	-14	9	---	---	---	---	---
626	74.6	89	1.19	22	22	95	97.5	1.03	-4	11	---	---	---	---	---
627	86.5	77.4	0.89	-5	6	120.9	102.5	0.85	-14	8	60.2	68.6	1.14	-4	4
628	69.9	72.5	1.04	-2	7	113.6	88.7	0.78	-26	12	76.4	70.2	0.92	-9	9
629	72.1	72.9	1.01	0	5	93.8	101	1.08	-5	0	71.9	69.8	0.97	-3	7
630	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-6

July 2008 Base Year 8-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

	Zone 3					Zone 4					Zone 5				
Date	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
701	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
702	101.5	73.9	0.73	-15	17	103.6	90.8	0.88	-17	4	65.1	74.6	1.15	7	7
703	108	70.9	0.66	-19	19	118.4	123.5	1.04	-2	5	80.5	91.1	1.13	0	16
704	90.8	68.2	0.75	-24	24	124.6	105.8	0.85	-25	12	95.2	84.9	0.89	-16	17
705	87.6	79.1	0.9	-6	13	104.1	106.9	1.03	-7	6	89	77.9	0.88	0	10
706	92.2	88.3	0.96	-5	8	99.1	108.1	1.09	5	8	81.1	92.3	1.14	21	21
707	92.1	82.7	0.9	-7	9	110.4	85.5	0.77	-29	16	71.4	80.2	1.12	2	2
708	102.9	87.4	0.85	-8	10	120	90.8	0.76	-23	10	---	---	---	---	---
709	81.2	80.6	0.99	7	11	108.4	114.9	1.06	4	22	---	---	---	---	---
710	78	105.8	1.36	27	27	90.5	110.4	1.22	0	16	---	---	---	---	---
711	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
712	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
713	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
714	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
715	68	69.3	1.02	2	2	92.4	89.8	0.97	-11	5	---	---	---	---	---
716	82	72.6	0.89	-12	12	95.1	106.7	1.12	0	8	---	---	---	---	---
717	97.1	66.9	0.69	-23	24	126	99.4	0.79	-7	5	---	---	---	---	---
718	100.8	81	0.8	-12	16	122.8	117.8	0.96	3	7	---	---	---	---	---
719	89.5	86.4	0.97	6	9	101.1	111.4	1.1	8	11	---	---	---	---	---
720	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
721	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
722	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
723	74.6	79.5	1.07	15	15	94.9	99.9	1.05	-3	2	---	---	---	---	---
724	99.9	100.6	1.01	6	8	118.8	118.9	1	5	12	67.6	77.4	1.14	7	7
725	90.1	79.7	0.88	-3	8	92.4	102.3	1.11	3	9	---	---	---	---	---
726	77.6	78.4	1.01	1	8	101	102.4	1.01	5	12	---	---	---	---	---
727	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
728	62.9	68.4	1.09	5	5	90.8	79.7	0.88	-16	7	---	---	---	---	---
729	69	78.6	1.14	13	13	100	83	0.83	-18	8	---	---	---	---	---
730	84.9	81.3	0.96	2	7	107.1	90.3	0.84	-11	7	---	---	---	---	---
731	96.8	85.6	0.88	1	7	99.2	95.1	0.96	-12	2	62	71.6	1.15	-5	5

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-7

August 2008 Base Year 8-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	Zone 3					Zone 4					Zone 5				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
801	102	81.4	0.8	-11	12	112.2	98.4	0.88	-15	3	71	75.7	1.07	-2	2
802	131.1	83	0.63	-23	23	114.1	110.1	0.96	-5	7	84	90.2	1.07	15	15
803	96.4	87.8	0.91	-3	8	101.6	107.3	1.06	0	7	75.4	88.1	1.17	13	13
804	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
805	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
806	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
807	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
808	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
809	59.9	62	1.04	---	---	89.6	77.4	0.86	-9	1	43.5	56.9	1.31	---	---
810	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
811	76	78.4	1.03	5	5	93.8	100.1	1.07	6	8	45.8	69.3	1.51	---	---
812	96	79.4	0.83	0	12	103	94.9	0.92	-7	6	60.2	77.6	1.29	18	18
813	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
814	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
815	83.9	81.1	0.97	-2	4	118	92.3	0.78	-14	4	50.3	62.1	1.23	---	---
816	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
817	71.4	69.4	0.97	-2	4	85.9	92.2	1.07	-5	1	60	64.7	1.08	---	---
818	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
819	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
820	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
821	82.2	74.8	0.91	1	8	101.8	98.7	0.97	8	17	45.9	78.9	1.72	---	---
822	71.4	76.9	1.08	15	15	92.9	106.6	1.15	11	18	51.2	71	1.39	---	---
823	66.6	88.7	1.33	28	28	101.1	101.7	1.01	-4	8	67.5	76.4	1.13	3	3
824	75.6	92.4	1.22	11	12	105.8	105.7	1	-12	7	79	100.1	1.27	24	24
825	86.1	76.4	0.89	-1	15	79.4	96.7	1.22	7	10	55.5	78.8	1.42	---	---
826	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
827	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
828	85.1	76.6	0.9	-4	5	119	94.9	0.8	-15	5	53.6	68.3	1.27	---	---
829	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
830	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
831	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

TABLE V-7-8

Coachella Valley Zone-9 Base Year 8-Hour Average Ozone Performance for Days When Regional 8-Hour Maximum ≥ 85 ppb

Date	June					July					August				
	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)	Observed (ppb)	Predicted (ppb)	Unpaired Peak Ratio	Normalized Bias* (ppb)	Normalized Error* (ppb)
1	---	---	---	---	---	---	---	---	---	---	90.5	68.1	0.75	-21	21
2	---	---	---	---	---	88.1	66.6	0.76	-16	16	70.1	63.3	0.9	-10	10
3	---	---	---	---	---	85.6	77.9	0.91	1	9	---	---	---	---	---
4	---	---	---	---	---	55.2	67.1	1.22	-2	11	---	---	---	---	---
5	---	---	---	---	---	62.8	66.2	1.05	-4	4	---	---	---	---	---
6	97.5	68.7	0.7	-22	22	68	70.5	1.04	-16	16	---	---	---	---	---
7	77.4	74.4	0.96	-10	10	65.2	61.3	0.94	-14	14	---	---	---	---	---
8	70.5	54.7	0.78	-19	19	83.5	65.4	0.78	-27	27	---	---	---	---	---
9	80.2	67.4	0.84	-11	12	---	---	---	---	---	66.1	72	1.09	-3	3
10	88.1	81.1	0.92	-9	9	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	---	---	---	80	72.9	0.91	-2	7
12	74.4	76.9	1.03	4	6	---	---	---	---	---	80.5	75.3	0.94	-8	9
13	81.9	56.4	0.69	-24	24	---	---	---	---	---	---	---	---	---	---
14	99.2	67.7	0.68	-25	25	---	---	---	---	---	---	---	---	---	---
12	---	---	---	---	---	82.9	71.8	0.87	-11	11	96.2	74.5	0.77	-15	15
16	80.9	71.2	0.88	-15	15	90.1	77.6	0.86	-14	14					
17	71.4	75.2	1.05	-4	9	94.4	74.8	0.79	-15	15	74.2	83.7	1.13	6	7
18	91.9	69.6	0.76	-19	19	87.1	76.7	0.88	-8	11	---	---	---	---	---
19	83.6	64	0.77	-8	9	---	---	---	---	---	---	---	---	---	---
20	90.8	69.9	0.77	-19	19	---	---	---	---	---	---	---	---	---	---
21	75.5	82.1	1.09	10	15	---	---	---	---	---	70.5	68.3	0.97	-1	5
22	63.2	77.6	1.23	25	25	---	---	---	---	---	74.9	65.1	0.87	-11	12
23	75	70.8	0.94	-10	10	79.9	72.2	0.9	-7	7	62.2	73.8	1.19	3	4
24	76.8	73.6	0.96	-11	12	84.6	81.6	0.96	6	8	---	---	---	---	---
25	101.2	78.2	0.77	-19	19	65.5	73.8	1.13	10	10	---	---	---	---	---
26	93.9	81.5	0.87	-16	16	63.2	64.4	1.02	4	4	---	---	---	---	---
27	81.6	62.7	0.77	-21	21	---	---	---	---	---	---	---	---	---	---
28	78.1	63.6	0.81	-24	24	79	75.6	0.96	-5	5	74.1	71.5	0.96	-6	9
29	81.5	71	0.87	-14	14	84.8	78	0.92	-13	13	---	---	---	---	---
30	---	---	---	---	---	87.1	68.4	0.79	-22	22	---	---	---	---	---
31						82.5	75.9	0.92	-16	17	---	---	---	---	---

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

Graphical Evaluation

Figures V-7-3 through V-7-8 show the diurnal trends of observed and predicted 8-hour ozone for the each day from June 1 through August 31, 2008 for six stations following a transport route from the coastal area of the Basin to inland Crestline and Banning. Supplemental diurnal observed and predicted 8-hour ozone for all remaining air quality sites are provided as Attachment 7 to this appendix. In general, the coastal-metropolitan areas of the Basin show reasonable agreement between observed and predicted diurnal distributions for June but as observations trend well below 80 ppb in July and August, the performance shifts to over prediction. The San Gabriel and San Bernardino Valley sites are relatively unbiased with mixed but reasonably good performance – over predicting on some days while displaying the reverse on others. Performance at Crestline displays a slight bias towards under prediction but several peak days are well characterized. Banning is the eastern most Basin site and furthest removed from the main source of NOx emissions. Ozone predictions at Banning track the peak concentrations well but nighttime NOx scavenging is not well represented in the simulations.

Figure V-7-9 depicts the scatter plots of observed and predicted 8-hour daily maximum ozone for Zones 3, 4 and 5 merged for the three months. A minimum observed threshold of 60 ppb is used in the data selection. V-7-10 provides the same scatter plot for Zone 9. The general tendency is for peak prediction to fall within 10 percent of the centerline perfect fit. Zone 9 tends to exhibit under prediction.

Overall, it is important to note that the effects of prediction biases or errors are mitigated by the use of relative response factors for the attainment analysis.

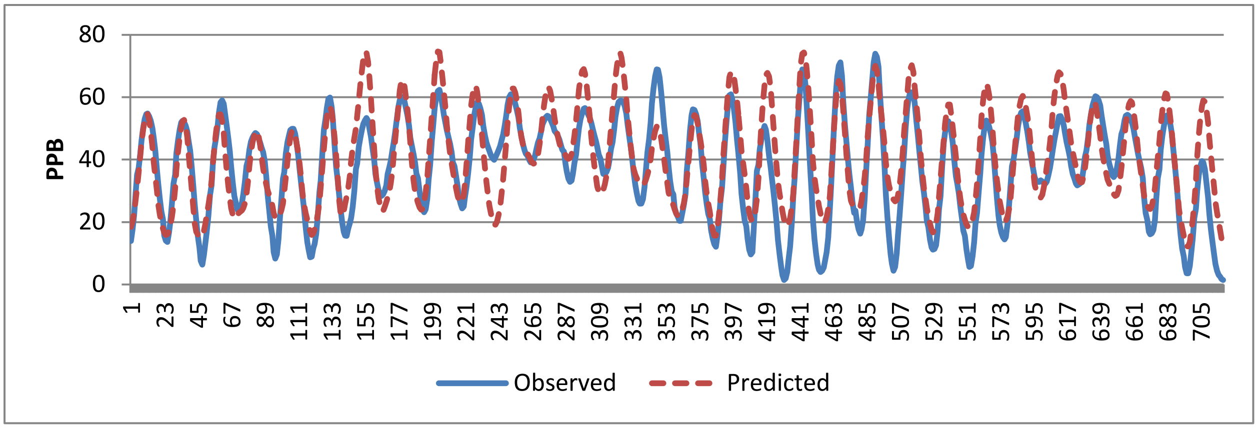

FIGURE V-7-3a

Time Series of Observed Vs.Predicted 8-Hour West Los Angeles Ozone: June, 2008

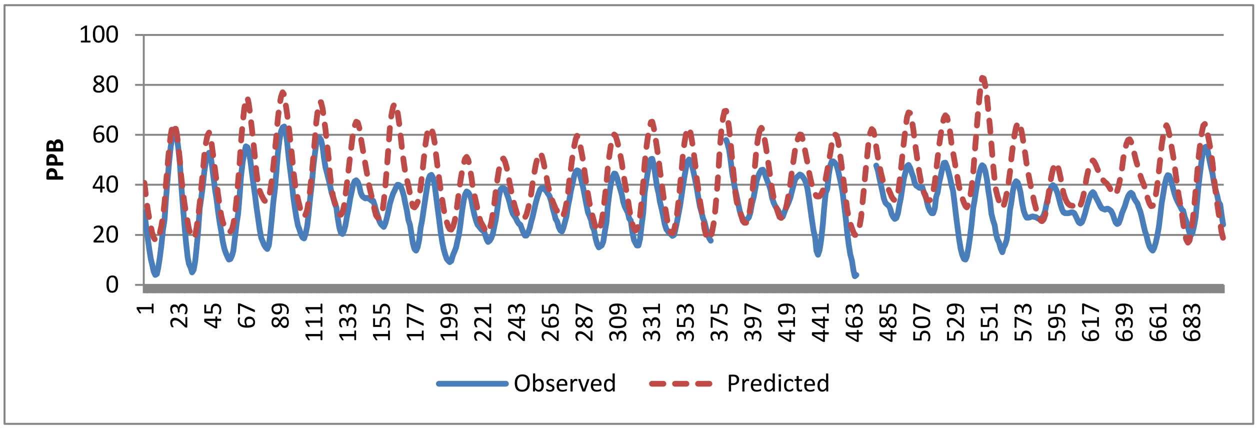

FIGURE V-7-3b

Time Series of Observed Vs.Predicted 8-Hour West Los Angeles Ozone: July, 2008

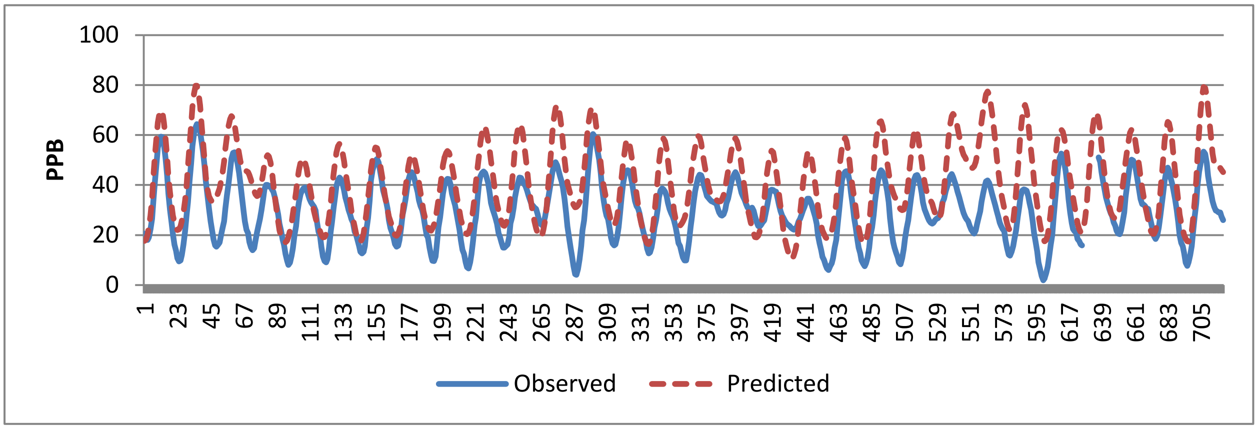

FIGURE V-7-3c

Time Series of Observed Vs.Predicted 8-Hour West Los Angeles Ozone: August, 2008

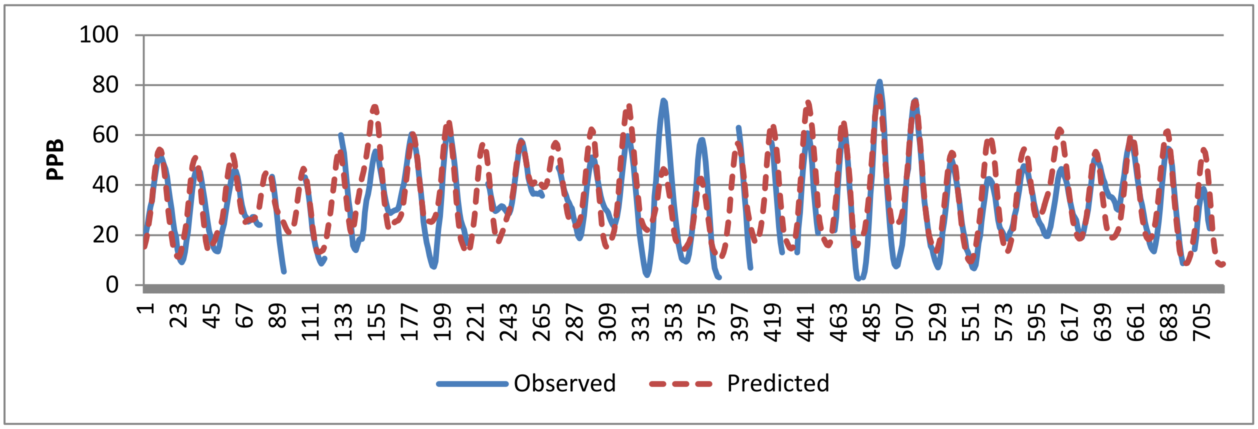

FIGURE V-7-4a

Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: June, 2008

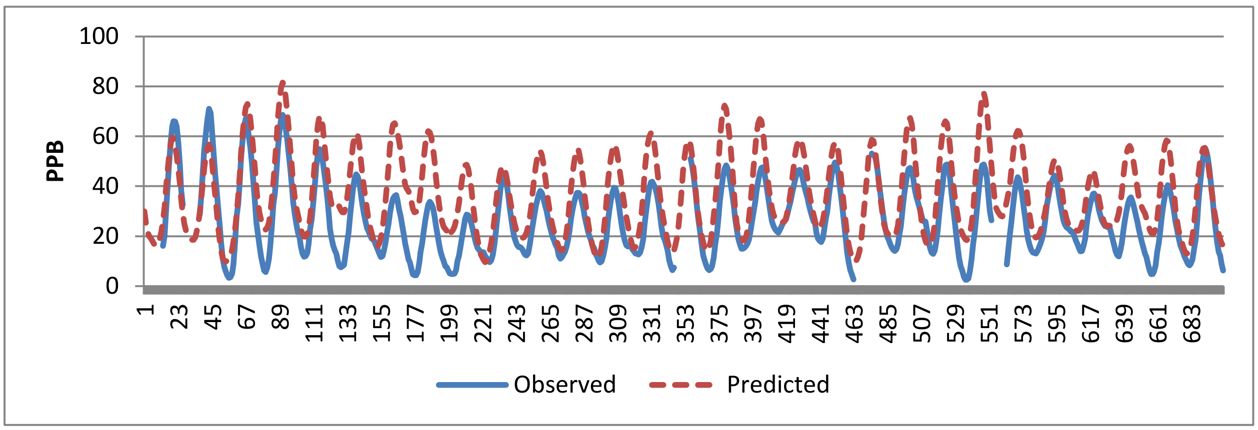

FIGURE V-7-4b

Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: July, 2008

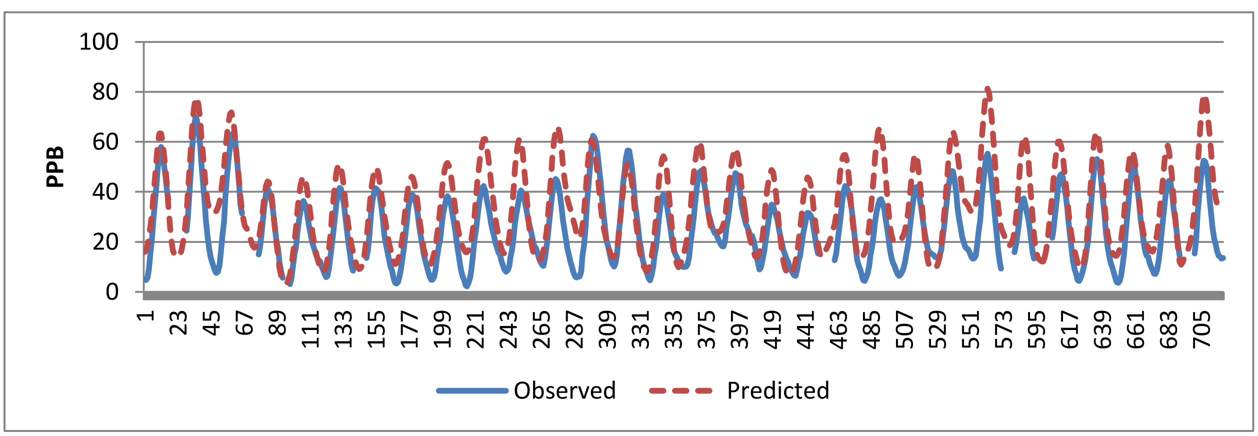

FIGURE V-7-4c

Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: August, 2008

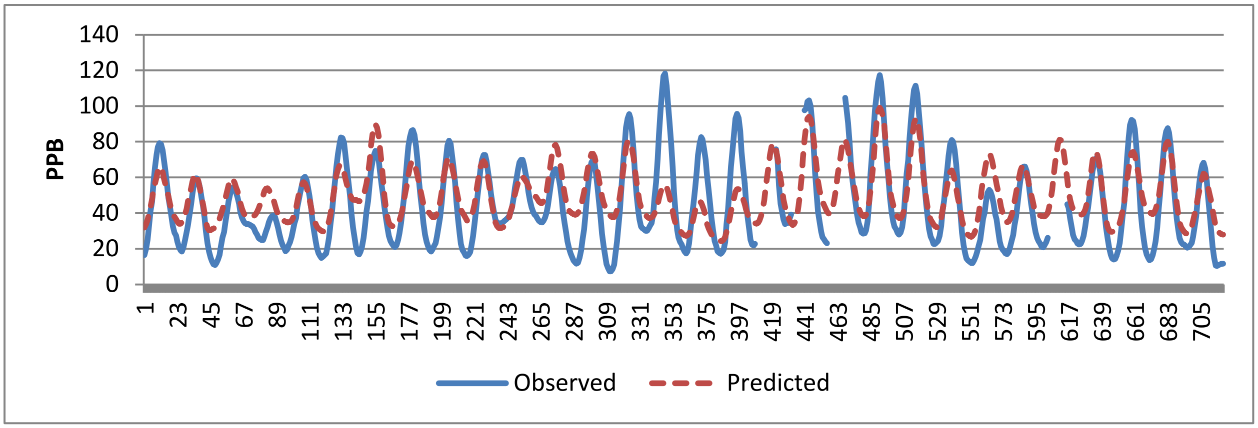

FIGURE V-7-5a

Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: June, 2008

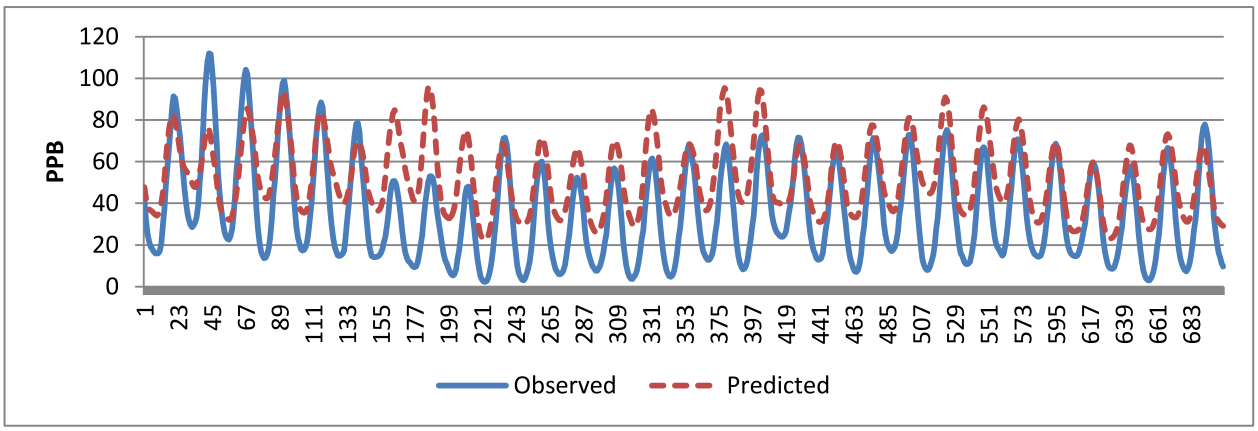

FIGURE V-7-5b

Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: July, 2008

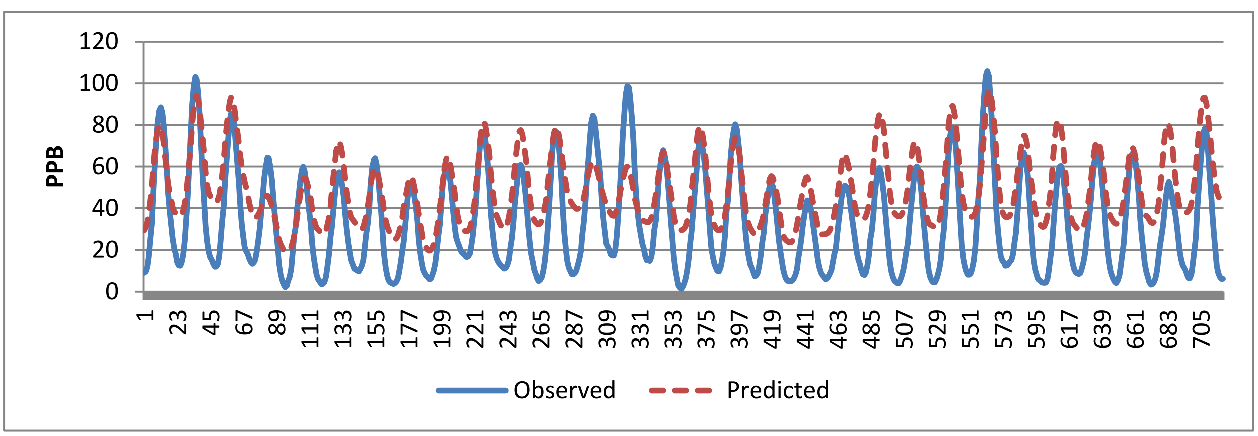

FIGURE V-7-5c

Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: August, 2008

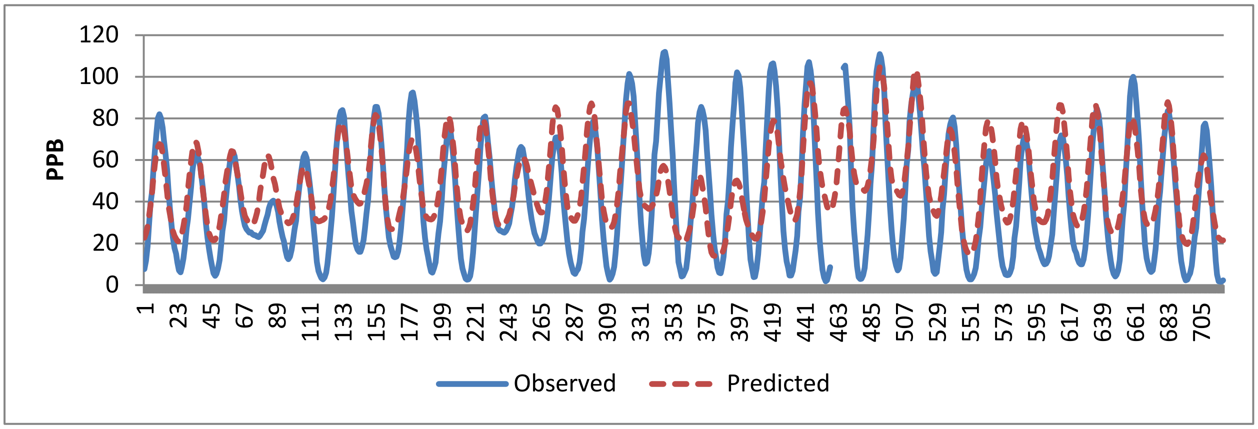

FIGURE V-7-6a

Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: June, 2008

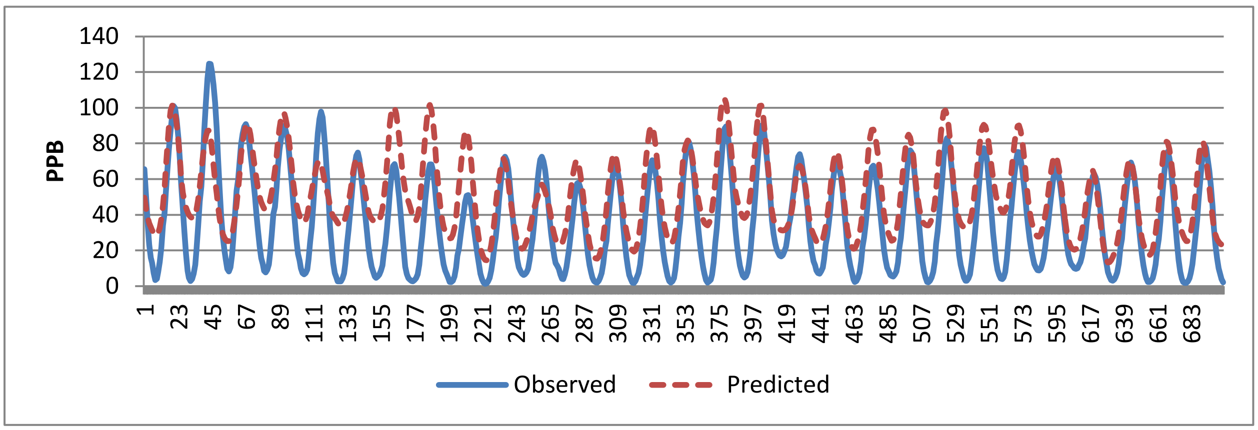

FIGURE V-7-6b

Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: July, 2008

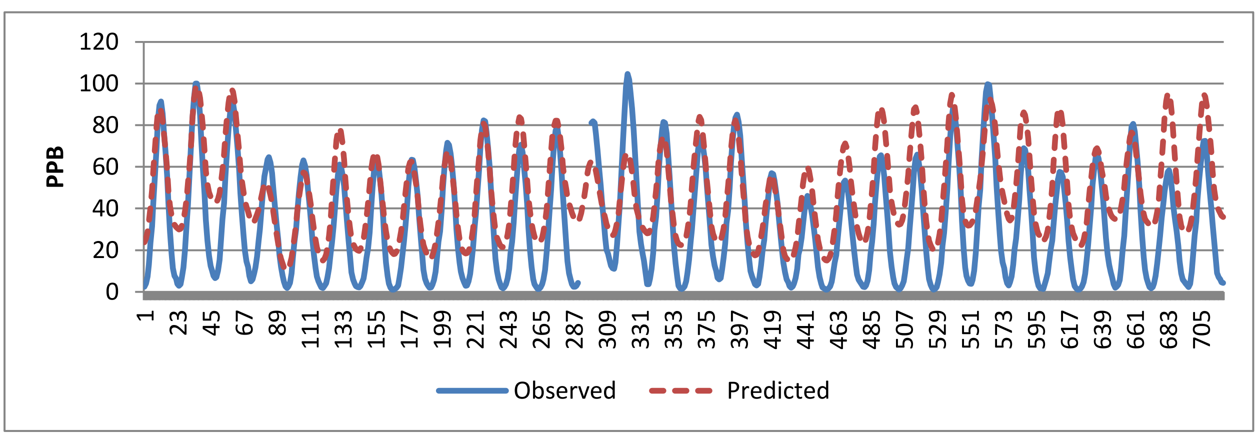

FIGURE V-7-6c

Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: August, 2008

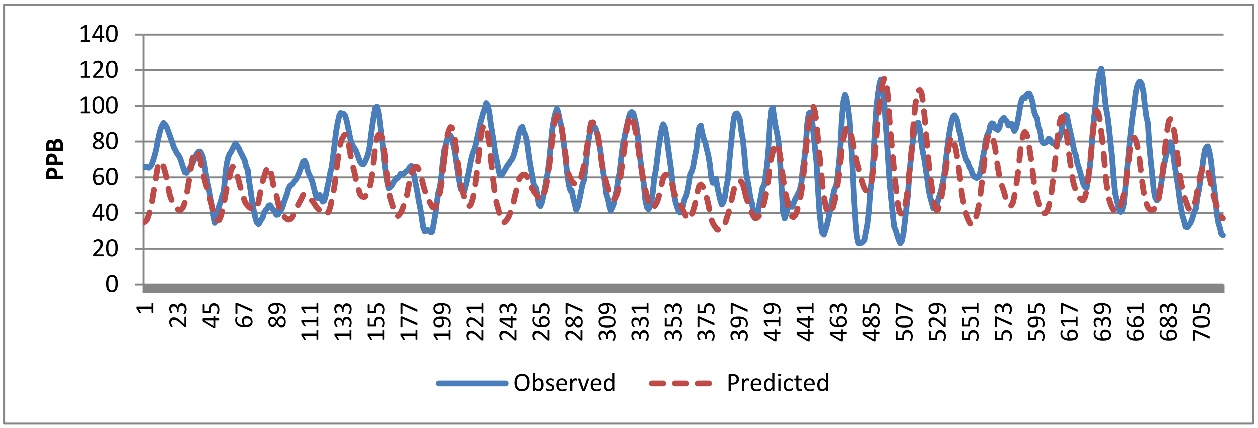

FIGURE V-7-7a

Time Series of Observed Vs.Predicted 8-Hour Crestline Ozone: June, 2008

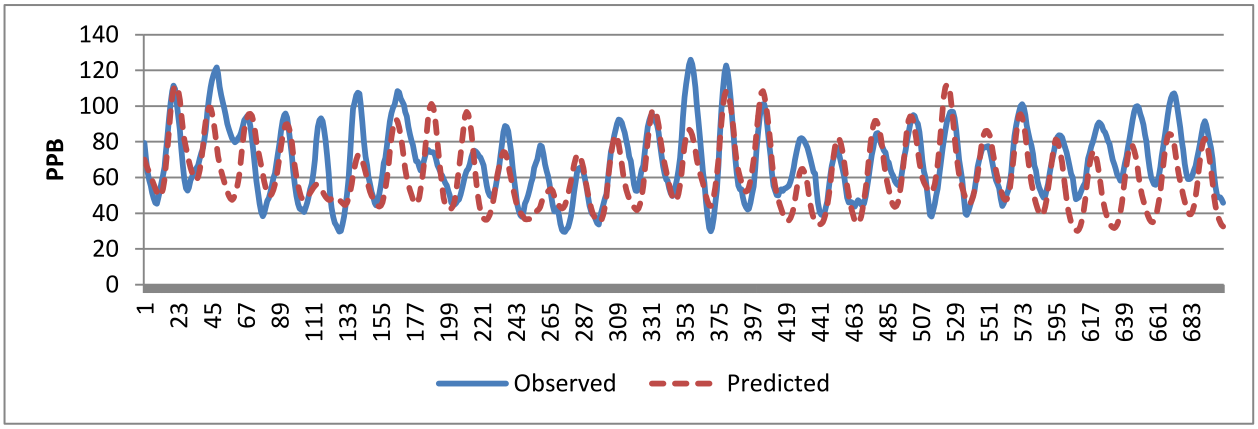

FIGURE V-7-7b

Time Series of Observed Vs.Predicted 8-Hour Crestline Ozone: July, 2008

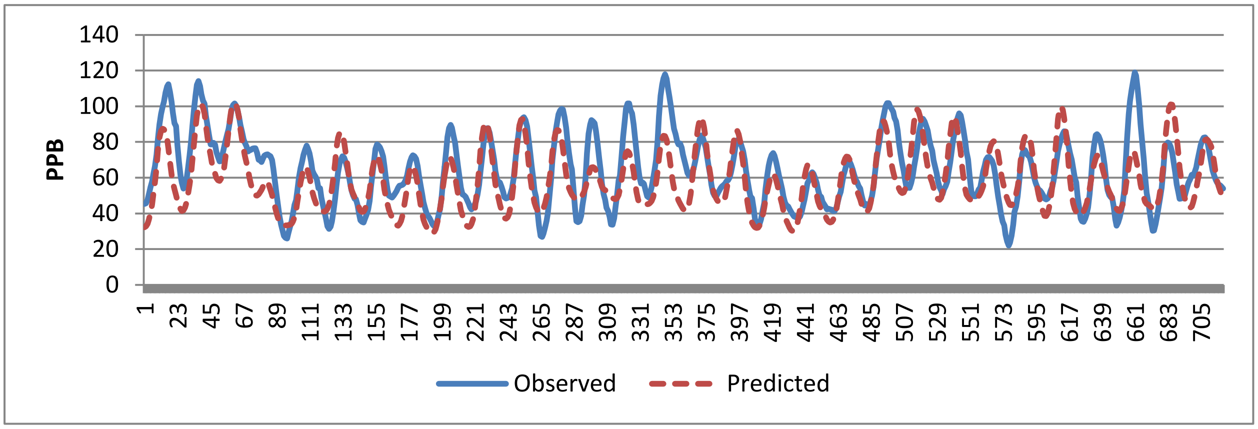

FIGURE V-7-7c

Time Series of Observed Vs.Predicted 8-Hour Crestline Ozone: August, 2008

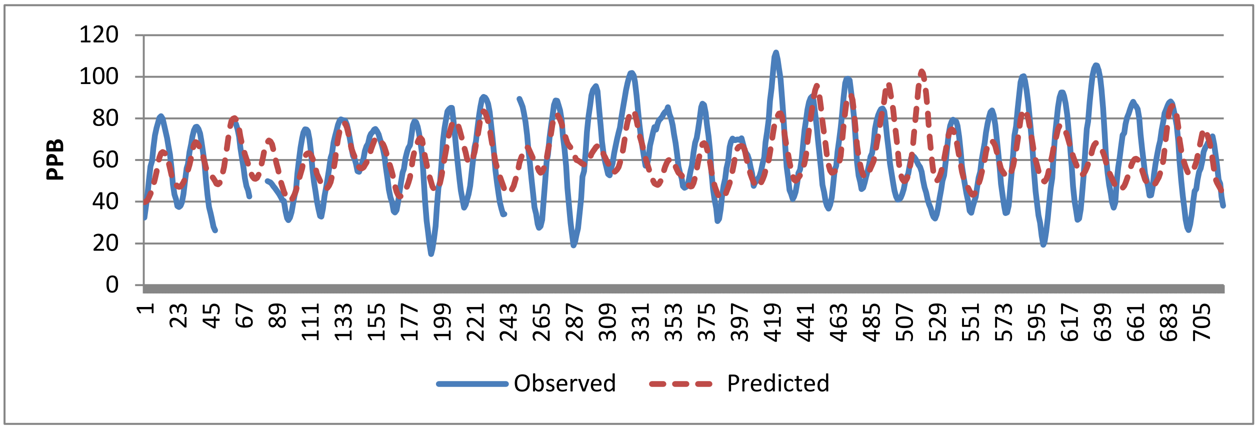

FIGURE V-7-8a

Time Series of Observed Vs.Predicted 8-Hour Banning Ozone: June, 2008

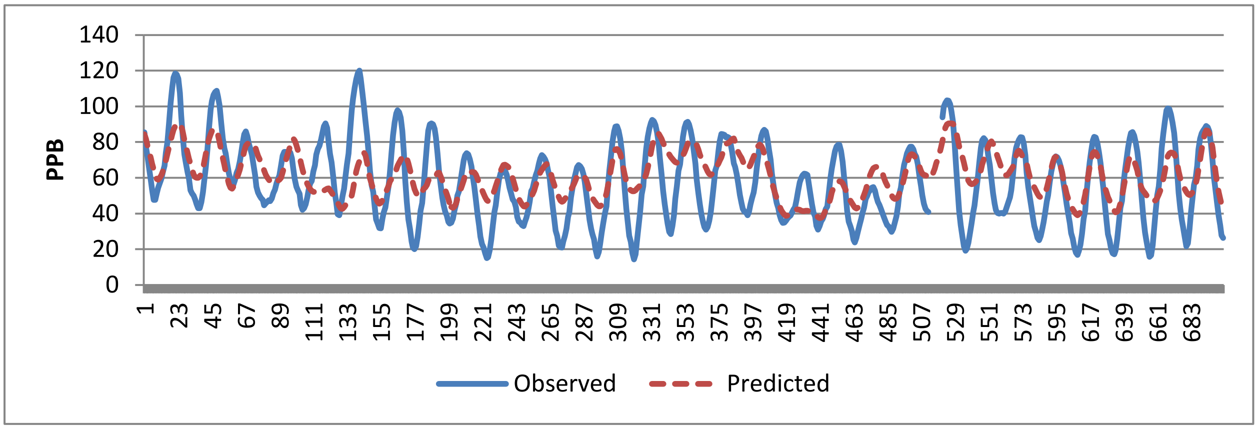

FIGURE V-7-8b

Time Series of Observed Vs.Predicted 8-Hour Banning Ozone: July, 2008

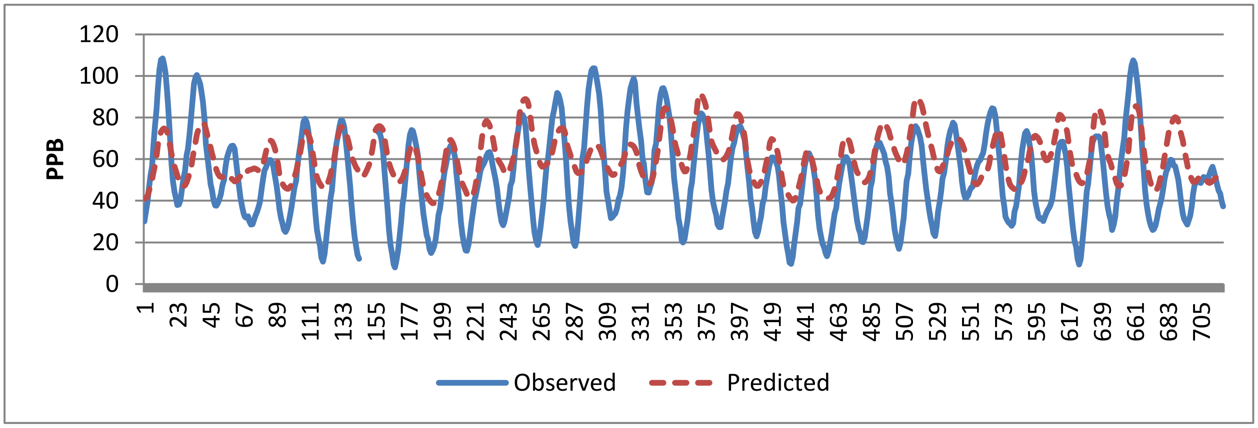

FIGURE V-7-8c

Time Series of Observed Vs.Predicted 8-Hour Banning Ozone: August, 2008

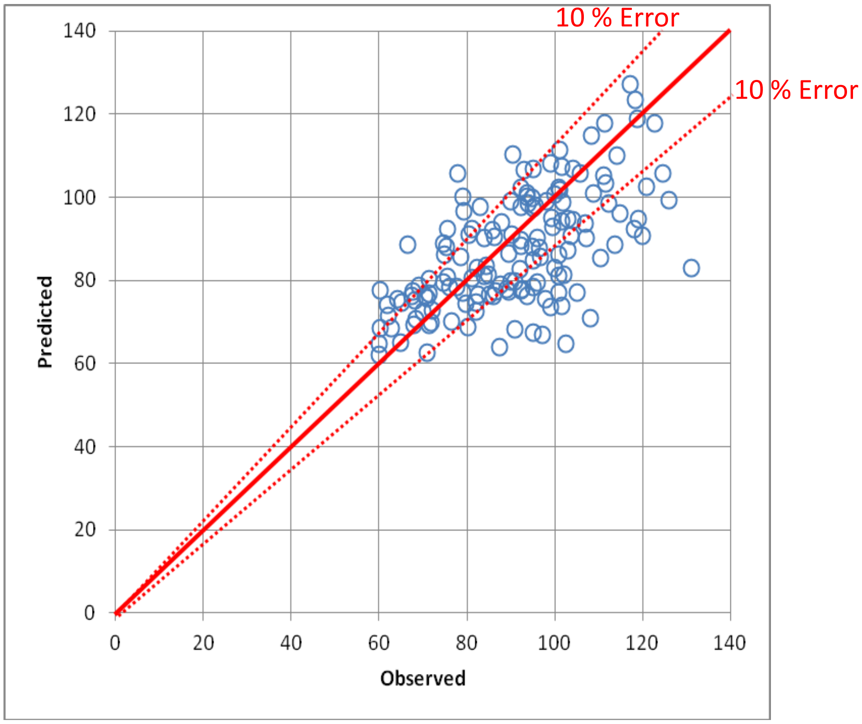

FIGURE V-7-9

Observed Vs.Predicted 8-Hour Sub Regional Ozone Maximums: Zones 3, 4 and 5 Combined

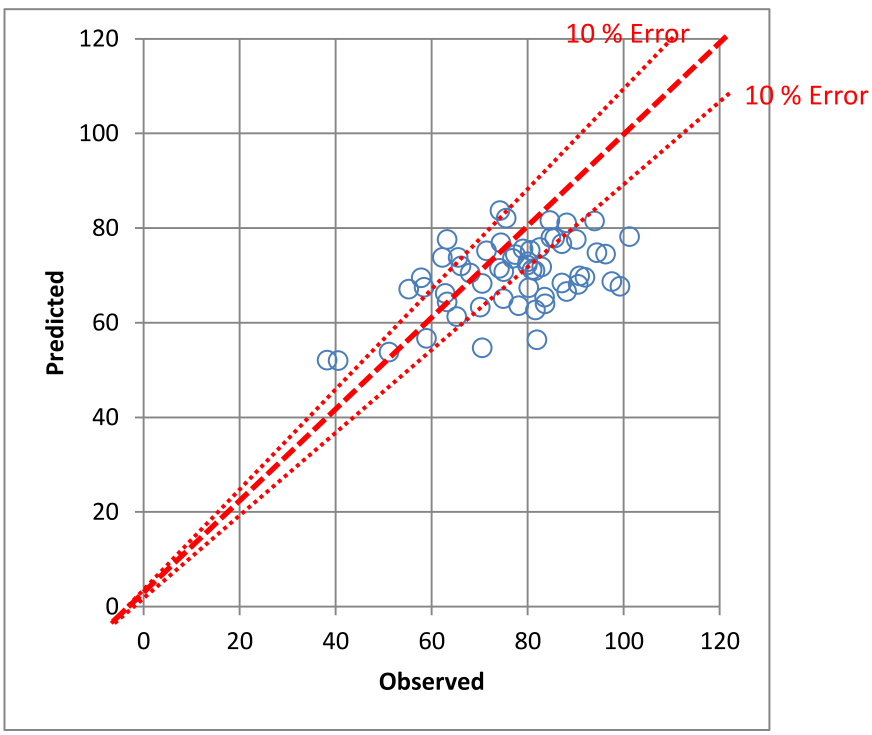

FIGURE V-7-10

Observed Vs.Predicted 8-Hour Sub Regional Ozone Maximums: Zones 9

OZONE MODELING APPROACH

The ozone modeling approach used in this update follows the same criteria employed for the 2007 AQMP attainment demonstration. Briefly, the set of 91 days from June 1 through August 30, 2008 were simulated as a subset of the annual PM2.5 simulations, and were analyzed to determine daily 8-hour average maximum ozone for the 2008 and 2023 emissions inventories. A separate 2023 simulation was conducted to assess future year ozone with VOC and NOx emissions specified at the levels defined by the 2007 AQMP attainment demonstration carrying capacity (420 TPD VOC and 114 TPD NOx). Finally, a set of simulations with incremental VOC and NOx emissions reductions from 2023 baseline emissions was generated to create ozone isopleths for each station in the Basin. The ozone isopleths provide updated guidance for the formulation of the future control strategies, particularly in light of the challenge of demonstrating attainment with the current 75 ppb standard in a SIP to be submitted to U.S. EPA in 2015.

The ozone RRFs were calculated using the ratio methodology described for the PM2.5 modeling. Individual station day inclusion in the analysis was determined by three basic criteria: (1) the observed ozone concentration had to be ± 30 percent of the station's weighted design value; (2) the absolute prediction accuracy of the base 2008 simulation for that day was required to be within 20 percent; and (3) the observed daily maximum concentration needed to be greater than 84 ppb. The criteria were designed to eliminate extreme values from entering the analysis and to only focus on station days were model performance met the long standing criteria for acceptance used in previous attainment demonstrations. Finally, only station days where ozone exceeded the 84 ppb threshold established to demonstrate attainment to the 1997 ozone standard as specified in the U.S. EPA Modeling Attainment Guidance Document were included in the analysis.

FUTURE OZONE AIR QUALITY

Table V-7-9 summarizes the results of the updated ozone simulations. Included in the table are the 2023 ozone baseline and 2023 controlled ozone projections from the 2007 AQMP ozone attainment demonstration modeling analysis approved by U.S. EPA as part of the SIP. The Final 2012 AQMP base year ozone simulations reflect the changes made to the 2023 base year inventory. The Final 2012 AQMP summer planning inventory has a higher ratio between VOC and NOX emissions (1.39 vs. 1.05) although total tonnages of both precursor emissions are lower than presented in the 2007 AQMP. The higher VOC to NOx ratio is indicative of a more reactive pollutant mix with average projected ozone design concentrations 9 percent higher than previously projected. One implication of this simulation is that moderate VOC emissions reductions in the years between 2014 and 2023 will benefit regional ozone concentrations. Yet, the projected 2023 baseline design value of 108 PPB continues to exceed the federal standard by 35 percent. With the implementation of the Final 2012 AQMP short term control measures and the Section 185(e)(5) long-term control measures, (defined in this update as the difference between the Final 2012 AQMP 2023 baseline VOC and NOx emissions and the corresponding 2007 AQMP ozone attainment demonstration carrying capacity for the Basin), projected regional ozone design values closely match those defined in the 2007 AQMP ozone attainment demonstration. Regardless, it will still require a 64 percent reduction in NOx emissions and an additional 3 percent reduction in VOC emissions to attain the 1997 ozone standard. With controls in place, the updated analysis corroborates the approved 2007 AQMP ozone attainment demonstration in that it is expected that all stations in the Basin will meet the federal 8-hour ozone standard.

The east Basin stations in the San Bernardino Valley continue to have among the highest projected 8-hour controlled design values for this update. The 2023 controlled ozone design value at Glendora is also projected to exceed 80 ppb. Glendora, Upland, Fontana and San Bernardino are downwind receptors along the primary wind transport route that moves precursor emissions and developing ozone eastward by the daily sea breeze. The higher projected design value at Glendora reflects the higher VOC to NOx ratio observed in the baseline inventory relative to the 2007 AQMP 2023 baseline inventory. The 2023 controlled design at Glendora for the Final 2012 AQMP actually represents a greater response to emissions reductions than in the 2007 AQMP attainment demonstration. Future year projections of ozone for this update along the northerly transport route through the San Fernando Valley indicate that the ozone design value in the Santa Clarita Valley will be approximately 15 percent below the standard.

TABLE V-7-9

Model-Predicted 8-Hour Ozone Concentrations (ppb)

Location	2007 Ozone SIP 2023 Baseline Design	2007 Ozone SIP 2024 Controlled Design	Final 2012 AQMP Updated 2023* Baseline Design	Final 2012 AQMP Updated* 2024 Controlled Design
Azusa	82	80**	95	77
Burbank	86	70**	88	72
Reseda	86	68	90	73
Pomona	85	75	100	80
Pasadena	78	74**	92	76
Santa Clarita	95	74	94	73
Glendora	91	79	107	84
Riverside	92	78	100	77
Perris	94	78***	88	66
Lake Elsinore	80	64	85	66
Banning	88	70	94	73
Upland	92	78	106	83
Crestline	100	83	107	81
Fontana	97	81	104	81
San Bernardino	92	78	108	83
Redlands	98	81	103	77

* Informational purpose only based on preliminary emissions inventories.
** Based on the city-station specific RRF's determined from the 19 episode day average.
*** Based on the average of the RRF's determined from the stations meeting the criteria having more than 5 episode days.

Spatial Projections of 8-Hour Ozone Design Values

The spatial distribution of ozone design values for the 2008 base year is shown in Figure V-7-11. Future year ozone air quality projections for 2024 with and without implementation of all control measures are presented in Figures V-7-12 andV-7-13. The predicted ozone concentrations will be significantly reduced in the future years in all parts of the Basin with the implementation of proposed control measures in the South Coast Air Basin.

Coachella Valley

The results of the CMAQ 8-hour ozone simulations conducted for 2014 and 2019 also indicate that the two Coachella sites, Palm Springs and Indio will meet the federal standard by the 2019 attainment date. The projected 2018 8-hour ozone design for the Coachella Valley portion of the Salton Sea Air Basin will be 84 ppb.

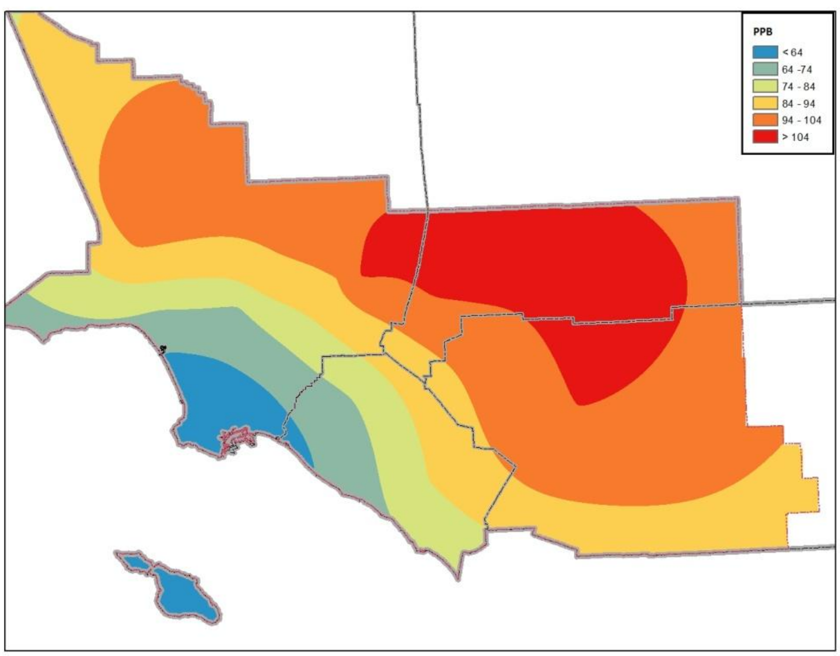

FIGURE V-7-11

2008 Baseline 8-Hour Ozone Design Concentrations (ppb)

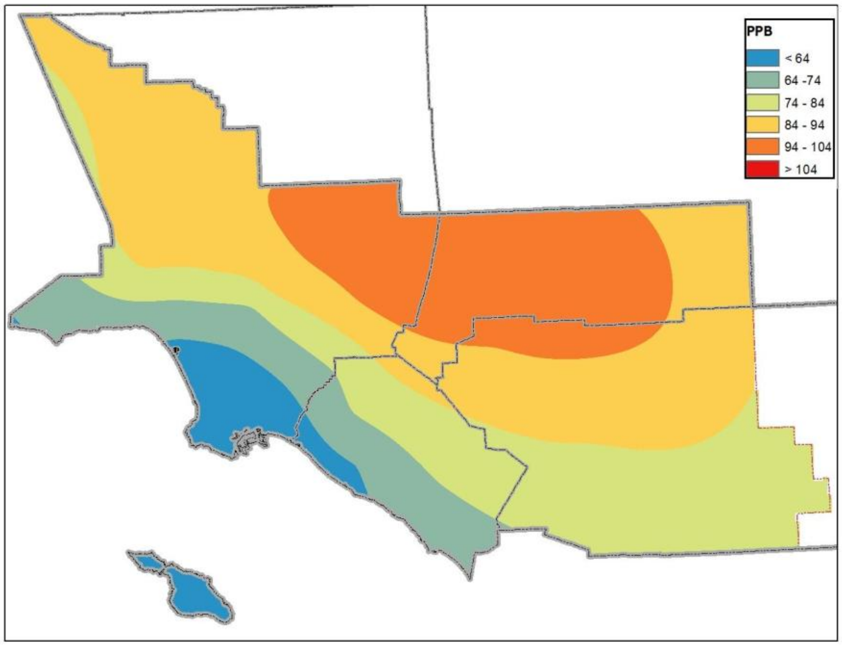

FIGURE V-7-12

Model-Predicted 2024 Baseline 8-Hour Ozone Design Concentrations (ppb)

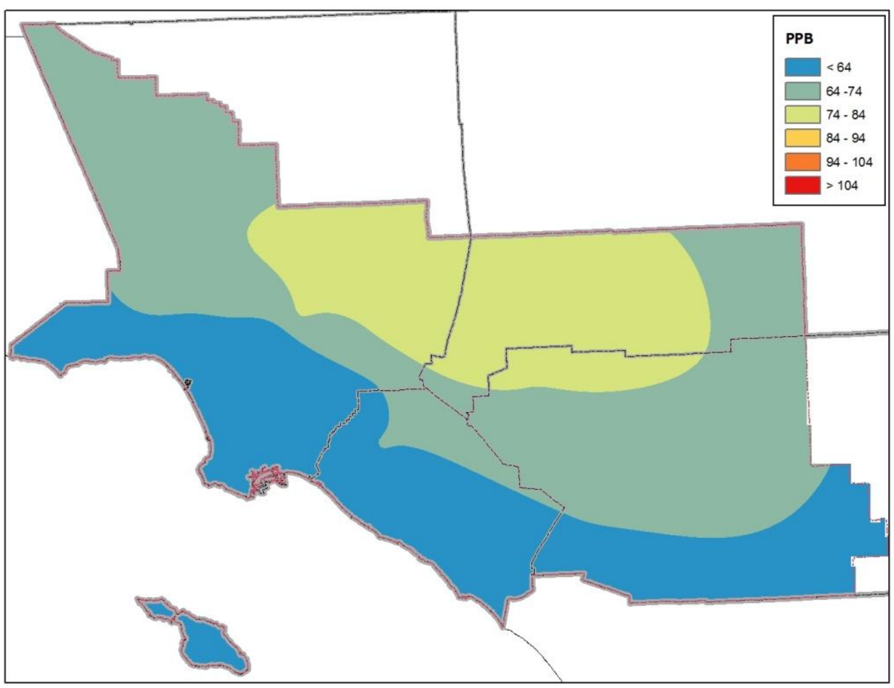

FIGURE V-7-13

Model-Predicted 2024 Controlled 8-Hour Ozone Design Concentrations (ppb)

LOOKING BEYOND 2023

The 2006 8-hour ozone standard is 75 ppb. The 2007 AQMP was focused on attainment of the 1997 8-hour ozone standard of 80 ppb. As of the writing of this document, the 2006 8-hour ozone implementation rule has not been finalized by U.S. EPA. The likely attainment date for Basin attainment of the 75 ppb standard is 2032. It is important to consider how much additional emissions reductions will be required for future attainment of this new standard. Figure V-7-14 provides the ozone isopleth for Crestline generated from the set of ozone simulations conducted during this analysis. Relying on the NOx heavy control strategy, it is projected that a reduction of NOx emissions exceeding 70 percent of the 2023 baseline (319 TPD) will be required to meet the 75 ppb standard. Additional NOx reductions will be required if the 8-hour ozone standard is lowered beyond 75 ppb. 8-hour ozone isopleths for all Basin sites exceeding the standard are provided in Attachment 8.

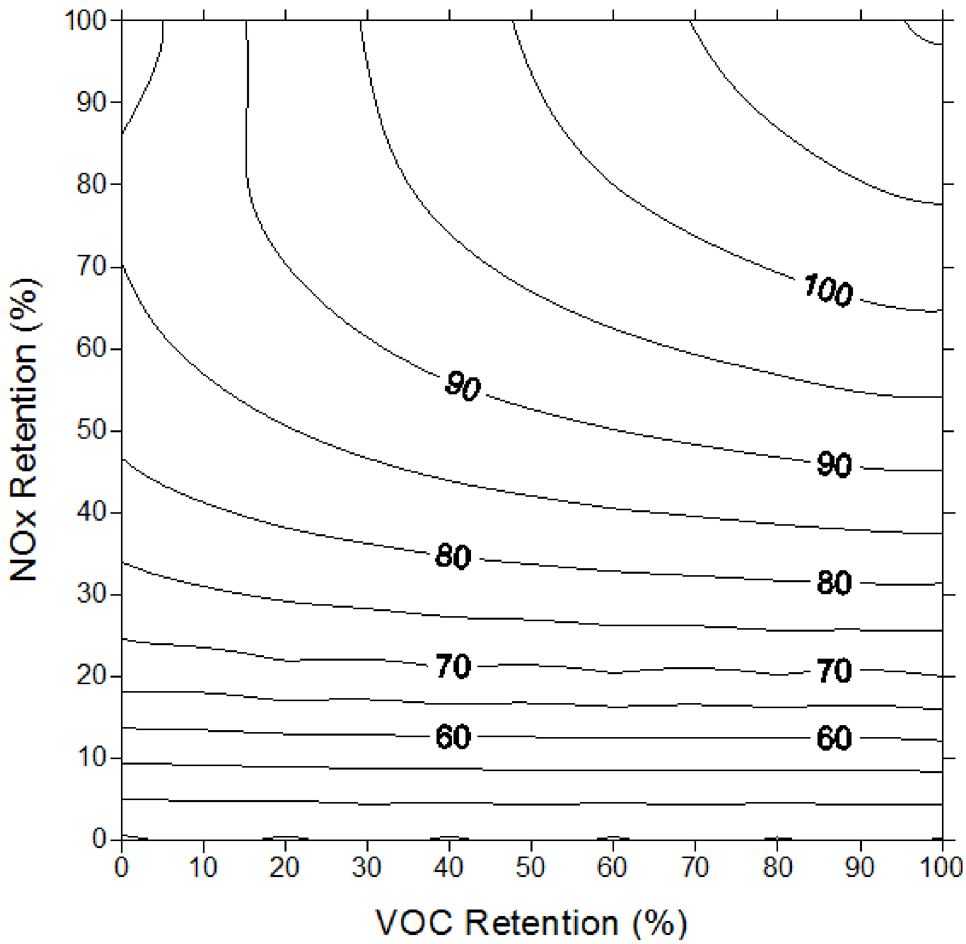

FIGURE V-7-14

2023 Crestline 8-Hour Ozone Isopleth

CHAPTER 8

SUMMARY AND CONCLUSIONS

Comparison to State and Federal Standards

COMPARISON TO STATE AND FEDERAL STANDARDS

Figure V-8-1 shows the 2008 observed and 2014 model-predicted regional peak concentrations for 24-hour average and annual PM2.5 as percentages of the most stringent federal standard. The federal 24-hour and annual PM2.5 standards are predicted to be attained in 2014 with implementation of the Final 2012 AQMP control measures. The California annual PM2.5 standard will not be attained before 2019. (see Figure V-8-2).

The challenge of attaining the proposed revision to the federal annual PM2.5 standard will depend on the final selection of a standard threshold at a value between 12 and 13 $\mu g/m^3$.

Given the changes made to the modeling platform, the number of episodes evaluated, and the distinct changes in the projected Final 2012 AQMP 2023 baseline inventory, projected 8-hour ozone design values with implementation of the short and long term controls are very consistent with those presented in the 2007 AQMP attainment demonstration. Again, an approximate 65 percent reduction in NOx emissions in 2023 will be required to meet the 1997 8-hour ozone standard of 80 ppb by 2024. More reductions will be required to meet the 2006 8-hour ozone standard by 2032.

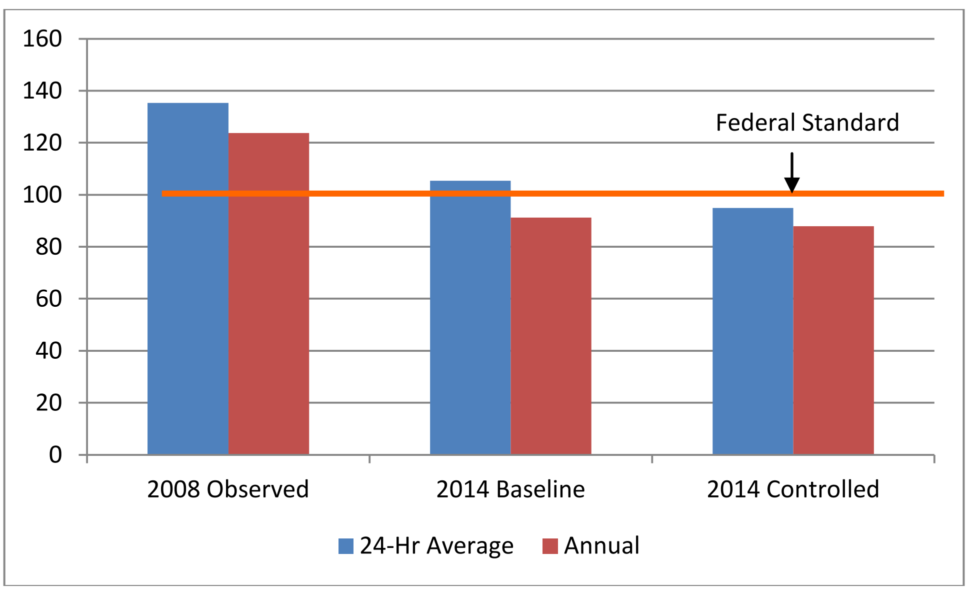

FIGURE V-8-1

Projection of Future Air Quality in the Basin as a percentage of the federal standards.

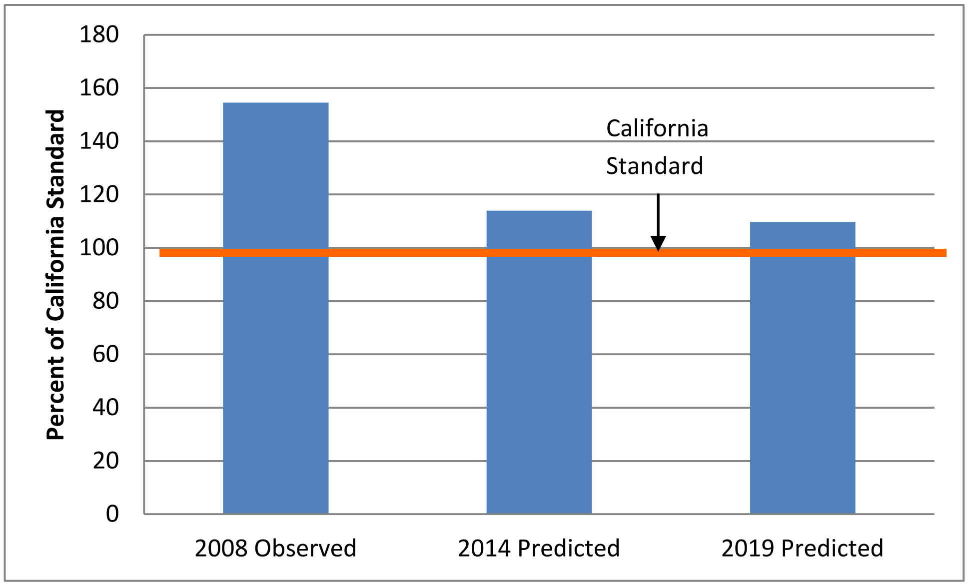

FIGURE V-8-2

Projection of Future PM2.5 in the Basin as a percentage of the California state standard

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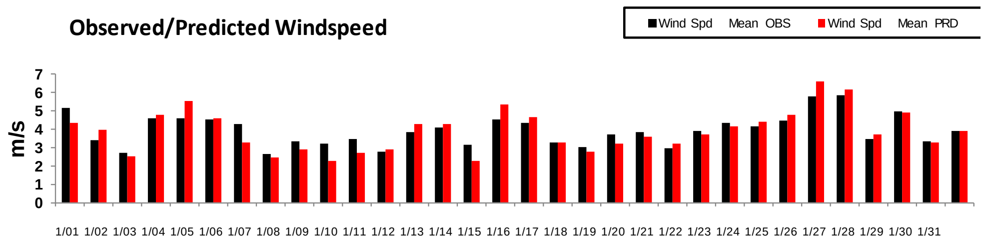
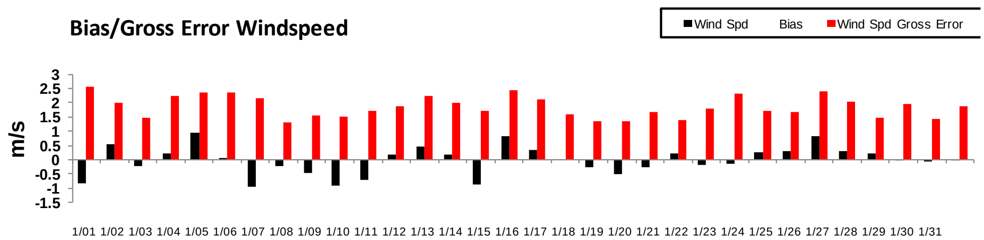
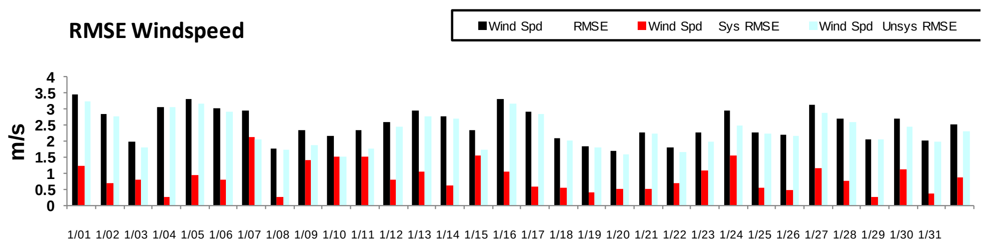
Attachment 1

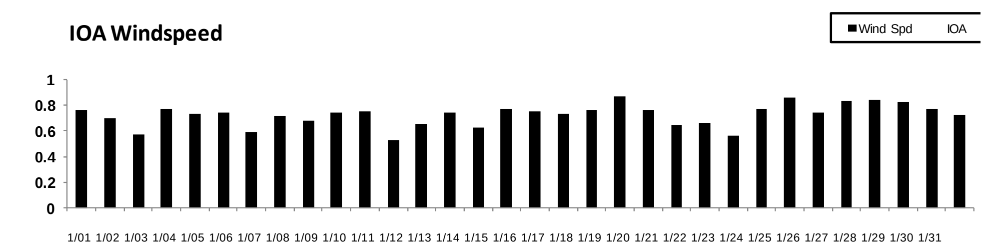
WRF METSTAT Model Graphical Performance Statistics

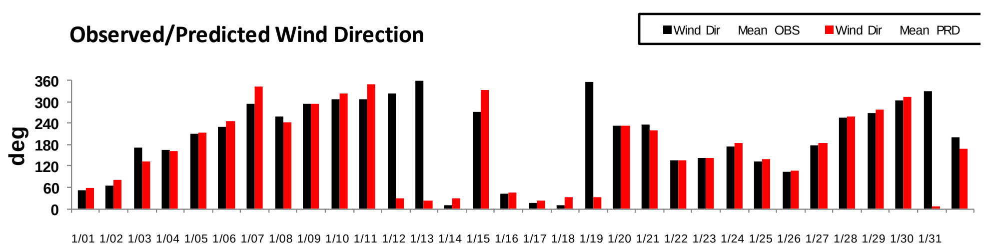
January Wind Speed & Direction

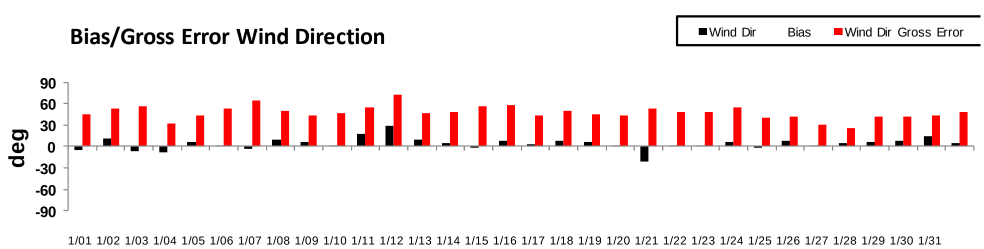












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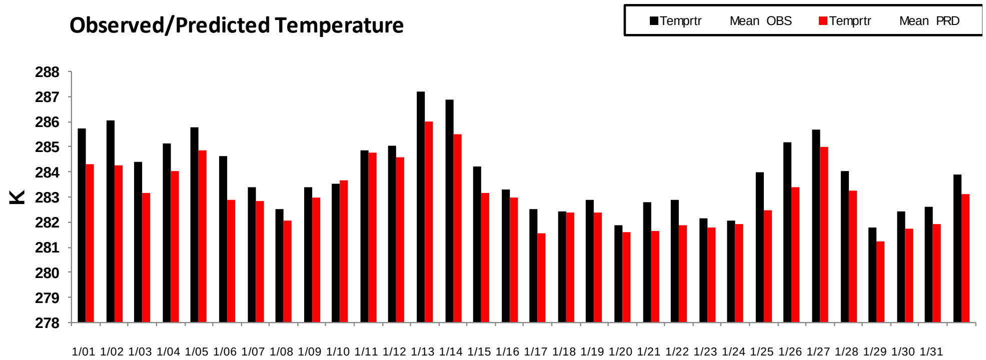

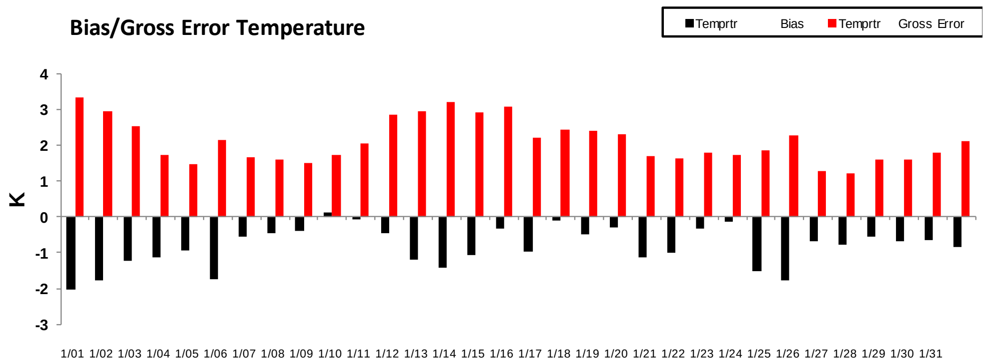

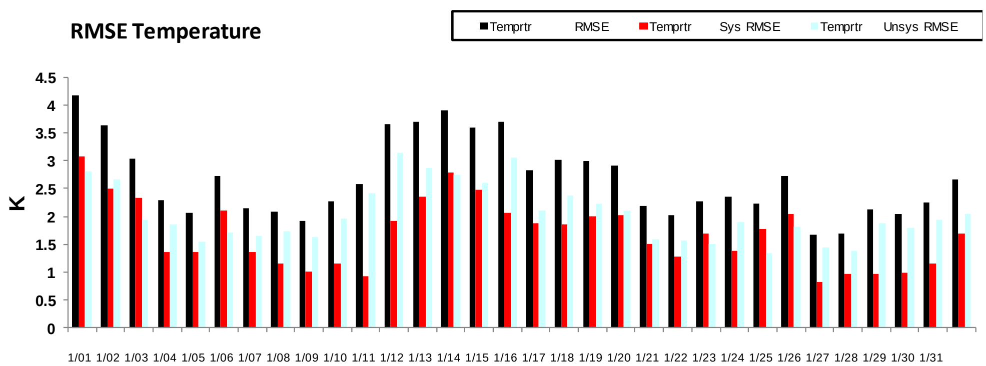

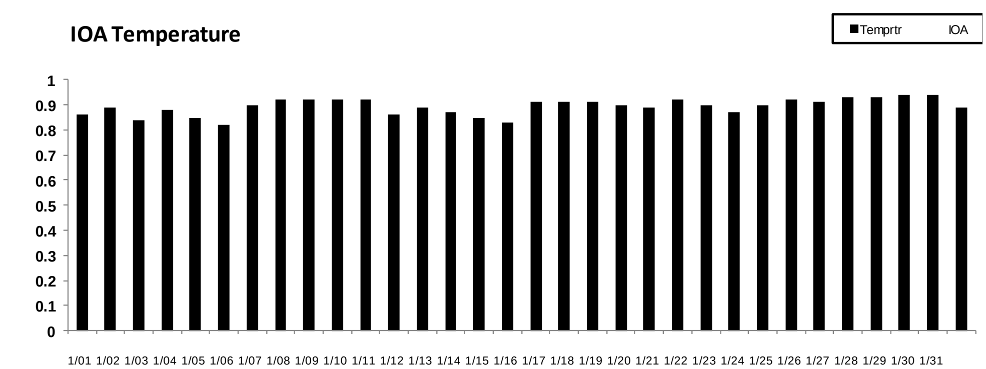

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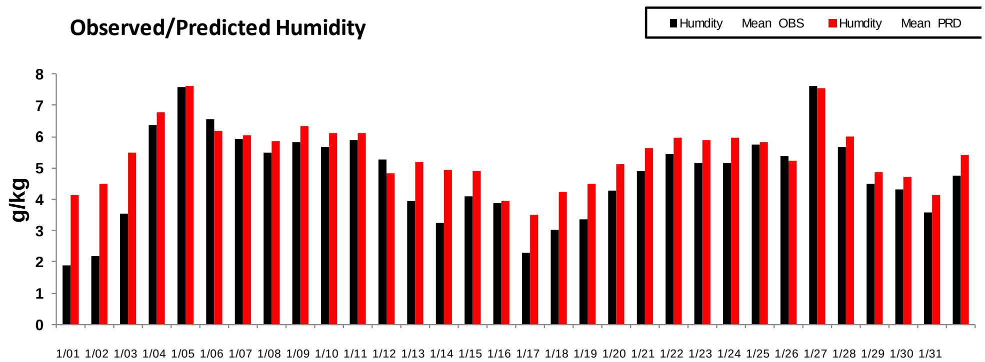

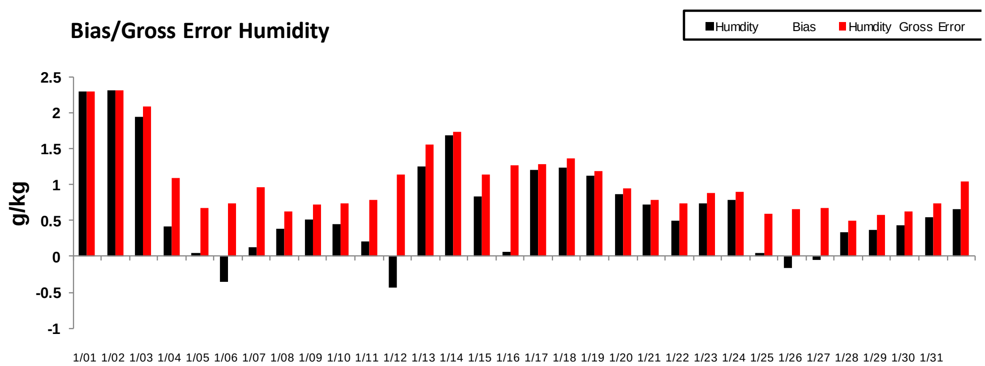

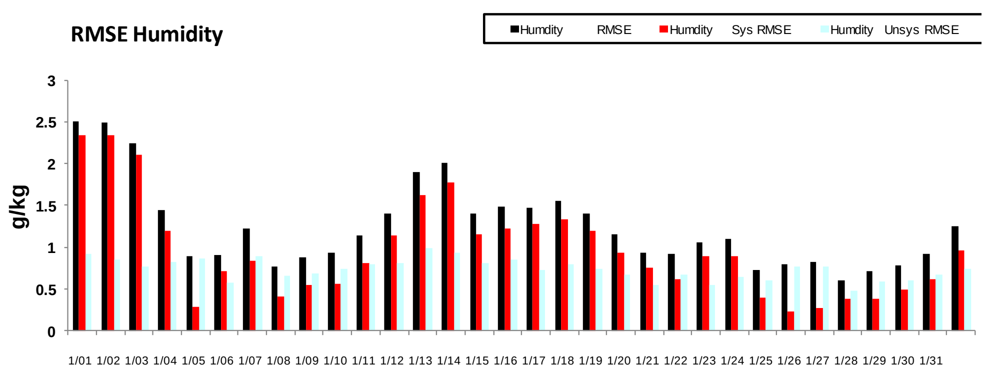

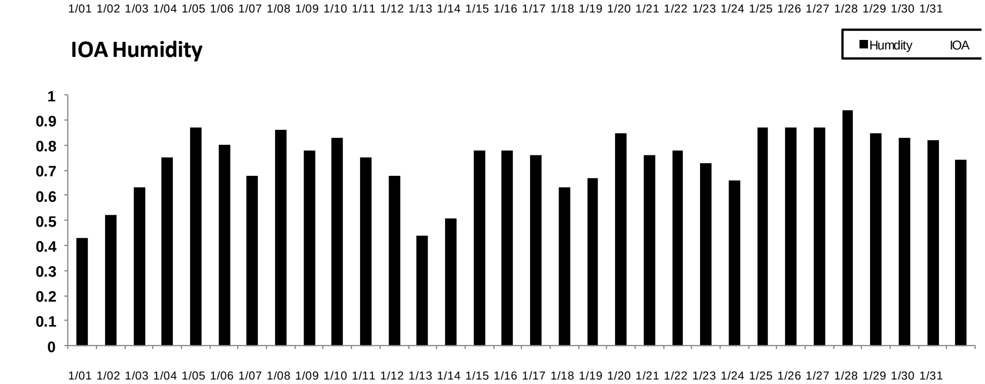

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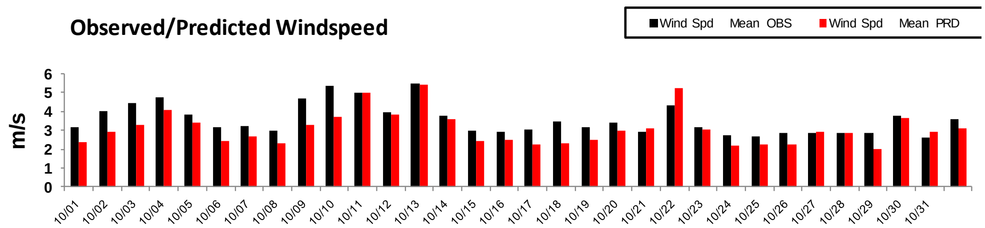

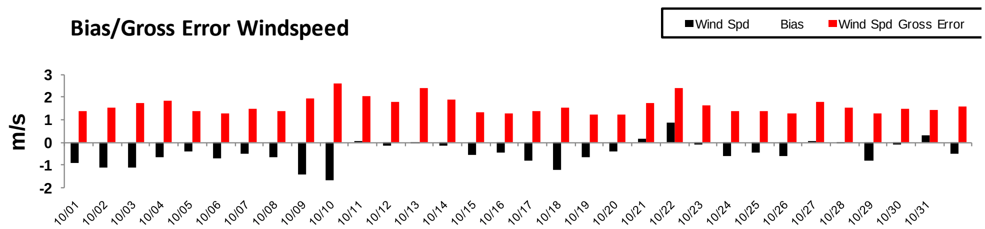

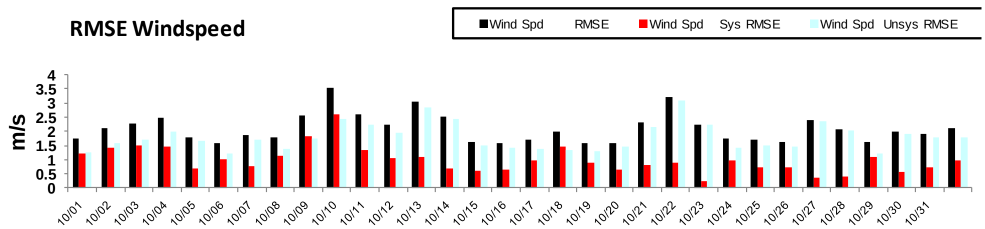

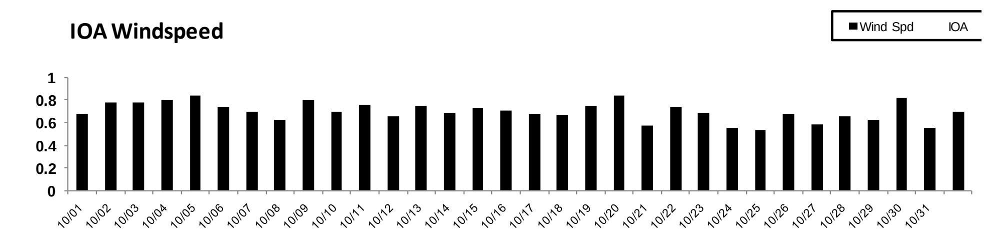

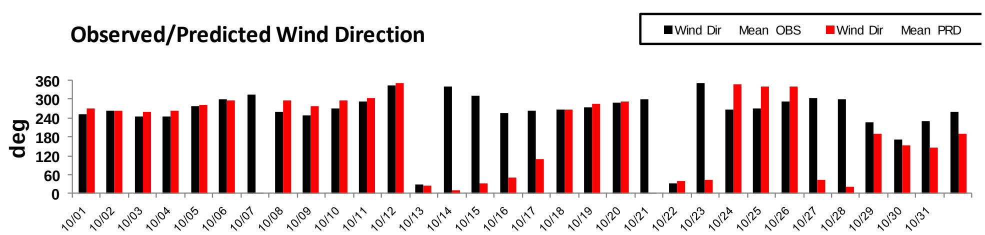

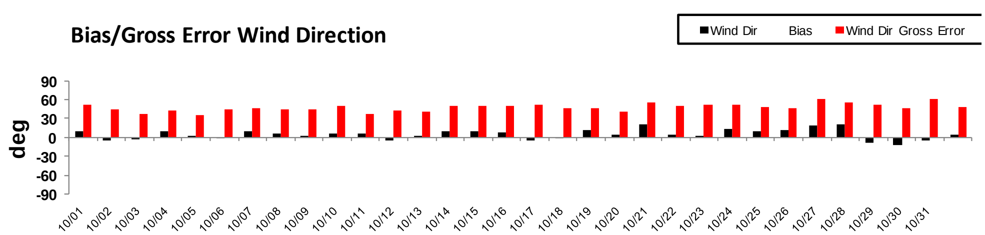

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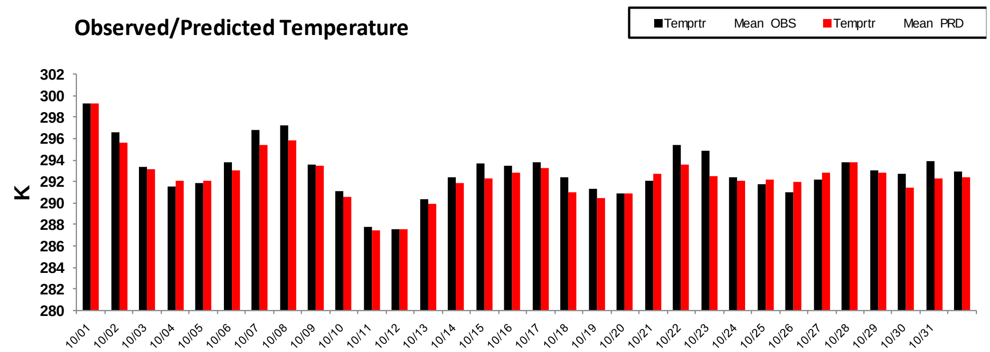
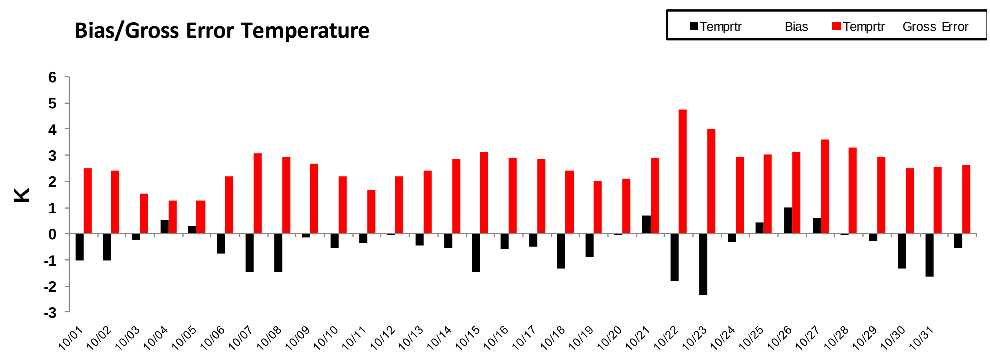
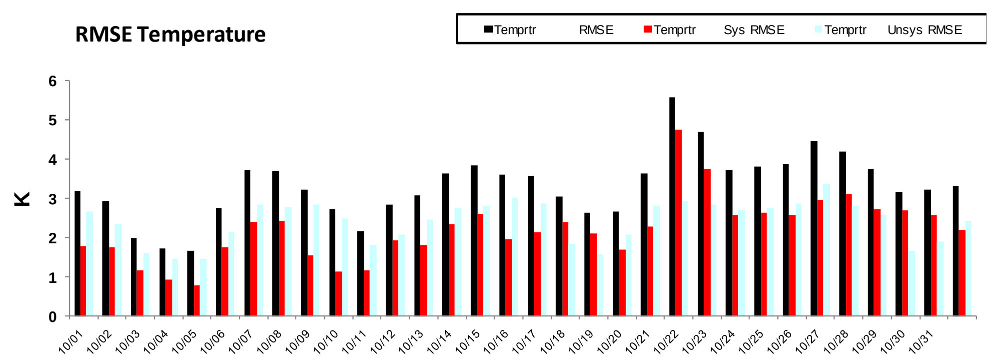
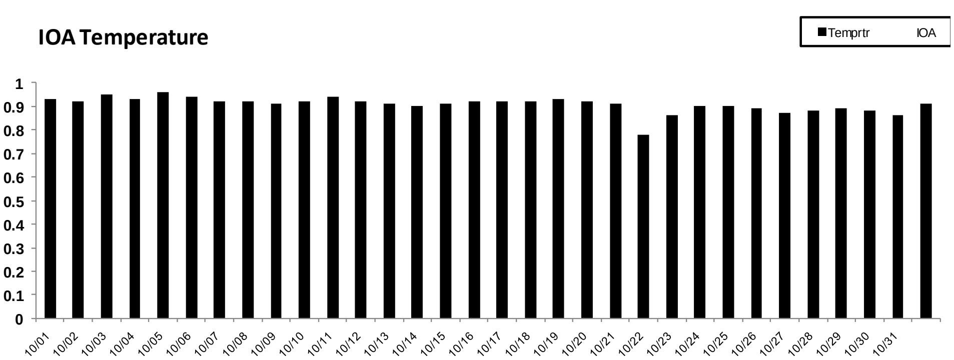


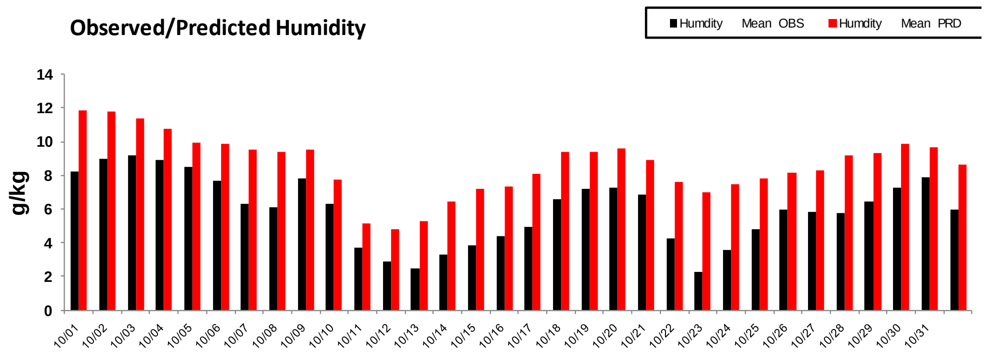




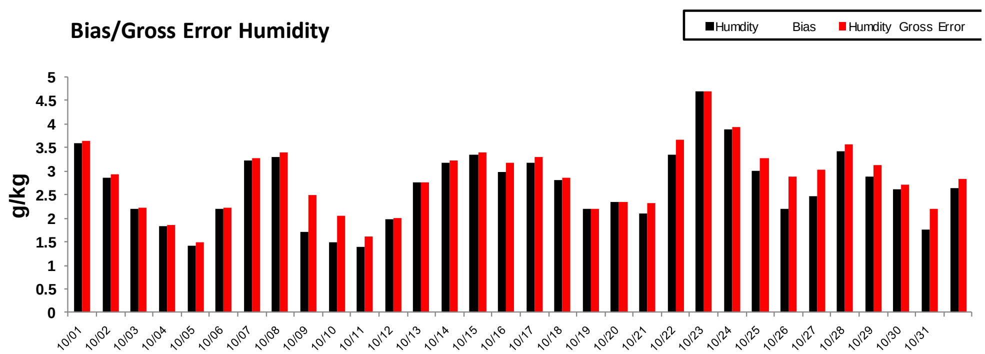


October Humidity

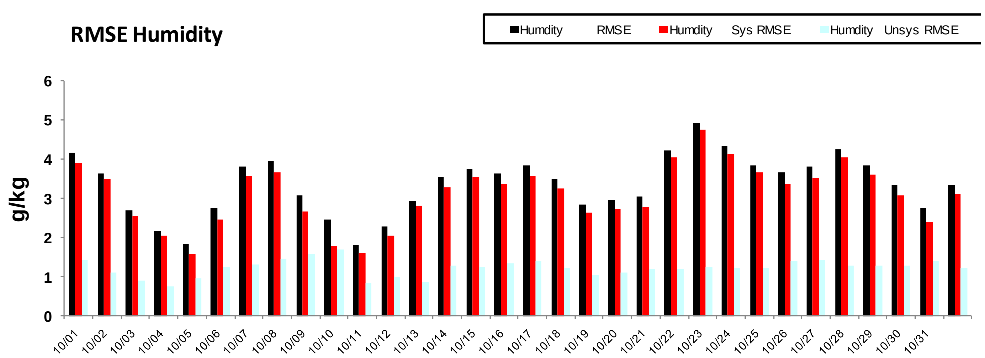
Observed/Predicted Humidity



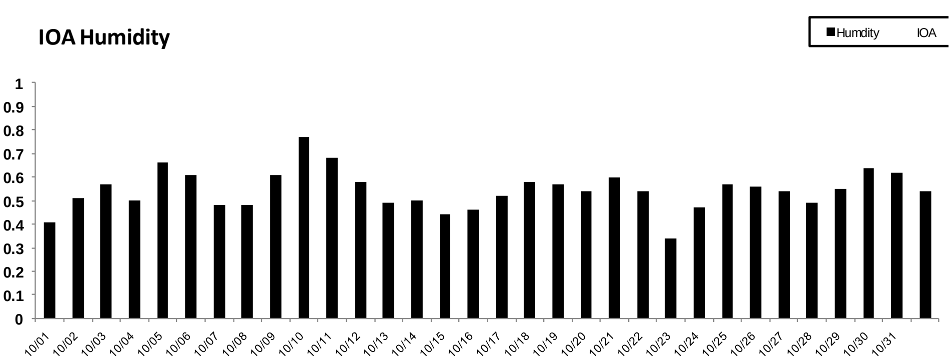
Bias/Gross Error Humidity



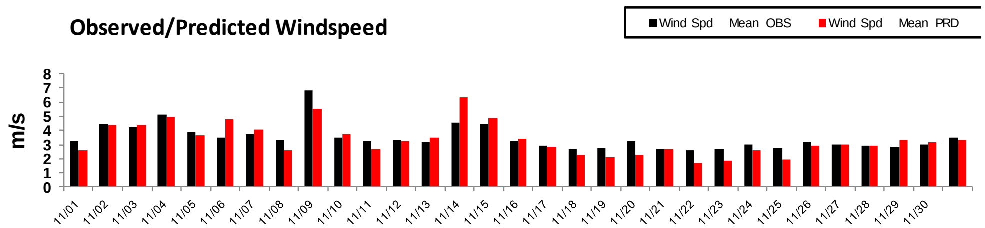
RMSE Humidity

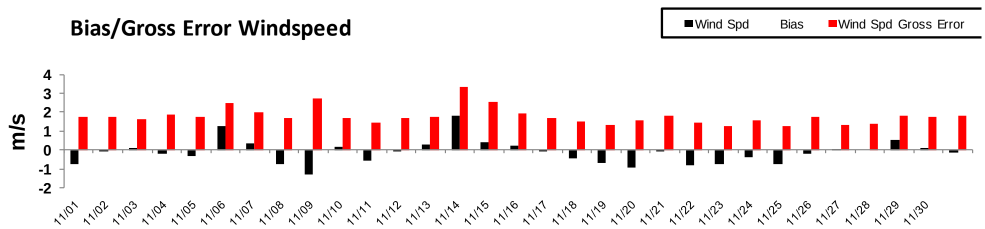


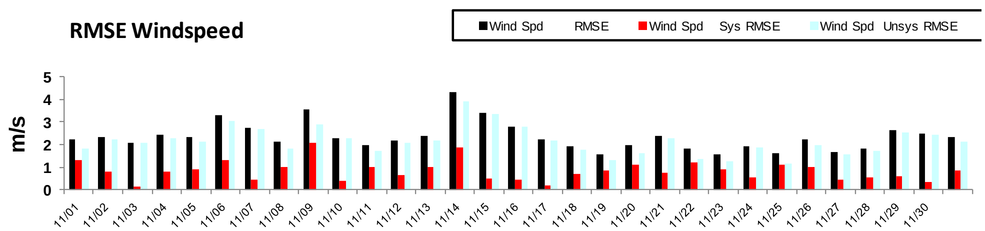
IOA Humidity

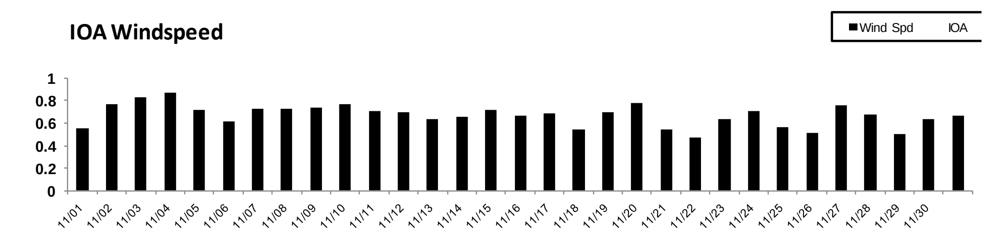


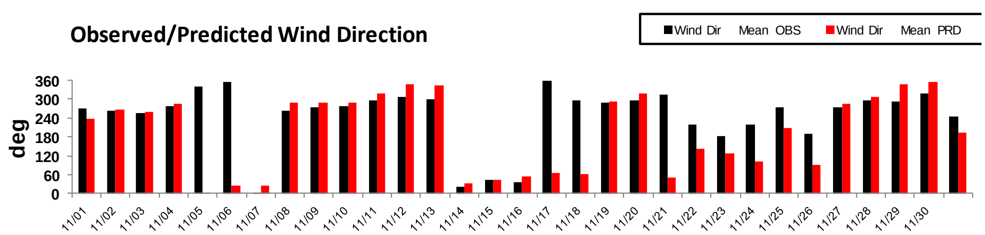
November Winds

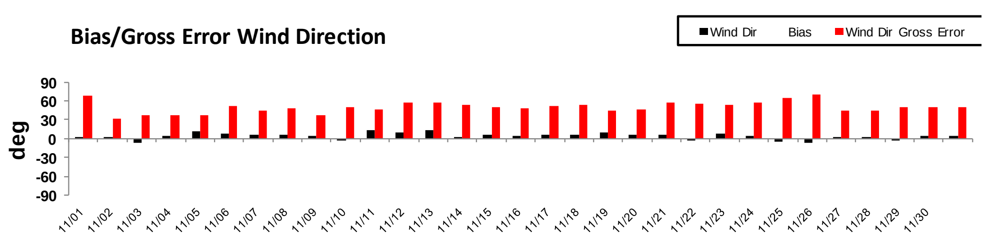




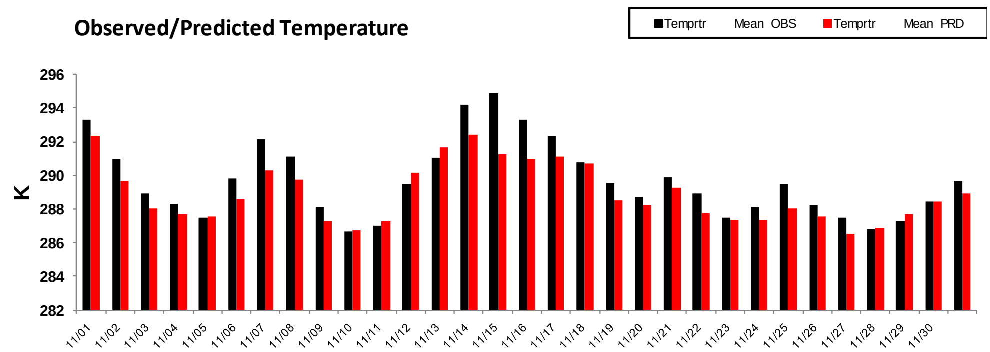


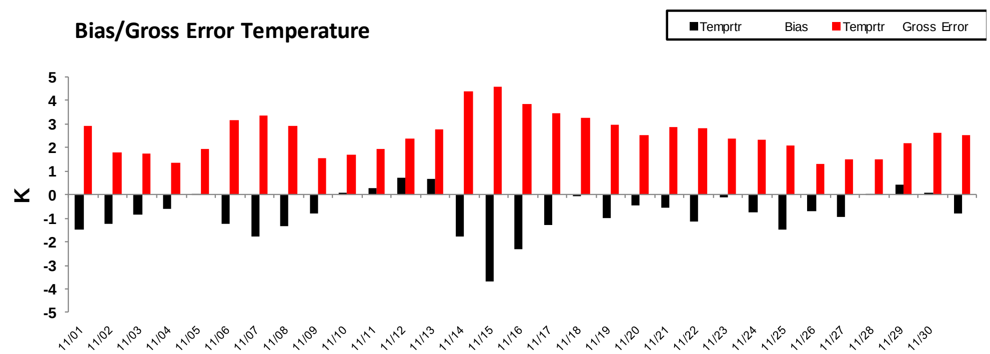


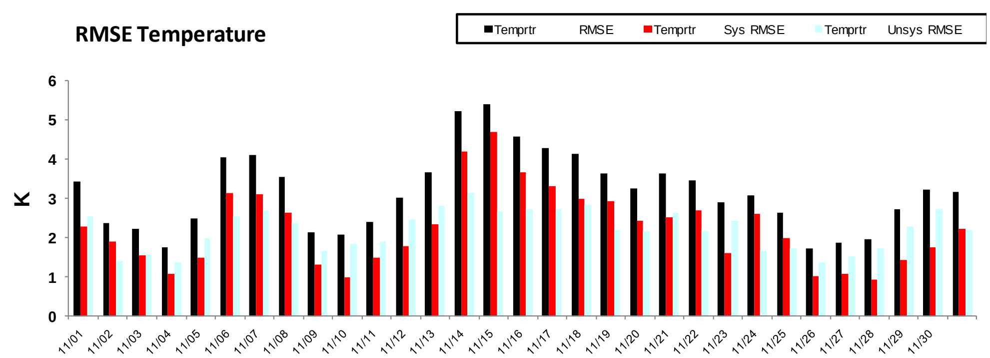


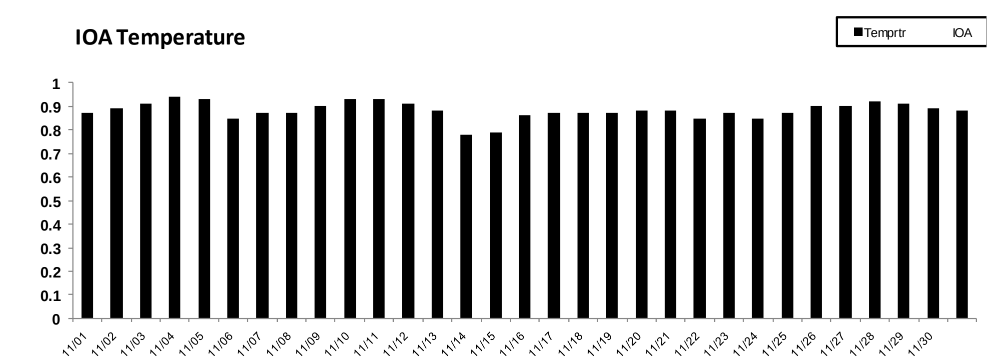


November Temperature

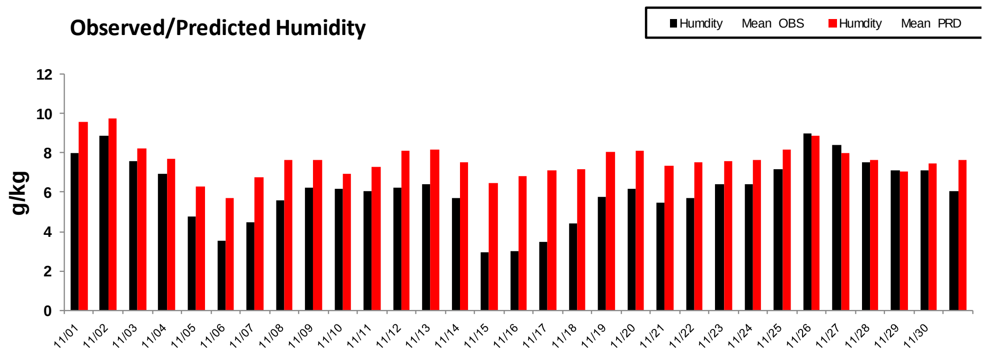


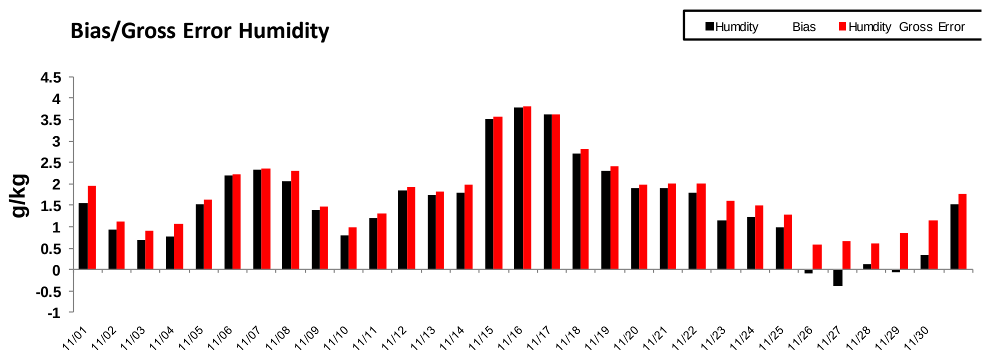


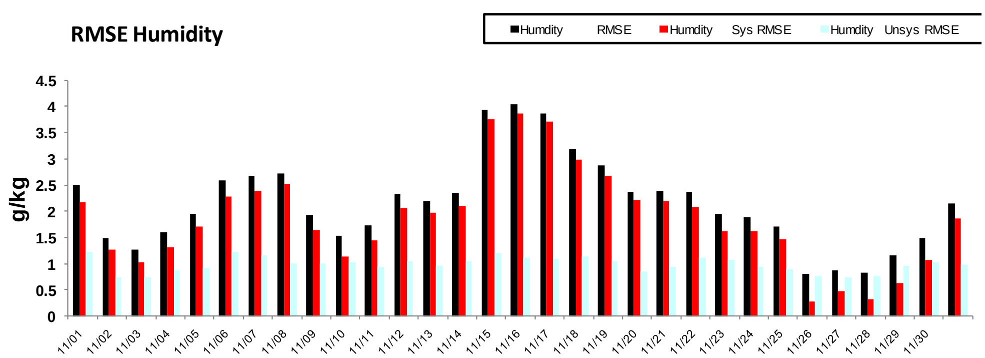


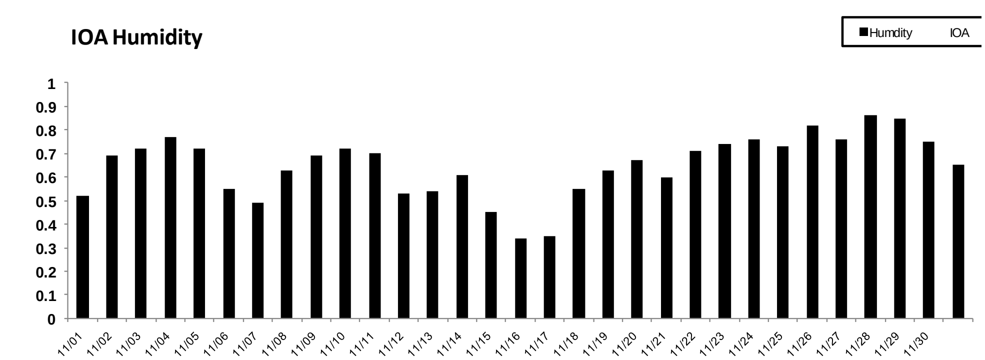


November Humidity

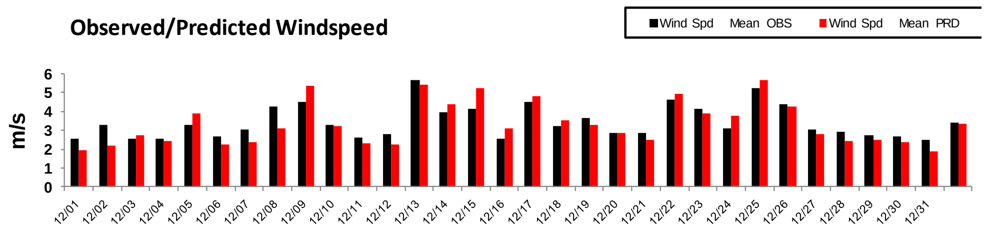


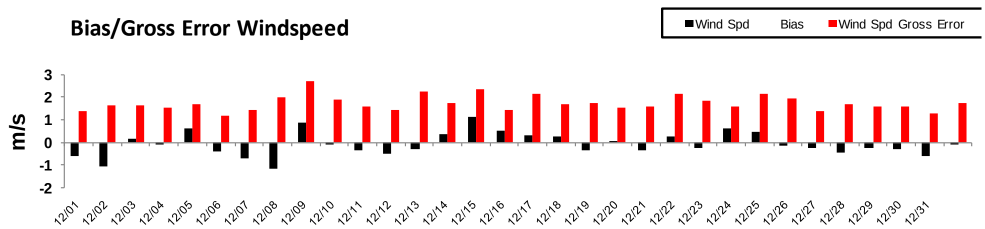


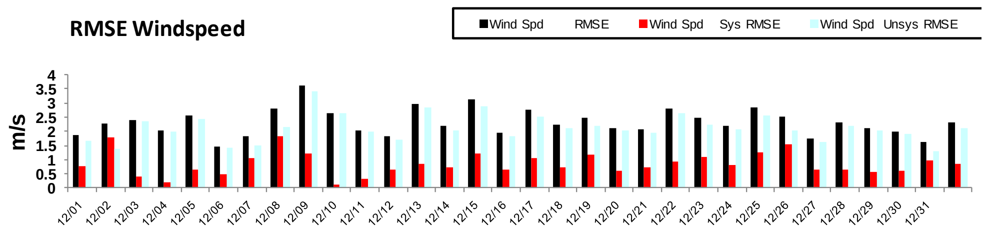


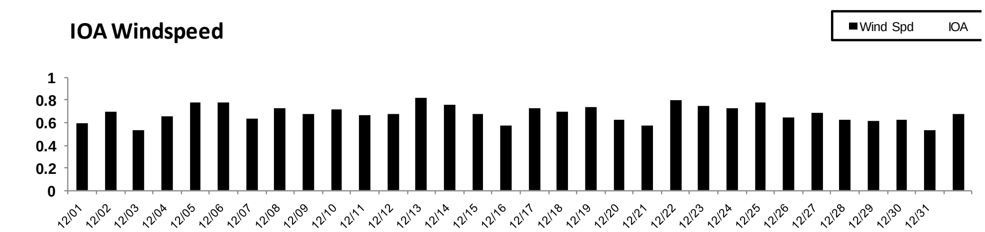


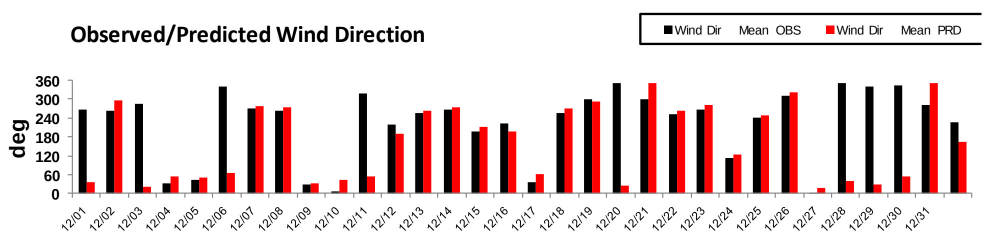
December Winds

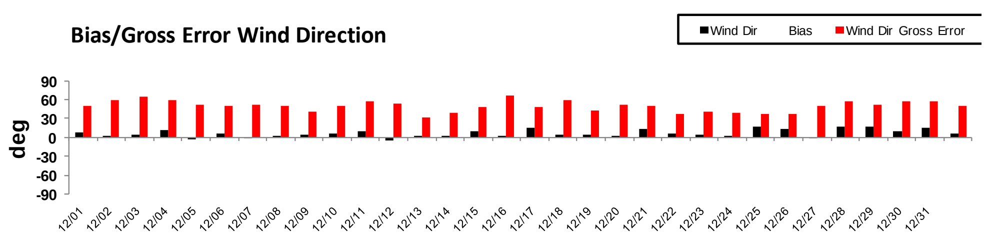




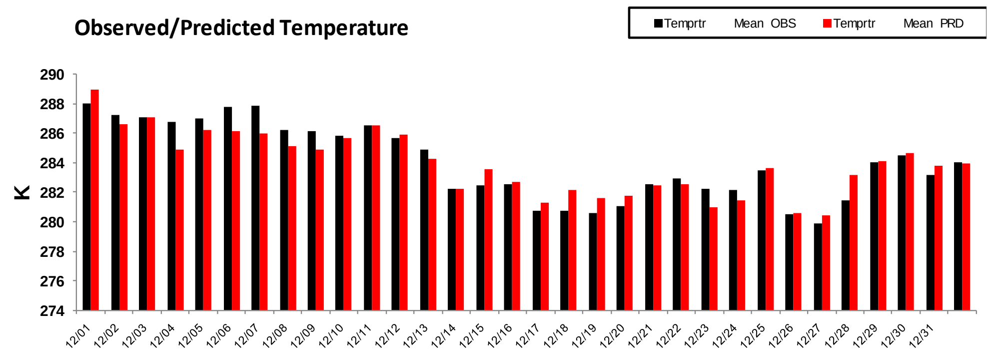


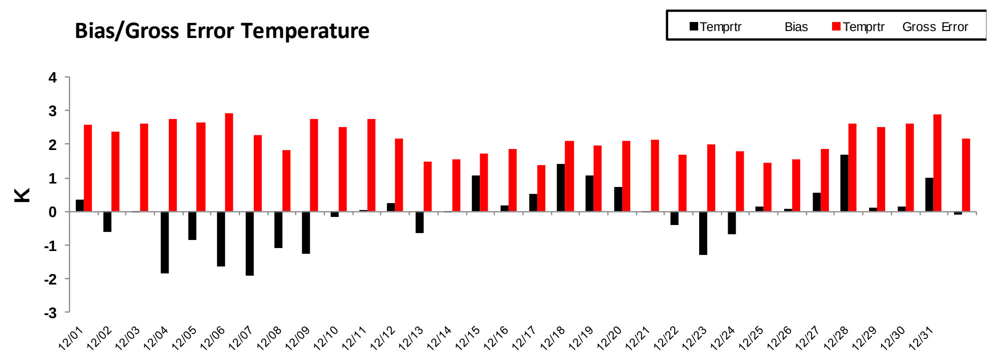


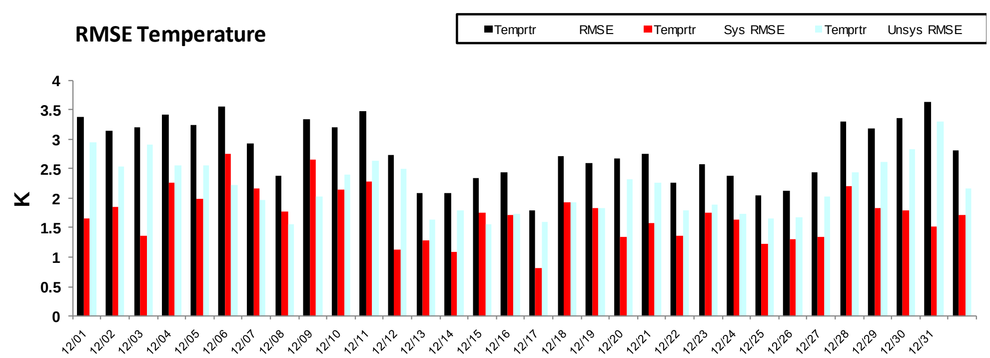


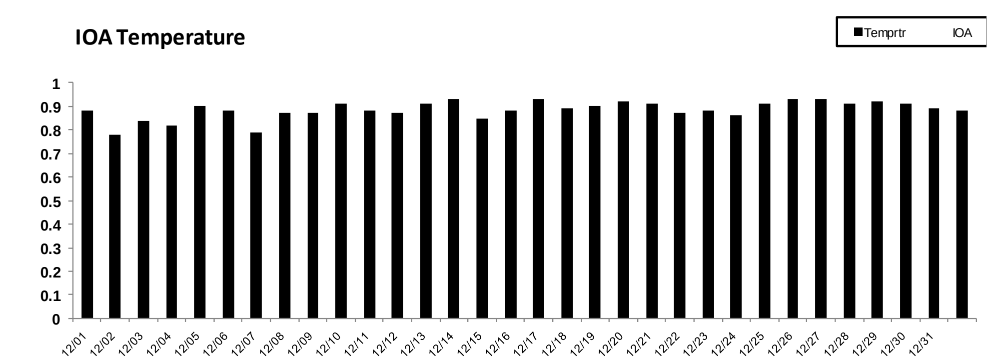


December Temperature

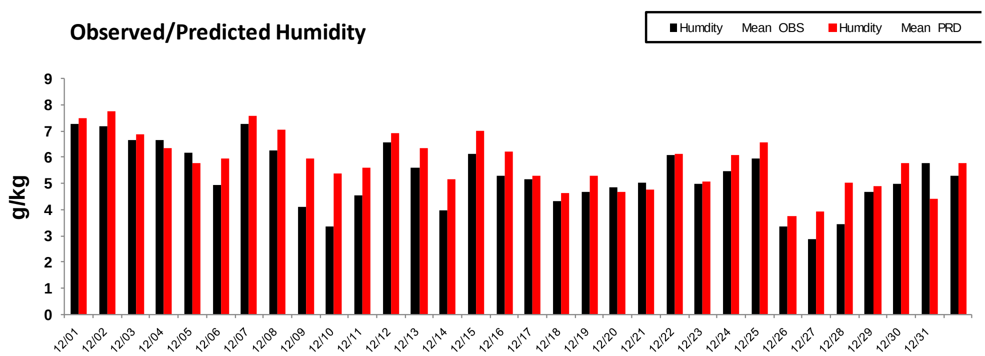


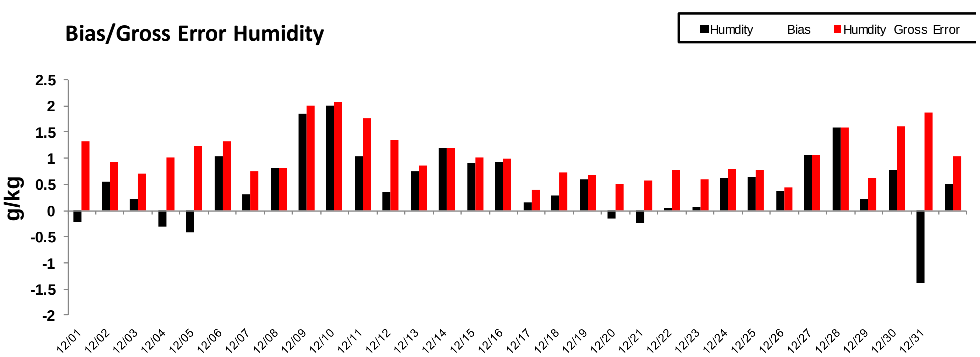


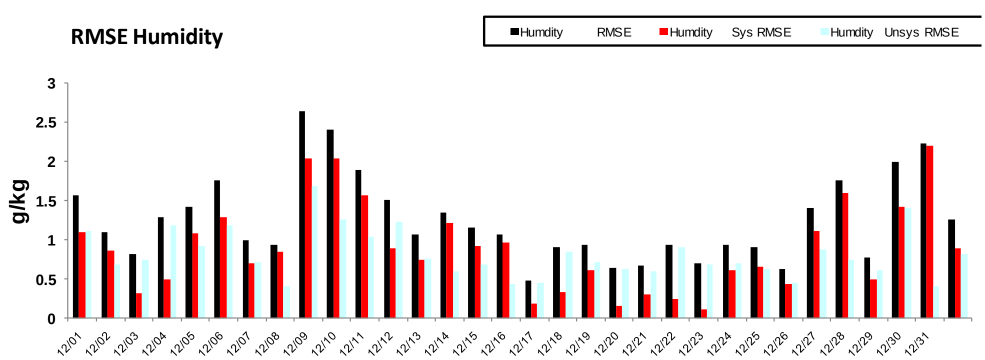


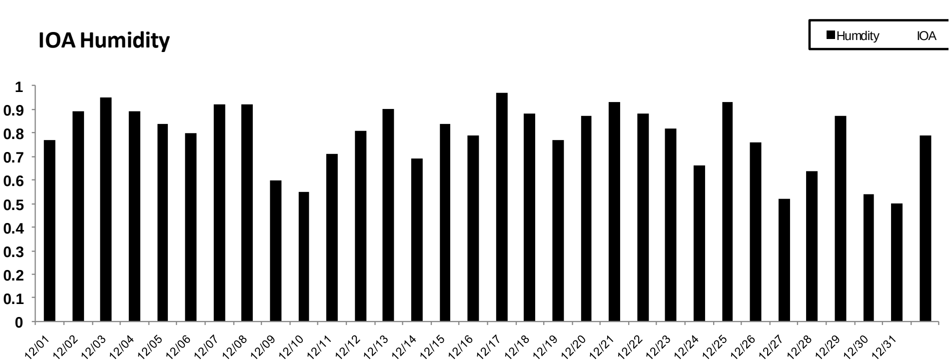


December Humidity









Attachment 2

Final CEPA Source Level Emissions Reduction Summary for 2014: Annual Average Inventory

Run Date: 10/31/2012 1:19:53 PM

(PC-CEPA V4.4 / October 2008)
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C:\Users\SYan\Documents\AQMP2012\ARB-dump082212\DFinal\ems14sc.txt
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C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\impact.txt
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\lineitem_092112_aa.prn
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\lineitem_092112_pl.prn

Year 2014 Emission Reductions Excluding Natural Sources by Control Measure
in the South Coast Air Basin (Annual Average Inventory - Tons/Day)

(A) Reductions Without Overlapping/Double-Counting With Other Control Measures (1)

		(Reductions - Tons/Day)						
Measure	Name	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
BA-05	Reductions from Carl Moyer - only to 2014	0.27	8.08	0.00	0.00	0.21	0.19	0.00
BA-06	Reductions from Prop 1B - only to 2014	0.00	7.65	0.00	0.00	0.25	0.23	0.00
CMB-03	Commercial Space Heating [Nox]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-01	Architectural Coatings [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-02	Locomotives [NOx,PM]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-03	Passenger Locomotives [NOx,PM]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Total (Net)		0.27	15.73	0.00	0.00	0.46	0.43	0.00

Year 2014 Emission Reductions Excluding Natural Sources by Control Measure in the South Coast Air Basin (Annual Average Inventory - Tons/Day)

(B) Reductions With Overlapping/Double-Counting With Other Control Measures (2)

		(Reductions - Tons/Day)						
Measure	Name	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
BA-05	Reductions from Carl Moyer - only to 2014	0.27	8.08	0.00	0.00	0.21	0.19	0.00
BA-06	Reductions from Prop 1B - only to 2014	0.00	7.65	0.00	0.00	0.25	0.23	0.00
CMB-03	Commercial Space Heating [Nox]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-01	Architectural Coatings [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-02	Locomotives [NOx,PM]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-03	Passenger Locomotives [NOx,PM]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Total (with potential overlapping)		0.27	15.73	0.00	0.00	0.46	0.43	0.00

EMISSION SUMMARY FOR
(POINT, AREA, MOBILE SOURCE, AND OFF-ROAD MV)

Baseline Emissions	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
Point source	30.71	6.22	34.80	2.21	11.29	8.72	10.46
Area source	203.09	44.50	128.59	1.77	109.67	40.76	75.11
RECLAIM	0.00	26.51	0.00	7.99	0.00	0.00	0.00
Total Stationary	233.80	77.23	163.40	11.96	120.95	49.48	85.57
On-road	116.91	271.62	1165.13	2.10	25.29	12.23	16.46
Off-road	96.89	143.44	729.05	2.83	8.26	7.76	0.10
Aircraft	3.51	13.94	37.02	1.50	0.83	0.42	0.00
TOTAL	451.12	506.23	2094.59	18.40	155.33	69.89	102.13
EMISSION REDUCTIONS							
Point source	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Area source	0.00	0.01	0.00	0.00	0.00	0.00	0.00
RECLAIM	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	0.00	0.02	0.00	0.00	0.00	0.00	0.00
On-road	0.02	9.14	0.00	0.00	0.30	0.28	0.00
Off-road	0.25	6.57	0.00	0.00	0.16	0.15	0.00
Aircraft	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	0.27	15.73	0.00	0.00	0.46	0.43	0.00
REMAINING EMISSIONS							
Point source	30.71	6.20	34.80	2.21	11.29	8.72	10.46
Area source	203.09	44.49	128.59	1.77	109.67	40.76	75.11
RECLAIM	0.00	26.51	0.00	7.99	0.00	0.00	0.00
Total Stationary	233.80	77.21	163.40	11.96	120.95	49.48	85.57
On-road	116.89	262.48	1165.13	2.10	24.99	11.96	16.46
Off-road	96.64	136.87	729.05	2.83	8.10	7.61	0.10
Aircraft	3.51	13.94	37.02	1.50	0.83	0.42	0.00
TOTAL	450.85	490.50	2094.59	18.40	154.86	69.46	102.13
NSR/Set-Aside	1.00	1.00	0.00	0.00	0.00	0.00	0.00
Public Funding	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRAND TOTAL (T/D)	451.85	491.50	2094.59	18.40	154.86	69.46	102.13
Mobility Adjustments	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(1) Emission reductions for individual measures were estimated based on the sequence of listing contained here. When the sequence changes, reductions from each measure could be affected, but the net total remain the same. The purpose of this table is to estimate total emission reductions without overlapping or double-counting between measures.

(2) Emission reductions for individual measures were estimated in the absence of other measures. Therefore, the sequence of listing does not affect the reduction estimates. The purpose of this table is to provide emission reduction estimates for Appendix IV control measure summary tables as well as cost effectiveness analysis.

Attachment 3

Final CEPA Source Level Emissions Reduction Summary for 2023: Annual Average Inventory

Run Date: 10/30/2012 3:00:03 PM

(PC-CEPA V4.4 / October 2008)
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C:\Users\SYan\Documents\AQMP2012\ARB-dump082212\DFinal\ems23sc.txt
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\scen_cm.txt
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\impact.txt
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\lineitem_092112_aa.prn
C:\Users\SYan\Documents\AQMP2012\CMs\F101112-Final-Clean\lineitem_092112_pl.prn

Year 2023 Emission Reductions Excluding Natural Sources by Control Measure
in the South Coast Air Basin (Annual Average Inventory - Tons/Day)

(A) Reductions Without Overlapping/Double-Counting With Other Control Measures (1)

		(Reductions - Tons/Day)						
Measure	Name	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
CMB-01	Reclaim NOx Reduction	0.00	3.00	0.00	0.00	0.00	0.00	0.00
CMB-03	Commercial Space Heating [Nox]	0.00	0.18	0.00	0.00	0.00	0.00	0.00
CTS-01	Architectural Coatings [VOC]	2.21	0.00	0.00	0.00	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	0.83	0.00	0.00	0.00	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	7.48	0.00	0.00	0.00	0.00	0.00
OFRD-02	Locomotives [NOx,PM]	0.00	12.71	0.00	0.00	0.35	0.32	0.00
OFRD-03	Passenger Locomotives [NOx,PM]	0.00	2.96	0.00	0.00	0.07	0.06	0.00
Grand Total (Net)		6.04	26.32	0.00	0.00	0.41	0.38	0.00

Year 2023 Emission Reductions Excluding Natural Sources by Control Measure in the South Coast Air Basin (Annual Average Inventory - Tons/Day)

(B) Reductions With Overlapping/Double-Counting With Other Control Measures (2)

		(Reductions - Tons/Day)						
Measure	Name	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
CMB-01	Reclaim NOx Reduction	0.00	3.00	0.00	0.00	0.00	0.00	0.00
CMB-03	Commercial Space Heating [Nox]	0.00	0.18	0.00	0.00	0.00	0.00	0.00
CTS-01	Architectural Coatings [VOC]	2.21	0.00	0.00	0.00	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	0.83	0.00	0.00	0.00	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	1.00	0.00	0.00	0.00	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	7.48	0.00	0.00	0.00	0.00	0.00
OFRD-02	Locomotives [NOx,PM]	0.00	12.71	0.00	0.00	0.35	0.32	0.00
OFRD-03	Passenger Locomotives [NOx,PM]	0.00	2.96	0.00	0.00	0.07	0.06	0.00
Grand Total (with potential overlapping)		6.04	26.32	0.00	0.00	0.41	0.38	0.00

EMISSION SUMMARY FOR
(POINT, AREA, MOBILE SOURCE, AND OFF-ROAD MV)

Baseline Emissions	VOC	NOx	CO	SOx	PM10	PM2.5	NH3
Point source	35.67	6.56	36.69	2.36	12.44	9.40	12.60
Area source	217.44	39.68	129.38	2.02	120.00	43.56	69.62
RECLAIM	0.00	26.51	0.00	6.08	0.00	0.00	0.00
Total Stationary	253.11	72.75	166.08	10.46	132.45	52.96	82.22
On-road	67.31	125.51	590.80	1.88	24.53	11.14	13.37
Off-road	80.91	114.26	784.01	4.01	6.43	6.08	0.13
Aircraft	4.52	15.62	42.32	1.77	0.93	0.51	0.00
TOTAL	405.85	328.14	1583.21	18.11	164.34	70.69	95.72
EMISSION REDUCTIONS							
Point source	1.83	0.00	0.00	0.00	0.00	0.00	0.00
Area source	4.20	0.18	0.00	0.00	0.00	0.00	0.00
RECLAIM	0.00	3.00	0.00	0.00	0.00	0.00	0.00
Total Stationary	6.04	3.18	0.00	0.00	0.00	0.00	0.00
On-road	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-road	0.00	23.14	0.00	0.00	0.41	0.38	0.00
Aircraft	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	6.04	26.32	0.00	0.00	0.41	0.38	0.00
REMAINING EMISSIONS							
Point source	33.84	6.56	36.69	2.36	12.44	9.40	12.60
Area source	213.23	39.50	129.38	2.02	120.00	43.56	69.62
RECLAIM	0.00	23.51	0.00	6.08	0.00	0.00	0.00
Total Stationary	247.07	69.57	166.08	10.46	132.45	52.96	82.22
On-road	67.31	125.51	590.80	1.88	24.53	11.14	13.37
Off-road	80.91	91.12	784.01	4.01	6.02	5.70	0.13
Aircraft	4.52	15.62	42.32	1.77	0.93	0.51	0.00
TOTAL	399.81	301.82	1583.21	18.11	163.93	70.31	95.72
AQMP/Set-Aside	5.00	2.00	0.00	0.00	0.00	0.00	0.00
Public Funding	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GRAND TOTAL (T/D)	404.81	303.82	1583.21	18.11	163.93	70.31	95.72
Mobility Adjustments	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(1) Emission reductions for individual measures were estimated based on the sequence of listing contained here. When the sequence changes, reductions from each measure could be affected, but the net total remain the same. The purpose of this table is to estimate total emission reductions without overlapping or double-counting between measures.

(2) Emission reductions for individual measures were estimated in the absence of other measures. Therefore, the sequence of listing does not affect the reduction estimates. The purpose of this table is to provide emission reduction estimates for Appendix IV control measure summary tables as well as cost effectiveness analysis.

Attachment 4

Quarterly CMAQ 24-Hour PM2.5 Model Performance

Quarter 1

(One Cell Analysis)

Mass	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	14.02	13.58	-0.73	3.49	-0.05	0.25
cela	16.44	24.50	7.17	7.33	0.44	0.45
lgbh	16.08	19.29	3.10	4.23	0.19	0.26
lbdt	18.76	20.11	1.54	4.32	0.08	0.23
font	16.60	13.37	-5.08	5.79	-0.31	0.35
rivr	16.43	13.65	-3.27	4.16	-0.20	0.25

OC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	6.70	2.16	-4.54	4.54	-0.68	0.68
cela	7.69	4.72	-2.97	2.97	-0.39	0.39
lgbh	6.72	2.65	-4.07	4.07	-0.61	0.61
lbdt	6.93	2.87	-4.06	4.06	-0.59	0.59
font	6.16	1.53	-4.58	4.58	-0.74	0.74
rivr	6.84	1.52	-5.32	5.32	-0.78	0.78

EC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	2.31	1.19	-1.12	1.17	-0.48	0.51
cela	2.82	2.47	-0.35	0.69	-0.12	0.25
lgbh	2.64	1.68	-0.96	1.12	-0.36	0.43
lbdt	2.95	1.96	-0.99	1.17	-0.34	0.40
font	2.60	1.00	-1.56	1.57	-0.60	0.60
rivr	2.34	0.93	-1.42	1.45	-0.60	0.62

NH4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.26	1.54	0.28	0.45	0.22	0.36
cela	1.25	2.35	1.10	1.10	0.88	0.88
lgbh	1.56	2.36	0.80	1.26	0.51	0.81
lbdt	1.42	2.36	1.04	1.11	0.73	0.78
font	1.98	1.73	-0.09	0.54	-0.04	0.27
rivr	1.79	1.88	0.09	0.54	0.05	0.30

NO3	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	3.72	3.18	-0.37	1.06	-0.10	0.29
cela	3.53	5.07	1.54	1.80	0.43	0.51
lgbh	4.49	3.72	-0.77	2.00	-0.17	0.44
lbdt	3.53	3.40	0.00	1.24	0.00	0.35
font	5.55	4.76	-0.29	1.72	-0.05	0.31
rivr	5.55	5.07	-0.48	1.93	-0.09	0.35

SO4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.75	1.41	-0.28	0.50	-0.16	0.29
cela	1.77	2.02	0.25	0.45	0.14	0.26
lgbh	1.99	3.18	1.19	1.38	0.60	0.69
lbdt	2.22	3.49	1.43	1.55	0.64	0.70
font	1.45	0.87	-0.53	0.56	-0.37	0.39
rivr	1.31	0.97	-0.34	0.58	-0.26	0.44

Quarter 2

(One Cell Analysis)

Mass	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	13.76	11.01	-2.41	3.27	-0.18	0.24
cela	15.09	18.94	4.32	4.67	0.29	0.31
lgbh	14.12	15.13	1.68	3.78	0.12	0.27
lbdt	15.45	16.15	2.20	3.77	0.14	0.24
font	14.99	11.73	-3.69	5.57	-0.25	0.37
rivr	16.88	11.10	-5.96	6.79	-0.35	0.40

OC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	4.34	1.42	-2.91	2.91	-0.67	0.67
cela	6.74	3.31	-3.43	3.43	-0.51	0.51
lgbh	4.47	1.70	-2.77	2.77	-0.62	0.62
lbdt	4.46	2.01	-2.41	2.41	-0.54	0.54
font	6.92	1.19	-5.74	5.74	-0.83	0.83
rivr	6.43	1.10	-5.33	5.33	-0.83	0.83

EC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.02	0.86	-0.17	0.38	-0.16	0.37
cela	1.97	1.72	-0.25	0.57	-0.13	0.29
lgbh	1.21	1.15	-0.05	0.42	-0.04	0.35
lbdt	1.44	1.39	0.00	0.57	0.00	0.40
font	2.13	0.92	-1.21	1.21	-0.57	0.57
rivr	1.62	0.74	-0.88	0.90	-0.54	0.56

NH4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.05	1.22	0.17	0.37	0.16	0.35
cela	1.50	1.76	0.26	0.59	0.17	0.39
lgbh	1.09	1.90	0.81	0.83	0.75	0.76
lbdt	1.31	1.93	0.68	0.82	0.52	0.62
font	1.85	1.41	-0.44	0.95	-0.24	0.52
rivr	2.03	1.48	-0.55	0.99	-0.27	0.49

NO3	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.94	2.28	0.34	0.98	0.18	0.51
cela	2.63	3.61	0.99	1.44	0.38	0.55
lgbh	2.17	2.26	0.01	0.44	0.01	0.20
lbdt	2.80	1.87	-0.87	1.17	-0.31	0.42
font	3.61	3.35	-0.26	2.03	-0.07	0.56
rivr	4.03	3.60	-0.43	1.67	-0.11	0.41

SO4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	2.30	1.47	-0.82	1.37	-0.36	0.59
cela	2.56	1.80	-0.76	0.88	-0.30	0.35
lgbh	2.81	3.41	0.72	1.18	0.26	0.42
lbdt	3.19	3.87	0.82	1.36	0.26	0.43
font	2.56	1.11	-1.45	1.45	-0.57	0.57
rivr	2.54	1.08	-1.46	1.46	-0.58	0.58

Quarter 3

(One Cell Analysis)

Mass	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	15.23	15.15	1.05	5.68	0.07	0.37
cela	20.01	25.04	5.03	8.36	0.25	0.42
lgbh	15.30	18.40	3.07	4.32	0.20	0.28
lbdt	16.87	19.86	3.03	5.74	0.18	0.34
font	21.17	17.66	-2.65	6.21	-0.13	0.29
rivr	19.30	19.85	0.51	6.82	0.03	0.35

OC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	5.28	1.51	-3.62	3.62	-0.69	0.69
cela	6.76	3.97	-2.72	2.72	-0.40	0.40
lgbh	5.73	1.83	-3.84	3.84	-0.67	0.67
lbdt	5.03	2.13	-2.90	2.90	-0.58	0.58
font	9.73	1.60	-8.17	8.17	-0.84	0.84
rivr	7.22	1.43	-5.82	6.03	-0.81	0.84

EC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.07	0.90	-0.06	0.21	-0.05	0.20
cela	1.81	1.92	0.12	0.54	0.07	0.30
lgbh	1.72	1.29	-0.41	0.65	-0.24	0.38
lbdt	1.82	1.52	-0.30	0.64	-0.16	0.35
font	2.45	1.28	-1.19	1.19	-0.49	0.49
rivr	1.77	0.95	-0.83	0.97	-0.47	0.55

NH4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	2.00	2.20	0.28	0.60	0.14	0.30
cela	2.40	2.80	0.40	0.84	0.17	0.35
lgbh	2.14	2.54	0.40	0.79	0.19	0.37
lbdt	1.97	2.60	0.64	0.93	0.33	0.48
font	2.11	2.31	0.38	0.64	0.18	0.30
rivr	2.85	3.17	0.31	1.24	0.11	0.43

NO3	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	2.79	4.12	1.52	1.93	0.54	0.69
cela	2.98	5.19	2.23	2.55	0.75	0.86
lgbh	2.09	2.14	0.15	0.78	0.07	0.38
lbdt	1.70	1.84	0.09	1.04	0.05	0.61
font	4.46	5.46	1.70	2.80	0.38	0.63
rivr	5.38	8.36	2.78	4.00	0.52	0.74

SO4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	3.86	2.58	-1.19	1.30	-0.31	0.34
cela	4.26	3.21	-1.07	1.58	-0.25	0.37
lgbh	4.14	5.39	1.37	1.52	0.33	0.37
lbdt	4.67	6.11	1.40	1.70	0.30	0.36
font	4.03	1.91	-1.84	1.84	-0.46	0.46
rivr	3.76	1.81	-1.94	1.94	-0.52	0.52

Quarter 4

(One Cell Analysis)

Mass	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	17.30	18.34	-0.19	5.09	-0.01	0.29
cela	18.71	26.56	7.85	10.53	0.42	0.56
lgbh	19.13	23.18	6.47	6.54	0.34	0.34
lbdt	19.86	25.17	8.66	8.66	0.44	0.44
font	12.87	11.39	-2.92	5.39	-0.23	0.42
rivr	20.05	13.57	-5.69	7.16	-0.28	0.36

OC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	6.70	3.00	-3.87	3.87	-0.58	0.58
cela	7.39	5.52	-1.86	2.00	-0.25	0.27
lgbh	6.63	3.00	-3.52	3.54	-0.53	0.53
lbdt	6.87	3.41	-3.27	3.46	-0.48	0.50
font	5.57	1.62	-4.14	4.14	-0.74	0.74
rivr	6.92	1.84	-4.97	4.97	-0.72	0.72

EC	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	2.35	1.64	-0.79	1.01	-0.33	0.43
cela	2.89	2.91	0.02	0.60	0.01	0.21
lgbh	2.65	2.02	-0.56	1.13	-0.21	0.43
lbdt	2.99	2.41	-0.51	1.30	-0.17	0.43
font	1.59	1.04	-0.70	0.80	-0.44	0.50
rivr	2.70	1.12	-1.51	1.55	-0.56	0.57

NH4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.36	2.02	0.30	0.75	0.22	0.55
cela	1.93	2.20	0.28	1.22	0.14	0.63
lgbh	1.85	2.95	1.26	1.34	0.68	0.72
lbdt	2.02	3.08	1.34	1.62	0.66	0.80
font	1.50	1.18	-0.45	0.81	-0.30	0.54
rivr	2.29	1.59	-0.60	1.12	-0.26	0.49

NO3	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	3.05	3.89	0.38	1.53	0.13	0.50
cela	3.87	4.47	0.60	2.49	0.15	0.64
lgbh	3.27	3.99	0.98	1.65	0.30	0.50
lbdt	3.37	3.76	0.94	1.79	0.28	0.53
font	3.81	2.80	-1.27	2.10	-0.33	0.55
rivr	5.78	3.71	-1.73	2.81	-0.30	0.49

SO4	Mean_Obs	Mean_CMAQ	Mean_Bias	Mean_Err	NormMeanBias	NormMeanErr
anah	1.94	2.14	-0.40	0.86	-0.20	0.44
cela	2.33	2.13	-0.19	1.14	-0.08	0.49
lgbh	2.70	4.45	1.96	2.21	0.73	0.82
lbdt	3.09	5.08	2.33	2.46	0.75	0.80
font	0.98	0.91	-0.26	0.35	-0.27	0.36
rivr	1.76	1.20	-0.46	0.82	-0.26	0.47

Attachment 5

CAMx Modeling

CAMX Vs CMAQ Comparison

The following tables provide a comparison between the 24-hour PM2.5 model performance for each of the six species for the 2008 base year, and two 2014 scenarios: base emissions and controlled emissions. The inventory simulated for this demonstration was the 2012 Draft Final version using the clean boundary assumption.

Table 1 provides the comparison of simulation performance between CMAX and CMAQ for the 2008 base-year draft final inventory. In general, the CAMX simulation had higher values of mean error and mean bias when compare to the CMAQ simulation. Model performance at the inland stations of Rubidoux and Fontana was in relative agreement for all species and total mass. The CAMX simulations tended to over predict species concentrations in the coast plain.

Table 2 and 3 provide the comparison of the CAMX and CMAQ simulation or the draft final 2014 base and controlled emissions scenarios, respectively. There is good agreement between the two sets of simulations at each station. Both analyses indicate that without the controls implemented, the standard would not be met in 2014. However with implementation both simulations show that the projected 24-hour PM2.5 concentrations would be less than 35 ug/m3 at all stations in the Basin.

TABLE 1

2008 Base Year Performance Comparison

CAMX							**CMAQ**						
NH4	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error	**NH4**	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	1.82	2.22	0.4	1.09	0.22	0.6	All stations	1.82	2.18	0.36	0.91	0.2	0.5
Anaheim	1.48	2.01	0.53	0.92	0.36	0.62	Anaheim	1.48	1.74	0.25	0.54	0.17	0.37
Fontana	1.91	1.4	-0.51	0.87	-0.27	0.45	Fontana	1.91	1.73	-0.18	0.76	-0.1	0.4
Downtown LGB	1.7	2.94	1.24	1.45	0.73	0.86	Downtown LGB	1.7	2.61	0.91	1.11	0.54	0.65
Long Beach	1.68	2.78	1.1	1.36	0.65	0.81	Long Beach	1.68	2.49	0.81	1.06	0.48	0.63
Los Angeles	1.82	2.33	0.51	0.94	0.28	0.52	Los Angeles	1.82	2.33	0.51	0.95	0.28	0.52
Rubidoux	2.31	1.72	-0.59	0.95	-0.25	0.41	Rubidoux	2.31	2.08	-0.23	0.99	-0.1	0.43

CAMX							**CMAQ**						
NO3	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error	**NO3**	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	3.6	5.39	1.79	2.99	0.5	0.83	All stations	3.6	3.87	0.27	1.74	0.08	0.48
Anaheim	2.92	5.65	2.73	3.32	0.93	1.14	Anaheim	2.92	3.37	0.45	1.38	0.15	0.47
Fontana	4.39	4.45	0.06	2.66	0.01	0.61	Fontana	4.39	4.26	-0.13	2.08	-0.03	0.47
Downtown LGB	2.87	5.04	2.17	2.7	0.76	0.94	Downtown LGB	2.87	2.87	0.01	1.29	0	0.45
Long Beach	3.07	5.4	2.33	3.15	0.76	1.03	Long Beach	3.07	3.13	0.06	1.25	0.02	0.41
Los Angeles	3.26	6.35	3.09	3.53	0.95	1.08	Los Angeles	3.26	4.59	1.33	2.06	0.41	0.63
Rubidoux	5.17	5.22	0.05	2.47	0.01	0.48	Rubidoux	5.17	4.94	-0.22	2.41	-0.04	0.47

CAMX						
SO4	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	2.64	3.08	0.44	1.47	0.16	0.56
Anaheim	2.5	2.24	-0.26	0.9	-0.1	0.36
Fontana	2.17	1.28	-0.89	0.97	-0.41	0.45
Downtown LGB	3.26	5.73	2.48	2.67	0.76	0.82
Long Beach	2.85	4.97	2.11	2.29	0.74	0.8
Los Angeles	2.69	2.58	-0.1	0.95	-0.04	0.35
Rubidoux	2.32	1.48	-0.84	1.03	-0.36	0.44

CMAQ						
SO4	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	2.64	2.6	-0.04	1.24	-0.01	0.47
Anaheim	2.5	1.74	-0.75	0.95	-0.3	0.38
Fontana	2.17	1.17	-1	1.03	-0.46	0.48
Downtown LGB	3.26	4.72	1.47	1.74	0.45	0.54
Long Beach	2.85	4.16	1.3	1.57	0.46	0.55
Los Angeles	2.69	2.27	-0.42	1	-0.16	0.37
Rubidoux	2.32	1.42	-0.9	1.12	-0.39	0.48

CAMX						
OC	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	2.78	3.05	0.26	1.35	0.09	0.48
Anaheim	2.52	2.53	0.02	1	0.01	0.4
Fontana	2.96	1.65	-1.31	1.41	-0.44	0.48
Downtown LGB	2.53	3.45	0.92	1.15	0.36	0.45
Long Beach	2.57	3.09	0.53	0.84	0.21	0.33
Los Angeles	3.12	5.36	2.24	2.35	0.72	0.75
Rubidoux	3.03	1.83	-1.2	1.33	-0.4	0.44

CMAQ						
OC	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	2.78	2.46	-0.33	1.08	-0.12	0.39
Anaheim	2.52	2.02	-0.49	0.76	-0.2	0.3
Fontana	2.96	1.41	-1.54	1.54	-0.52	0.52
Downtown LGB	2.53	2.63	0.1	0.69	0.04	0.27
Long Beach	2.57	2.34	-0.23	0.6	-0.09	0.23
Los Angeles	3.12	4.42	1.3	1.49	0.41	0.48
Rubidoux	3.03	1.62	-1.41	1.46	-0.46	0.48

CAMX							CMAQ						
EC	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error	**EC**	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	2.14	1.9	-0.24	0.9	-0.11	0.42	All stations	2.14	1.51	-0.63	0.89	-0.29	0.41
Anaheim	1.73	1.44	-0.3	0.77	-0.17	0.44	Anaheim	1.73	1.16	-0.58	0.74	-0.33	0.42
Fontana	2.21	1.15	-1.06	1.15	-0.48	0.52	Fontana	2.21	1	-1.21	1.24	-0.55	0.56
Downtown LGB	2.28	2.39	0.1	0.9	0.05	0.4	Downtown LGB	2.28	1.82	-0.46	0.91	-0.2	0.4
Long Beach	2.06	2.07	0.01	0.81	0.01	0.39	Long Beach	2.06	1.56	-0.5	0.84	-0.24	0.41
Los Angeles	2.41	2.88	0.47	0.85	0.19	0.35	Los Angeles	2.41	2.28	-0.13	0.61	-0.05	0.25
Rubidoux	2.15	1.27	-0.88	0.99	-0.41	0.46	Rubidoux	2.15	1.12	-1.03	1.08	-0.48	0.5

CAMX							CMAQ						
OTR	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error	**OTR**	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	4.43	6.66	2.23	3.53	0.5	0.8	All stations	4.43	4.53	0.09	2.42	0.02	0.55
Anaheim	4.52	5.98	1.46	3.14	0.32	0.7	Anaheim	4.52	3.66	-0.86	2.37	-0.19	0.52
Fontana	3.83	3.71	-0.13	2.44	-0.03	0.64	Fontana	3.83	2.98	-0.86	2.37	-0.22	0.62
Downtown LGB	5.04	8.25	3.21	3.76	0.64	0.74	Downtown LGB	5.04	5.13	0.08	1.93	0.02	0.38
Long Beach	4.53	7.89	3.36	3.65	0.74	0.81	Long Beach	4.53	4.98	0.45	2.2	0.1	0.48
Los Angeles	4.13	8.81	4.68	5.16	1.13	1.25	Los Angeles	4.13	6.26	2.13	3.22	0.52	0.78
Rubidoux	4.44	4.05	-0.39	2.4	-0.09	0.54	Rubidoux	4.44	3.34	-1.1	2.25	-0.25	0.51

CAMX							CMAQ						
MASS	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error	**MASS**	Mean Obs	Mean Pred	Mean Bias	Mean Error	Norm Mean Bias	Norm Mean Error
All stations	16.84	21.8	4.96	8.58	0.29	0.51	All stations	16.84	18.02	1.18	5.71	0.07	0.34
Anaheim	15	19.27	4.27	6.98	0.28	0.47	Anaheim	15	14.41	-0.58	4.34	-0.04	0.29
Fontana	16.16	12.79	-3.37	6.38	-0.21	0.39	Fontana	16.16	12.47	-3.69	5.72	-0.23	0.35
Downtown LGB	17.71	27.83	10.12	10.71	0.57	0.6	Downtown LGB	17.71	21.28	3.57	5.44	0.2	0.31
Long Beach	16.16	26.1	9.95	9.97	0.62	0.62	Long Beach	16.16	19.73	3.57	4.71	0.22	0.29
Los Angeles	17.65	28.06	10.41	11.34	0.59	0.64	Los Angeles	17.65	23.8	6.15	7.83	0.35	0.44
Rubidoux	18.16	15.16	-2.99	5.78	-0.16	0.32	Rubidoux	18.16	15.15	-3	5.97	-0.17	0.33

TABLE 2

2014 Base Year Performance Comparison

CAMX	NH4	NO3	SO4	OC	EC	OTR	Wat	Blk	PM2.5	**CMAQ**	NH4	NO3	SO4	OC	EC	OTR	Wat	Blk	PM2.5
Anaheim	3.31	8.56	2.3	6.9	3.59	3.18	1.61	0.5	29.97	Anaheim	2.93	7.6	2.31	8.13	3.43	3.56	1.53	0.5	29.98
Downtown LGB	2.89	7.61	2.4	5.86	3.33	2.21	1.79	0.5	26.58	Downtown LGB	2.89	6.95	2.66	6	3.37	2.24	1.67	0.5	26.29
Fontana	4.33	11.23	1.95	7.4	3.81	3.14	2.14	0.5	34.5	Fontana	4.69	11.81	2.02	7.1	3.72	3.05	2.16	0.5	35.05
Long Beach	3.81	8.59	3.26	6.93	3.28	2.1	1.78	0.5	30.25	Long Beach	3.86	8.36	3.55	7.02	3.22	2.15	1.88	0.5	30.55
Los Angeles	3.52	7.65	3.56	9.9	2.59	3.4	1.66	0.5	32.77	Los Angeles	4.17	9.32	3.45	7.48	2.81	2.84	1.92	0.5	32.48
Mira Loma	4.71	12.82	1.84	7.23	3.85	3.52	2.32	0.5	36.8	Mira Loma	5.25	14.92	1.88	6.06	3.02	2.85	2.82	0.5	37.3
Rubidoux	4.44	12.42	1.93	6.06	3.04	2.95	2.39	0.5	33.74	Rubidoux	4.59	11.58	2.17	6.16	3.1	3.25	2.28	0.5	33.64

TABLE 3

2014 Controlled Emissions Performance Comparison

CAMX	NH4	NO3	SO4	OC	EC	OTR	Wat	Blk	PM2.5	**CMAQ**	NH4	NO3	SO4	OC	EC	OTR	Wat	Blk	PM2.5
Anaheim	2.88	7.51	2.13	6.32	2.87	3.37	1.44	0.5	27.02	Anaheim	2.81	7.28	2.23	6.04	2.77	3.32	1.5	0.5	26.45
Downtown LGB	2.88	7.58	2.4	5.03	3.07	2.14	1.86	0.5	25.45	Downtown LGB	2.89	6.74	2.5	5.43	3.08	1.95	1.3	0.5	24.41
Fontana	4.5	10.48	2.42	4.8	3.8	3.84	1.89	0.5	32.24	Fontana	4.6	11.42	1.94	5.1	3.33	3.33	2.2	0.5	32.43
Long Beach	3.74	8.41	3.35	5.85	2.84	2.26	1.77	0.5	28.71	Long Beach	3.77	8.13	3.51	5.71	2.85	2.07	1.7	0.5	28.24
Los Angeles	4.02	8.88	3.37	7.81	2.68	2.87	1.75	0.5	31.89	Los Angeles	3.96	8.62	3.47	7.66	2.55	2.87	1.89	0.5	31.53
Mira Loma	4.66	12.67	1.82	5.7	3.29	3.35	2.39	0.5	34.36	Mira Loma	5.07	13.92	1.92	4.89	2.44	2.75	2.75	0.5	34.24
Rubidoux	4.52	13.05	1.92	4.36	2.29	2.52	2.68	0.5	31.84	Rubidoux	4.39	11.1	2.02	4.93	3.03	3.29	2.11	0.5	31.37

Attachment 6

Relative Contributions of Precursor Emissions Reductions to Simulate Controlled Future Year 24-Hour PM2.5 Concentrations

Relative Contributions of Precursor Emissions Reductions to Simulated Controlled Future-Year 24-hour PM2.5 Concentrations

The concept of establishing relative weights of precursor emissions to simulated reductions in predicted PM2.5 was introduced in the 2007 AQMP. The procedure estimated per ton reductions of the five main contributing emissions to corresponding regional reductions of PM2.5 species concentrations. The five major precursors that contribute to the development of the ambient PM2.5 aerosol include ammonia, NOx, SOx, VOC, and directly emitted PM2.5. The contribution of ammonia emissions was embedded as a component of the SOx and NOx factors since ammonium nitrate and ammonium sulfate are the resultant particulates formed in the ambient chemical process. Various combinations of reductions in these pollutants could all provide a path to clean air.

In the 2007 AQMP the relative weights of the precursor emissions to reductions in PM2.5 species concentrations were calculated on a regional basis. Overall emissions reductions from the base year (2005) to the controlled 2014 emissions scenario were divided into the respective projected species concentration reductions averaged for a set of representative air quality stations distributed throughout the Basin. The analysis did not focus directly on the site reporting the maximum observed PM2.5 impact (Riverside-Rubidoux). The Final 2007 AQMP established a set of factors to relate regional per ton precursor emissions reductions to PM2.5 air quality improvements based on the annual average concentration. One TPD reduction of NOx was projected to reduce regional annual PM2.5 by 0.00345 $\mu g/m^3$. The Basin averaged conversion factors resulting from this analysis were submitted as part of the 2007 SIP (Appendix C, of the CARB staff report, "PM2.5 Reasonable Further Progress Calculations"[1]) and approved by U.S. EPA. The normalized-equivalent NOx emissions conversion factors for annual PM2.5 in 2014 were as follows: VOC: 0.43, NOx: 1.0, directly emitted PM2.5: 9.86 and SOx: 15.03.

The Draft Final 2012 AQMP provides a similar set of factors, but this time directed at 24-hour PM2.5 based on the 2012 CMAQ simulation results for the precursor emission reductions from 2008 to the controlled 2014 scenario. The projected reductions in 24-hour PM2.5 component species concentrations from implementation of the control strategy in 2014 were averaged for six regionally representative locations having speciated data. These sites included Riverside-Rubidoux, downtown Los Angeles, Fontana, Long Beach, South Long Beach and Anaheim.

[1] http://www.arb.ca.gov/planning/sip/2007sip/southcoast/staffrepappc.pdf

Riverside-Rubidoux was the historic PM2.5 maximum concentration location in the Basin (annual and 24-hour) and is located less than 8 km downwind of the Mira Loma monitoring station. Rubidoux and Mira Loma share a common emissions profile that is dominated by local dairy emissions coupled with mobile source emissions reflecting both freeway traffic and an emerging warehouse distribution center truck profile. The Fontana site shares the traffic and warehouse emissions profiles together with local emissions from industrial activities. The Fontana site will periodically be impacted from transported emissions from the dairy farms as well. Both Fontana and Rubidoux are downwind receptors of regional emissions from the major metropolitan sources that have incorporated a mix of primary and reactive chemical species.

By comparison, the metropolitan central Los Angeles site reflects a mix of emissions from heavy local and freeway traffic, railway and goods movement operations and significant industrial activities from a varying profile of small to large sources. The Long Beach site is in close proximity to three heavily traveled freeways including the commuter impacted I405 and the heavy diesel truck impacted I710. The site is also located directly downwind of refineries and rail transfer facilities. The South Long Beach monitor is directly impacted from goods movement trucking and rail emissions as well as the ocean going vessel (OGV) emissions emanating from the Ports of Los Angeles and Long Beach. The Anaheim site reflects a neighborhood profile including both freeway and local-residential traffic and light to moderate industrial activities. Both Anaheim and Los Angeles are downwind of OGV and port emissions. Typical Basin wind flow places Los Angeles as a receptor of these source emissions during the morning hours after which the rotation of the sea breeze targets the Anaheim area in the afternoon and early evening hours.

Calculation of the Draft Final 2012 AQMP relative contributions of the precursor emissions to the regionally averaged reductions in the component 24-hour PM2.5 species followed the procedure as in the 2007 SIP. Table 1 summarizes the relative precursor contributions to 2014 24-hour PM2.5 from 1-TPD emissions reduction to simulated reductions of VOC, NOx, SOx and directly emitted PM2.5. (Again, it is important to note that the reductions of ammonium are incorporated together with bonded water in the estimation of reduced regional sulfate and nitrate). Compared with the annual Basin averaged conversion factors included in the 2007 AQMP, 1-TPD of directly PM2.5 emissions reductions resulted in 6 times more reduction of mass for the 24-hour PM2.5. For the 2014 controlled scenario, 1-TPD of directly emitted PM2.5 resulted in an average 0.2132 $\mu g/m^3$ improvement in ambient PM2.5. 1-TPD reductions of VOC, NOx and SOx emissions resulted in between 2 to 4 times more mass reduction for the 24-hour PM2.5 than estimated for the Basin annual average concentration.

Table 2 provides the normalized NOx-equivalent conversion factors that relate the precursor emissions to PM2.5 species reduction factors to a common currency, NOx emissions. The 24-hour PM2.5 factors place a greater weight on the reduction of directly emitted particulate while maintaining the emissions contribution factor for VOC and nominally lowering the factor for SOx compared with the 2007 SIP factors for annual PM2.5. Overall the normalized-equivalent NOx emissions conversion factors for 24-hour PM2.5 for the 2014 controlled scenario were: VOC: 0..3, NOx: 1.0, SOx: 7.8 and directly emitted PM2.5: 14.8. As with the annual estimation, the factors are valid for the 2014 controlled emissions scenario. Figure 1 depicts the relative PM2.5 reductions for ammonium nitrate, ammonium sulfate, organic carbon and particulates projected from the 2008 base year to the simulated 2014 control scenario.

TABLE 1

Relative Contributions of Precursor Emissions Reductions to 2014 Simulated Controlled Future-Year 24-hour PM2.5 Concentrations

PRECURSOR	PM2.5 COMPONENT (μg/m^3)	FINAL 2012 AQMP BASIN AVERAGED 24-HOUR PM2.5 CONVERSION FACTORS: 1-TPD EMISSIONS TO PM2.5 CONCENTRATION (μg/m^3)
VOC	Organic Carbon	0.0046
NOx	Nitrate	0.0144
SOx	Sulfate	0.1115
PM2.5	Elemental Carbon & Others	0..2132

TABLE 2

Normalized NOx-Equivalent Conversion Factors

PRECURSOR	PM2.5 COMPONENT ($\mu g/m^3$)	FINAL 2012 AQMP STANDARDIZED CONTRIBUTION TO AMBIENT 24-HOUR PM2.5 MASS
VOC	Organic Carbon	Factor of 0.3
NOx	Nitrate	Factor of 1.0
SOx	Sulfate	Factor of 7.8
PM2.5	Elemental Carbon & Others	Factor of 14.8

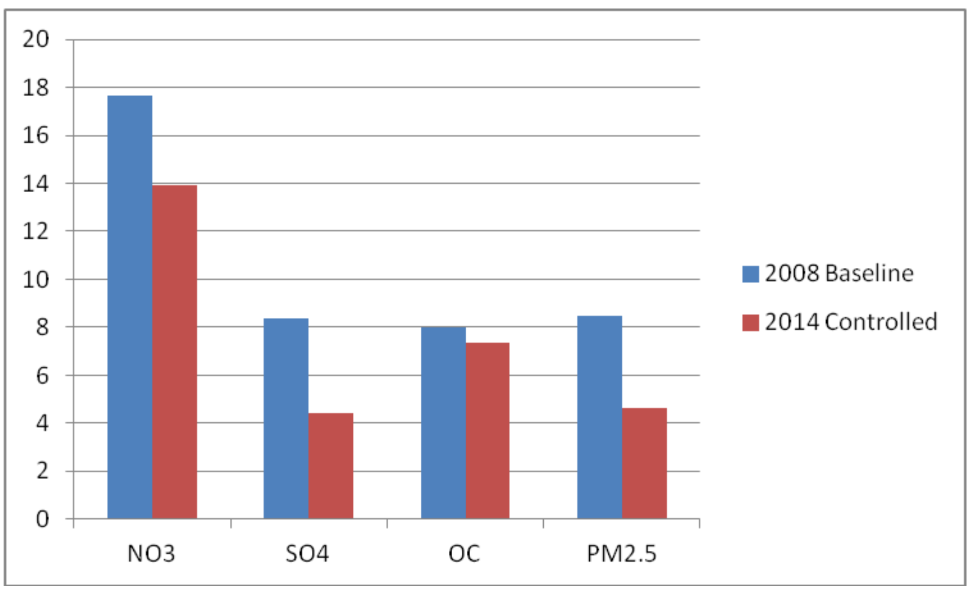
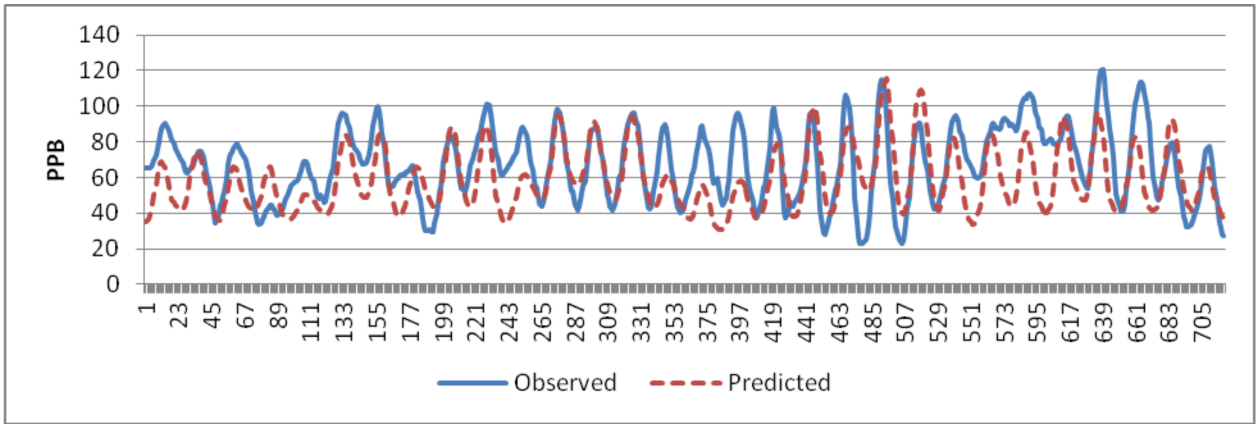


FIGURE 1

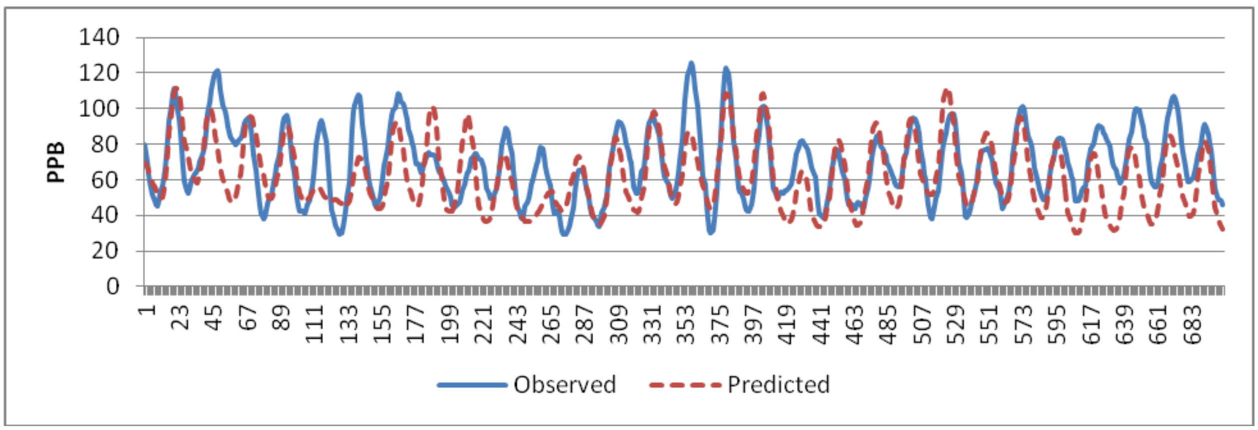
Simulated 2014 Controlled Future-Year 24-hour PM2.5 Concentrations by Species

Attachment 7

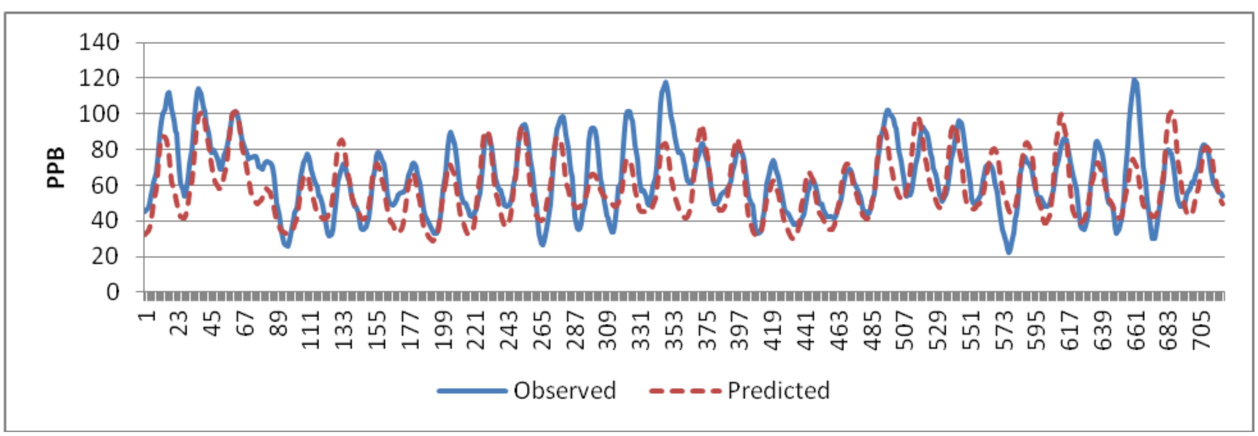
Time Series of Observed Vs.Predicted 8-Hour Ozone



Time Series of Observed Vs.Predicted 8-Hour Crestline Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Crestline Ozone: July, 2008



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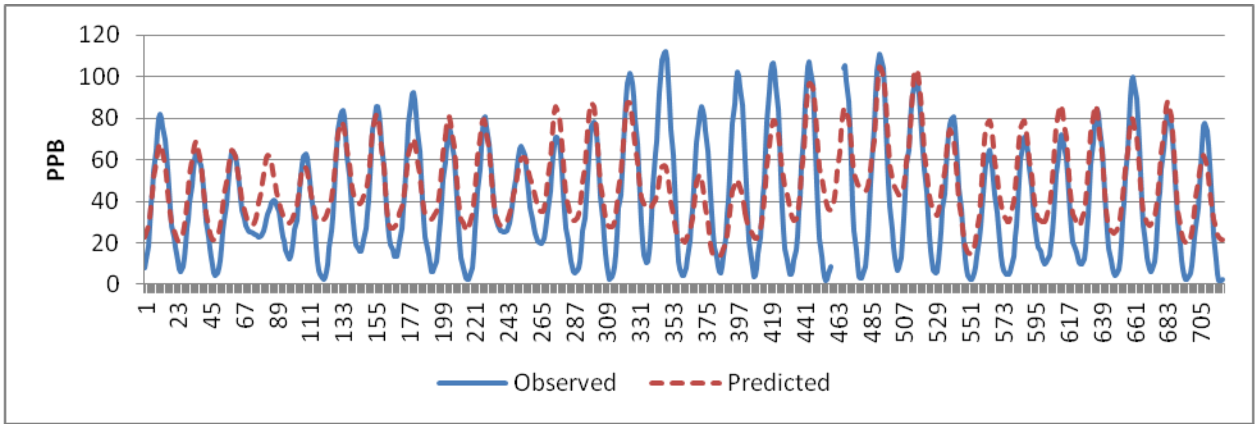
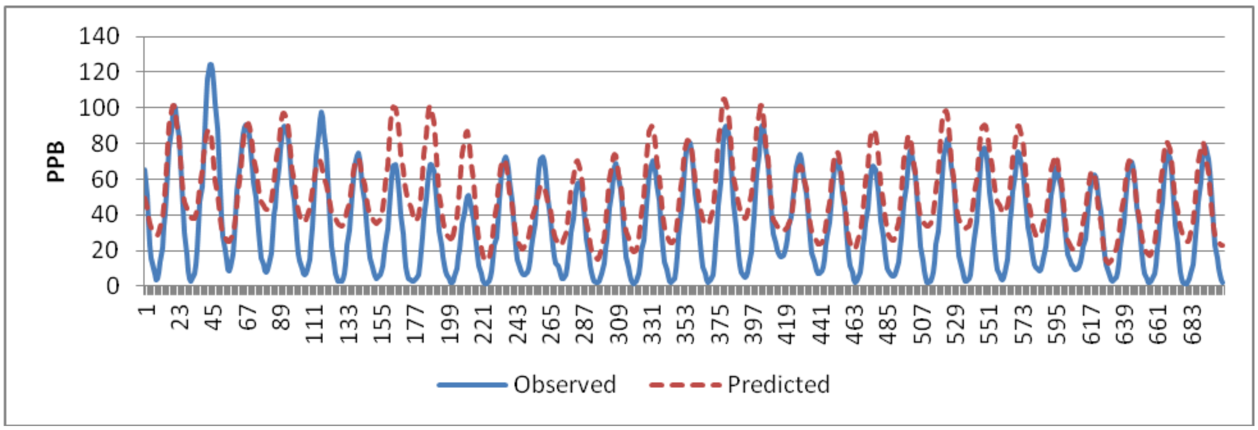
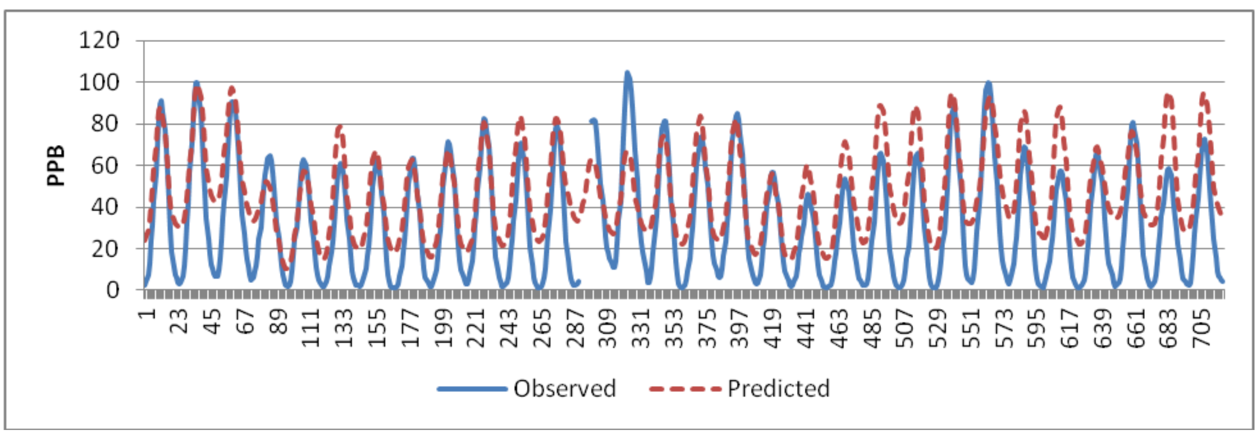


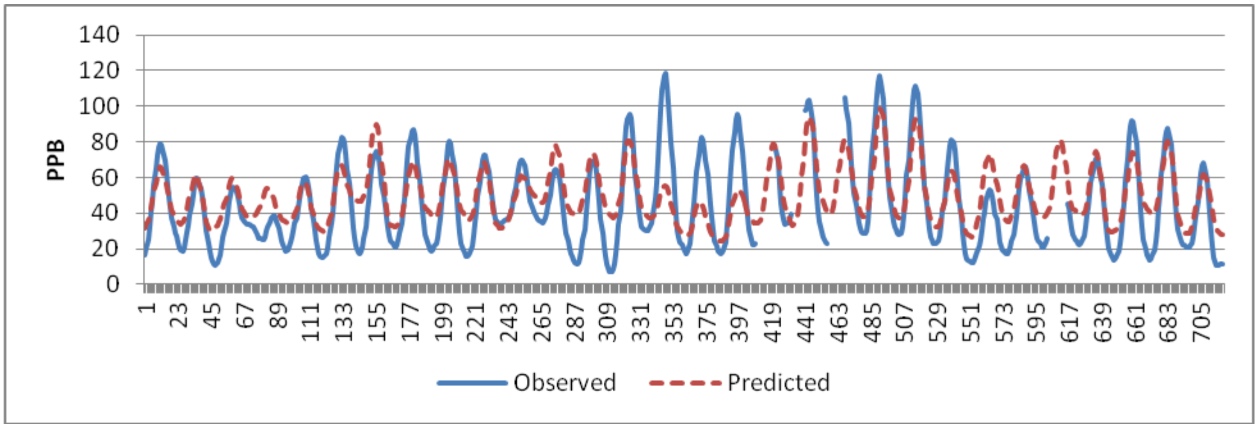
Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: June, 2008



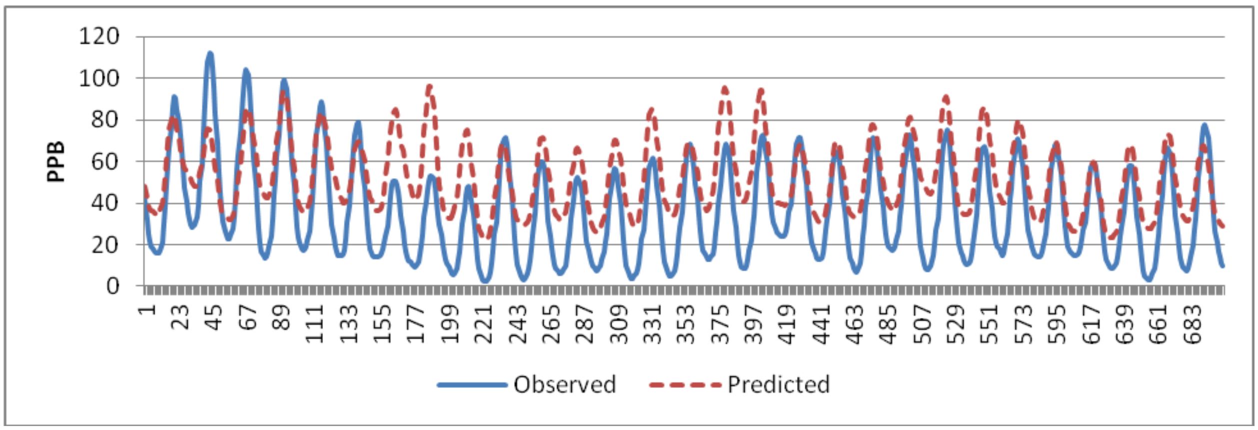
Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: July, 2008



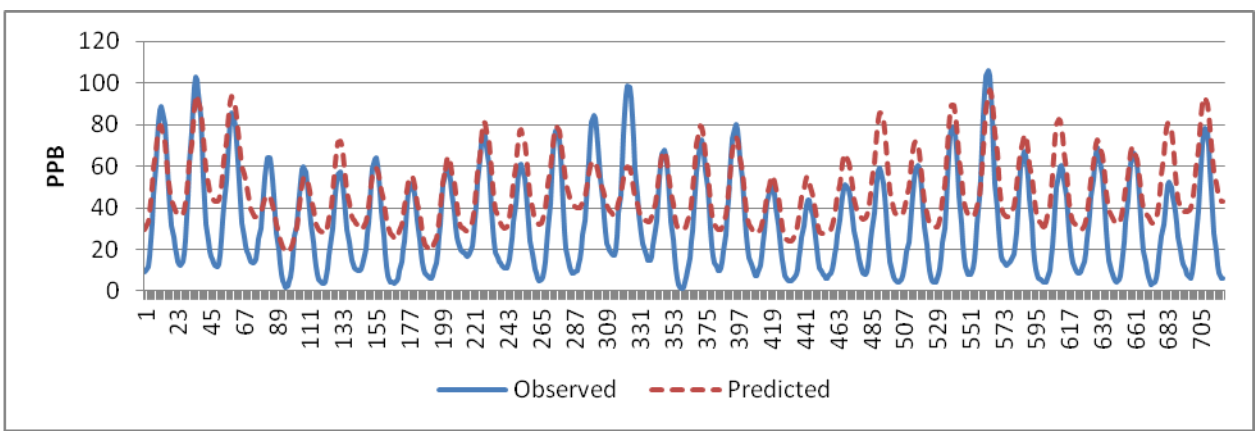
Time Series of Observed Vs.Predicted 8-Hour Fontana Ozone: August, 2008



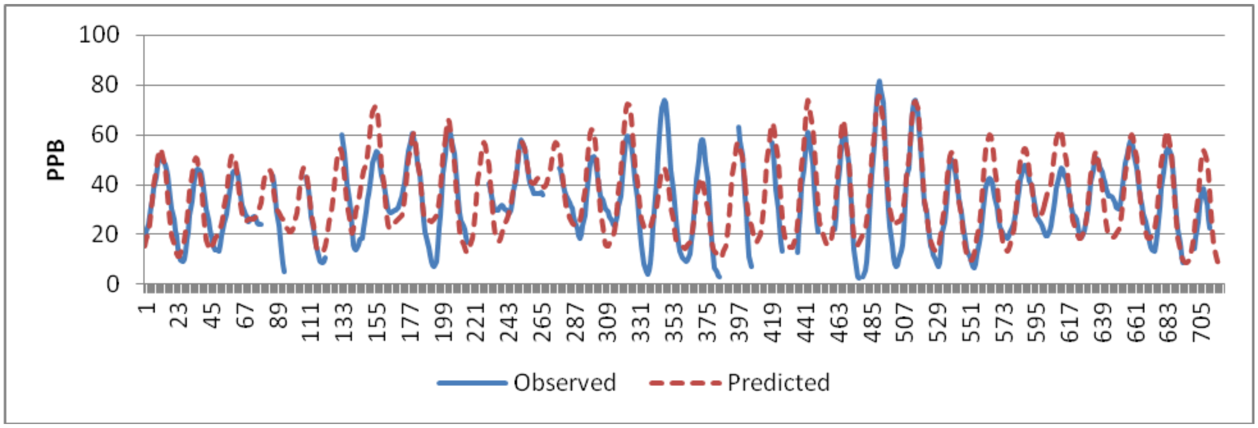
Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: June, 2008



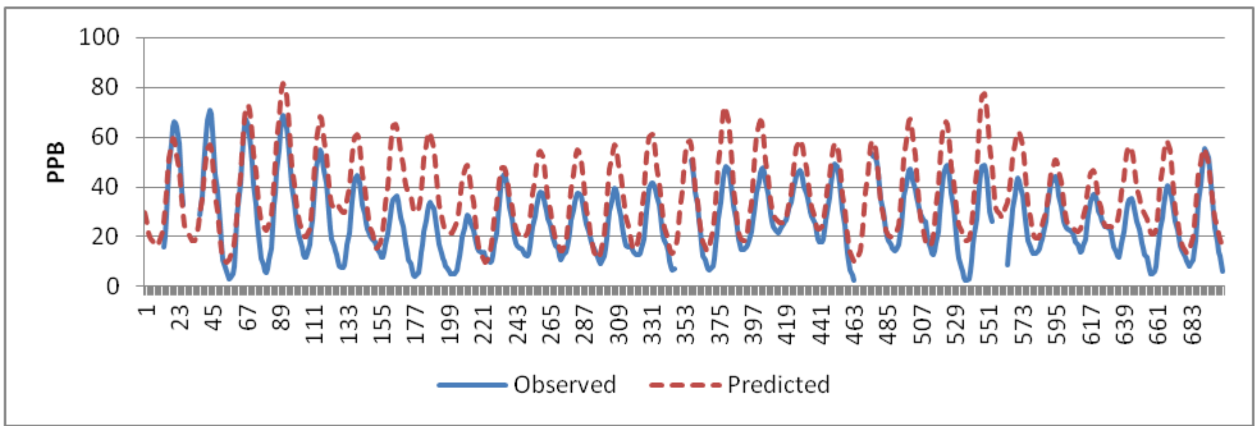
Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: July, 2008



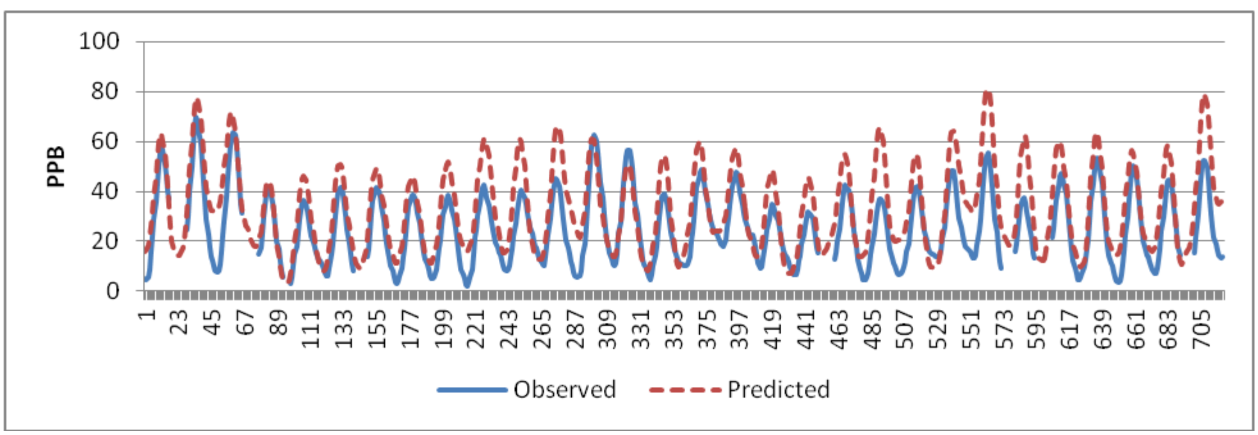
Time Series of Observed Vs.Predicted 8-Hour Glendora Ozone: August, 2008



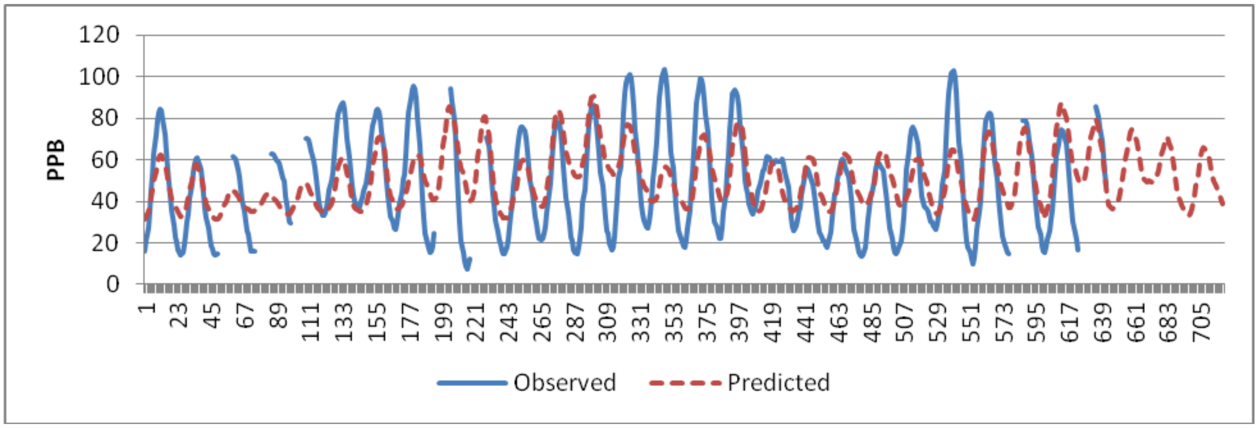
Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: June, 2008



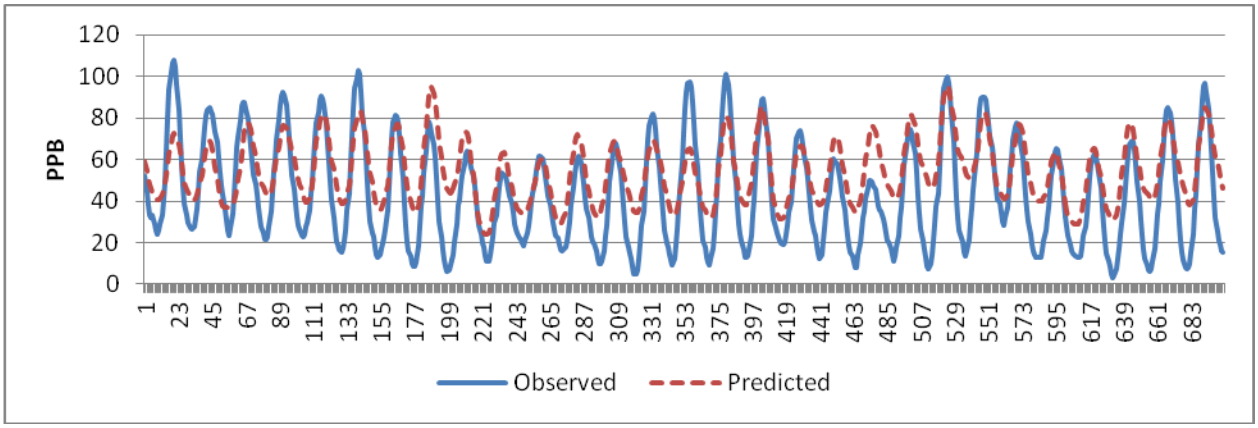
Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: July, 2008



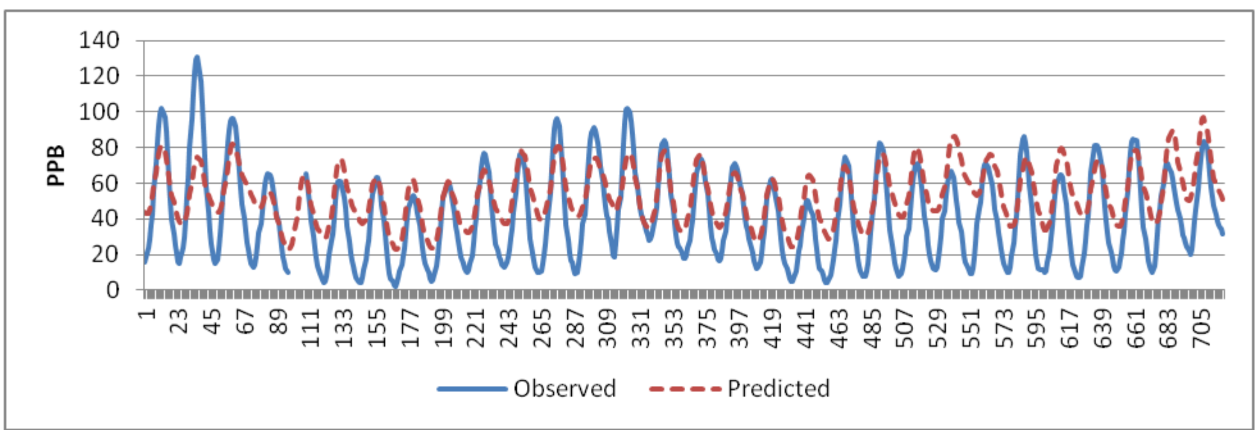
Time Series of Observed Vs.Predicted 8-Hour Los Angeles Ozone: August, 2008



Time Series of Observed Vs.Predicted 8-Hour Santa Clarita Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Santa Clarita Ozone: July, 2008



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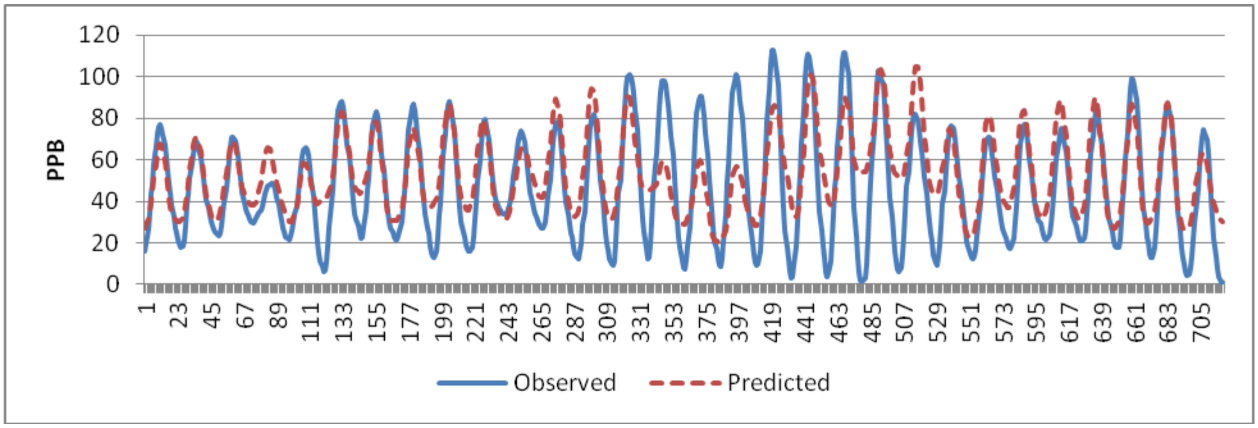
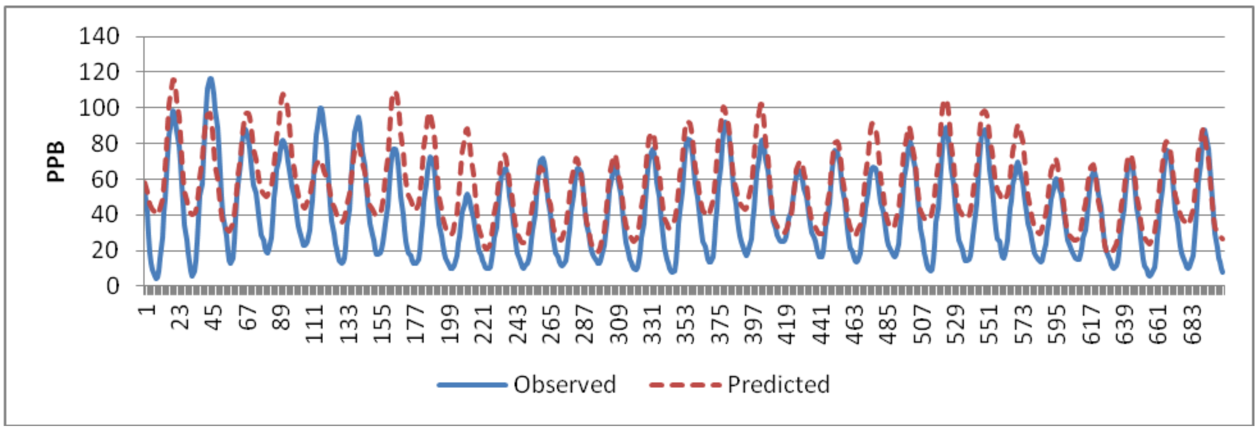
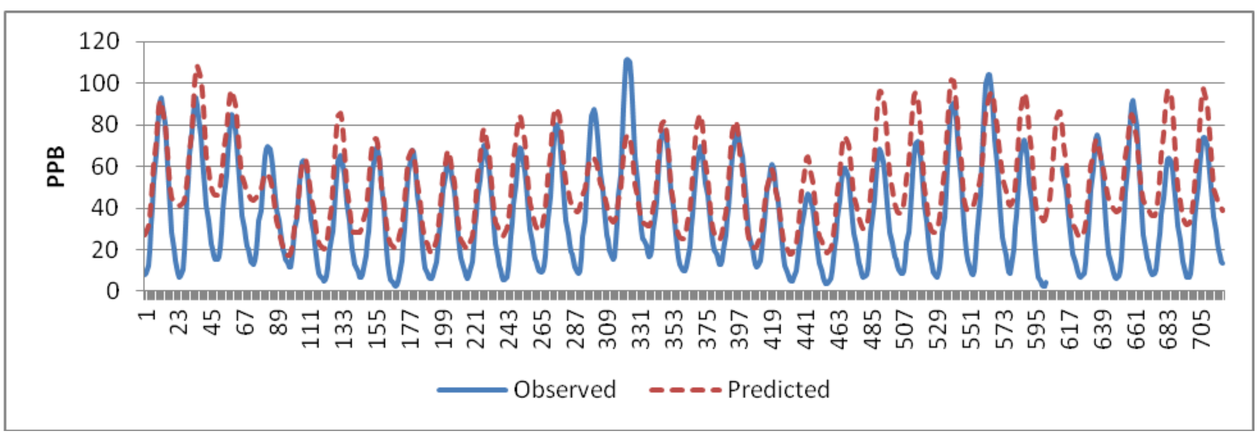


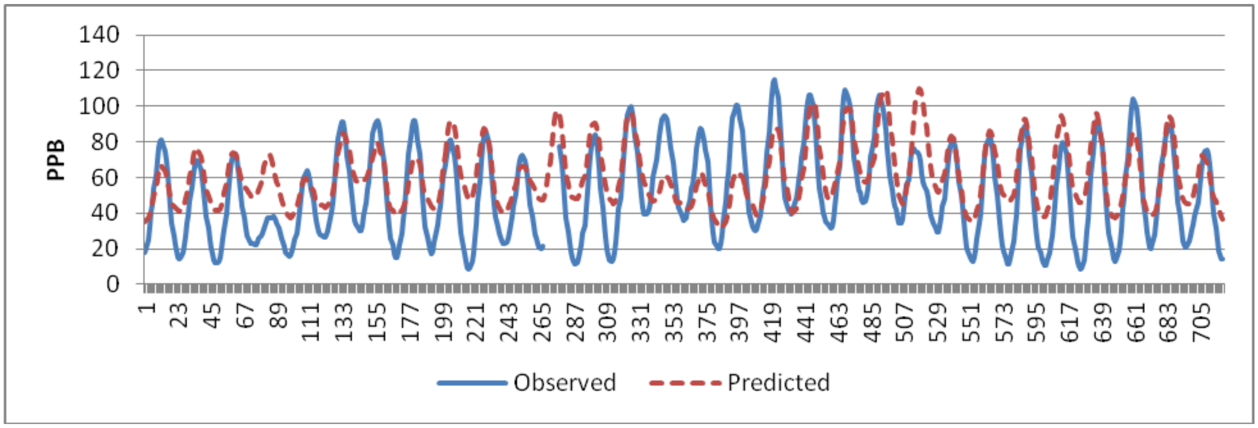
Time Series of Observed Vs.Predicted 8-Hour Rubidoux Ozone: June, 2008



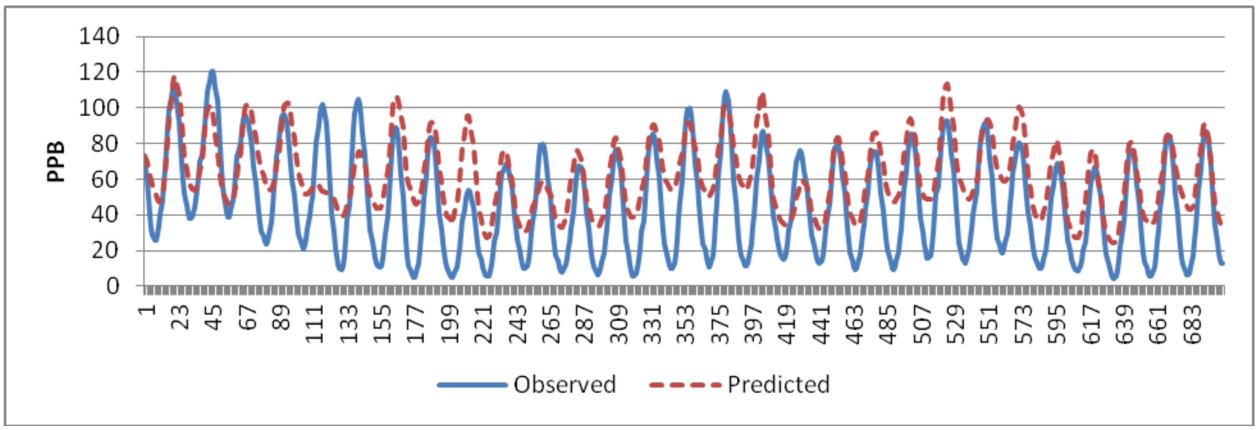
Time Series of Observed Vs.Predicted 8-Hour Rubidoux Ozone: July, 2008



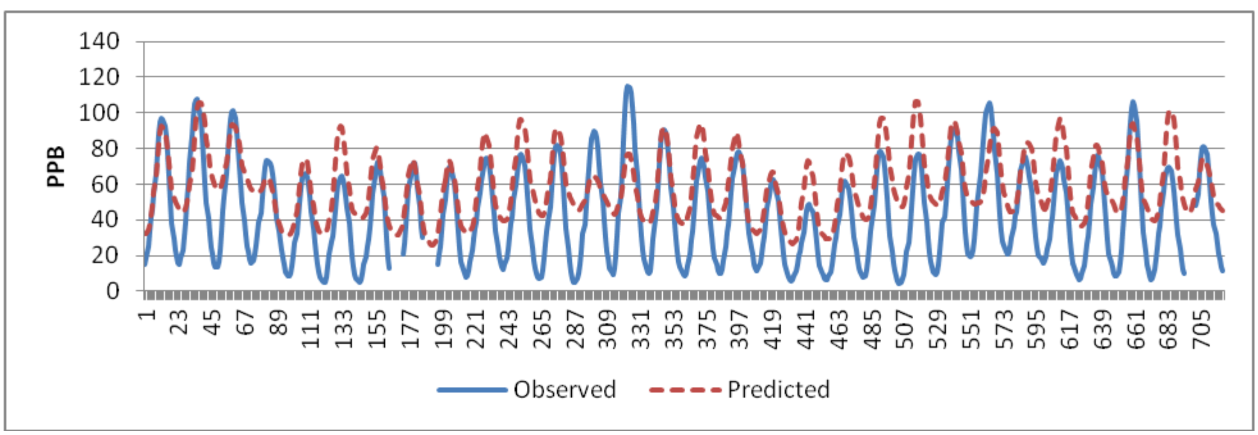
Time Series of Observed Vs.Predicted 8-Hour Rubidoux Ozone: August, 2008



Time Series of Observed Vs.Predicted 8-Hour Redlands Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Redlands Ozone: July, 2008



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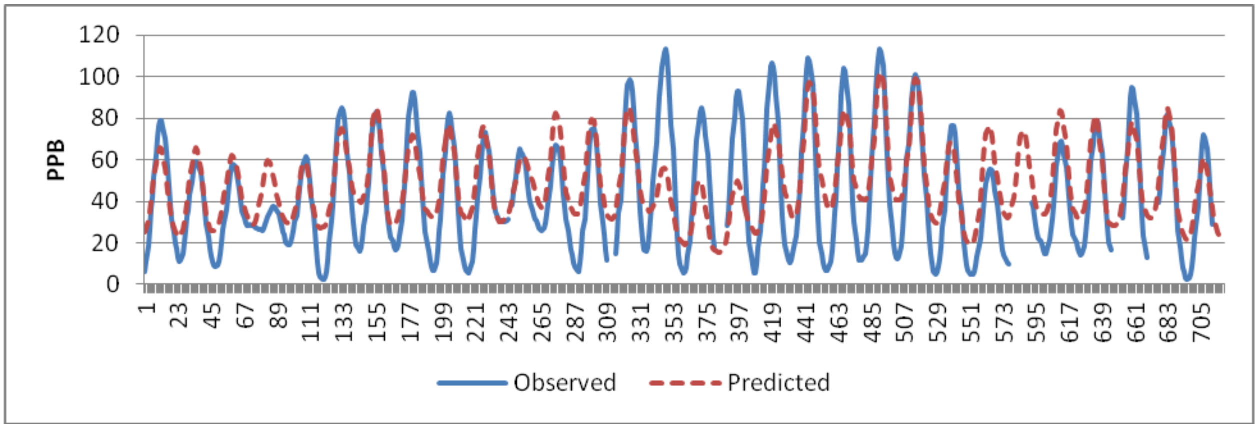
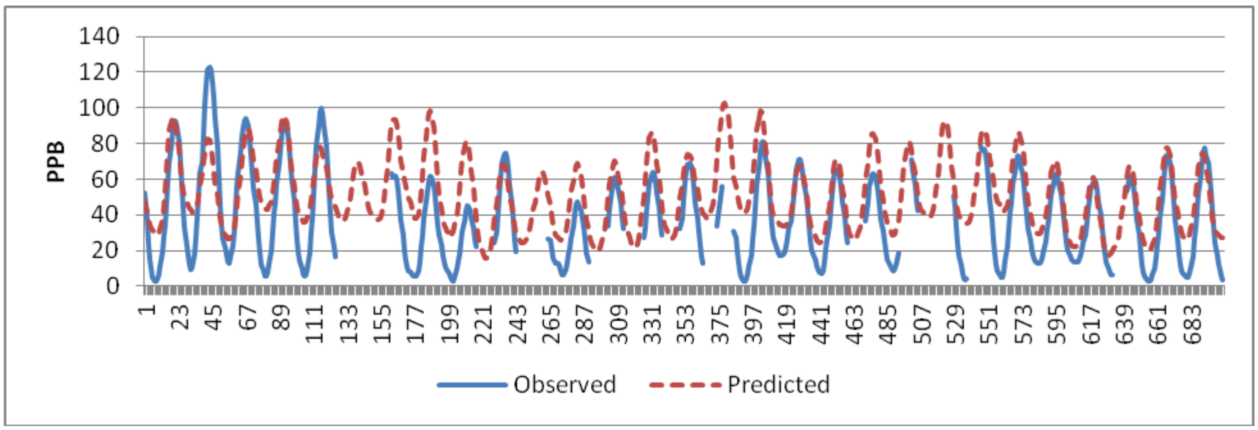
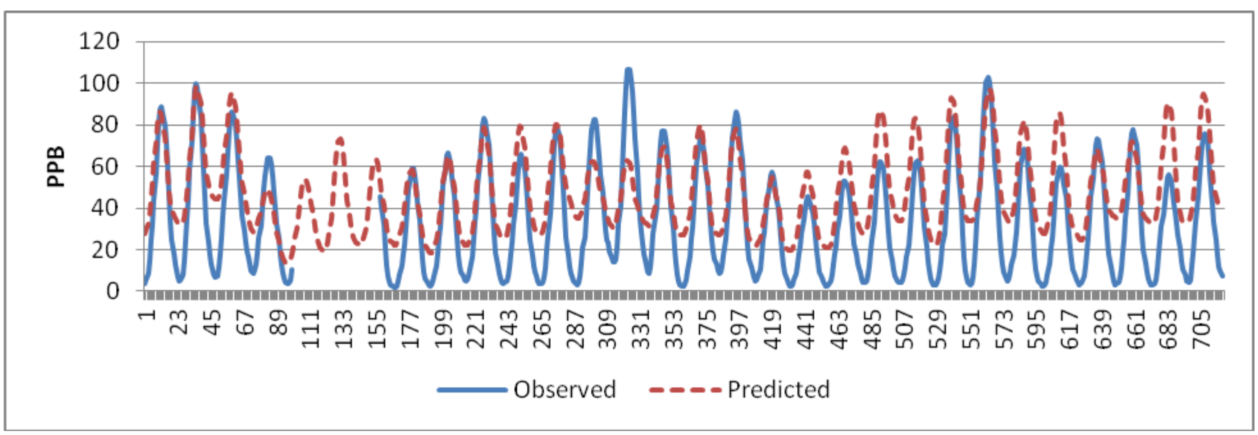


Time Series of Observed Vs.Predicted 8-Hour Upland Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Upland Ozone: July, 2008



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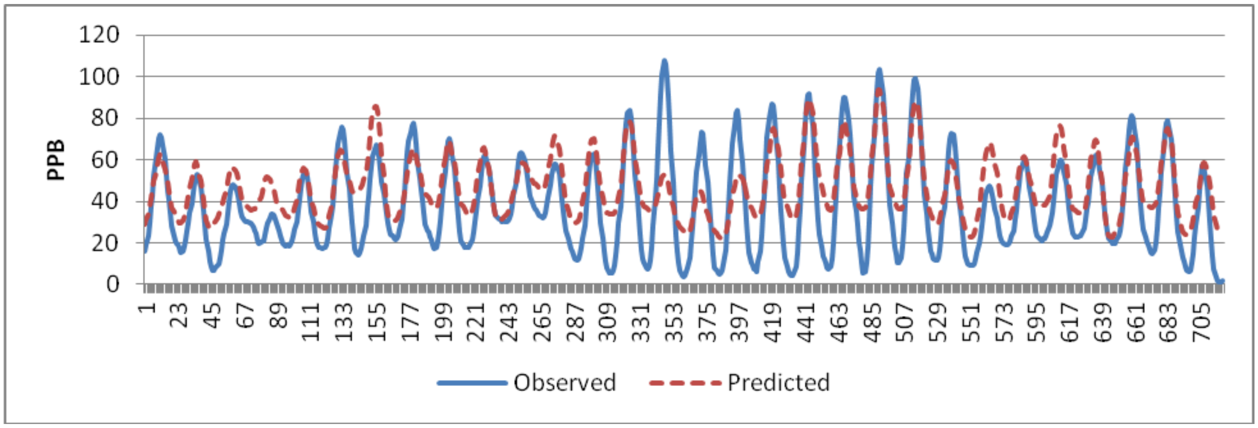
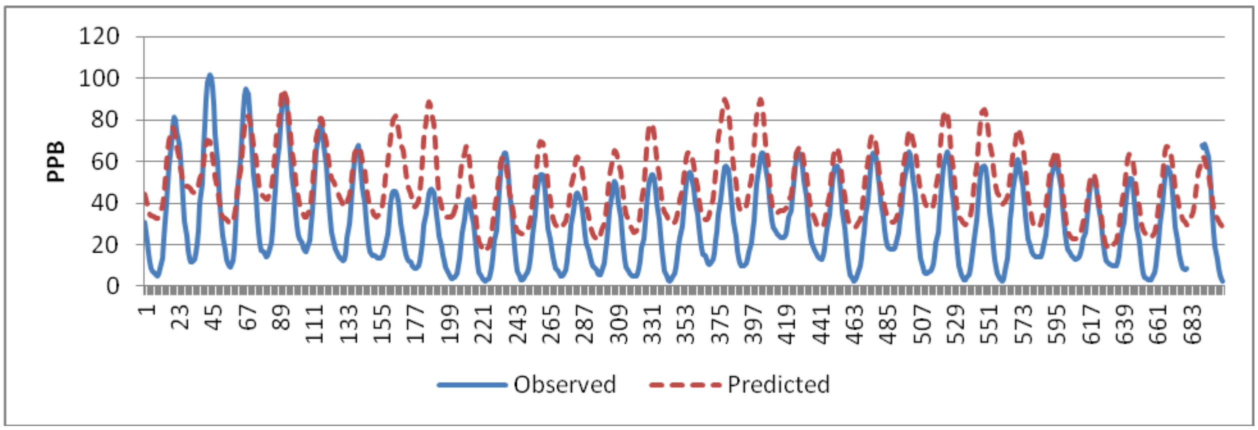
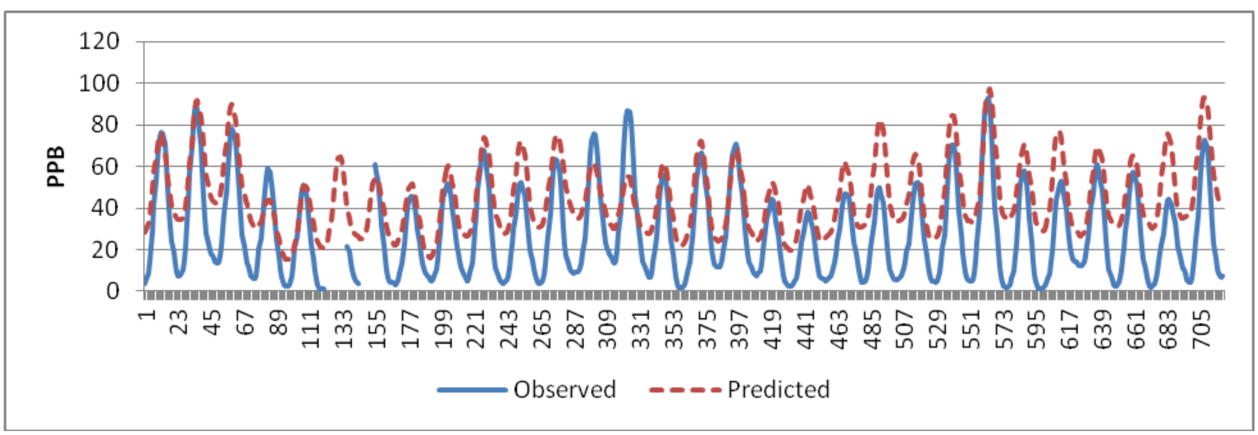


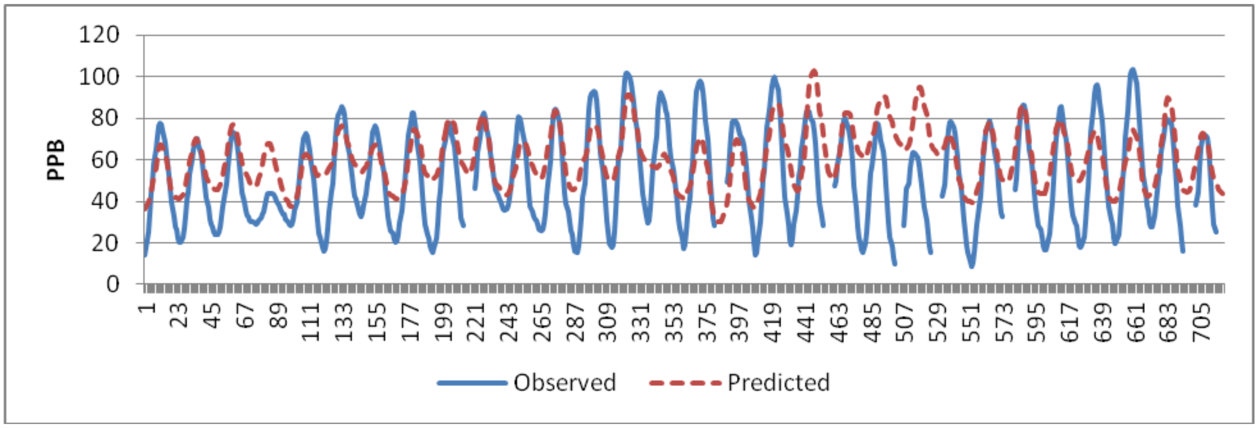
Time Series of Observed Vs.Predicted 8-Hour Azusa Ozone: June, 2008



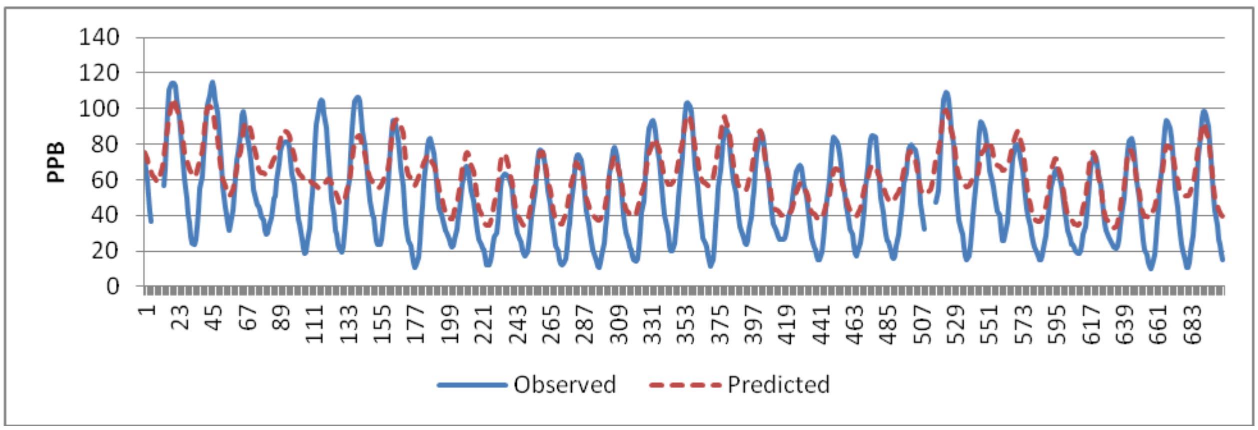
Time Series of Observed Vs.Predicted 8-Hour Azusa Ozone: July, 2008



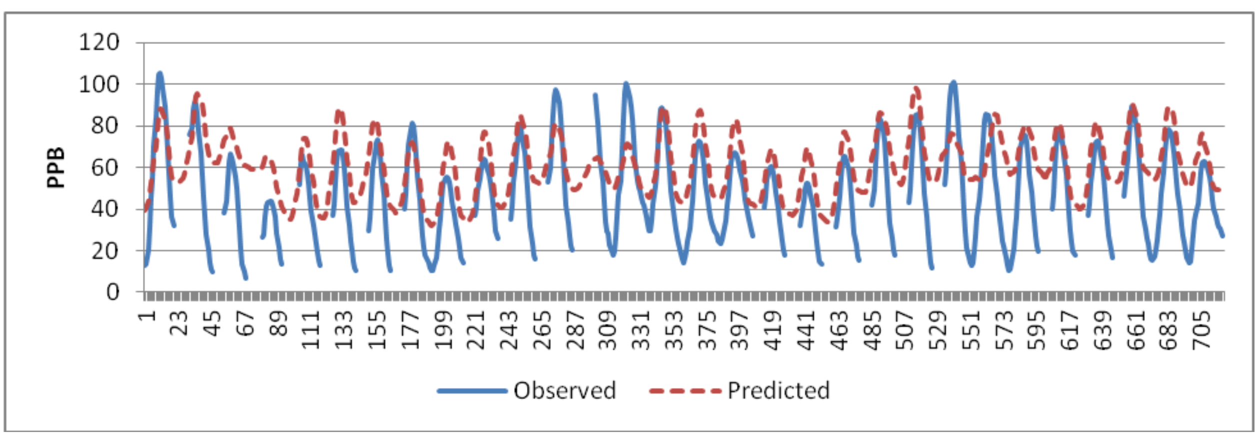
Time Series of Observed Vs.Predicted 8-Hour Azusa Ozone: August, 2008



Time Series of Observed Vs.Predicted 8-Hour Perris Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Perris Ozone: July, 2008



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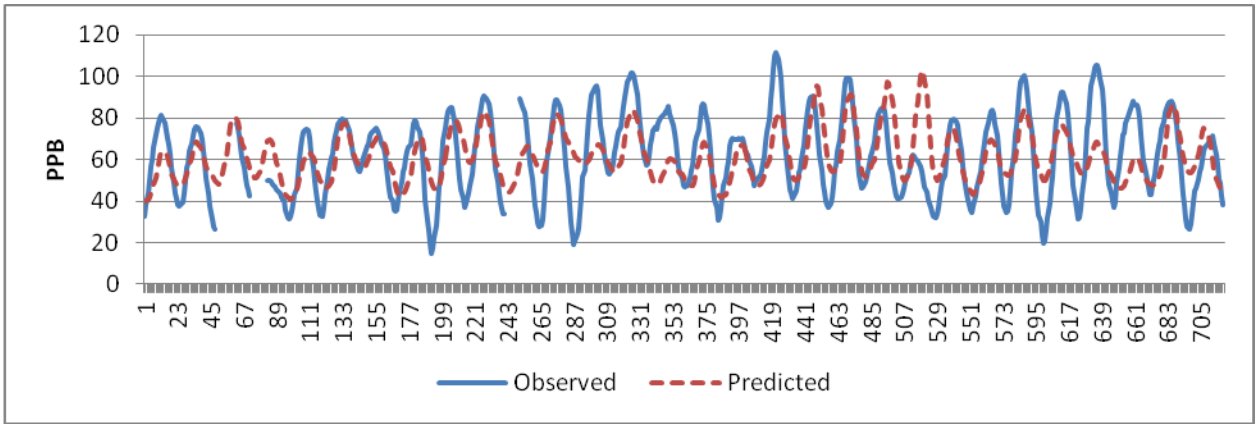
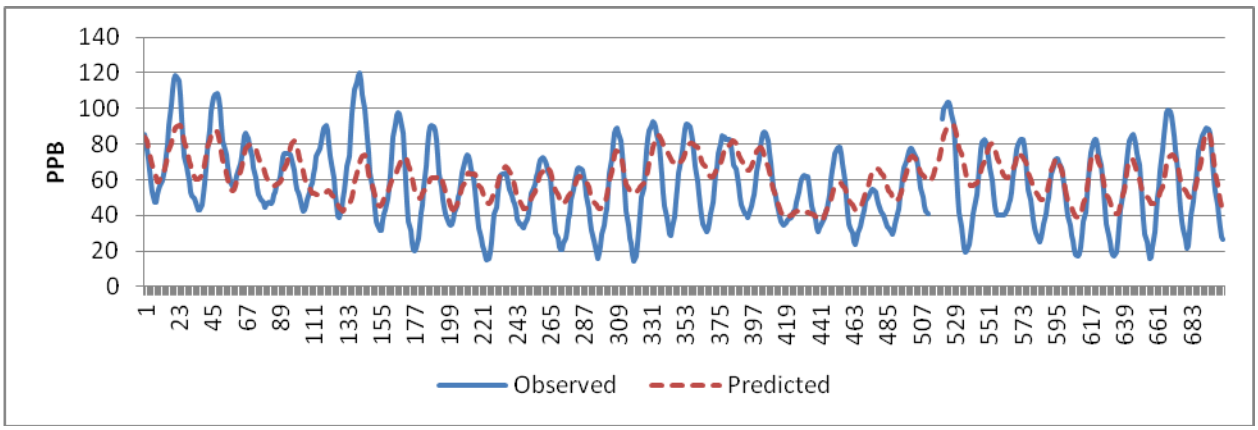


Time Series of Observed Vs.Predicted 8-Hour Banning Ozone: June, 2008



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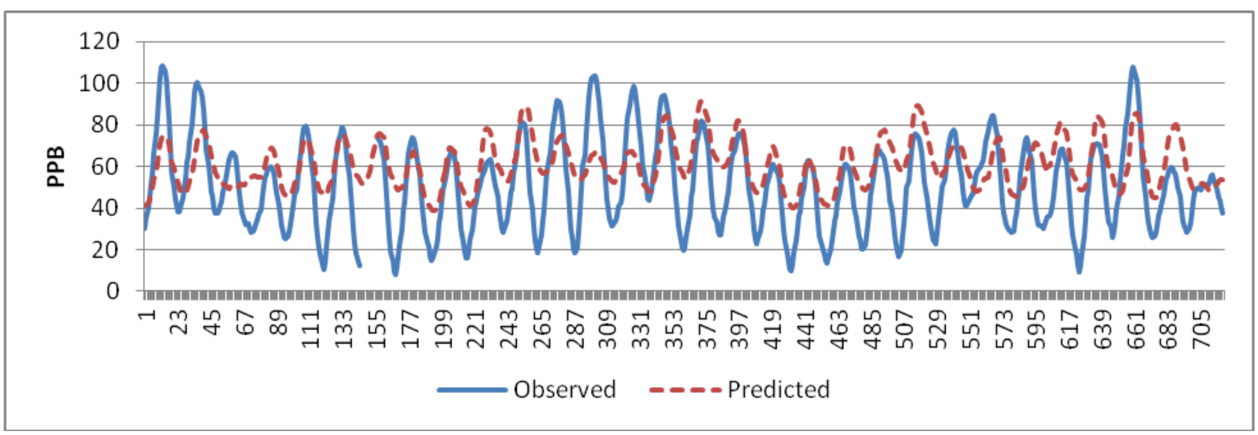
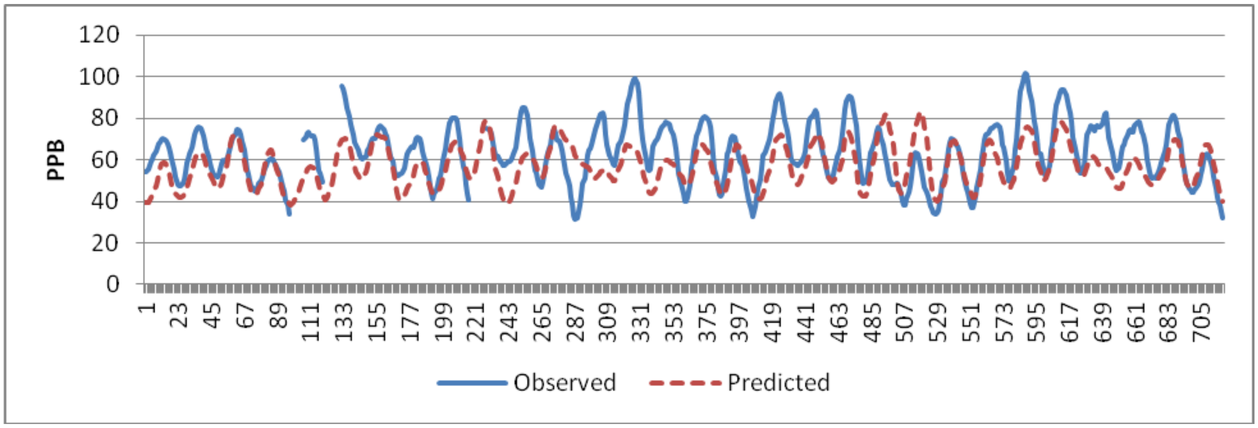
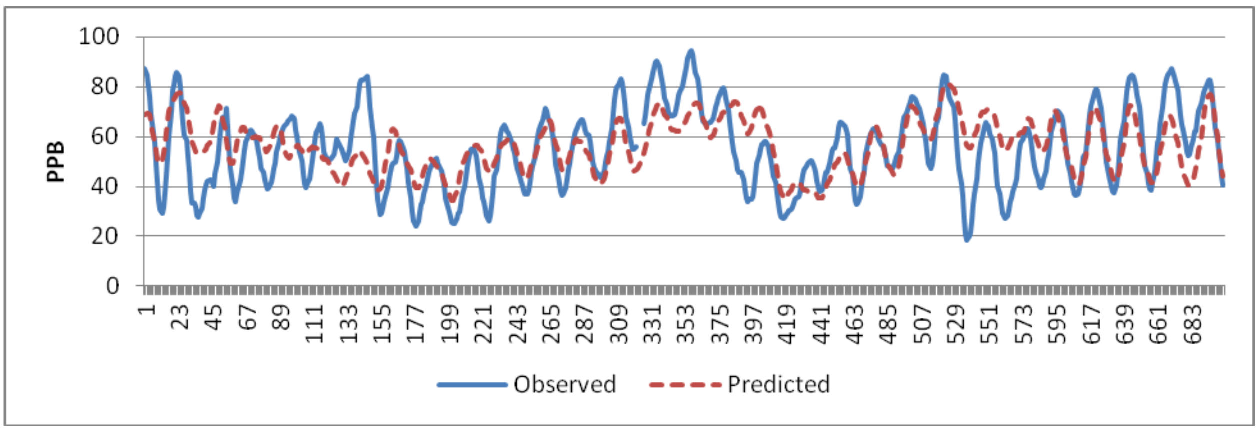


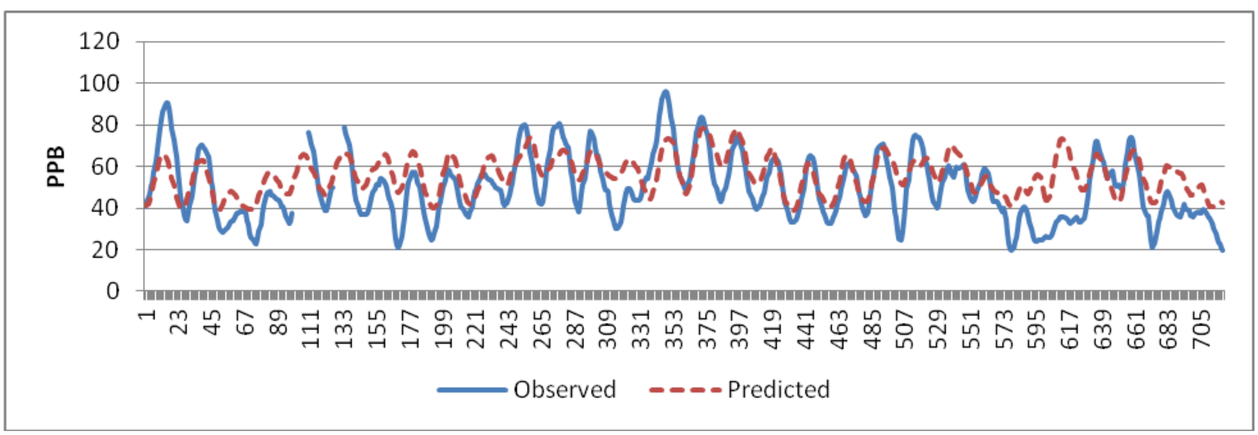
Time Series of Observed Vs.Predicted 8-Hour Banning Ozone: August, 2008



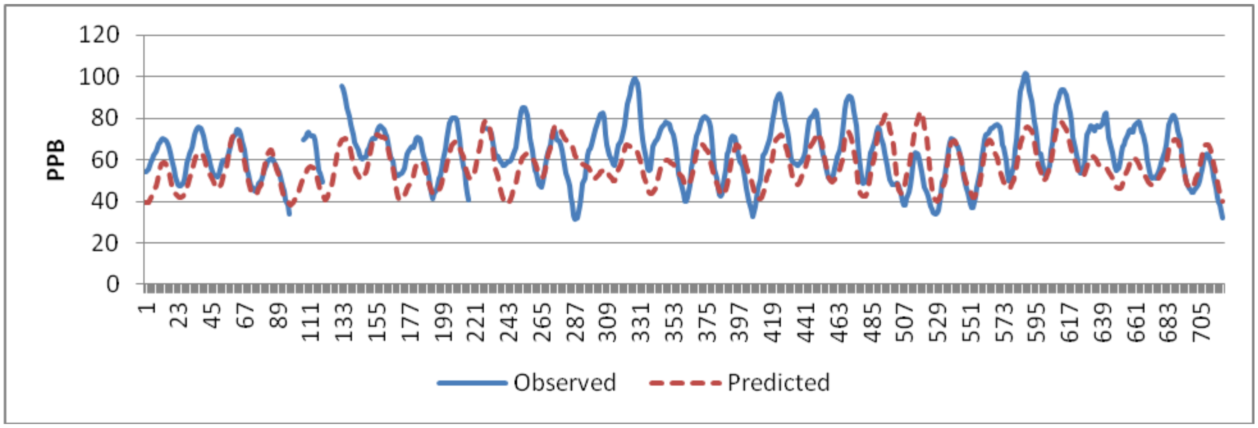
Time Series of Observed Vs.Predicted 8-Hour Palm Springs Ozone: June, 2008



Time Series of Observed Vs.Predicted 8-Hour Palm Springs Ozone: July, 2008



Time Series of Observed Vs.Predicted 8-Hour Palm Springs Ozone: August, 2008



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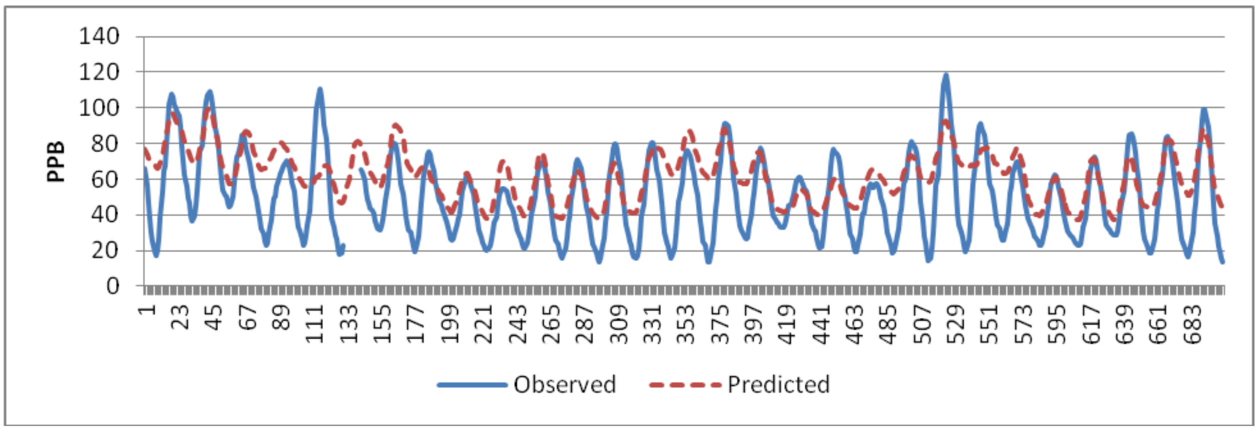

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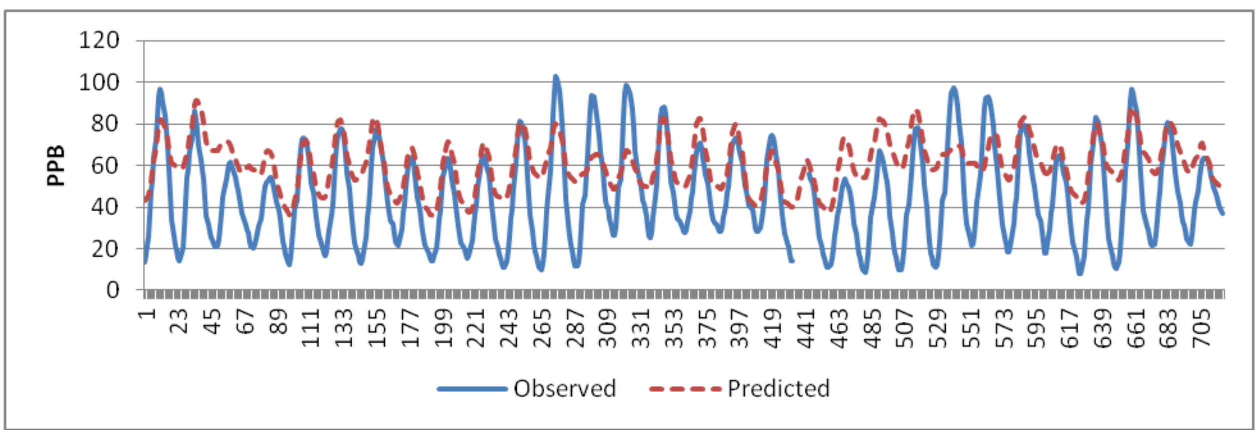

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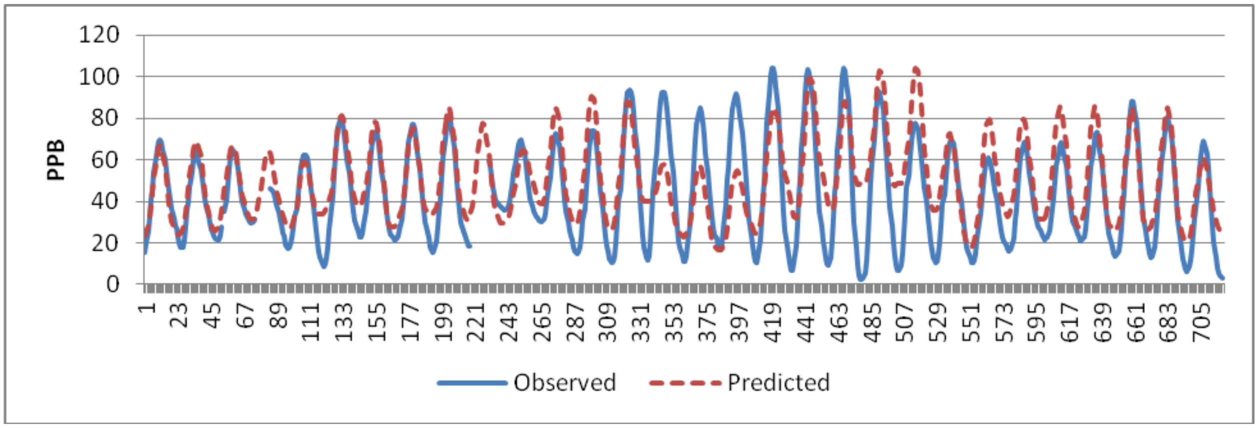

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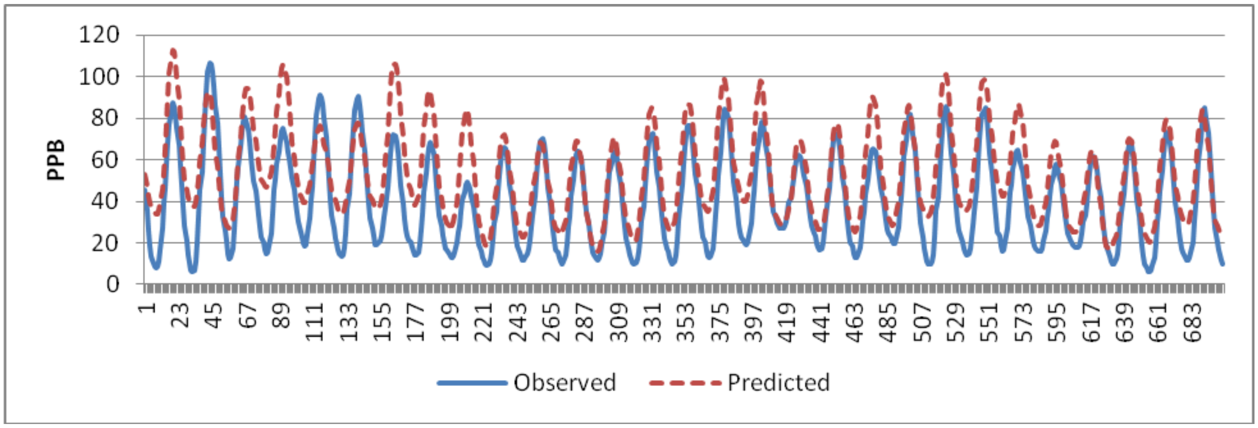

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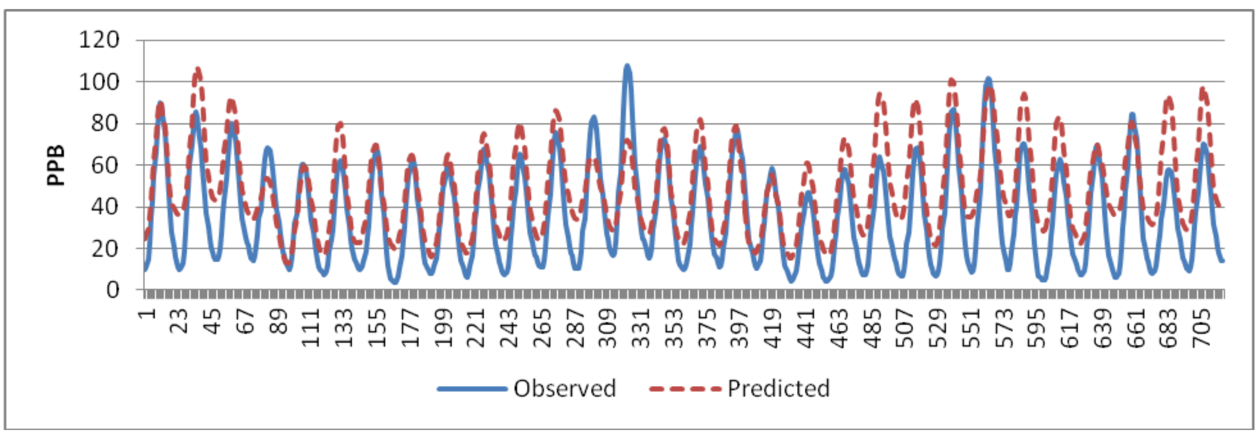

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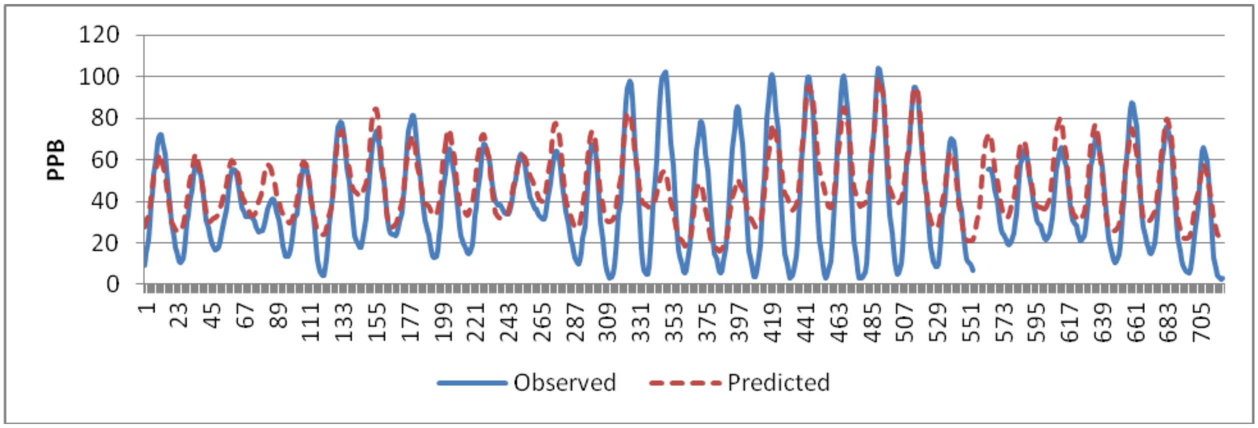

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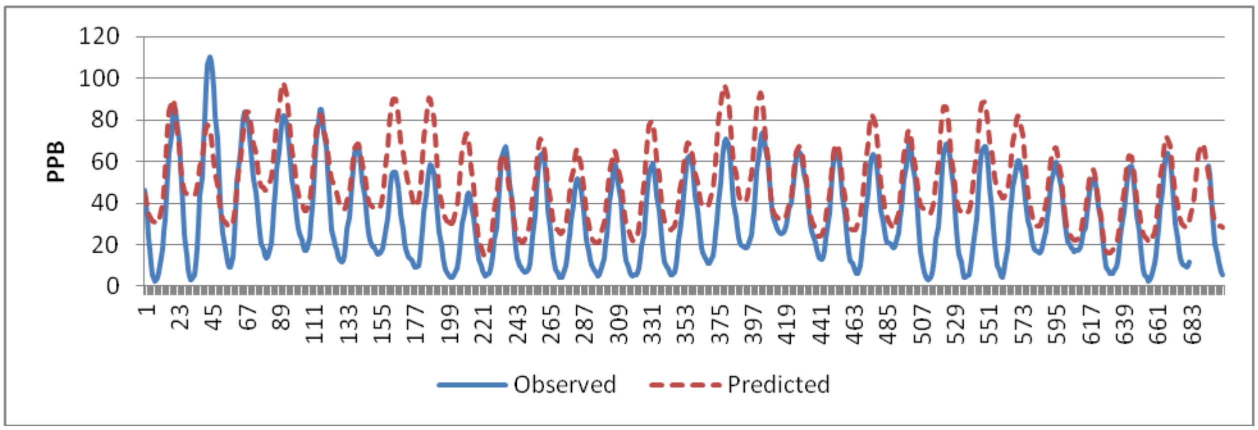

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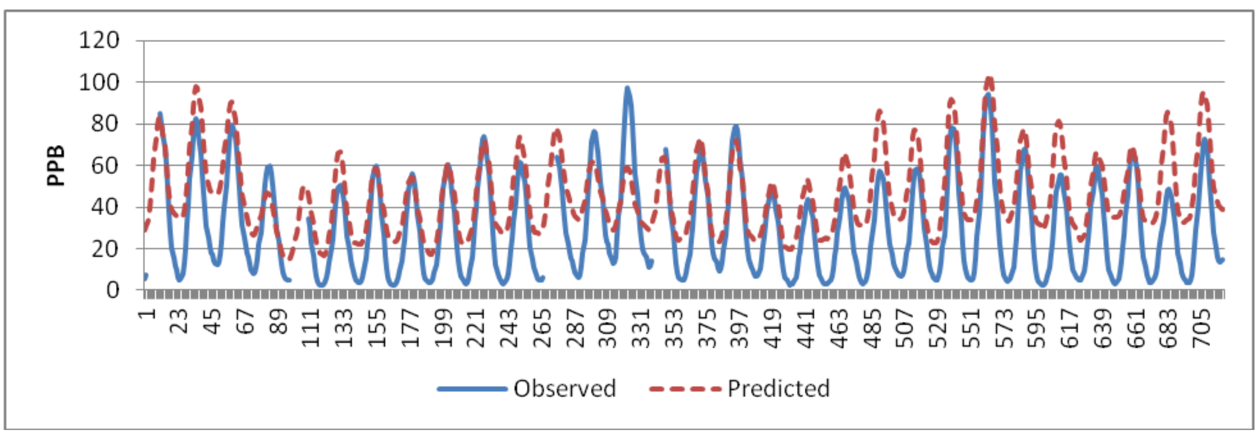

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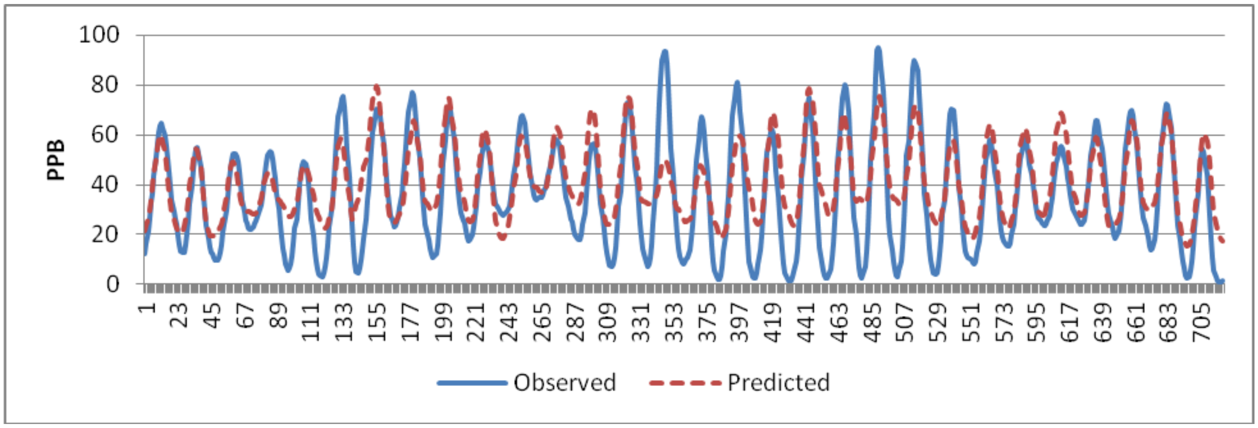

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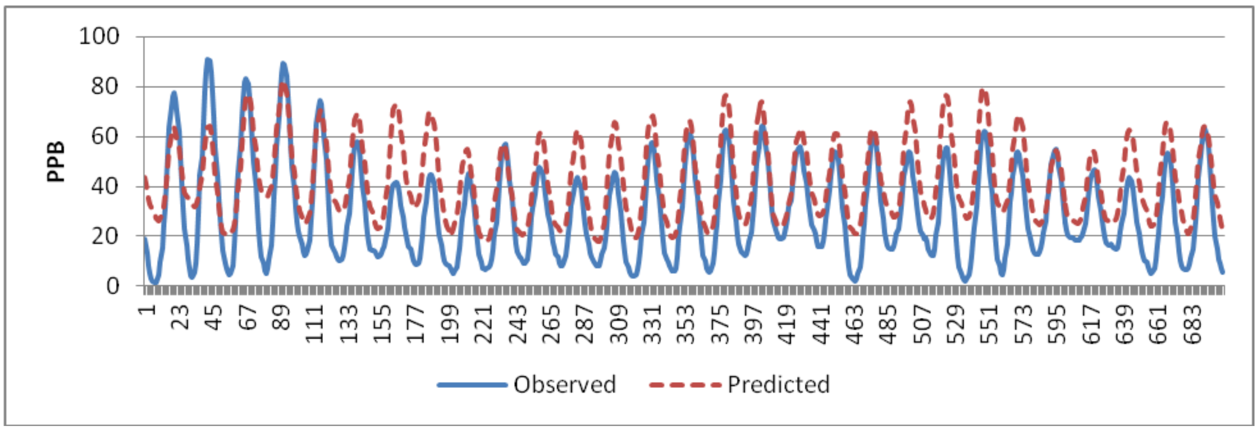

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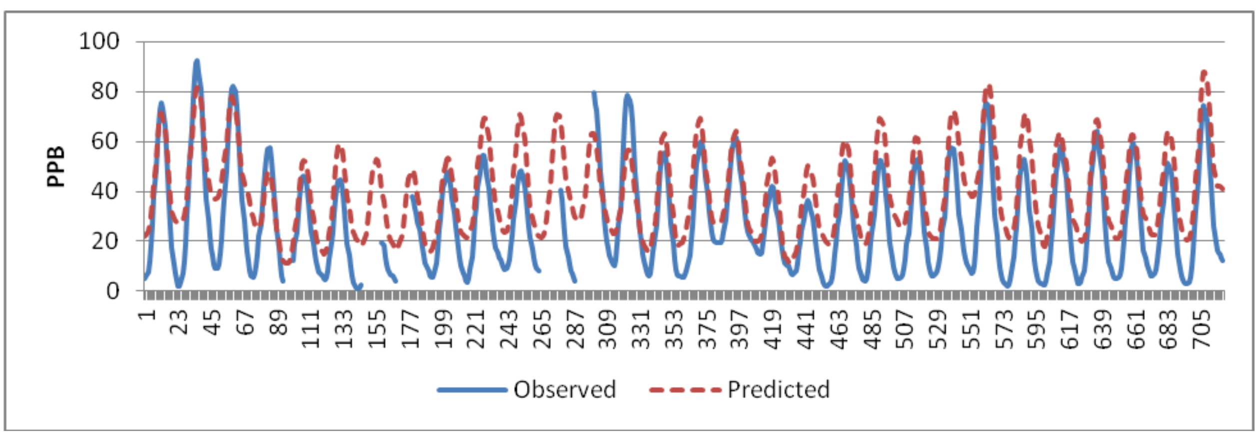

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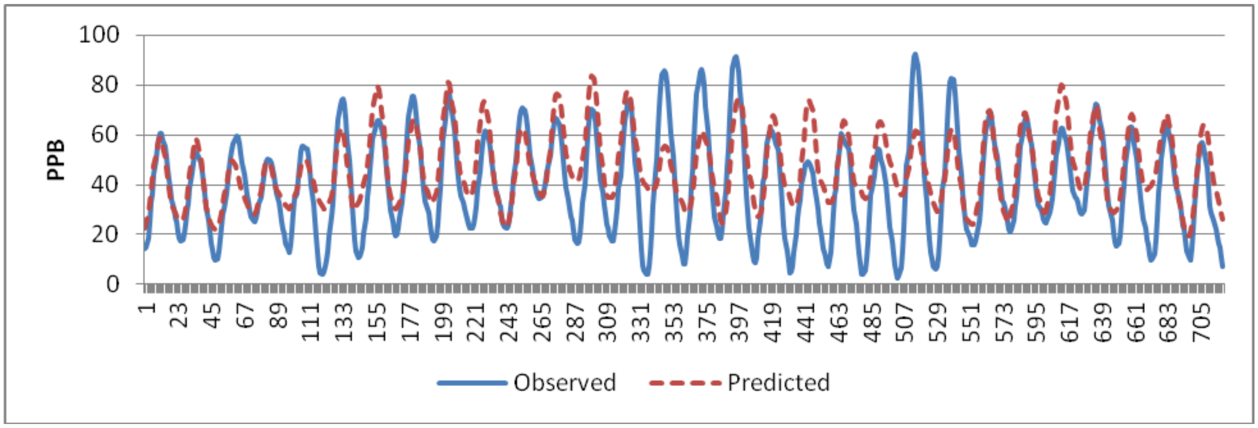

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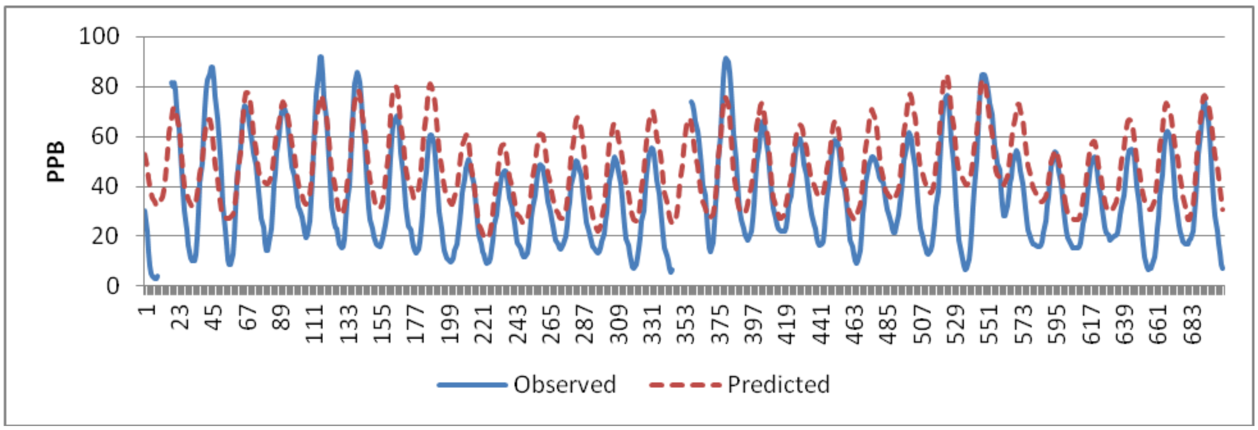

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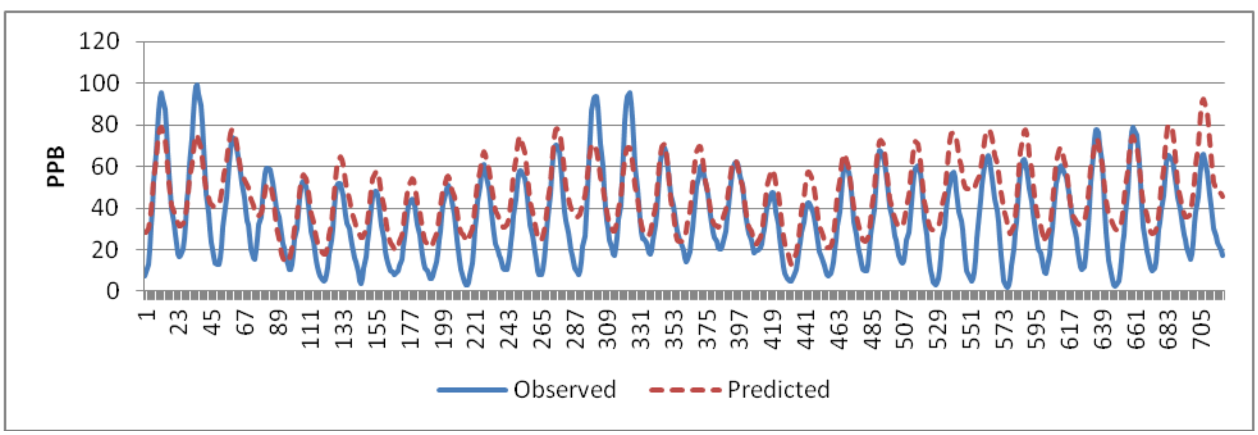

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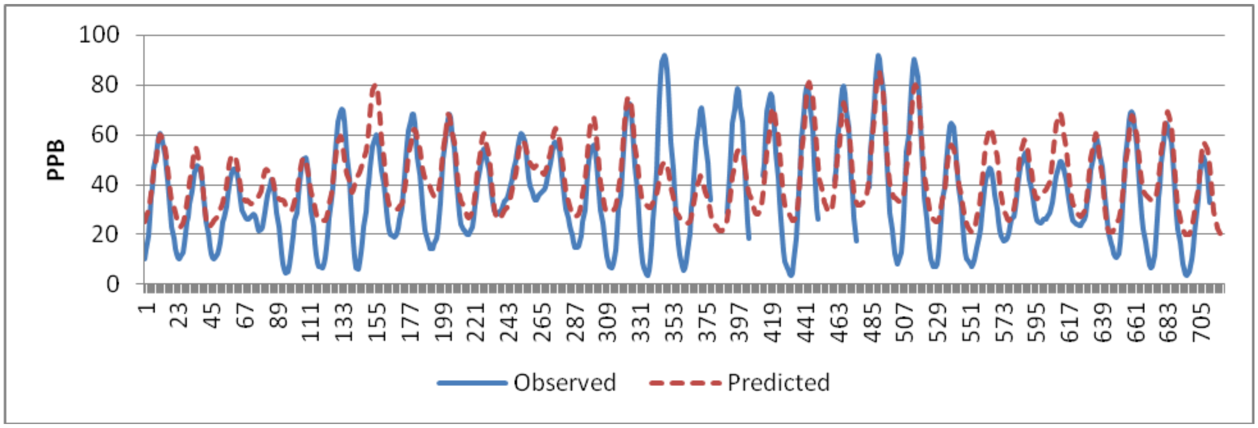

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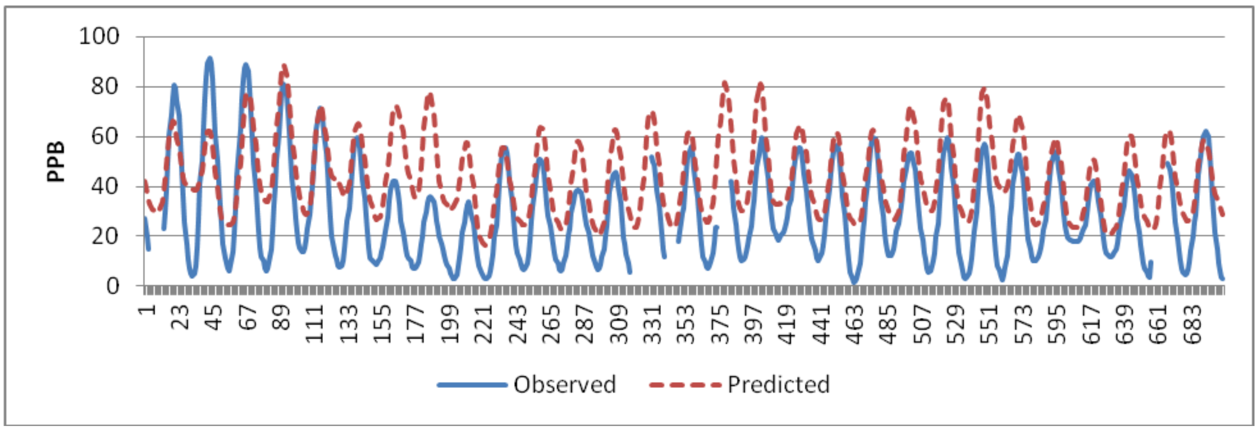

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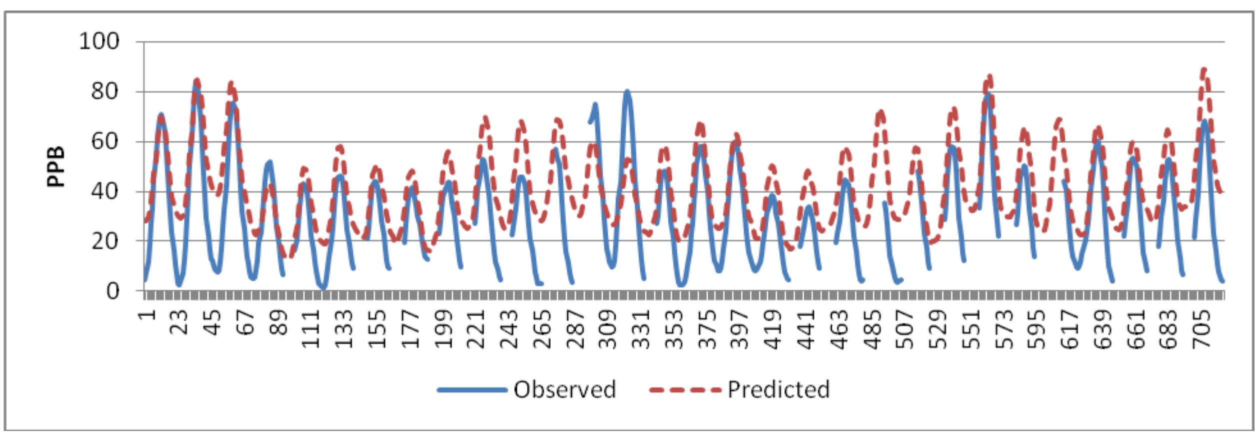

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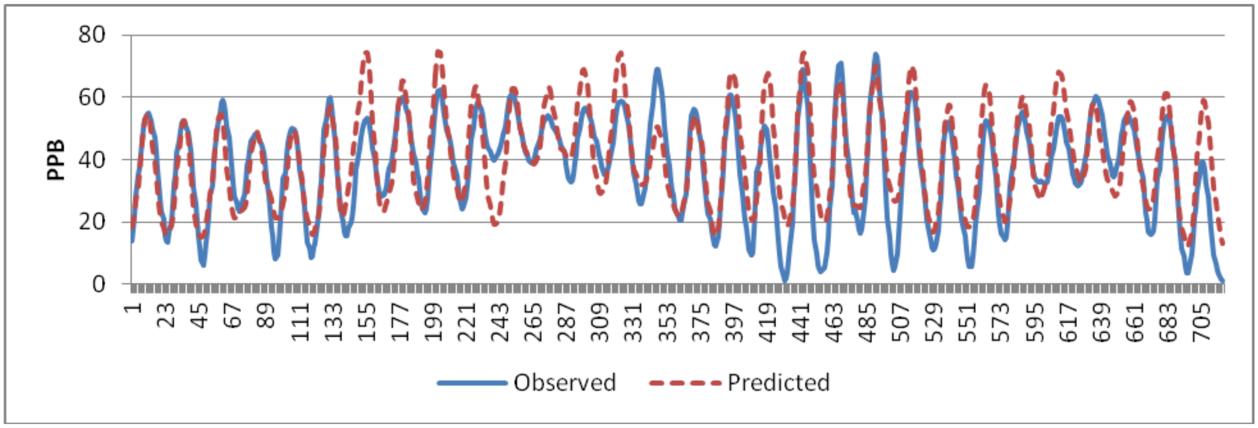

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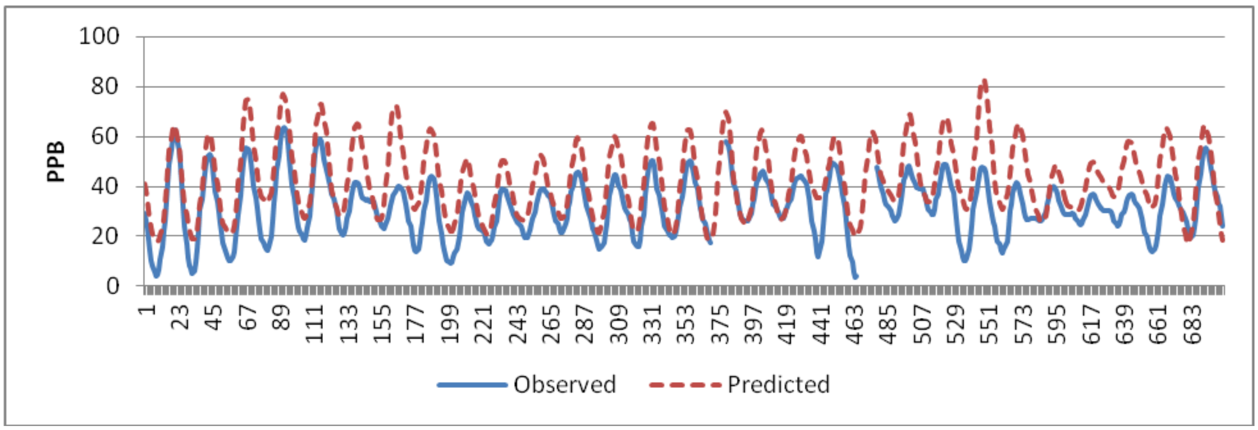

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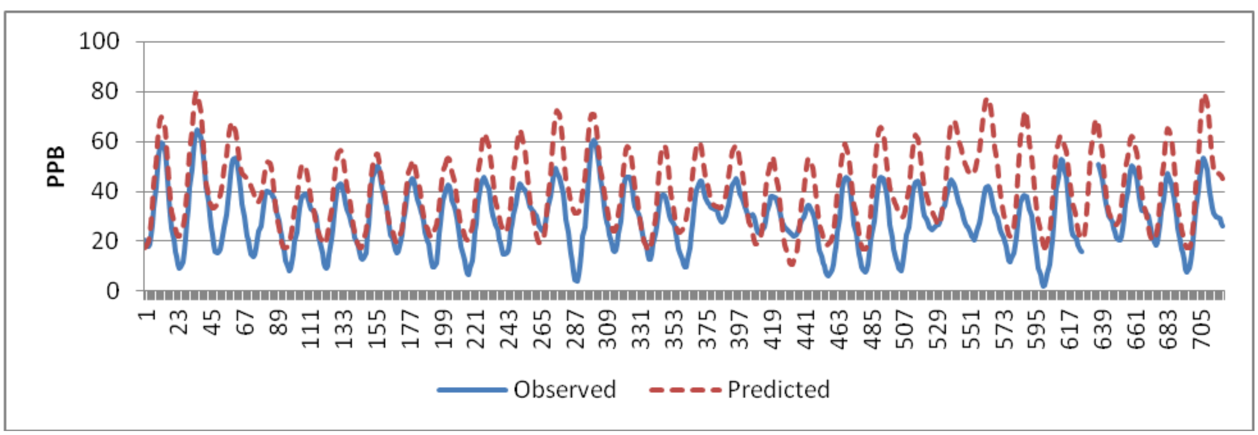

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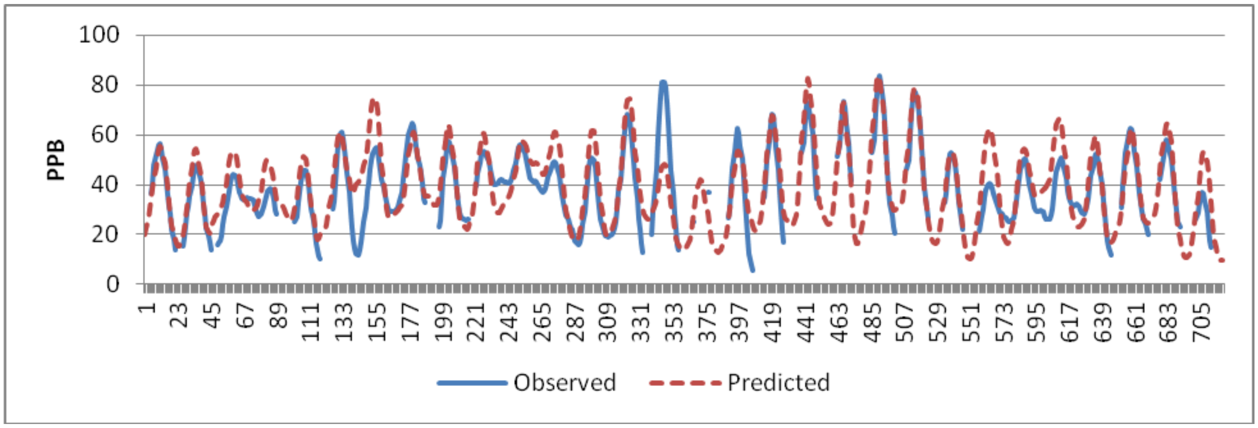

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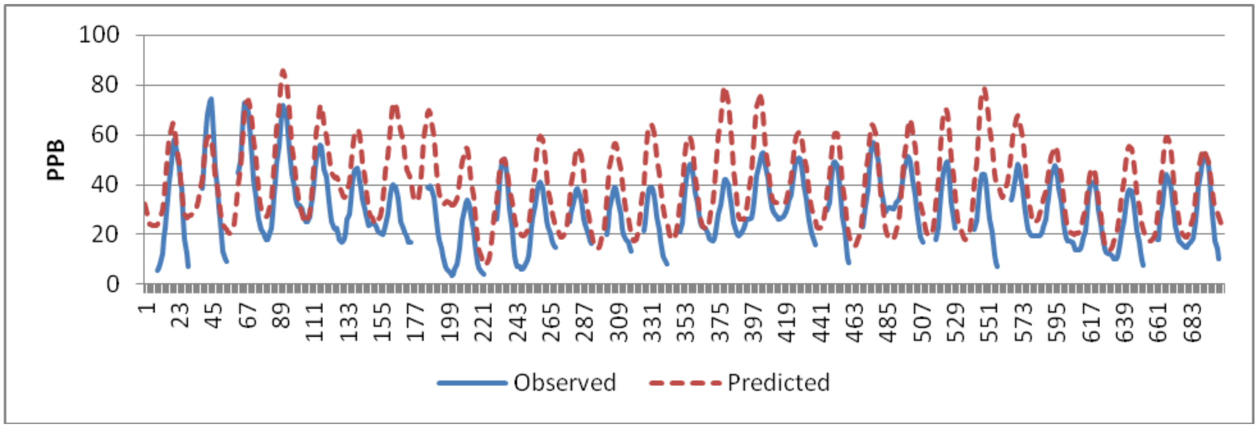

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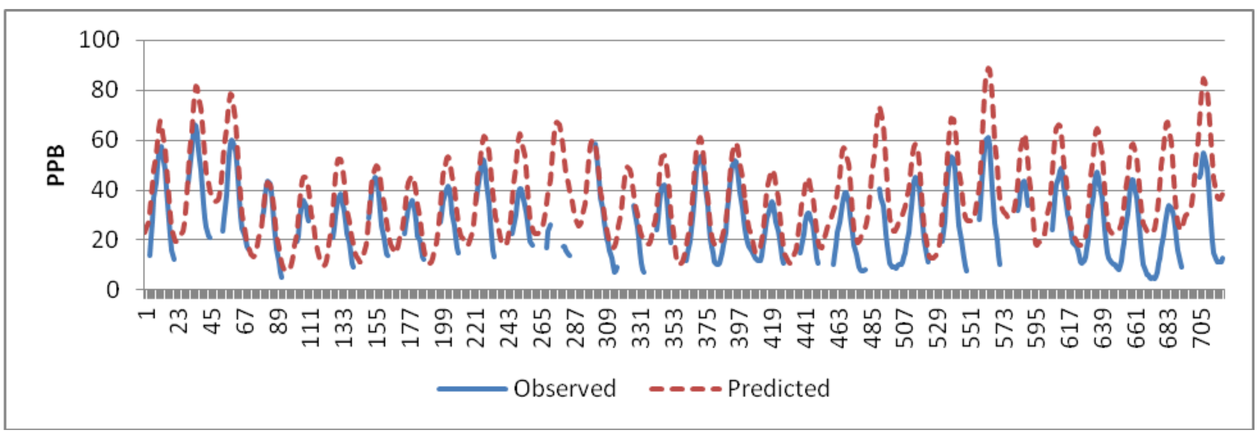

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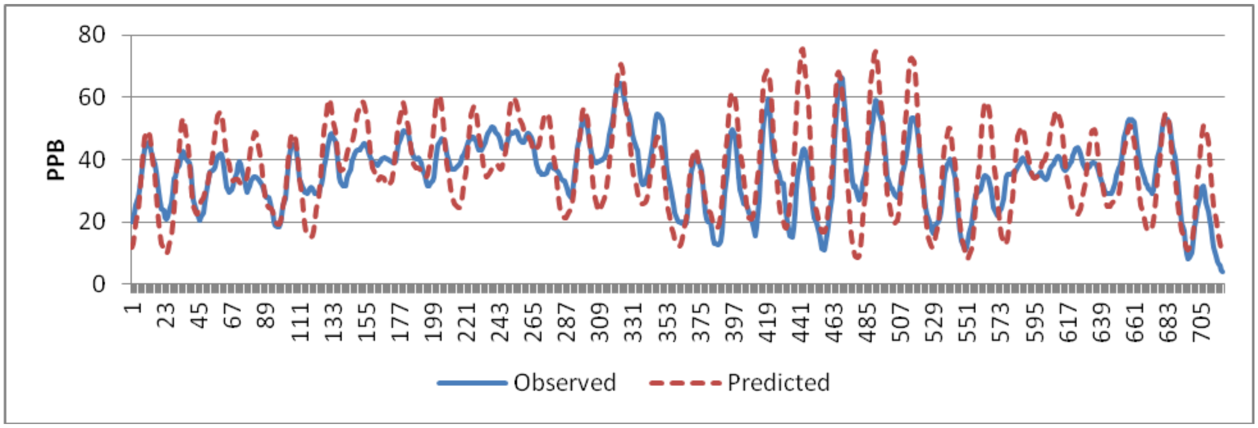

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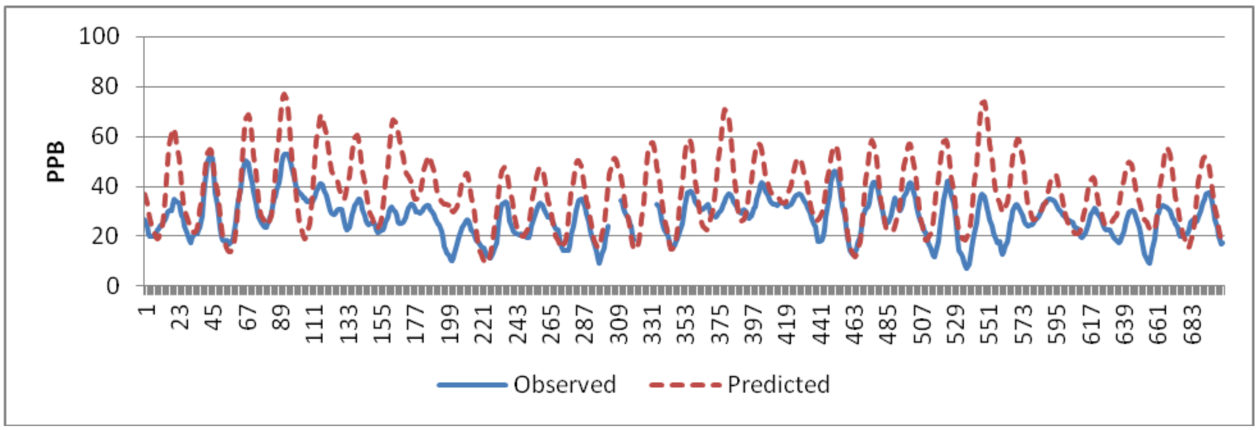

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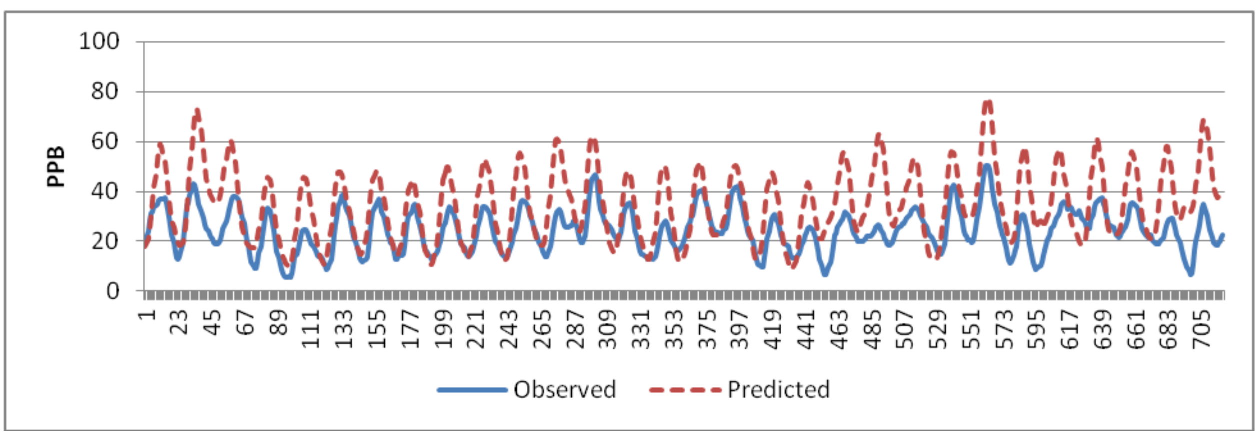

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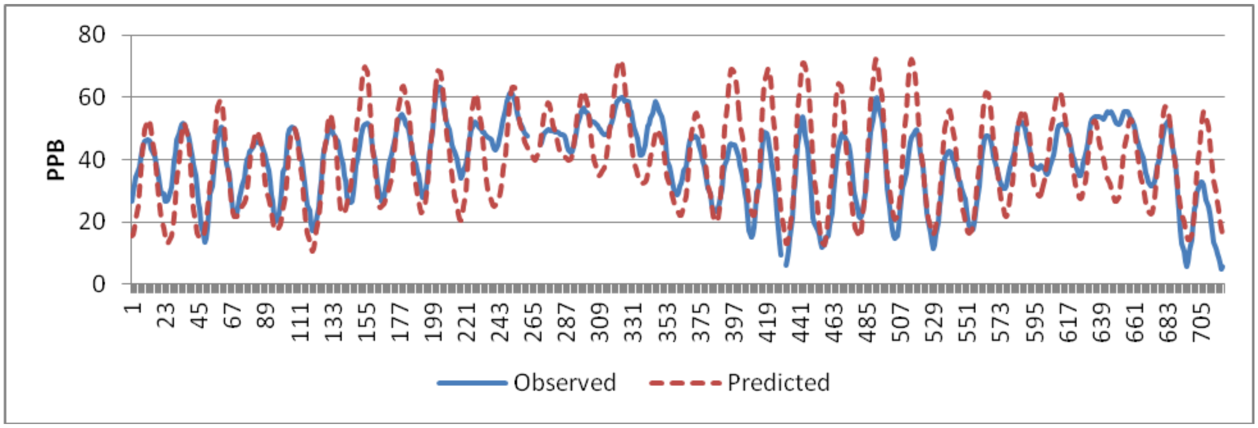

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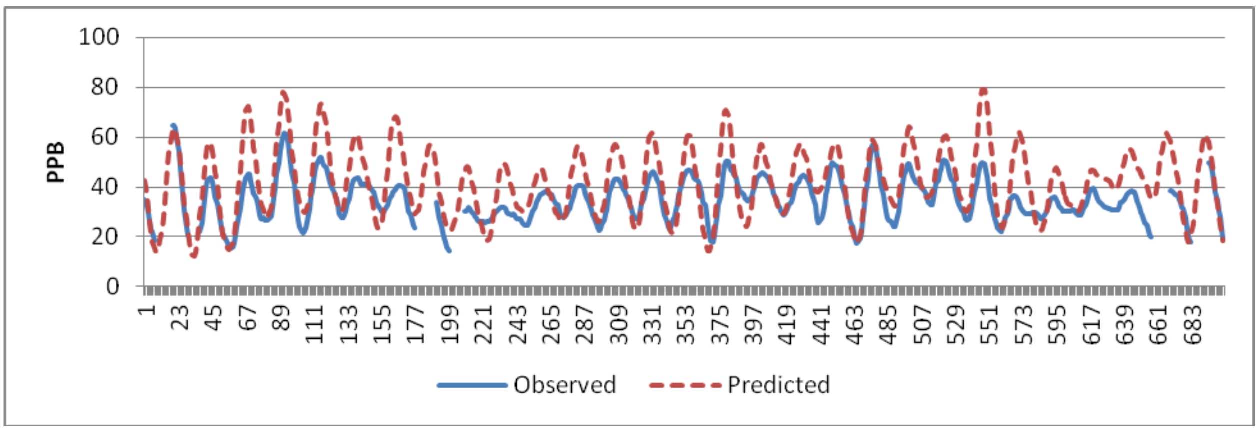

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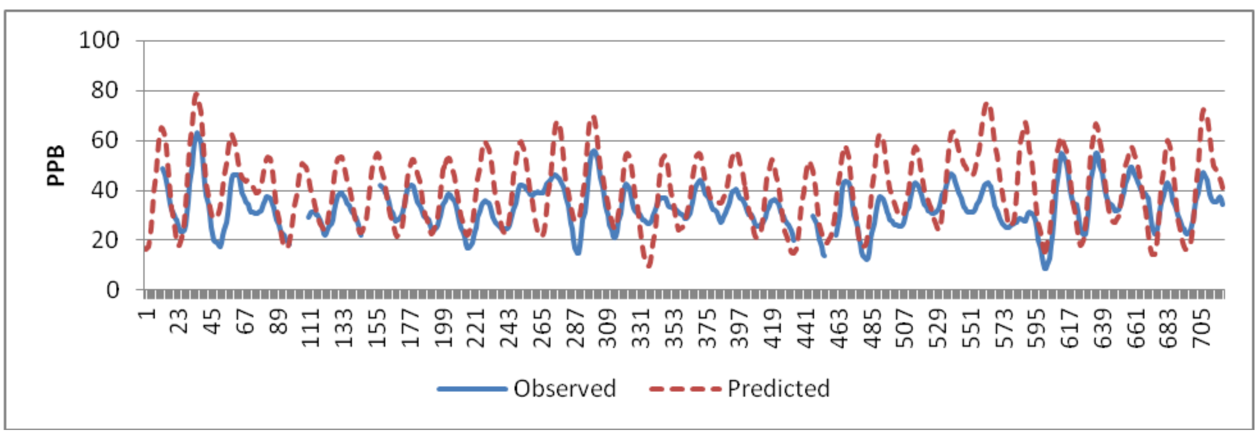

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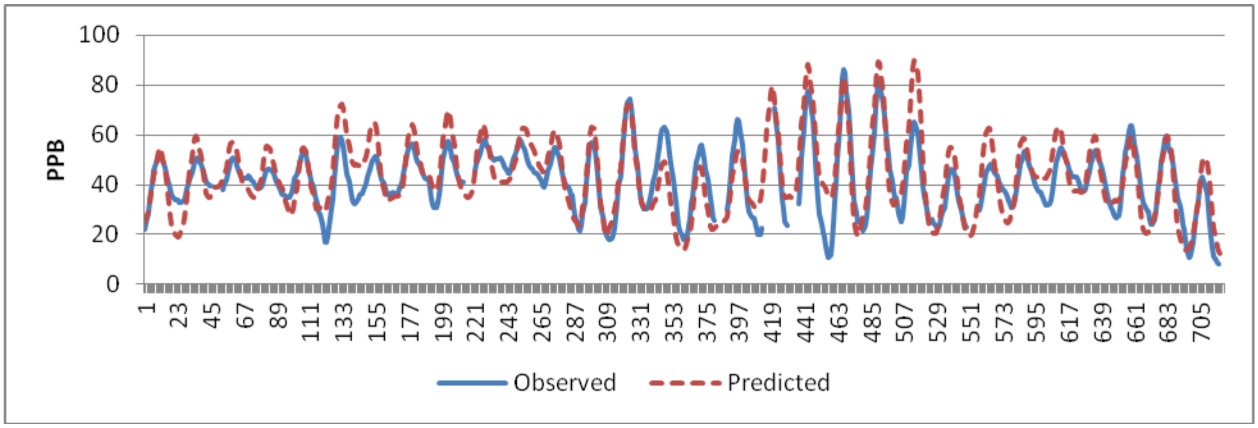

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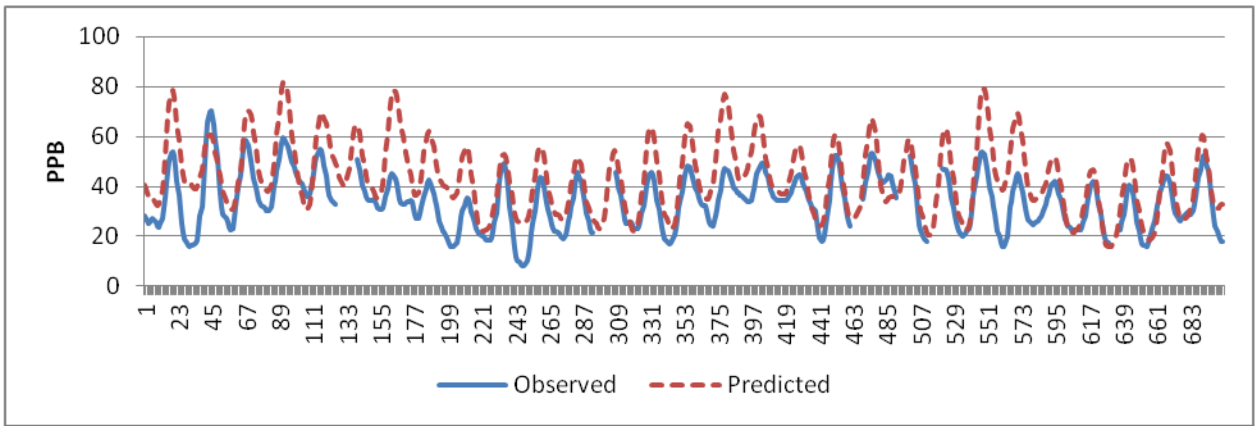

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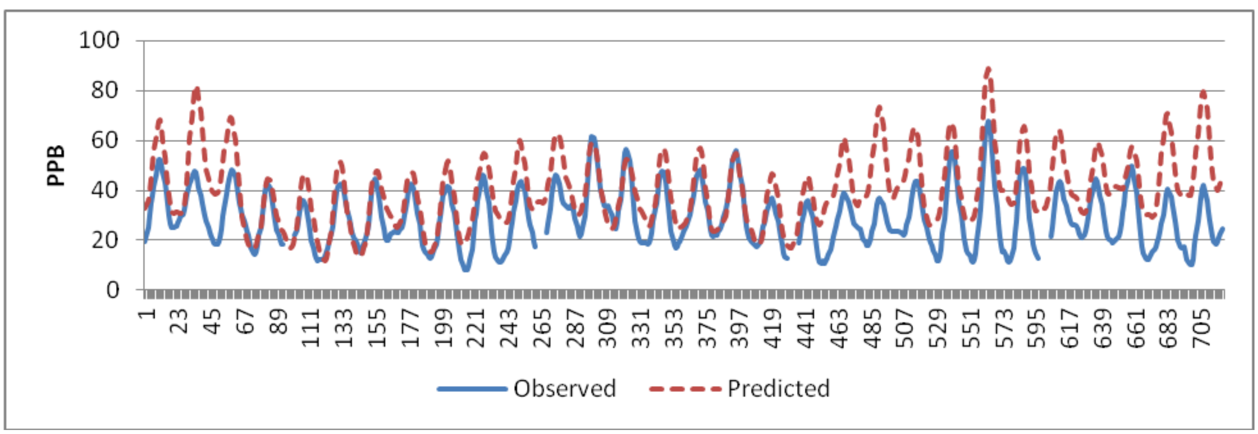

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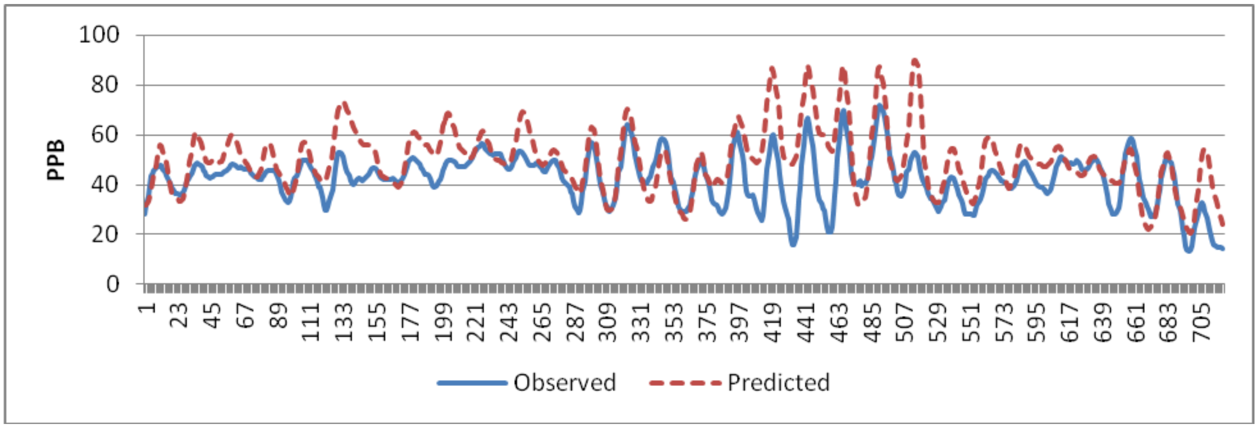

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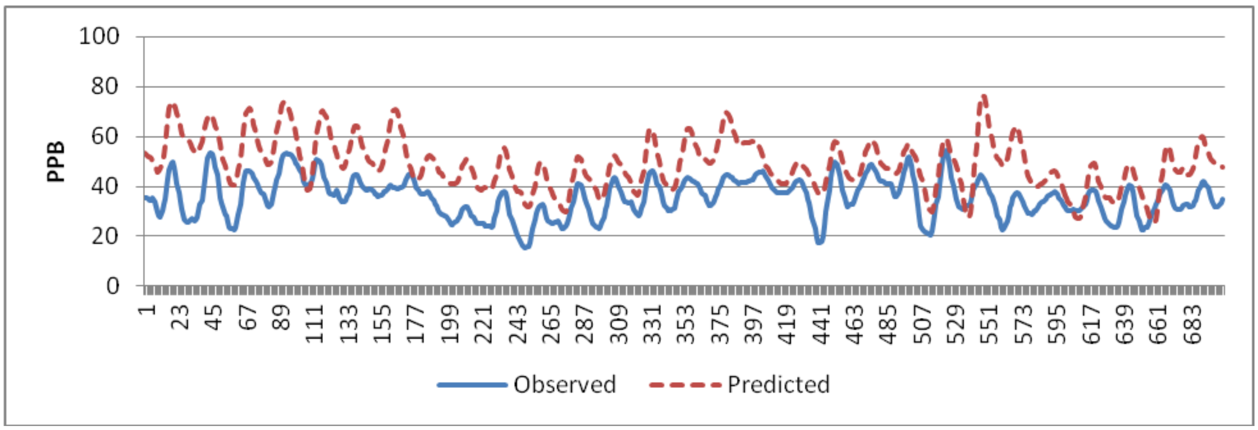

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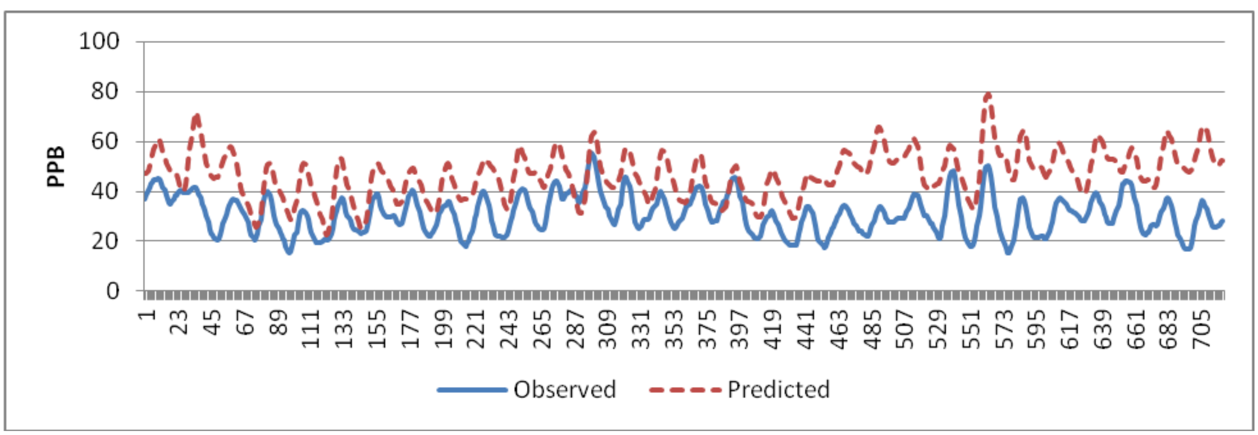

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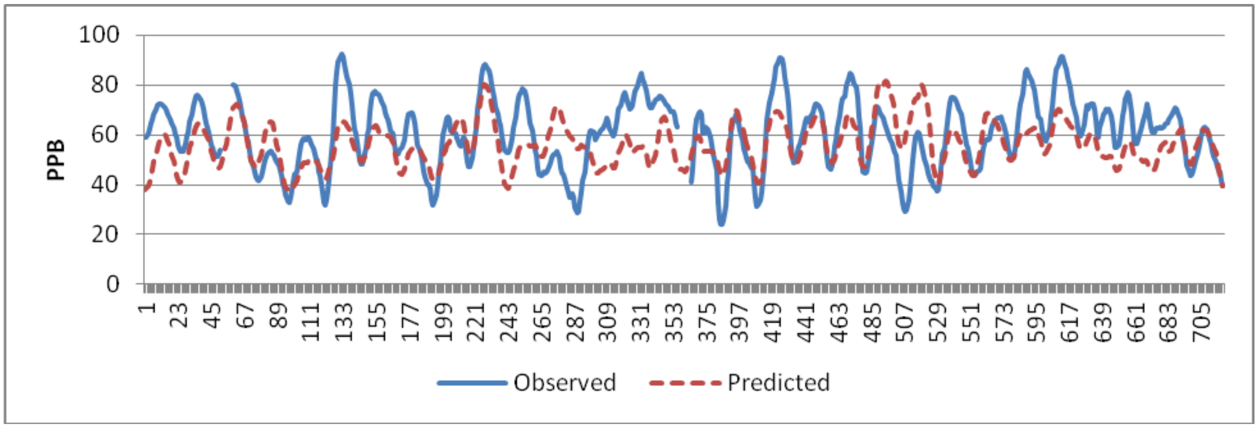
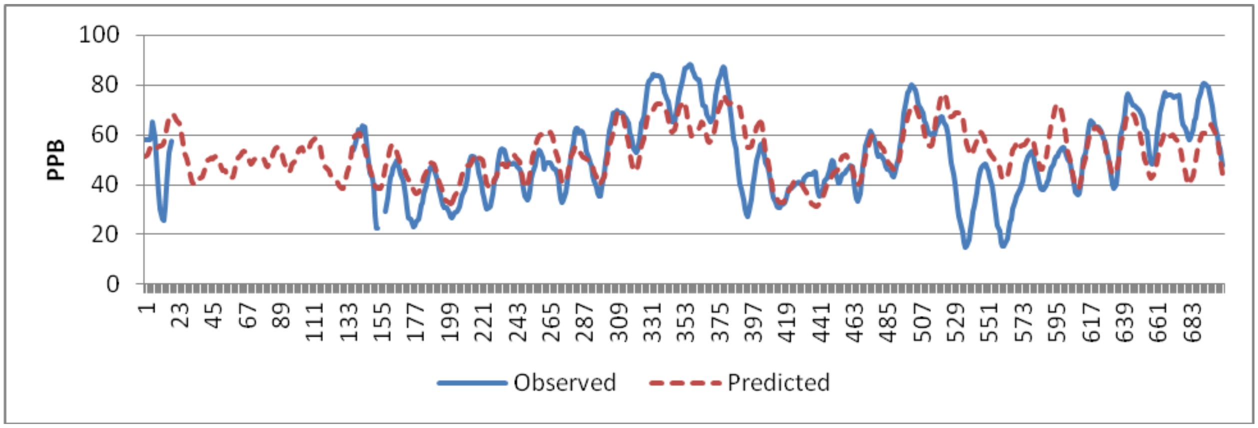


Time Series of Observed Vs.Predicted 8-Hour Indio Ozone: June, 2008



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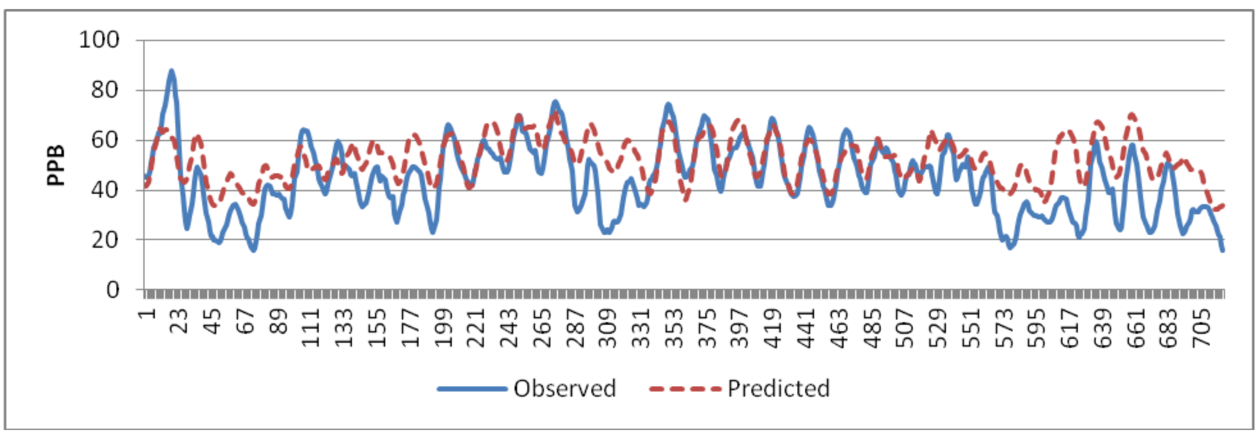
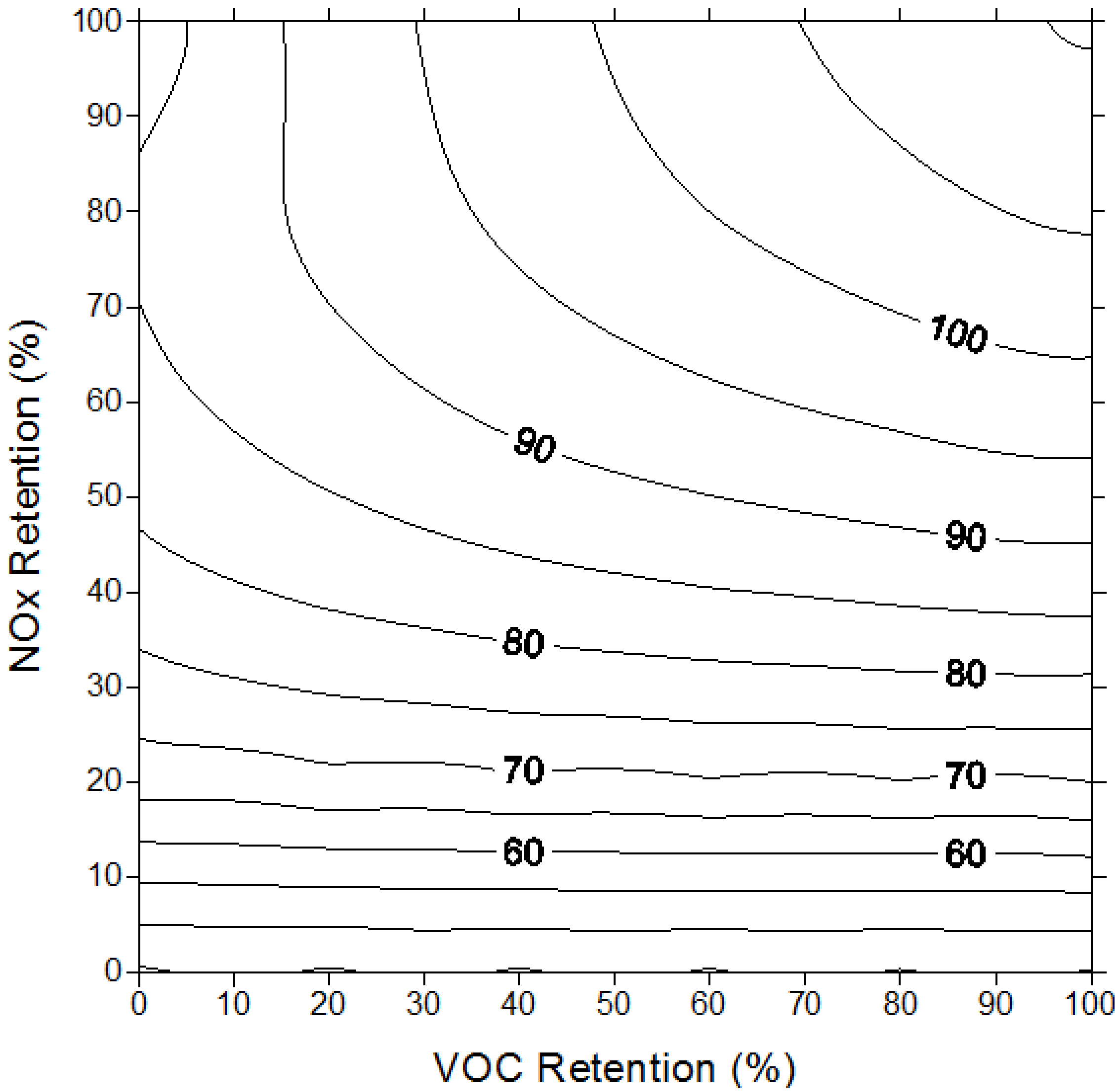


Time Series of Observed Vs.Predicted 8-Hour Indio Ozone: August, 2008

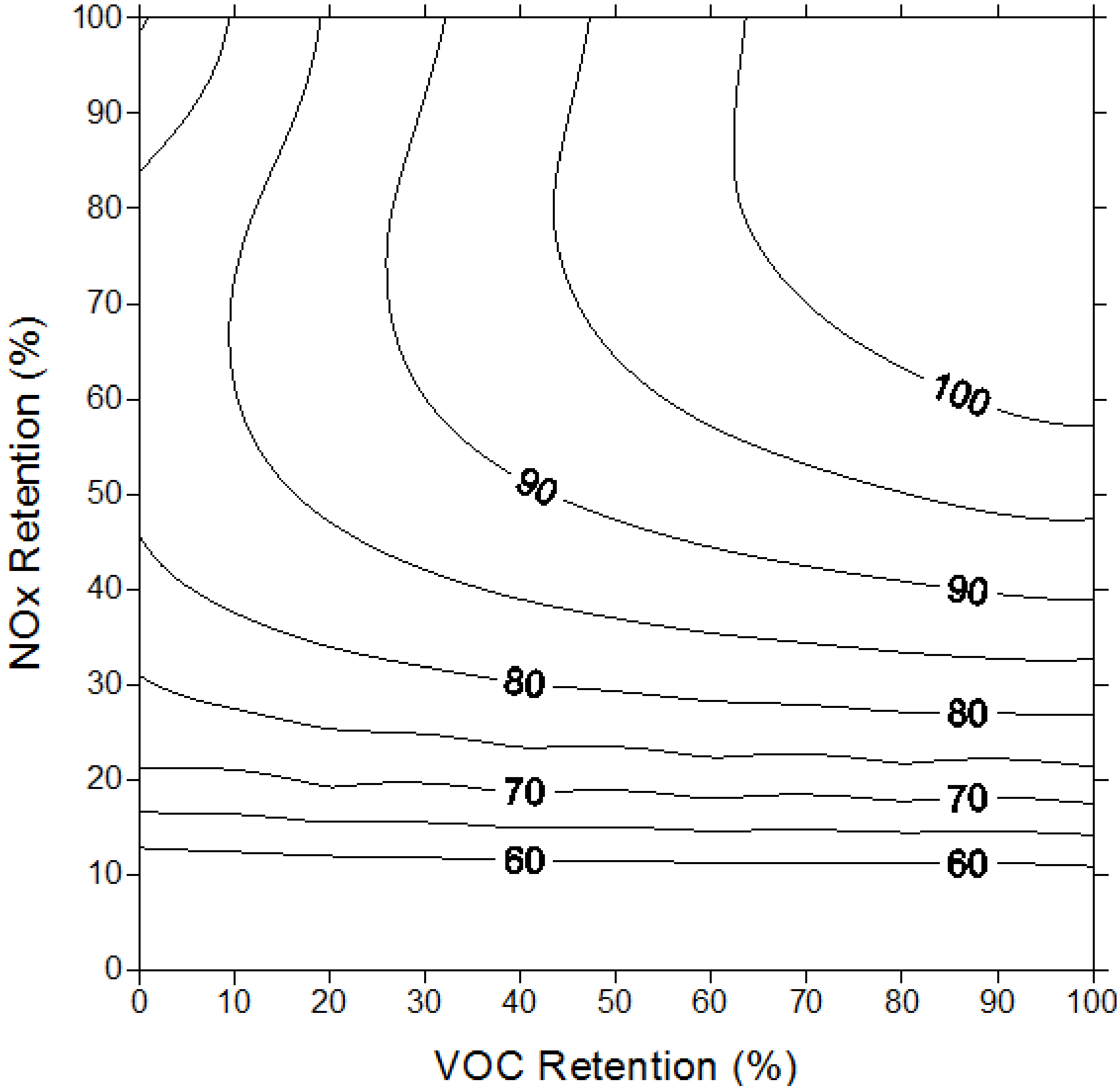
Attachment 8

2023 8-Hour Ozone Isopleths

The ozone isopleths, commonly referred as Empirical Kinetics Modeling Approach (EKMA) plots show ozone concentrations predicted under a given combination of VOC and NOx emissions. The upper right corner represents the projected VOC and NOx emissions in 2023 with full implementation of all adopted control measures (baseline). Moving down and left on each figure corresponds to relative emissions reductions of NOx (down) and VOC (left). The lines within each figure represent the ozone design value at that location for a given amount of NOx and VOC. The shape of the EKMA plots are different at different locations in the Basin due to the complex photochemical reactions involved in ozone formation. These O3 isopleths are an important tool to provide guidance in the choice of control strategies by indicating the amount of reductions needed to meet the current and future air quality standards.



2023 Crestline 8-Hour Ozone Isopleth



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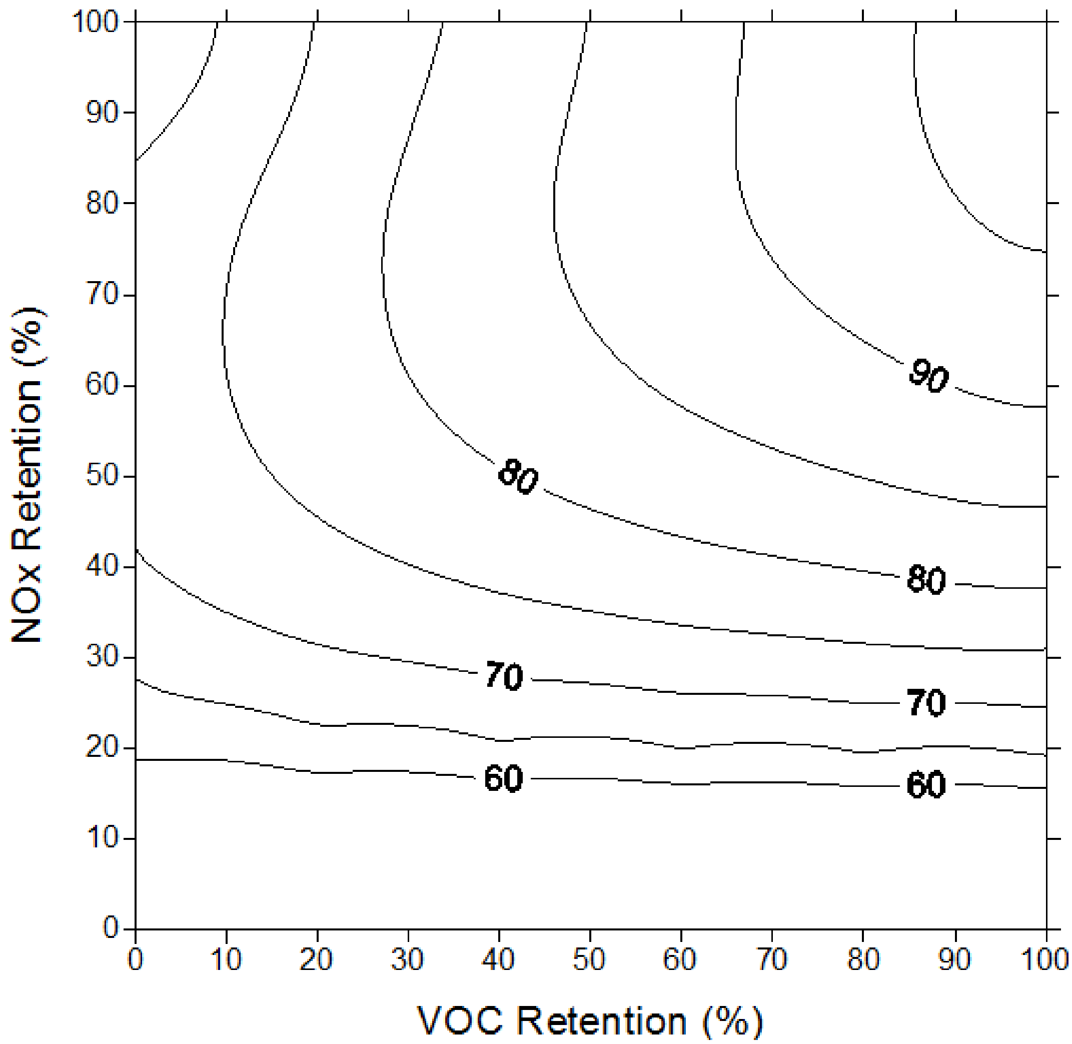
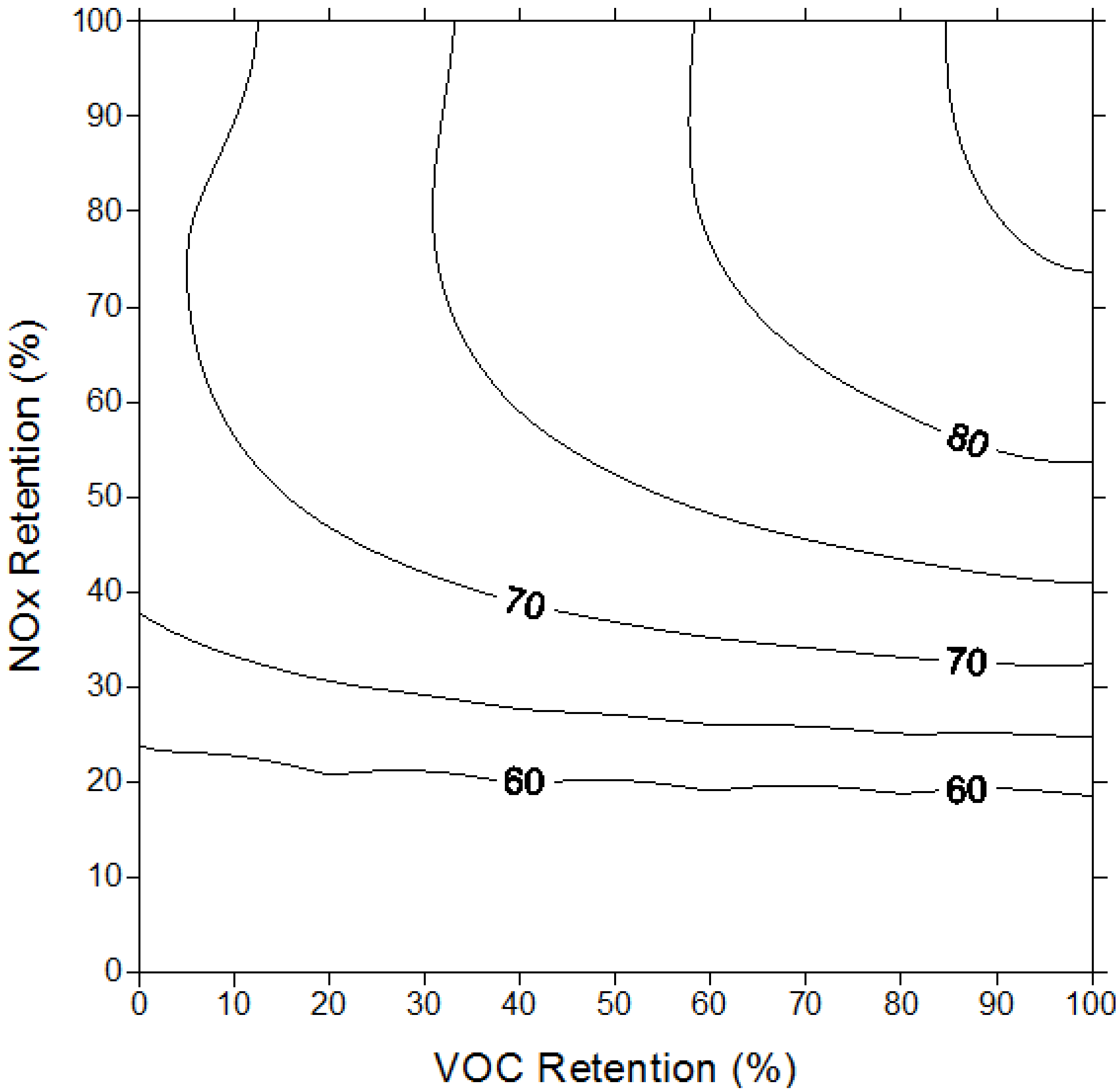


2023 Azusa 8-Hour Ozone Isopleth



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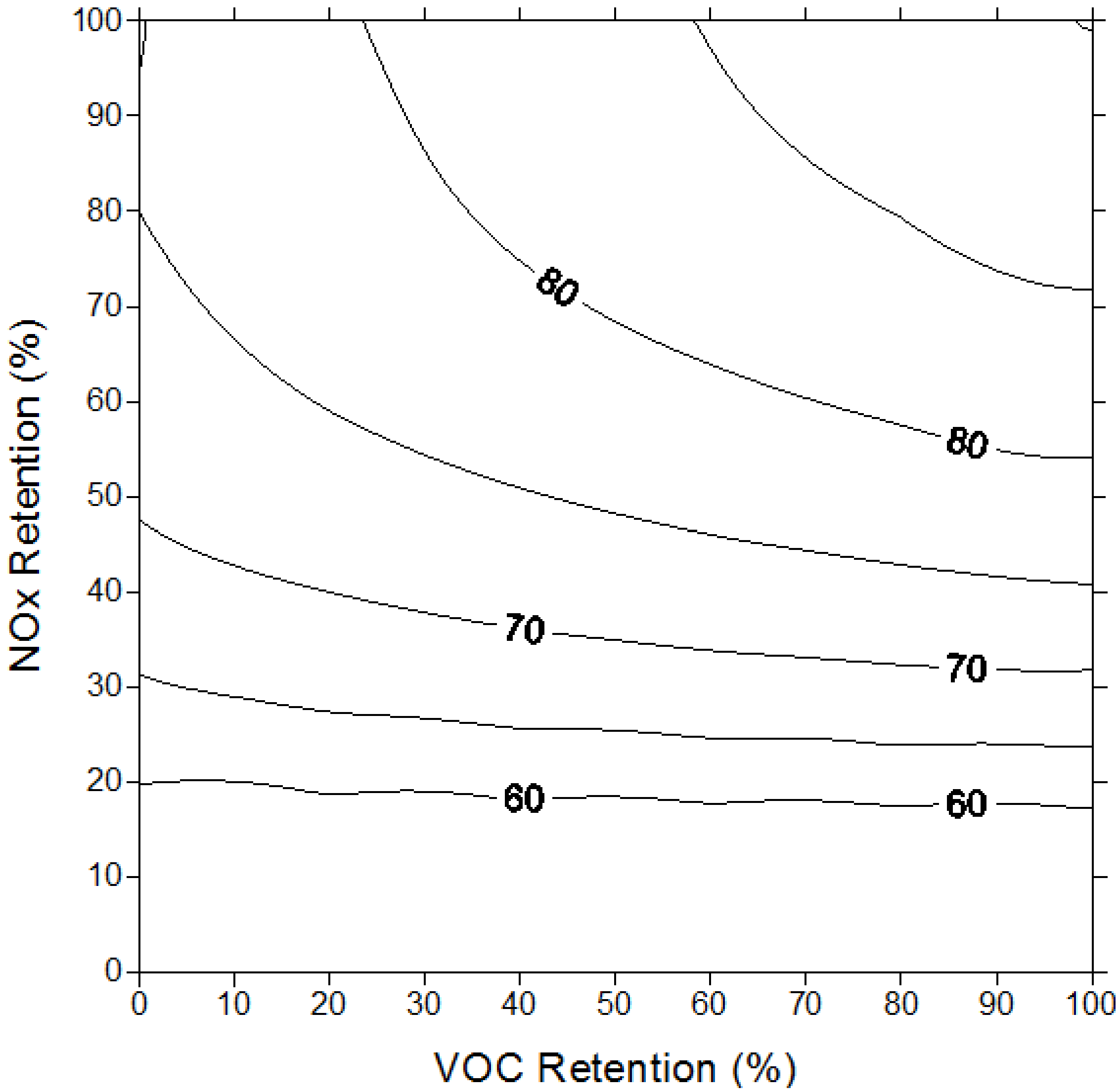

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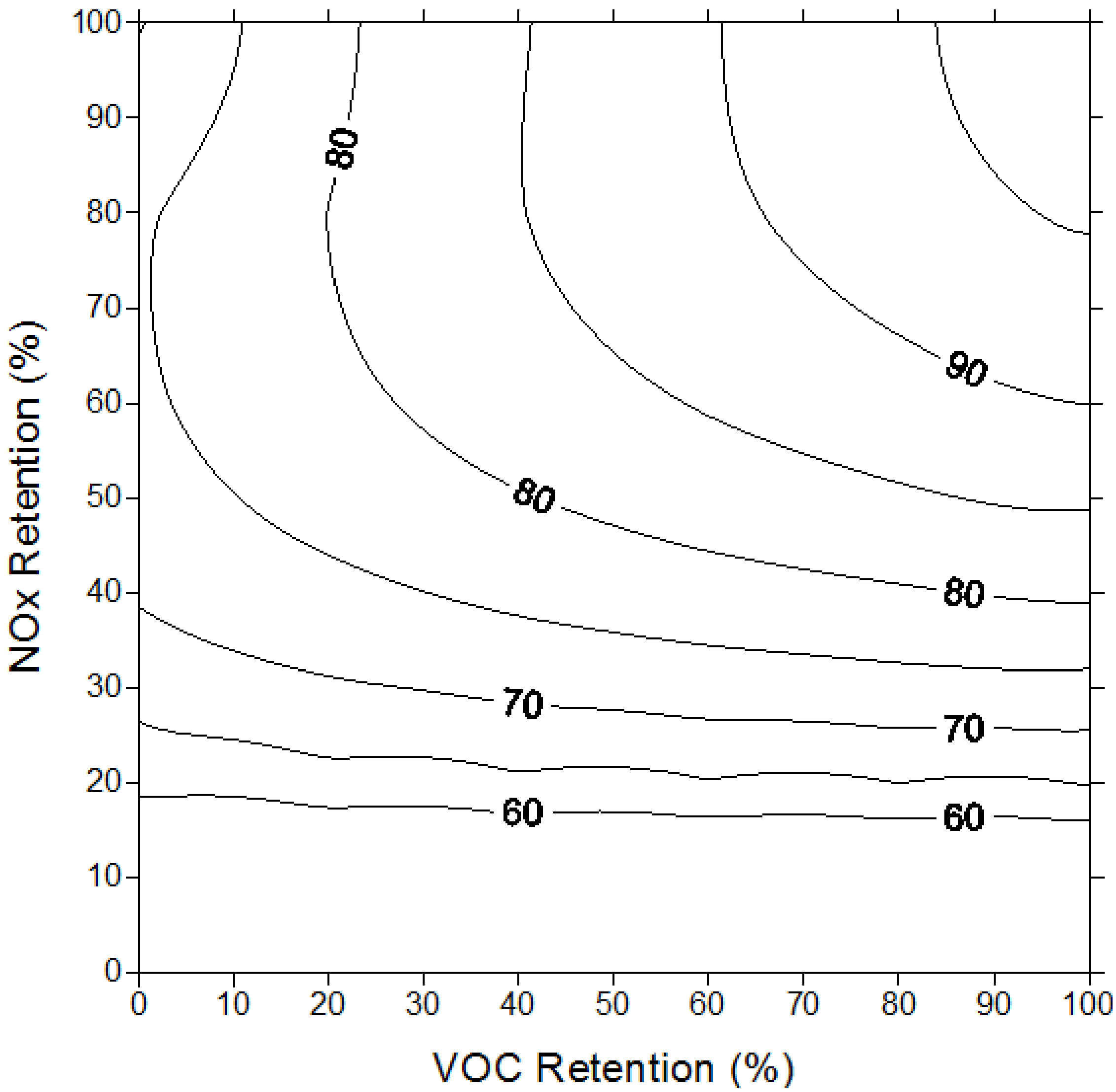
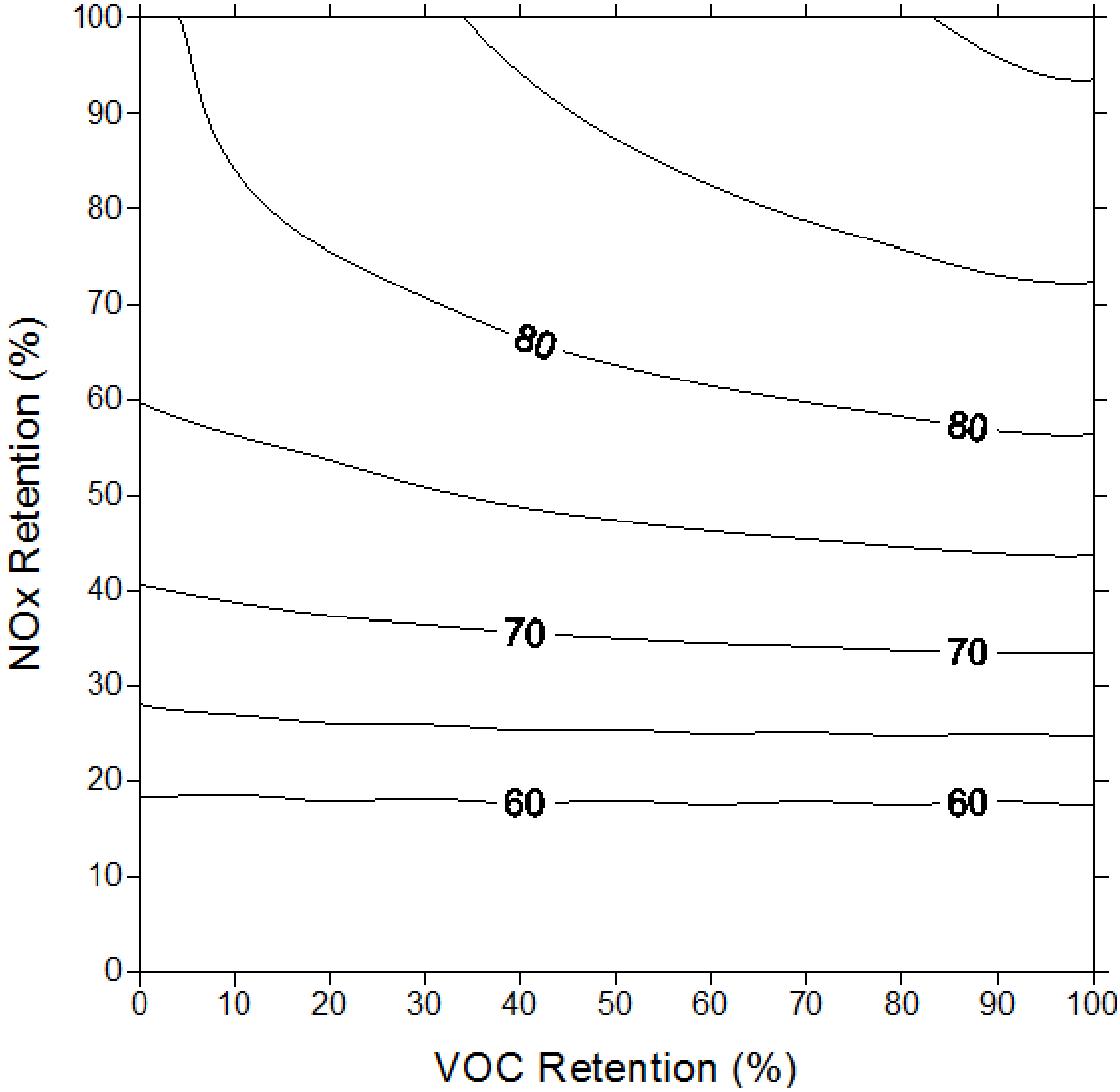


2023 Pomona 8-Hour Ozone Isopleth



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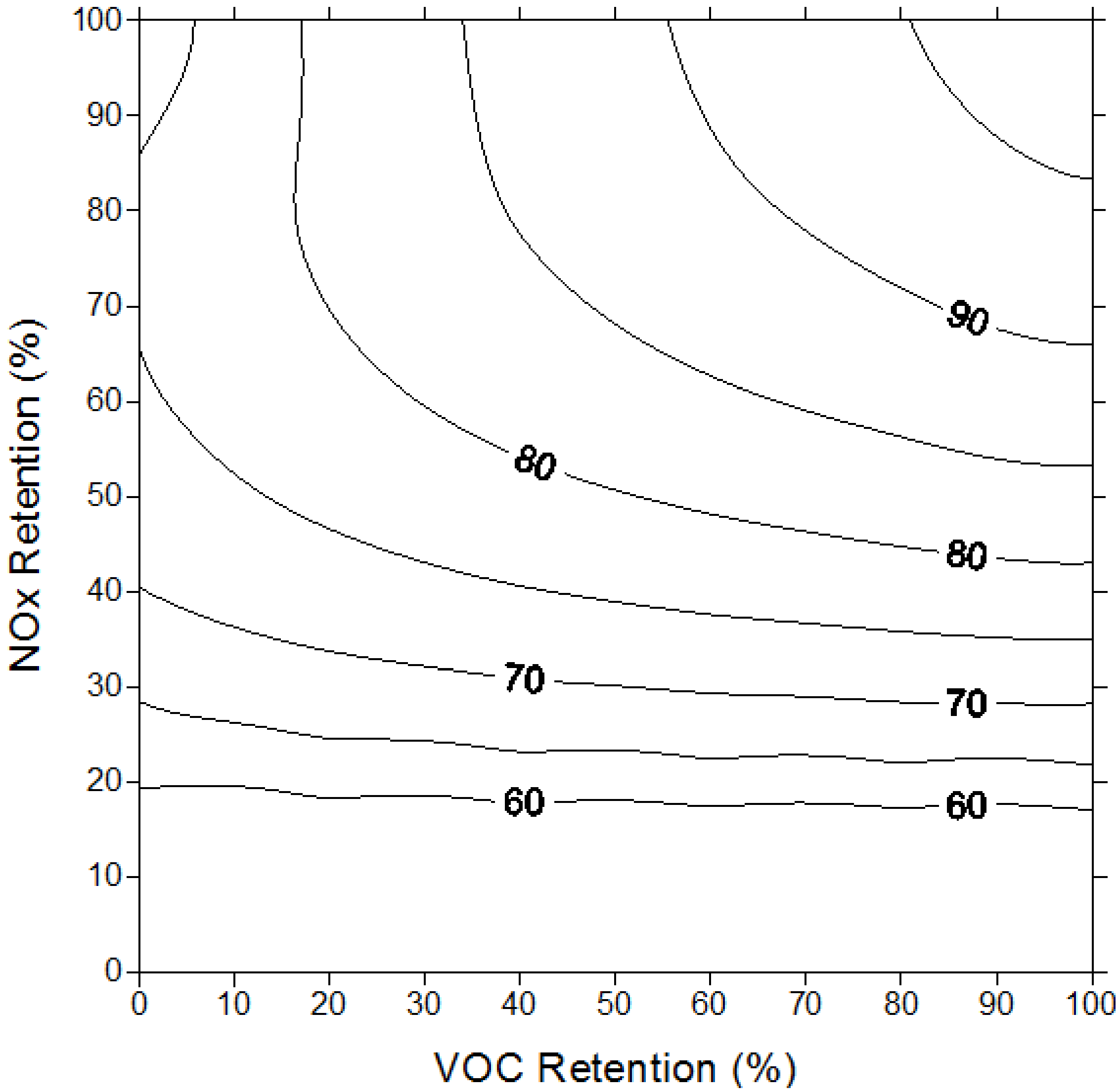

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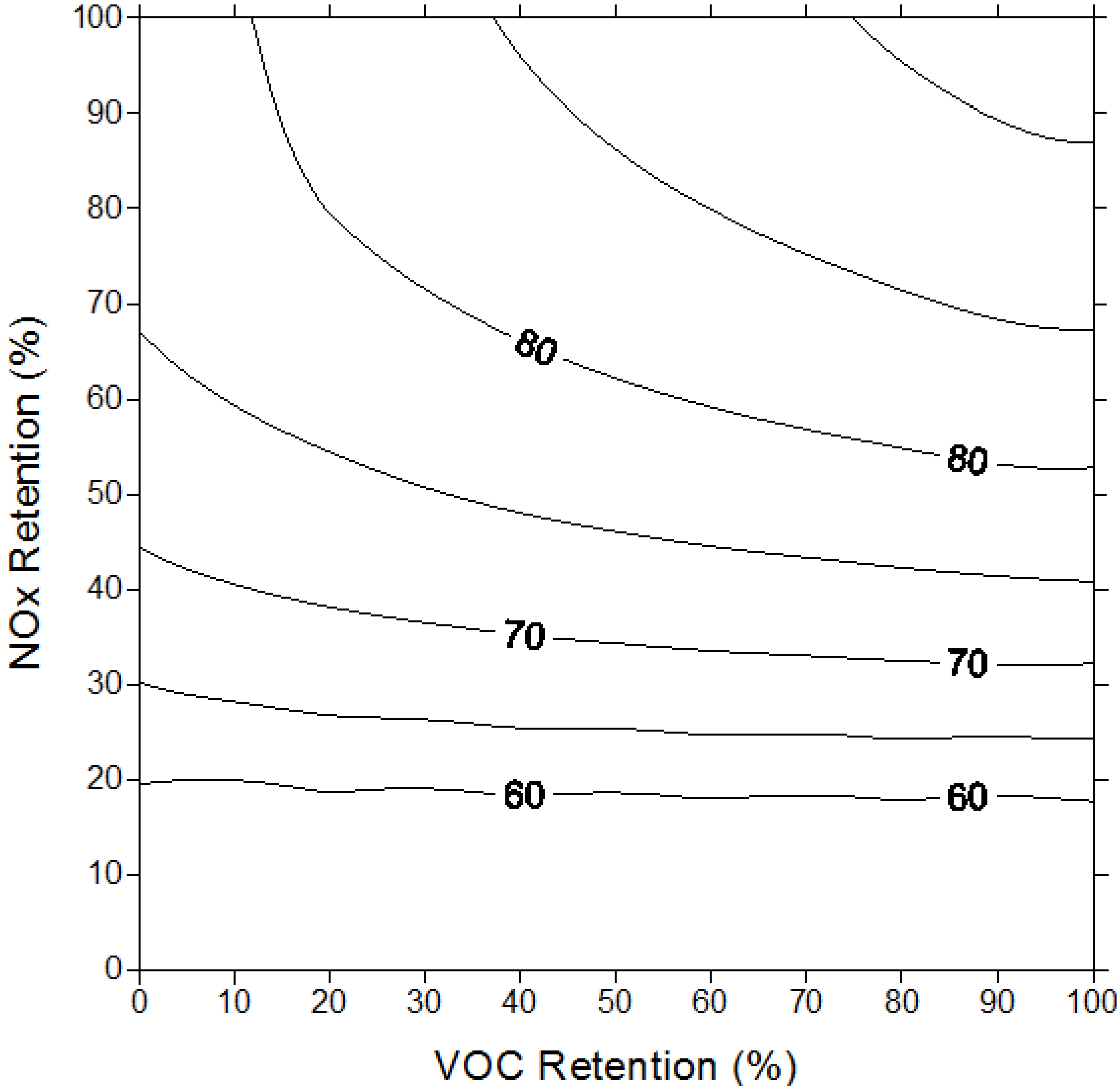

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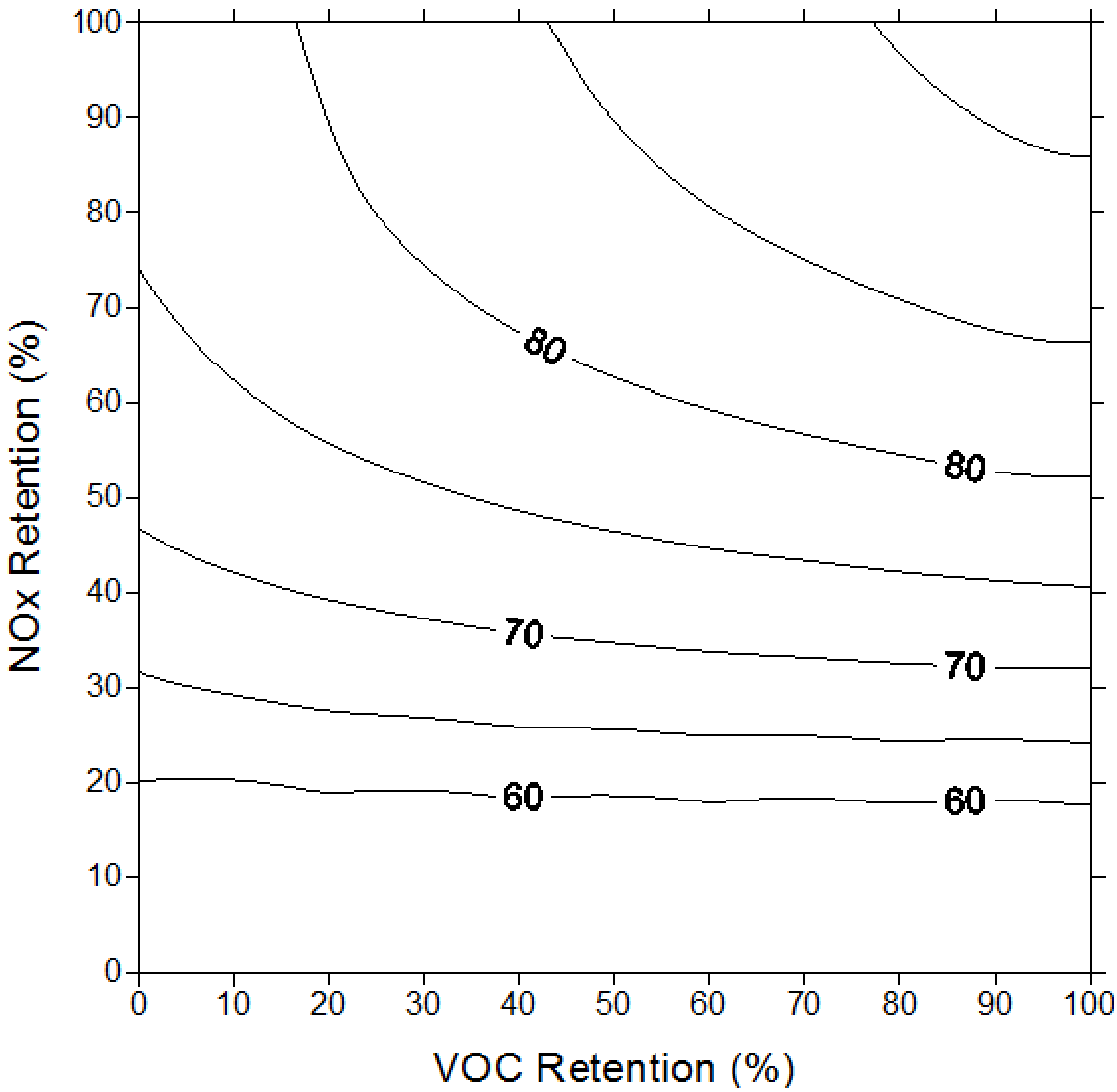

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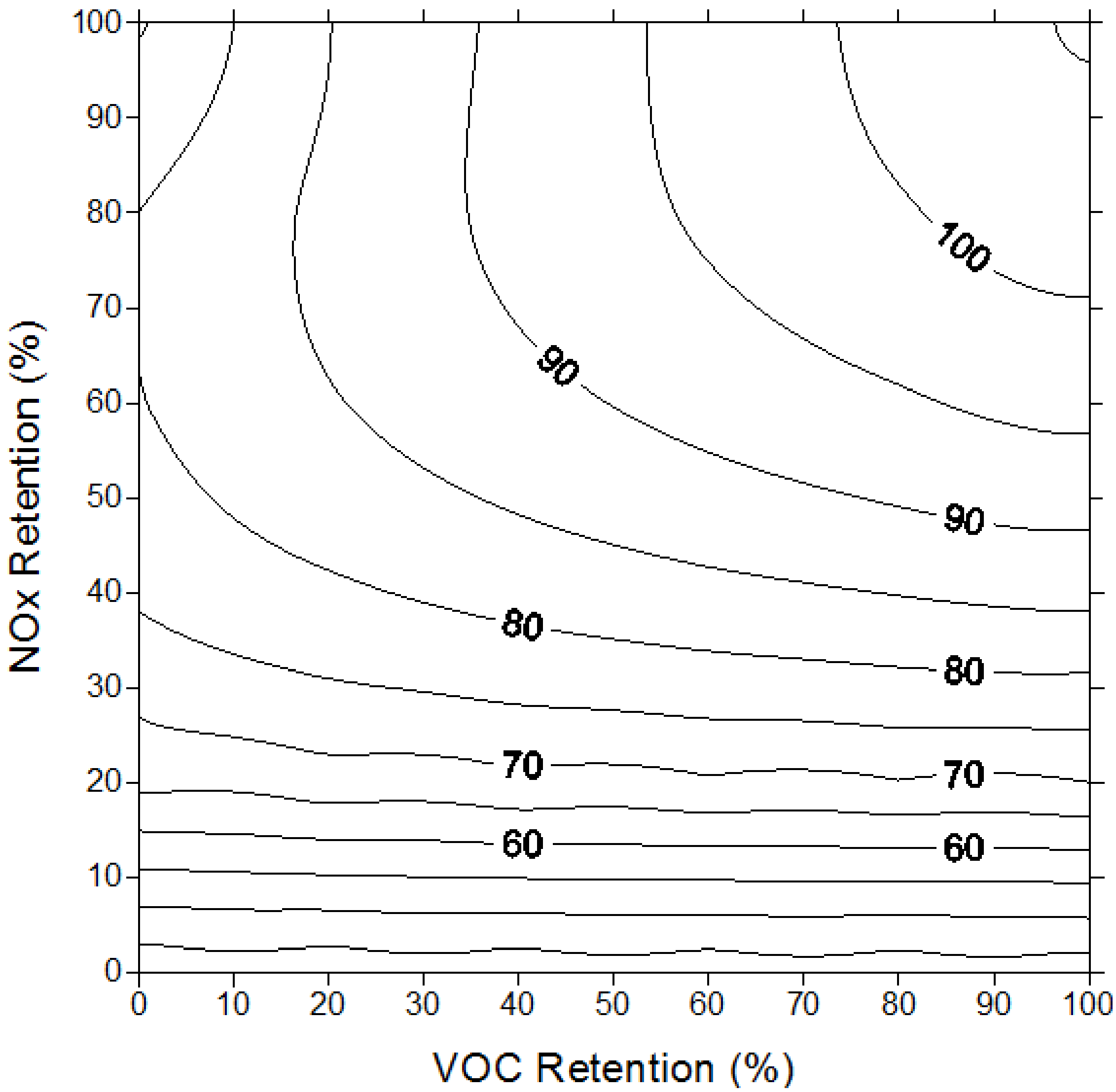

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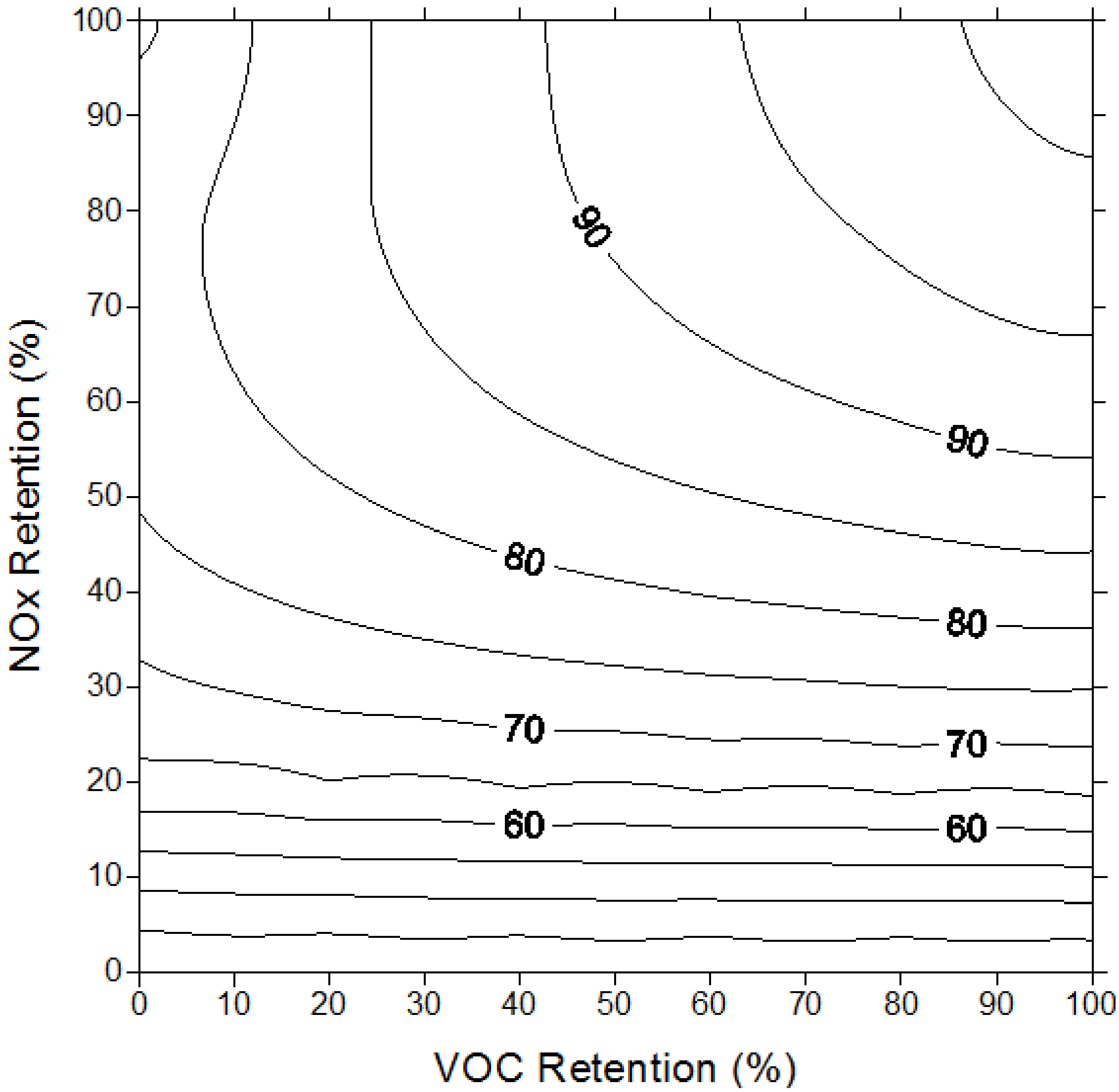

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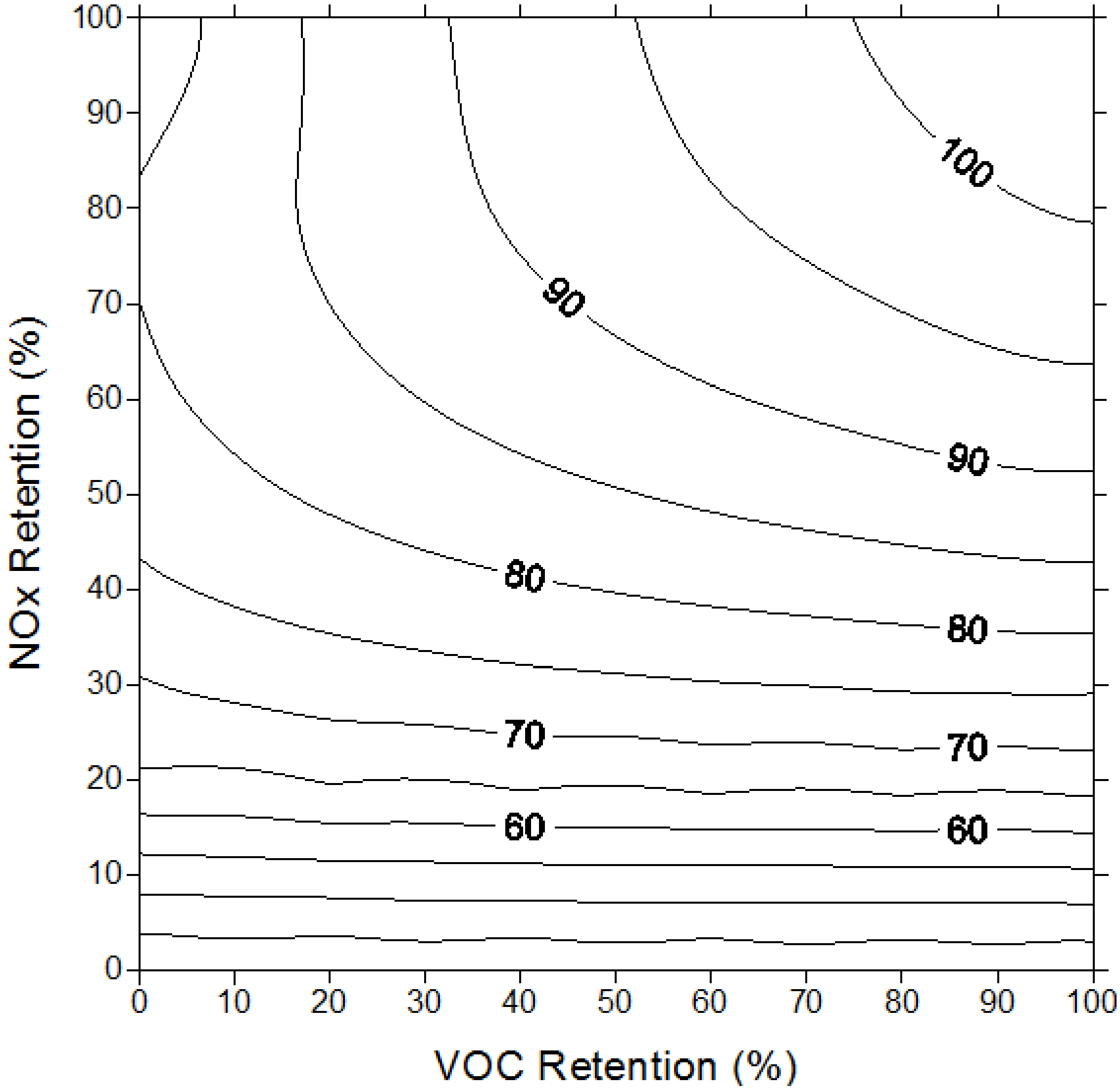

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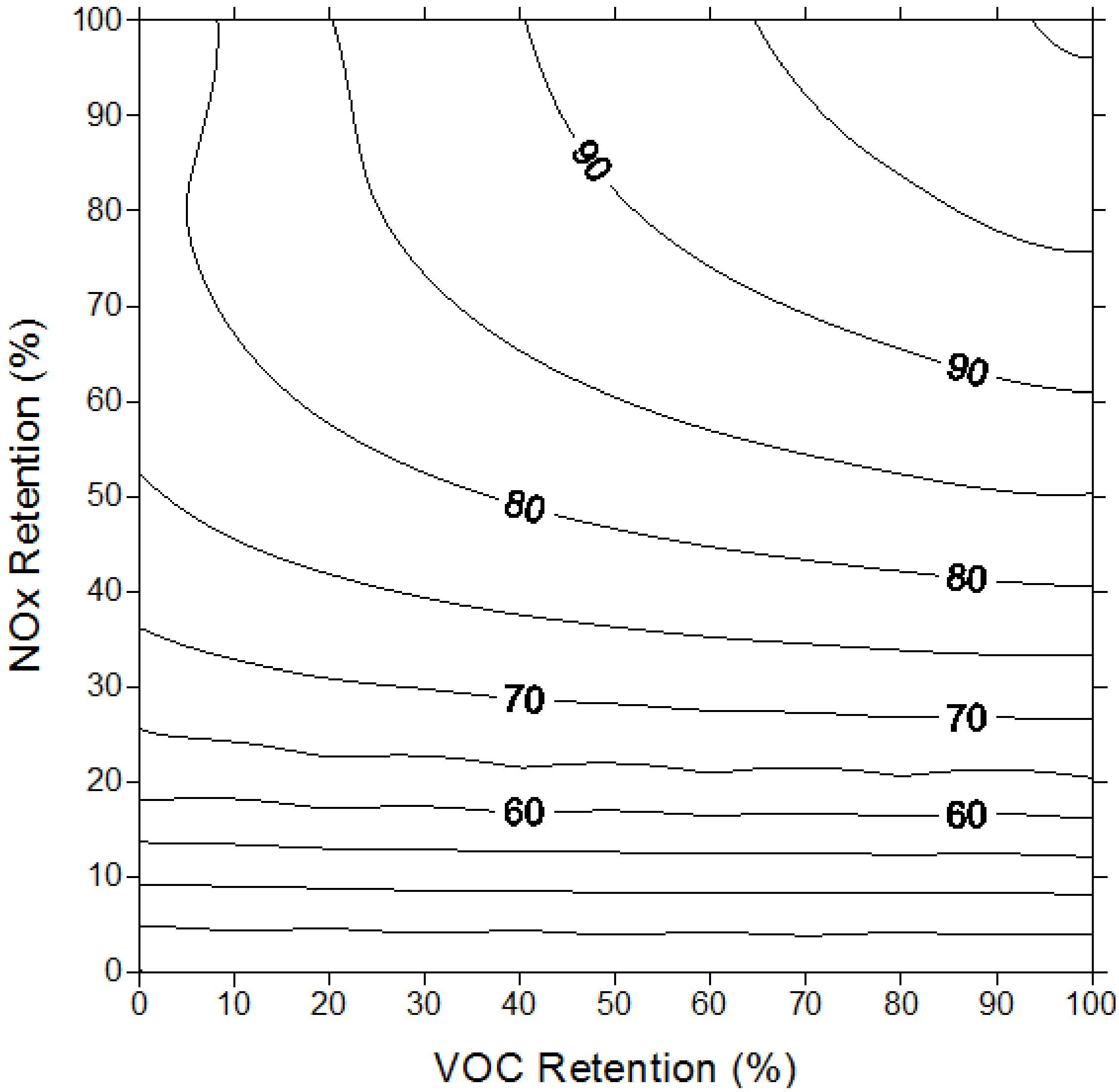
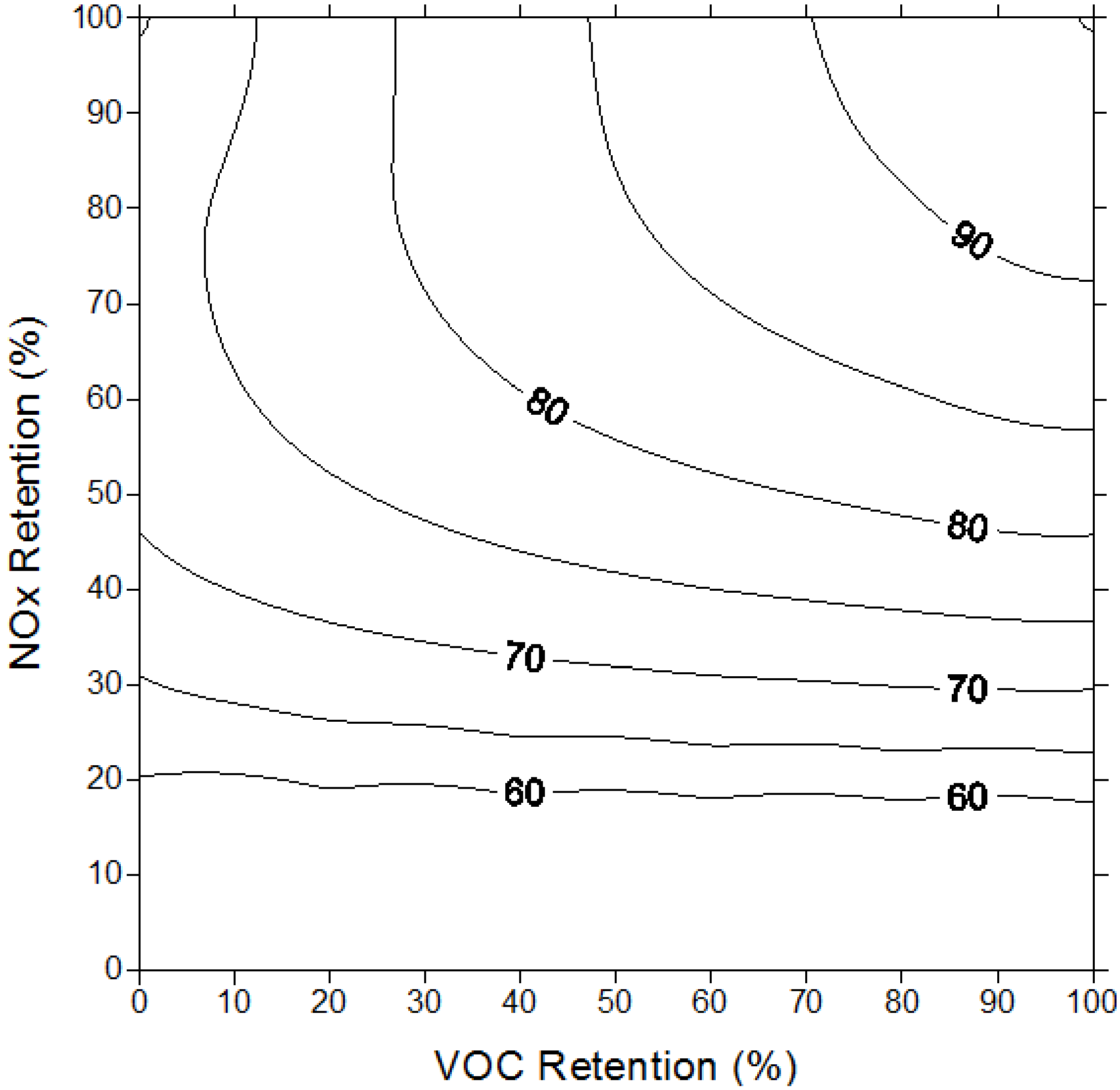


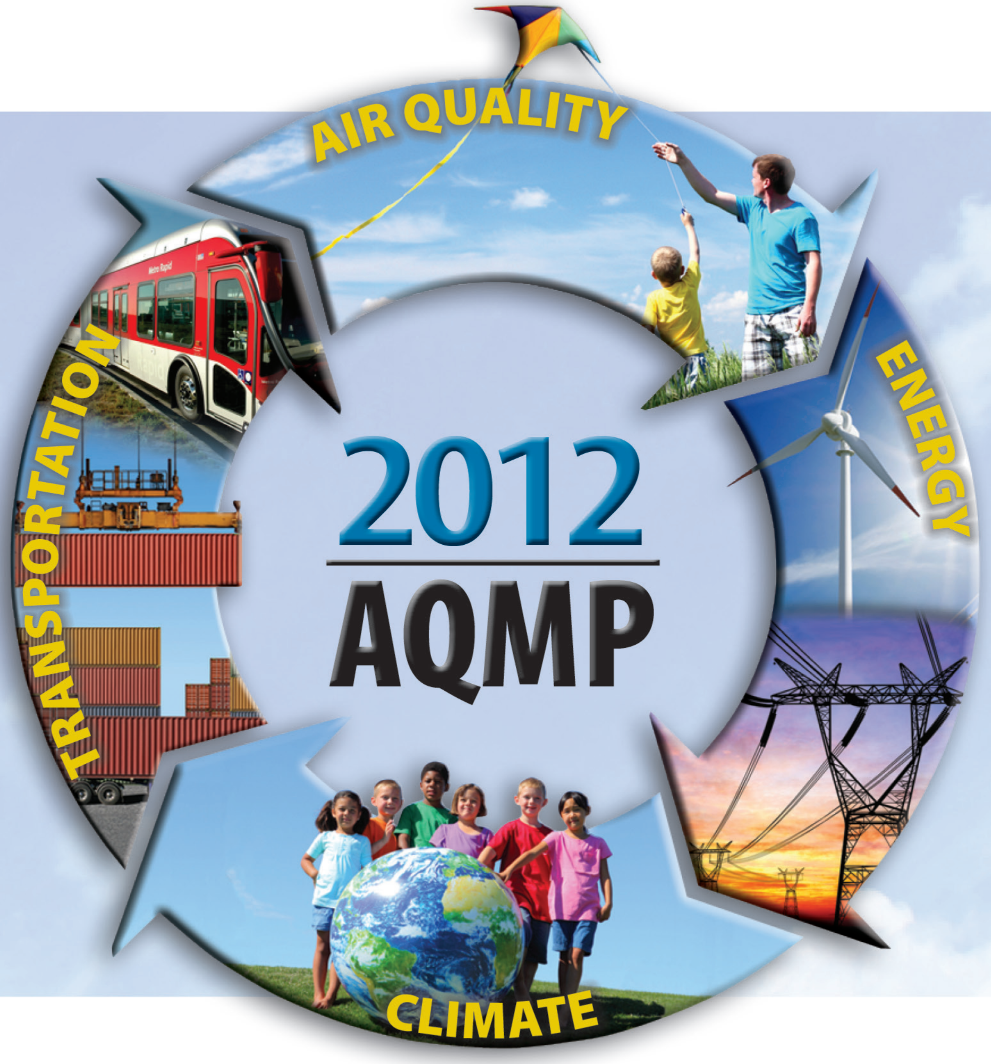
2023 Redlands 8-Hour Ozone Isopleth



2023 Miraloma 8-Hour Ozone Isopleth

Appendix VI

Air Quality Management Plan



Reasonably Available Control Measures (RACM) Demonstration

February 2013

South Coast Air Quality Management District
Cleaning the air that we breathe...™
South Coast AQMD

FINAL 2012 AQMP
APPENDIX VI

REASONABLY AVAILABLE CONTROL MEASURES (RACM) DEMONSTRATION

FEBRUARY 2013

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INTRODUCTION

The South Coast Air Basin (Basin) is classified as "Nonattainment" with respect to the 1997 PM2.5 National Ambient Air Quality Standards (NAAQS) of 15 µg/m^3 annual average, and 65 µg/m^3 24-hour average, and the U.S. EPA has granted the Basin a one-time extension to April 5, 2015 to reach attainment.[1] In 2006, the U.S. EPA lowered the 24-hour PM2.5 standard to 35 µg/m^3, and designated the Basin and 30 other areas as nonattainment, effective December 14, 2009. The Basin is required to submit an Air Quality Management Plan (AQMP) to U.S. EPA no later than 3 years after designation date, by December 14, 2012, to address the attainment strategies for the 2006 24-hour PM2.5 standard. In addition, the Basin must reach attainment within 5 years of the designation date, or by December 14, 2014. Table VI-1 provides a list of several nonattainment areas in the nation and the important milestone dates that require actions from the nonattainment air districts.

TABLE VI-1

PM2.5 NAAQS Designation and Implementation

	1997 PM2.5 NAAQS	2006 PM2.5 NAAQS
Nonattainment Areas	— Los Angeles, South Coast Air Basin, CA — San Joaquin Valley, CA — New York, New Jersey, Long Island, CT	— Los Angeles, South Coast Air Basin, CA — San Joaquin Valley, CA — Sacramento Metro, CA — San Francisco, CA — New York, New Jersey, Long Island, CT
Effective Date of Standards	September 1997	December 2006
Effective Date of Designations	April 2005	December 2009
SIPs Due Within 3 Years	April 2008	December 2012
Attainment Date Within 5 Years	April 2010	December 2014
Attainment Date With Extension	Up To April 2015	Up To December 2019

Particulate Matter ($PM_{2.5}$) Nonattainment Areas, www.epa.gov/airquality/greenbook/rnc.html, posted on 3/30/2012.

With regards to the ozone standards, on March 12, 2008, the U.S. EPA strengthened its ground-level 8-hour ozone standard from 0.08 parts per million (ppm) to a level of 0.075 ppm. On May 21, 2012, the U.S. EPA classified two areas in the country, the South Coast and the San Joaquin Valley, as "Extreme" nonattainment areas with respect to the 2008 8-hour ozone standard.[2] The attainment dates for the 1997 and 2008 ozone standards are June 15, 2024 and December 31, 2032, respectively. Table VI-2 shows the classifications and attainment dates for several nonattainment areas in the nation. While an extreme nonattainment area has a period of 20 years from the date of designation to reach attainment, other areas that are classified as severe, serious, moderate and marginal must reach attainment sooner in 15 years, 9 years, 6 years and 3 years after the date of designation, respectively. [3]

TABLE VI- 2

8-Hour Ozone NAAQS Designation and Implementation

NONATTAINMENT AREA	1997 OZONE STANDARD		2008 OZONE STANDARD	
	Classification	**Attainment**	**Classification**	**Attainment**
Los Angeles South Coast Air Basin, CA	Extreme	June 2024	Extreme	December 2032
San Joaquin Valley, CA	Extreme	June 2024	Extreme	December 2032
Riverside County (Coachella Valley), CA	Severe-15	June 2019	Severe-15	December 2027
Sacramento Metro, CA	Severe-15	June 2019	Severe-15	December 2027
Houston-Galveston-Brazoria (HGB), TX	Severe-15	June 2019	Marginal	December 2015
Ventura County, CA	Serious	June 2013	Serious	December 2021
Dallas-Fort Worth , TX	Serious	June 2013	Moderate	December 2018
New York, New Jersey, Long Island, CT	Moderate	June 2010	Marginal	December 2015
Washington (DC-MD-VA Area), District Columbia	Moderate	June 2010	Marginal	December 2015
San Francisco, CA	Marginal	June 2007	Marginal	December 2015

Note: Classifications of 8-Hour Ozone Nonattainment Areas, www.epa.gov/airquality/greenbook/gnc.html, posted on 3/30/2012. The designation date is December 31, 2012. Attainment dates are within 20 years after the date of designation for extreme area, 15 years after the date of designation for severe area, 9 years after the date of designation for serious area, 6 years after the date of designation for moderate area, and 3 years after the date of designation for marginal area.

To address multiple layers of attainment deadlines, the District is working in collaboration with CARB and the San Joaquin Valley to develop a joint "Vision of Clean Air" and formulate the attainment strategies for 24-hour PM2.5 standards in 2014-2019, 8-hour ozone standards in 2024-2032, and the state is committed to reduce greenhouse gases emissions by 2050. The District's goal is to develop and incorporate all feasible control measures while balancing costs and socioeconomic impacts to meet the requirements of the Clean Air Act (CAA) on a timely basis.

The CAA, Section 172(c)(1), sets the overall framework for the Reasonably Available Control Measures (RACM) analysis. The CAA requires the nonattainment air districts to:

> *"provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology)and shall provide for attainment of the national primary ambient air quality standards."*

The U.S. EPA provided further guidance on the RACM in the preamble and the final "Clean Air Fine Particle Implementation Rule" to implement the 1997 PM2.5 NAAQS which were published in the Federal Register in November 1, 2005 and April 25, 2007, respectively. [4, 5] The U.S. EPA's long-standing interpretation of the RACM provision stated in the 1997 PM2.5 Implementation Rule is that the nonattainment air districts should consider all candidate measures that are available and technologically and economically feasible to implement within the nonattainment areas, including any measures that have been suggested; however, the districts are not obligated to adopt all measures, but should demonstrate that there are no additional reasonable measures available that would advance the attainment date by at least one year or contribute to reasonable further progress (RFP) for the area.

Regarding the approach of identifying emission reduction programs, the U.S. EPA recommends the nonattainment air districts to first identify the emission reduction programs that have already been implemented at the federal, other states and local air districts. Next, the U.S. EPA recommends the air districts to examine additional RACM/RACTs adopted for other nonattainment areas to attain the ambient air quality standards as expeditiously as practicable. The U.S. EPA also recommends the air districts evaluate potential measures for sources of direct PM2.5, SOx and NOx first with a presumption that VOC and ammonia do not significantly contribute to the PM2.5 concentration in the nonattainment area. The PM2.5 Implementation Rule also requires the air districts establish RACM/RACT emission standards taking into consideration the condensable fraction of direct PM2.5 emissions after January 1, 2011. In addition, the U.S. EPA recognizes that each nonattainment area has its own profile of emitting sources, and thus neither requires specific RACM/RACT to be implemented in every nonattainment area, nor includes a specific source size threshold for the RACM/RACT analysis. The U.S. EPA however recommends severe nonattainment air districts to evaluate controls for smaller sources if needed for attainment.

A RACM/RACT demonstration must be provided within the State Implementation Plan (SIP). For areas projected to attain within five years of designation, a limited RACM/RACT analysis including the review of available reasonable measures, the estimation of potential emission reductions, and the evaluation of the time needed to implement these measures is sufficient. The areas that cannot reach attainment within five years must conduct a thorough RACM/RACT analysis to demonstrate that sufficient control measures could not be adopted and implemented cumulatively in a practical manner in order to reach attainment at least one year earlier.

In regards to economically feasible, the U.S. EPA did not propose a fixed dollar per ton cost threshold and recommended the air districts to include health benefits in the cost analysis. As indicated in the preamble of the 1997 PM2.5 Implementation Rule:

> "*In regard to economic feasibility, U.S. EPA is not proposing a fixed dollar per ton cost threshold for RACM, just as it is not doing so for RACT…Where the severity of the nonattainment problem makes reductions more imperative or where essential reductions are more difficult to achieve, the acceptable cost of achieving those reductions could increase. In addition, we believe that in determining what are economically feasible emission reduction levels, the States should also consider the collective health benefits that can be realized in the area due to projected improvements.*"

Subsequently, on March 2, 2012, the U.S. EPA issued a memorandum to confirm that the overall framework and policy approach stated in the PM2.5 Implementation Rule for the 1997 PM2.5 standards continue to be relevant and appropriate for addressing the 2006 24-hour PM2.5 standards. [6]

The objective of this Appendix is to demonstrate that the District has conducted a thorough RACM/RACT analysis to meet the requirement of the CAA following closely the policy and guidance approach provided by the U.S. EPA in its PM2.5 Implementation Rule in identifying and selecting the control measures for the Final 2012 AQMP.

For the scope of this RACM analysis, District staff will closely study the attainment strategies for stationary and area sources, the rules and regulations of the air districts responsible for the nonattainment areas listed in Table VI-1 and Table VI-2 while taking into account all available candidate measures proposed by the U.S. EPA, CARB, the Advisory Committee members, the technical experts in air pollution control as well as the public and variety of stakeholders. Staff selected the air districts listed on Table VI-1 and Table VI-2 based on the severity of their nonattainment status and their near-term attainment dates. The RACM analysis for Transportation Control Measures is conducted by SCAG as shown in Appendix IV-C and the RACM analysis for mobile sources conducted by the CARB is shown in the Attachment of this Appendix.

IDENTIFYING AND EVALUATING REASONABLY AVAILABLE CONTROL MEASURES

To demonstrate that the District has considered all candidate measures that are available and technologically and economically feasible to implement within the Basin, the District staff has conducted 6-steps analysis described below.

Step 1 - Air Quality Technology Symposium

District staff conducted the 2012 Air Quality Technology Symposium in September 2011with participation of technical experts from a variety of areas and the public to solicit new and innovative concepts to assist the Basin in attaining the NAAQS) for PM2.5 by 2014-2019 and ozone by 2024-2032. In addition, the District's Planning, Rules Development and Area Sources Division conducted multiple internal meetings with the District's Technology Advancement Office and the Engineering & Compliance Division from September through November of 2011 to brainstorm ideas for feasible control measures. In addition, the District also conducted an on-going extensive outreach to engage a wide range of stakeholders in the process. In general, the following concepts were proposed:

- Promoting zero or near-zero emission measures and providing incentives for on-road and non-road mobile sources as well as goods movement;

- Further reducing VOC emissions from marine coatings, aerospace coatings, solvents and various consumer products, and focusing on reformulations or alternatives to VOC based-solvents;

- Conducting a mandatory technology review for NO_x RECLAIM, and further reducing NOx emissions through the use of low NO_x burners, fuel cells, biogas control, distributed power generation applications, and assessment for all feasible measures, as well as incentives;

- Addressing energy-climate change and co-benefits, the need for electricity storage and smart grid, or new fossil-fueled peaking plants, to compensate for fluctuations in renewable energy supply, and the use of outreach to promote energy efficiency measures; and

- Influencing consumer behavior, expanding carpool programs, incentivizing with outreach, increasing gas tax, and promoting public-private participation and multi-agency collaboration.

Step 2 – U.S. EPA's Suggested List of Control Measures

District staff reviewed for inclusion the control measure concepts suggested by the U.S. EPA for PM2.5 nonattainment areas described in the preamble of the PM2.5 Implementation Rule. As summarized in Table VI-3, the District either has an existing rule or developed a 2012 control measure for each control measure concept suggested by the U.S. EPA.

TABLE VI-3

Demonstration of Compliance with Control Measures Recommended by U.S. EPA

U.S. EPA'S CONTROL MEASURE CONCEPTS	2012 CONTROL MEASURES AND EXISTING RULES
STATIONARY SOURCE MEASURES	
Diesel engine retrofit, rebuild, replacement, with catalyzed particle filter	Rule 1470, Rule 1110.2
New or upgraded emission controls for direct PM2.5 (e.g., baghouse or electrostatic precipitator; improved monitoring methods)	Rule 1155, Rule 1156
New/upgraded emission controls for PM2.5 precursors (e.g., scrubbers)	2010 RECLAIM Amendment
Energy efficiency measures to reduce fuel consumption	Rule 1146, Rule 1146.1, Rule 1146.2, Rule 1114, Rule 1111, Control Measure EDU-01, INC-01
MOBILE SOURCE MEASURES	
On-road diesel engine retrofits for school buses and trucks using U.S. EPA-verified technologies	Refer to CARB's Existing Rules and Control Measures
Non-road diesel engine retrofit, rebuild/replace with catalyzed particle filter	Refer to CARB's Existing Rules and Control Measures

TABLE VI-3 (concluded)

Demonstration of Compliance with Control Measures Recommended by U.S. EPA

U.S. EPA'S CONTROL MEASURE CONCEPTS	2012 CONTROL MEASURES AND EXISTING RULES
MOBILE SOURCE MEASURES (continued)	
Diesel idling programs for trucks, locomotive, and other mobile sources	Refer to CARB's Existing Rules and Control Measures
Transportation control measures (including those listed in section 108(f) of the CAA as well as other TCMs), as well as other transportation demand management and transportation systems management strategies	Refer to SCAG's Control Measures
Programs to reduce emissions and accelerate retirement of high emitting vehicles, boats, lawn and garden equipment	Refer to CARB's Rules and Control Measures
Emissions testing and repair/maintenance programs for on-road vehicles	Refer to CARB's Rules and Control Measures
Emissions testing and repair/maintenance programs for non-road heavy duty vehicles and equipment	Refer to CARB's Rules and Control Measures
Programs to expand use of clean burning fuels	Refer to CARB's Rules and Control Measures
Opacity/emissions standards for gross-emitting diesel equipment or vessels	Refer to CARB's Rules and Control Measures
AREA SOURCE MEASURES	
New open burning regulations and/or measures to minimize emissions from forest and agricultural burning activities	Rule 444
Reduce emissions from woodstoves and fireplaces	Rule 445, Control Measure BCM-01
Regulate charbroiling/other commercial cooking operations	Control Measure BCM-02
Reduce solvent usage or solvent substitution	Control Measure CTS-02
Reduce dust from construction activities/vacant disturbed areas, paved and unpaved roads.	Rule 1157

Step 3 – Reasonably Available Control Technology (RACT)

As required by the CAA, Section 172(c)(1), the nonattainment areas must implement applicable RACTs. While RACM refers to measures which may be applicable to a wide range of sources, stationary as well as area and mobile sources, the U.S. EPA defines RACT as the lowest level of control specifically designed for stationary sources:

"*lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility*".

The CAA, Section 172(c)(1) and Section 182, require nonattainment areas for ozone that are designated at moderate or above to adopt RACT for major sources. Nonattainment areas classified as serious, severe, or extreme must adopt control measures above and beyond the minimum RACT levels to fulfill attainment.

In addition, the CAA, Section 183, requires the U.S. EPA to provide guidance to the air districts on the "presumptive" RACT levels. As a result, the U.S. EPA developed several Control Techniques Guidelines (CTGs) for VOC sources, and Alternatives Control Techniques (ACT) documents for VOC and NOx sources. Most of the CTGs were issued prior to 1990, and most of the ACT documents were issued in the mid-1990s. The CTGs contain mandated emission standards and work practices whereas the ACTs describe available control techniques and their cost effectiveness, but do not define "presumptive" RACT levels. The U.S. EPA is required to update existing CTG/ACTs, or develop new guidelines, on a frequent basis as new or updated control technologies become available.

The CAA, Section 182(b)(2), further requires the air districts to revise their SIPs to include the mandated RACT levels covered by the CTGs issued after November 15, 1990 and prior to the area's date of attainment. The U.S. EPA's final rule to implement the 8-hour ozone standard discusses RACT requirements which states that where a RACT SIP is required, the states must assure that RACT is met, either through a certification that previously required RACT controls represent RACT for 8-hour ozone standards, or through a new RACT determination.[7] To satisfy this requirement, the District developed and submitted to CARB and U.S. EPA a demonstration and certification that the District's rules and regulations fulfill the 8-hour ozone RACT requirements developed between 1990 and the beginning of 2006.[8] The U.S. EPA approved the District's RACT demonstration in December 2008.[9]

Subsequently, the U.S. EPA developed twelve new CTGs in 2006-2008 to update the requirements for several types of coatings, and staff again conducted an analysis comparing the current requirements in the District's rules with those requirements in the new CTGs. The 12 new CTGs developed by the U.S. EPA are: [10]

- Flat Wood Paneling Coatings (2006)

- Flexible Packaging Printing Materials (2006)
- Industrial Cleaning Solvents (2006)
- Lithographic Materials and Letterpress Printing Materials (2006)
- Large Appliance Coatings (2007)
- Metal Furniture Coatings (2007)
- Paper, Film, and Foil Coatings (2007)
- Miscellaneous Metal Products Coatings (2008)
- Plastic Parts Coating (2008)
- Auto and Light-Duty Truck Assembly Coatings (2008)
- Fiberglass Boat Manufacturing Materials, and Miscellaneous (2008)
- Industrial Adhesives (2008)

District staff's analysis is summarized in Table VI-4. As shown in Table VI-4, three District's VOC rules, Rule 1130 – Graphic Arts, Rule 1115 – Motor Vehicle Assembly Line Coating Operations and Rule 1168 - Adhesives and Sealants have met or exceeded most, but not all, minimum requirements of the CTGs. Consequently, District staff has developed one or more control measures to address these issues. Staff estimates a potential reduction of 0.2 tons per day VOC associated with Rule 1130, and less than 0.01 tons per day VOC associated with Rule 1115, and no emission reduction estimate for Rule 1168 is available at this time. District staff is aware that additional assessments may be required, such as a determination that major VOC sources subject to Rules 1130, 1115, and 1168 met the minimum requirements in the CTGs, or a negative declaration that there are no sources in the area subject to the CTGs. These additional analyses will be provided during the rule development phase, or at the time of developing the 8-hour ozone AQMPs, whichever comes first.

TABLE VI-4
Evaluation of 2006-2008 U.S. EPA's VOC CTGs

CTG TITLE	DISTRICT RULE	EVALUATION
Flat Wood Paneling Coatings (2006)	Rule 1104 - Wood Flat Stock Coating Operations	Overall equivalency to CTG emission standards. No further action is needed. [1]
Flexible Packaging Printing Materials (2006); Lithographic Printing Materials and Letterpress Printing Materials (2006)	Rule 1130 - Graphic Arts	Regarding flexible packaging printing, the rule is more stringent than CTG, and thus no further action is needed. Regarding lithographic and letterpress printing, the CTG standards for alcohol content in fountain solution and overall control efficiency are more stringent. Staff estimated a potential reduction of 0.2 tpd and may pursue rule update as part of Control Measure MCS-01 – Application of All Feasible Measure Assessment if needed for ozone attainment. [1]
Industrial Cleaning Solvents (2006)	Rule 1171 - Solvent Cleaning Operations	District rule is more stringent than CTG. No further action is needed. [2]
Large Appliance Coatings (2007); Metal Furniture Coatings (2007); and Miscellaneous Metal Products Coatings (2008)	Rule 1107 - Coating of Metal Parts and Products	District rule is equivalent or more stringent than CTGs, thus no further action is needed. [2]
Paper, Film, and Foil Coatings (2007)	Rule 1128 - Paper, Fabric, and Film Coatings	District rule is more stringent than CTG. No further action is needed.[1]
Plastic Parts Coatings (2008)	Rule 1145 - Plastic, Rubber, Glass Coatings	District rule is equivalent or more stringent than CTG. No further action is needed. [1]
Auto and Light-Duty Truck Assembly Coatings (2008)	Rule 1115 - Motor Vehicle Assembly Line Coating Operations	CTG has more stringent limits for electro-deposition primer at 84 g/L (145 g/L in Rule 1115); sprayable primer, primer-surfacer, and topcoat at 144 g/L (180 g/L in Rule 1115); and trunk coatings, interior coatings, sealers, and deadeners at 650 g/L (Rule 1115 provides an exemption for these categories). However, Rule 1115 has a small inventory of about 0.01 tpd, thus no action is needed. [1]
Fiberglass Boat Manufacturing Materials, and Miscellaneous (2008)	Rule 1162 - Polyester Resin Operations	The rule has an overall equivalency to CTG based on more stringent transfer efficiency requirements. No further action is needed. [2]
Industrial Adhesives (2008)	Rule 1168 - Adhesives and Sealants	CTG has more stringent limits for reinforced plastic composite at 200 g/L (250 g/L in Rule 1168); single-ply roof membrane adhesive primer at 250 g/L (450 g/L in Rule 1168); other adhesive primers at 250 g/L (420 g/L in Rule 1168); the control efficiency is 85% (80% in Rule 1168); and the work practices is limited only for stripping cured adhesives or sealants for Rule 1148. Staff may further pursue rule update as part of Control Measure MCS-01 – Application of All Feasible Measures Assessment or CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants if needed for ozone attainment. [3]

Note: 1) Evaluation conducted by Hopps and Ono; 2) Evaluation conducted by Morris and Ono; 3) Evaluation conducted by Calungcagin and De Boer.

Step 4 - Other Districts' Current Rules and Regulations

Because the District is classified as extreme nonattainment for both the 1997 and 2008 ozone standards, and nonattainment for both the 1997 and 2006 PM2.5 standards, the District staff commits to search for innovative control technologies, make improvements, and update the District's rules and regulations as expeditiously as possible to effectively help the Basin reach the PM2.5 attainment in 2014-2019, and ozone attainment in 2024-2032. District staff's envisioned that the control technologies available and cost-effective to be implemented in other local areas in California, or any other areas in the nation, would be available and cost-effective for use in the Basin in a timely manner.

To catch all the improvements on innovative control technologies and identify the areas for improvements in its rules and regulations, the District staff re-evaluated all the District's source-specific rules and regulations, and compared the requirements in these rules with more than 100 rules recently adopted or amended by four local air districts in California from 2007 to 2012. The four air districts selected are San Joaquin Valley, Sacramento Metropolitan, Ventura, and San Francisco Bay Area. Staff selected these districts based on the severity of their nonattainment status and their near-term attainment dates as shown in Table VI-1 and Table VI-2.

The summary of this analysis is presented in Table VI-5. In this table, staff *only* listed the areas where the requirements in other local air district's rules are more stringent than those in the District's rules and regulations. The analysis in Table VI-5 shows that in general the District's current rules and regulations are equivalent to or more stringent than those developed by other air districts. However, where improvements are possible, District staff has developed several control measures to further study the situations.

Details of the control measures, emission reductions, cost effectiveness, prioritization and implementation schedule are discussed in Chapter 4 and Appendix IV. The modeling results discussed in Chapter 5 has shown that the attainment for PM2.5 can be achieved with a few episodic additional control measures. With regards to the ozone attainment, the District has identified several control measures with estimated early emission reductions. The control measures of which emission reductions cannot be quantified will not be considered RACMs since they cannot be used collectively to estimate the advancement of the attainment date.

Staff commits to fine-tune the emission inventory, emission reduction, and cost-effectiveness analysis, especially during the rule development process. In addition, staff commits to monitor the rule development in other air districts and conduct further analysis if necessary, and has developed a catch-all Control Measure MCS-01 – Application of All Feasible Measures Assessment to facilitate this activity.

Step 5 - Other Districts' Control Measures

In an effort to ensure that all feasible candidate control measures are considered, District staff evaluated more than 100 control measures adopted within the period of 2007-2012 by eight nonattainment air districts in the nation for both PM2.5 and 8-hour ozone listed on Table VI-1 and Table VI-2, specifically Ventura, San Francisco Bay Area, San Joaquin Valley, Sacramento Metro in California, Dallas-Fort Worth and Houston-Galveston-Brazoria in Texas, New York and New Jersey. A summary of this evaluation is provided below.

Ventura

Ventura is classified as serious nonattainment for the 2008 8-hour ozone standard. In the 2006-2008 Final Triennial Assessment and Plan Update,[11] the Ventura County Air Pollution Control District conducted an analysis of all feasible control measures, and identified 7 new control measures in addition to the 15 control measures in the Ventura's 2007 AQMP. In this list, there is only one new Ventura's control measure described below that is more stringent than the requirements in the existing District's rules:

Ventura adopted a control measure to eliminate the current vapor pressure limit (45 mmHg) of low VOC spray gun cleaning and establish a new limit of 25 g/L VOC content for cleaning solutions used in aerospace assembly and component manufacturing operations, adhesives and sealants, marine coating operations, and pleasure craft coatings and commercial boatyard operations. Currently, the cleaning solutions used in marine coating operations, pleasure craft coatings, and adhesives and sealants in the Basin are subject to District's Rule 1171 limit of 25 g/L, and there is no vapor pressure limit in Rule 1171. However, the limit for cleaning solutions and strippers in District's Rule 1124 – Aerospace Assembly and Component Manufacturing Operations are currently at 200 g/L (or 45 mmHg) and 300 g/L (or 9.5 mmHg), respectively, and there is a potential to reduce these limits. Further assessment will be conducted through the District's Control Measure CTS-02 – Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants.

San Francisco Bay Area

San Francisco Bay Area is a nonattainment area for PM2.5 standard and a marginal nonattainment for 8-hour ozone standards. On September 15, 2010, the Bay Area adopted the final Bay Area 2010 Clean Air Plan (CAP) [12] to provide an integrated, multi-pollutant strategy to address ozone, PM, air toxics and greenhouse gases. The plan established 55 feasible control measures to be implemented in the 2010-2012 timeframe in which there are 18 measures for stationary and area sources and 4 energy and climate measures. The following 6 Bay Area's control measures are currently above and beyond the requirements in the existing District's rules:

- Bay Area's Control Measure SSM1 – Metal Melting, and Control Measure SSM6 – PM Limitation proposed to reduce particulate emission limits and encourage the use of high efficiency filtration at foundry operations and metal melting facilities, and other facilities whenever appropriate. The Bay area has developed and proposed amended rule for SSM1 and scheduled for a Public Hearing in 2012. District staff will conduct further analysis study on this concept through the District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

- Bay Area's Control Measure SSM2 – Digital Printing proposed to control VOC emissions from digital printing. The Bay Area is currently collected emissions information from this fairly new category of printing, including solvent-based inkjet printing and laser printing. It is forecasted to have 21% market share by 2025, and thus there will be a potential to reduce VOC emissions from this category. District staff will conduct further study on this concept through the District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

- Bay Area's Control Measure SSM5 – Vacuum Trucks requires carbon or other control technology on vacuum trucks to reduce emissions of VOCs. District staff will conduct further study on this concept through the District's Control Measure FUG-01 – Further VOC Reductions from Vacuum Trucks.

- Bay Area's Control Measure SSM9 – Cement Kilns, SSM10 – Refinery Boilers and Heaters, SSM11 - Glass Furnaces proposed to further reduce NOx from these source category. District staff will conduct further study through the Control Measure CMB-01 – Further NOx Reductions from RECLAIM.

- Bay Area's Control Measure ECM1 – Energy Efficiency proposed 1) to promote education and training to increase awareness on energy efficiency; 2) to provide technical assistance to local governments and encourage them to adopt and enforce energy efficient building codes; and 3) to provide incentives for improving energy efficiency at schools. These concepts are similar to those described in the District's Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.

- Bay Area's Control Measure ECM2 - Renewable Energy proposed to promote distributed renewable energy generation (solar, micro wind turbines, cogeneration, etc.) on commercial and residential buildings, and at industrial facilities. These concepts are covered under the District's Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.

The District already spearheaded in implementing other concepts in the Bay Area's AQMP that called for reducing SO_2 emissions from coke calciner and cement kilns; further controlling VOC emissions from livestock waste and natural gas production facilities; and NOx emissions from residential fan type furnaces, space heating, dryers, and ovens. The District also has an on-going program that promotes tree planting. Other Bay Area's control measures addressing New Source Review, Air Toxics "Hot Spots" program, and greenhouse gases in permitting, are either administrative in nature or not related to criteria pollutants.

San Joaquin Valley

San Joaquin Valley is extreme nonattainment with respect to 2008 8-hour ozone standards and nonattainment with respect to PM2.5 standards. Up to date, the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has developed two separate plans to address the 8-hour ozone standards in 2007 and the 1997 PM2.5 standards in 2008. Recently, the SJVUAPCD developed a 2010 mid-course review for the ozone plan, and continued the feasibility study for several other measures such as refinery wastewater separators, refinery turnaround units, refinery vacuum devices and municipal water treatment plans. In addition, the SJVUAPCD is in the process of developing a plan to address the 2006 PM2.5 standards in cooperation with CARB and the District. District staff reviewed the list of control measures completed and listed in the San Joaquin Valley's 2010 mid-course review in comparison with the 2012 control measures recommended by the District. Overall, the District has either already implemented or developed control measures with similar concepts proposed in the SJVUAPCD plans. [13-15]

Dallas-Fort Worth (DFW) Texas

The entire state of Texas is in attainment of the PM2.5 standards, but the state has two nonattainment areas with respect to the 8-hour ozone standards: the Dallas-Fort Worth and the Houston-Galveston-Brazoria. The DFW area was reclassified from a moderate to a serious nonattainment area for the 1997 8-hour ozone standard, and is moderate nonattainment with respect to the 2008 8-hour ozone. The area must attain the 1997 and 2008 8-hour ozone standards by June 2013 and December 2018, respectively. In their previous SIPs, the Texas Commission on Environmental Quality (TCQE) identified 8 new RACMs for area sources and point sources, and 6 of these measures were already implemented at the District. The remaining 2 measures, one for the cement kilns and one for the voluntary energy efficiency and renewable energy will be implemented through the District's Control Measure CMB-01 – Further NOx Reductions from RECLAIM and Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.[16]

After being reclassified from a moderate to a serious nonattainment area, TCQE conducted additional RACM analysis in 2011 and made a determination not to adopt any additional measures since modeling demonstrated that the area would be able to meet the attainment date of 2013 for the 1997 ozone standard.

Houston-Galveston-Brazoria (HGB) Texas

The Houston-Galveston-Brazoria area was reclassified from moderate to a severe nonattainment area for the 1997 8-hour ozone standard, and classified as marginal for the 2008 8-hour ozone standard. The HGB area must attain the 1997 8-hour ozone standards by June 2019. The TCQE identified 11 RACMs for area sources and point sources. After being reclassified to severe nonattainment area, the TCQE conducted additional RACM analysis, analyzed additional 100 potential control measures, and determined that there is only one control measure that would help advance the attainment date for the HGB by one year. [17]

This specific control measure calls for a 25% additional reduction of the facility's highly reactive VOC (HRVOC) caps from the facilities which are located in the Harris County and regulated under the HRVOC Emissions Cap and Trade program. The HRVOC cap includes the emissions from cooling towers, process vents, and flares. The District does not have a VOC cap and trade program, nevertheless plans to further control emissions from flares and from process vents at specific facilities through the District's Control Measure CMB-02 – NOx Reductions from Biogas Flares, FUG-01 – Further VOC Reductions from Vacuum Trucks, FUG-02 – Emission Reduction from LPG Transfer and Dispensing , and FUG-03 – Further VOC Reductions from Fugitive VOC Emissions. The District has no plan to further regulate the emissions from cooling towers at this stage.

New York Metropolitan

The New York Metropolitan Area is classified as nonattainment area or the 1997 annual PM2.5 standard of 15 µg/m3. All of the New York State is in compliance with the 1997 24-hour PM2.5 standard of 65 µg/m3. To satisfy the requirement of the CAA, the New York Department of Environmental Conservation (NYDEC) finalized the final annual PM2.5 SIP in July 2008. [18] In this final PM2.5 SIP, it was determined that modeling will be used to demonstrate attainment in 2010 taking into effect the emission reduction programs already in place, the control measures already proposed, and the contingency measures, if needed. The three stationary source control measures that are more stringent than the District's existing rules are: [19]

- Portland Cement Plants. The NYDEC has revised its regulations for cement plants on June 11, 2010 to require case-by-case RACT analysis for cement kilns. The District selects to reduce cement kiln emissions through the District's Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

- Glass Furnaces. The NYDEC has revised its regulation for glass manufacturing facilities on June 11, 2010 to require case-by-case RACT analysis to potentially include control technologies such as oxy-fuel firing, low NOx burners, SCR, SNCR. The District selects to reduce emissions from glass furnaces through Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

- Stationary Combustion Installations. The NYDEC has revised its regulation on June 8, 2010 to include stricter, case-by-case RACT determination for major stationary sources that contain natural gas and/or oil-fired Industrial/Commercial/Institutional boilers, or combined cycle/cogeneration combustion turbines. The Districts will reduce emissions from this category of sources through the District's Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

In addition, many counties in the New York state are nonattainment areas with respect to the 8-hour ozone standards. The NYDEC developed a comprehensive plan to address multi-pollutant attainment for criteria pollutants, greenhouse gases and toxics in June 2010.[20] In addition to the control measures for cement kilns, glass furnaces, boilers and turbines addressed above, the NYDEC includes several measures for VOC Clean Air Interstate Trading of NOx and SO_2. Some of the VOC measures are more stringent than the District's existing rules which will be further analyzed under District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

New Jersey and Sacramento Metro

District staff also reviewed the control measures developed by Sacramento Metro and New Jersey Department of Environmental Protection for their 8-hour ozone plans. There are no additional new measure concepts that the District has not yet considered for this Final 2012 AQMP. [21-24]

Step 6 - Additional Studies and Analyses

In addition to all of the above analyses, SCAG, CARB, and the District have completed the following analyses to meet the requirements of the CAA:

- RACM analyses and demonstration conducted by SCAG and CARB for transportation and mobile sources control measures are included in Appendix IV-C and in the Attachment of this Appendix.[25]

- Costs and cost effectiveness analyses, planning and scheduling to implement for each District's stationary source and mobile source control measures, if available, are provided in Chapter IV, Appendix IV-A and B.

CONCLUSION

Following are the District staff's findings:

- As required by the CAA and the U.S. EPA's PM2.5 Implementation Rule, District staff evaluated and analyzed all feasible control measure concepts that were currently available for inclusion in the Final 2012 AQMP. These concepts were either provided by the public and experts, or recommended by U.S. EPA, or implemented by other air districts. From these concepts, District staff selected and developed 8 short-term stationary source control measures to address the 24-hour PM2.5 attainment, 16 early-action stationary source control measures and 17 on-road and off-road control measures to address the 8-hour ozone attainment. District staff also developed a catch-all Control Measure MSC-01 – Application of All Feasible Measures Assessment to facilitate the inclusion of any incoming innovative air pollution control technologies or ideas that can help the Basin achieve the NAAQS as expeditiously as possible.

- Following the approach recommended by the U.S. EPA in the PM2.5 Implementation Rule, District staff conducted a study of more than 100 rules and regulations and 100 control measures recently developed in the 2007-2012 timeframe by other nonattainment air districts in the nation. In general, the District's existing rules and regulations are equivalent to, or more stringent than other districts' rules and regulations and their proposed control measures in their respective SIPs. In the few areas where the District's rules can be amended to promote cleaner technologies, add additional best management practices, and improve enforceability, District staff has developed one or more control measures to facilitate these activities.

- The control measures that do not have estimated emission reductions cannot be considered RACMs, and the District commits to further conduct analyses to refine the emission inventory, emission reductions, and cost-effectiveness for these measures. The District's ambient air quality data and modeling analysis in Chapter 3 and Chapter 5 demonstrates that the Basin would be able to meet the 24-hour PM2.5 attainment date by 2014 with the implementation of a few episodic control measures discussed in Chapter 4.

- With regards to the early actions to achieve ozone attainment, District staff has developed an effective menu of controls to meet the attainment dates as expeditiously as possible. The available control measures that District staff did not include would not collectively advance the attainment date or contribute to the RFP because of the uncertain non-quantifiable amount of emission reductions that they may potentially generate.

- In conclusion, the District has conducted the RACM/RACT analysis for identifying and selecting the control measures for the Final 2012 AQMP is in compliance with the requirements of the CAA, the U.S. EPA's PM2.5 Implementation Rule, as well as the U.S. EPA's policy and guidelines.

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TABLE VI-5

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1109	NOx	Emissions of Oxides of Nitrogen from Boilers and Process Heaters – Petroleum Refineries (Amended 8/5/88)	0.03 lbs/mmBTU of heat input (~25 ppmv). Subsumed by RECLAIM. RECLAIM (Amended 1/2005): • 5 ppmv for >110 mmbtu/hr units • 25 ppmv for units 40-100 mmbtu/hr	San Joaquin Rule 4306 (Amended 10/18/08) has the following limits: NOx limits for refinery gas: • 5 ppmv for units >110 mmbtu/hr; • 25 ppmv for units 65-110 mmbtu/hr; and • 30 ppmv for 5-65 mmbtu/hr units San Joaquin Rule 4320 (Amended 9/5/08) has the following limits for refinery gas: • 5 ppmv for >110 mmbtu/hr units • 5 - 6 ppmv for units between 20 - 110 mmbtu/hr Compliance may be mitigated with annual emissions fee.	Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM
1110.2	NOx, VOC, CO	Emissions from Gaseous and Liquid Fueled Engines (Amended 7/9/2010)	Rule 1110.2 has NOx, VOC, CO limits for all stationary and portable engines over 50 brake horse power (bhp). In general, the limits applicable to 1) stationary, non-emergency engines by 7/1/2011, and 2) biogas (landfill and digester gas) engines by 7/1/2012 are:	San Joaquin Valley Rule 4702 (Amended 8/19/2011) has NOx, VOC, CO and SOx limits for engines rated over 25 bhp. For engines over 50 bhp: - By 1/1/2017, the limits for spark-ignited engines are: • 11 ppmv NOx	Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
			• 11 ppmv NOx • 30 ppmv VOC • 250 ppmv CO Limits for new non-emergency engines driving electrical generators are: • 0.07 lbs NOx per MW-hr • 0.20 lbs CO per MW-hr • 0.10 lbs VOC per MW-hr NOx limits for low usage biogas engines: • 36 ppmv, engines ≥ 500 bhp 45 ppmv, engines < 500 bhp VOC and CO limits for low usage biogas engines: • 40 ppmv VOC, landfill gas • 250 ppmv VOC, digester gas • 2000 ppmv CO. Portable and agricultural engines are not subject to the general limits listed above. Many of Rule 1110.2 engines are in RECLAIM, and RECLAIM will be amended to incorporate feasible BARCT.	• 250 ppmv VOC (rich-burn) and 750 ppmv VOC (lean burn), and • 2000 ppmv CO - Engines used in agricultural operations (AO), or fueled with waste gas, or limited used, or cyclic loaded and field gas fueled are subject to higher limits than the above - In general, all compression ignited engines must meet EPA Tier 4 standards. Engines between 25 bhp - 50 bhp, non agricultural operations (AO), must meet federal standards 40CFR Part 60 Subpart IIII and JJJJ. The SOx limits are: 1) Natural gas, propane, butane, LPG, or combination, or 2) 5 grains/100 scf for gaseous fuel, or 3) 15 ppmv liquid fuel, or 4) CA reformulated gasoline for spark-ignited engines, or 5) CA reformulated diesel for compression ignited engines, or 6) 95% control.	

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1111	NOx	NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces (Amended 11/6/09)	40 nanograms per joule heat output until 2014. A lower standard of 14 ng/J is required with staggering compliance dates from 2014-2018.		
1112	NOx	Emissions of Oxides of Nitrogen from Cement Kilns (Amended 6/6/86)	Applicable to gray cement only. 11.6 lbs/ton clinker averaged over 24 hours and 6.4 lbs/ton clinker averaged over 30 days. Subsumed by RECLAIM. RECLAIM, amended 1/2005 version, had no recommendation for cement kiln BARCT. However, RECLAIM BARCT analysis is an on-going process and will be evaluated every three years.		Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM
1117	NOx	Emissions of Oxides of Nitrogen from Glass Melting Furnaces (Amended 1/6/84)	4 lb/NOx per ton of glass pulled. Flat glass and fiberglass melting furnaces are exempt. Many of these R1117 units are in RECLAIM. RECLAIM (Amended 1/2005 version) had no BARCT recommendation for this class. However, BARCT analysis is an on-going process and will be reevaluated every three years.	San Joaquin Rule 4354 – Glass Melting Furnaces (Amended 5/19/2011) have NOx, CO, VOC, SOx limits. There are several options for the NOx limits: • Container Glass: 1.5 lbs/ton (rolling 30-day average) • Fiberglass: 1.3-3 lbs/ton (24-hour average)	Further study the feasibility of lowering NOx limit through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE VI-5 (continued)
Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1117 (Cont.)				• Flat Glass: 2.9 lbs/ton (30-day average) – 3.7 lbs/ton (24-hour average) The SOx limits are: • Container Glass: 0.9-1.1lbs/ton (rolling 30-day average) • Fiberglass: 0.9 lbs/ton (rolling 24-hour average) • Flat Glass: 1.2 lbs/ton (30-day average) – 1.7 lbs/ton (24-hour average) The VOC limits are: • Container or Fiberglass: 0.25 lbs/ton or 20 ppmv • Flat Glass: 0.10 lbs/ton or 20 ppmv.	
1121	NOx	Control of Nitrogen Oxides from Residential Type, Natural-Gas-Fired Water Heaters (Amended 9/3/2009)	15 ppmv at 3% O2, dry input (or 10 ng/j output) for all stationary water heaters; and 55 ppmv at 3% O2, dry input (40 ng/j output) for mobile water heaters.	Other Districts' plans propose to accelerate replacements of old water heaters with electric units or new highly-efficient lower-emitting water heaters with the use of incentives.	Further study the possibility of using incentives to promote electric heaters through: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx] In addition, further consider the feasibility of technology transfer through: CMB-03 – Reductions from Commercial Space Heating

TABLE VI-5

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1134	NOx	Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Amended 8/8/97)	Standard = Reference Limit x (Unit Efficiency/25%), where reference limit depends on size of units, varying from 9 ppmv for units rating at equal to or larger than 10MW to 25 ppmv for units rating from 0.3 MW to less than 2.9 MW. RECLAIM, amended 1/2005 version, indicated that 5 ppmv was achieved in practice but not cost effective, therefore did not propose BARCT. This analysis may need to be revised based on new information. RECLAIM BARCT is an on-going process that is planned to be reviewed every 3 years.	Bay Area, Regulation 9, Rule 9 (Adopted 12/6/06) contains the following limits: • 9 ppmv for units between 250-500 mmBTU/hr and • 5 ppmv for units more than 500 mmBTU/hr San Joaquin Valley Rule 4703, (Amended 8/17/06) requires 3 ppmv for combined cycle >10 MW, and standards from 5 – 50 ppmv for other units. Sacramento Rule 413 (Amended 03/24/05) requires 9 – 25 ppmv depending on size of units, but are independent on equipment efficiency. Ventura Rule 74.9 (Amended 11/08/05) requires 25 – 125 ppmv depending on fuel type but are independent from equipment size and efficiency. Control efficiency 90% - 96%. In addition, all units have to meet 20 ppmv NH_3.	Further study the feasibility of lowering the NOx standard and establish ammonia standard through: CMB-01 – Further NOx Reductions from RECLAIM MCS-01 – Application of All Feasible Measures Assessment (for non-RECLAIM facilities)

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1135	NOx	Emissions of Oxides of Nitrogen From Electric Power Generating Systems (Amended 7/19/91)	Mass emission limits and emission reduction goals for utility boilers. Only City of Glendale is subject to Rule 1135, which is allowed to meet 0.2 lb/MW-hr (or a daily mass limit of 390 lb NOx per day, or an annual limit of 35 tons per year). Other utility boilers are in RECLAIM subject to declining NOx allocations which were determined based on a level of 7 ppmv = 0.07 lb/MW-hr = 0.008 lb/mmbtu, assuming a heat rate of 8130 Btu/kw-hr. The utility boilers are operated at various BARCT levels from 5 - 30 ppmv. (Note)	Ventura Rule 59 (amended 7/15/97) requires: • 0.1 lb NOx/MW-Hr for utility boilers and • 0.04 lb/MW-hr for auxiliary boilers. San Joaquin Rule 4306 – Phase 3 (amended 3/17/2005) requires boilers more than 20 mmbtu/hr to comply with the following options: • Standard option of 9 ppmv (or 0.011 lb/mmbtu) complied by 2005-2007, or • Enhanced option of 6 ppmv (or 0.007 lb/mmbtu) complied by 2006-2008. (Assuming a heat rate of 8130 Btu/kw-hr, 6 ppmv is about 0.06 lb/MW-hr.)	Further study the feasibility of lowering the emission targets through: CMB-01 – Further NOx Reductions from RECLAIM facilities MCS-01 – Application of All Feasible Measures Assessment

Note: RECLAIM facilities have flexibility to operate their utility boilers provided that the total facility emissions must be at or below their allocations determined based on a level of 7 ppmv. Regarding BARCT levels, according to Marty Kay and John Yee, the utility boilers at Southern California Edison, Department of Water and Power, and City of Burbank are operated at a level from 5 – 7 ppmv (1-hr to 1-month average time) whereas City of Pasadena boilers are operated at a level of 30 ppmv. In addition, since heat rate (mmbtu per kw-hr) varies with each utility boiler, District staff used 8130 BTU/kw-hr to convert the ppmv to lb/MW-hr for the unit operated by City of Glendale.

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146	NOx	Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters (Amended 9/5/2008)	Applicable to units rating of more than 5 mmbtu/hr. Current NOx limits: • For digester gas: 15 ppmv • For landfill gas: 25 ppmv • For refinery gas: 30 ppmv (the 2008 amendment did not revise limits for refinery gas) • For other types of fuels: 5 ppmv for ≥75 mmbtu/hr, natural gas; 30 ppmv for ≥75 mmbtu/hr, other fuels; and 5 or 9 ppmv for 20–75 mmbtu/hr units CO limit: 400ppmv Many Rule 1146 units are in RECLAIM. RECLAIM (Amended 1/2005 version) contains the following NOx limits: • For refinery gas: 5 ppmv for units > 110 mmbtu/hr; and 25 ppmv for units < 110 mmbtu/hr units • For other units: 9 ppmv for units > 20 mmbtu/hr; and 12 ppmv for units >2 mmBTU/hr	Sacramento Rule 411 (Amended 10/27/05) limits for gaseous fuel are 9 ppmv for units greater than 20 mmbtu/hr, and 15 ppmv for units from 5 to 20 mmbtu/hr. San Joaquin Rule 4306 (Amended 10/18/08) has the following limits: NOx limits: • 30 ppmv for 5-65 mmbtu/hr units using refinery gas. For units from 40 – 100 mmbtu/hr, refer to the comparison under Rule 1109. • For other types of fuels: 9 ppmv for >20 mmbtu/hr units; 15 ppmv for ≤20 mmbtu/hr units (6 – 9 ppmv for enhanced options) • Other units: 15 – 30 ppmv CO limit: 400 ppmmv. San Joaquin Valley further reduces NOx, CO, SO_2 and PM10 emissions by adopting Rule 4320 on 10/16/08. The limits in Rule 4320 are:	Further explore the feasibility of lowering the NOx standards for Rule 1146 (e.g. refinery fuels, digester and landfill gases) and RECLAIM through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE VI-5 (continued)
Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146 (Cont.)	NOx			NOx limits: • For refinery gas: 5 – 6 ppmv for units between 20-110 mmbtu/hr; 6 – 9 ppmv for units between 5 - 20 mmbtu/hr; and 9 ppmv for units firing of less than 50% by vol PUC quality gas. Refer to the comparison under Rule 1109 for 40 mmbtu/hr units and above using refinery gas. • For oil field generators: 5 - 7 ppmv for units greater than 20 mmbtu/hr; 6 – 9 ppmv for units larger than 5 but less than 20 mmtu/hr; and 9 ppmv for units firing of less than 50% by vol PUC quality gas • For low usage units: 9 ppmv • For units at a wastewater treatment facilities firing on less than 50% by vol PUC quality gas: 9 ppmv • For other units: 5 – 7 ppmv for units larger than 20 mmbtu/hr; and 6 – 9 ppmv for units between 5 mmbtu/hr and 20 mmbtu/hr Compliance may be mitigated with annual emission fees.	

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146.1	NOx	Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 9/5/2008)	Applicable to units rating from 2 mmbtu/hr to 5 mmbtu/hr. NOx limits: • Atmospheric Units: 12 ppmv • Digester gas: 15 ppmv • Landfill gas: 25 ppmv • All others: 9 ppmv CO limit: 400 ppmv. Many Rule 1146.1 units are in RECLAIM, and RECLAIM (Amended 1/2005 version) BARCT analysis recommended 12 ppmv for less than 20 mmbtu/hr units based on ultra low NOx technology that is achieved in practice. RECLAIM (Amended in 2005) has a limit of 12 ppmv NOx for boilers in this size range.	Bay Area Rule 9-11 (Amended 5/17/00) has following limits for boilers using gaseous fuel 1) 10 ppmv for boilers with rated input greater than 1.75 mmbtu/hr, 2) 25 ppmv for boilers from 1.5-1.75 mmbtu/hr, 3) 30 ppmv for boilers less than 1.5 million btu/hr. Non-gaseous fuel combustion devices have higher limits than gaseous fuel devices. San Joaquin Rule 4307 (Amended 5/19/2011) has the following limits: NOx limits: - For New or Replacement Units: Atmospheric Units: 12 ppmv, and Non-Atmospheric Units: 9 ppmv -For Retrofit Units: 30 ppmv burning gaseous fuels; and 40 ppmv burning liquid fuels Sulfur limits for SO2: -For natural gas, propane, butane, or LPG: 5 grains of total sulfur per 100 scf, or 9 ppmv SO2, or 95% control -For liquid fuels: 15 ppmv sulfur	Further study the feasibility of promoting the use of cleaner units through incentives through one of the following: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146.2	NOx	Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers (Amended 5/5/06)	Applicable to units less than 2 mmbtu/hr. Current limits are: • 20 ppmv for units from 400,000 btu/hr – 2 mmbtu/hr • 55 ppmv for units rating less than 400,000 btu/hr	San Joaquin Valley Rule 4308, (Amended 12/17/09) requires: • 20 ppmv for units used PUC gas from 75,000 btu/hr – 2 mmbtu/hr • 30 ppmv for units from 400,000 btu/hr - 2 mmbtu/hr used other types of fuels • 77 ppmv for units rating from 75,000 btu/hr – 400,000 btu/hr used other types of fuels	Further study the feasibility of promoting the use of cleaner units through: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]
2000 - 2015	NOx, SOx	RECLAIM (Amended 5/6/05)	Include facility allocations for NOx and SOx for RECLAIM facilities.	Since other Districts do not have RECLAIM, refer to comparison for individual rules such as Rule 1146, 1146.1, 1110.2 etc.	Further review BARCT through: CMB-01 – Further NOx Reductions from RECLAIM . District has set most stringent BARCT for SOx sources in the 2010 RECLAIM Amendments.

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1106	VOC	Marine Coating Operations (Amended 1/13/95)	Coating-specific emission limits from 275 – 780 g/L. In lieu of complying with specific emission limits, operator can use air pollution control system with at least 85% efficiency. Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.24 (Amended 11/11/03) generally has the same limits as South Coast Rule 1106, except the limit for special marking of items such as flight decks, ship numbers is 420 g/L (490 g/L in Rule 1106) Bay Area Rule 8-43 (Amended 10/16/02) generally has the same limits as South Coast Rule 1106, except it has lower limit for pretreatment wash primer at 420 g/L (780 g/L in Rule 1106)	Further study the potential of lowering the emission standards for this source category through: CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1106.1	VOC	Pleasure Craft Coating Operations (Amended 2/12/99)	Coating-specific emission limits from 340 – 780 g/L. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley's Rule 4603 (Amended 9/17/09) limit for teak primer, wood sealer, and clear wood varnish is 420 g/L, which is more stringent than the limits in Rule 1106.1 (i.e. 775 g/L for teak primer, 550 g/L for clear wood sealers, and 490 g/L for clear wood varnishes.)	Further study the potential of lowering the emission standards for this source category through: CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1113	VOC	Architectural Coatings (Amended 6/3/2011)	Coating-specific emission limits from 50 g/L – 730 g/L. Allow averaging, scheduled to be phased out on January 1, 2015.		Further study the potential of lowering the emission standards for this source category through: CTS-01 – Further VOC Reductions from Architectural Coatings (R1113)

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1107	VOC	Coating of Metal Parts and Products (Amended 1/6/06)	Coating-specific emission limits from 2.3 lbs/gal – 3.5 lbs/gal. In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 5 ppmv outlet) and 90% capture efficiency. Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.12 (Amended 1/6/06) generally has the same coating-specific limits as South Coast Rule 1107, except in the following categories: • Limit for metallic coating is 3 lbs/gal (3.5 lbs/gal in Rule 1107); • Limit for camouflage is 3 lbs/gal (3.5 lbs/gal in Rule 1107); • Limit of pretreatment coatings is 2.3 lbs/gal (3.5 lbs/gal in Rule 1107) • Overall minimum control efficiency is 90%, higher than Rule 1107 requirement at 85% San Joaquin Valley Rule 4603 (Amended 9/17/09) have more stringent limits than Rule 1107 for baked camouflage and baked metallic coating at 360 g/L (420 g/L in Rule 1107)	Explore the feasibility of lowering the VOC limits considering the diversity of applications, and if feasible, implement through the following control measure: CTS-02 – Further Emission Reduction from Miscellaneous Coatings. Adhesives, Solvents, and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1115	VOC	Motor Vehicle Assembly Line Coating Operations (Amended 5/12/95)	Limits from 1.2 lbs VOC/gal coating for electrophoretic primer to 15 lbs/gal of applied solids for primer, primer surfacer and topcoat. Cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4602, (Amended 9/17/09) has more stringent limits for: 1) Primer at 0.7 lbs/gal and 2) Primer surface and topcoat at 12 lbs/gal	Further lowering the VOC limits
1118	All	Refinery Flares (Amended 11/4/05)	• Minimize flare emissions & require smokeless operations • Specify SO_2 gradually decreasing performance target to less than 0.5 tons per million barrels of crude by 2012. • If the performance target is exceeded, the operator must 1) pay mitigation fee; or 2) submit a Flare Mitigation Plan to reduce emissions. • Require Cause Analysis for event exceeding 100 lbs VOC, 500 lbs of SO2, or 500,000 scfm of vent gas, excluding planned shutdown, startup and turnarounds • Require 160 ppmv H2S, 3 hour average by 1/1/2009, and no limits for NOx, VOC, PM and CO.	U.S. EPA suggested the District to further re-evaluate Rule 1118 (FR Vol 76 No 217, Nov 9, 2011, CBE comments). San Joaquin Valley Rule 4311 (Amended 6/18/09) has VOC/NOx limits for ground-level enclosed flares; SO_2 Targets (1.50 tons/million barrels of crude by 2011, and 0.5 tons/million barrels by 2012); Flare Minimization Plan for refinery flares more than 5 mmbtu/hr; and operational requirements for all flares that have potential to emit more than 10 tons/yr VOC and more than 10 tons/yr of NOx. Bay Area Rule 12-12 (Adopted 4/5/06) does not specify a declining SO2 target and does not contain a mitigation fee option.	Explore the possibility of further minimizing flare related events, through: MSC-03 – Improved Start-Up, Shutdown and Turnaround Procedures In addition, further study the feasibility of reducing emissions of landfill flares through: CMB-02 – NOx Reductions from Biogas Flares

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1122	VOC	Solvent Degreasers (Amended 5/1/09)	Contain various work practice and design requirements.		Further study to assess the feasibility of reducing emissions through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1124	VOC	Aerospace Assembly and Component Manufacturing Operations (Amended 9/21/01)	Coating-specific emission limits from 160 – 1000 g/L. Specific high transfer coating applications (e.g. HVLP spray). In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 50 ppmv outlet) and 90% capture efficiency. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4605 (Amended 6/16/2011) has the following limits that are more stringent than those in Rule 1124: • Flight Test Coatings = 600 g/L (840 g/L in Rule 1124) • Fastener Sealant = 600 g/L (675 g/L in Rule 1124) Sacramento Rule 456 (Amended 10/23/08) has the following limits that are more stringent than those in Rule 1124: • Conformal Coating = 600 g/L (Rule 1124 limit is 750 g/L)	Explore the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1124 (Cont.)				• Fire Resistant Coatings = 600 g/L. (Rule 1124 limits are 650 g/L for Commercial; 800 g/L for Military) • High-Temperature Coating = 420 g/L. (Rule 1124 limit is 850 g/L) • Mold Release Coatings = 762 g/L. (Rule 1124 limit is 780 g/L) • Radiation Effect = 600 g/L. (Rule 1124 limit is 800 g/L) • Rain Erosion Resistant Coating = 600 g/L in All Other Category. (Rule 1124 limit is 800 g/L) Ventura 2006-2008 Triennial Assessment and Plan Update has a control measure to require 25 g/L VOC limit for cleaning solutions and remove the 45 mmHg vapor pressure allowance. (Rule 1124 limits for cleaning solutions and strippers are 200 g/L (or 45 mmHg vapor pressure) and 300 g/L (or 9.5 mmHg vapor pressure)	

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1125	VOC	Metal Container, Closure, and Coil Coating Operations (Amended 3/7/2008)	Coating-specific emission limits from 0 g/L (for non food cans) – 660 g/L. Specific high transfer coating applications (e.g. HVLP spray). In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 50 ppmv outlet) and 90% capture efficiency, which is equivalent to an overall control efficiency of 85%. Solvent cleaning operations must comply with Rule 1171.	The following limit in San Joaquin Rule 4604 (Amended 9/20/07) are more stringent than those in Rule 1125: • Two-Piece Interior Body Spray = 420 g/L (440 g/L in Rule 1125) • Three-Piece Interior Body Spray = 360 g/L (510g/L in Rule 1125) In addition, SJV Rule 4604 have many limits that are not listed in Rule 1125 such as 20 g/L for end seal compounds and 225 g/L for two-piece interior sheet base coating and over-vanish. Sacramento Rule 452 (Amended 9/25/2008) has the following more stringent limits than Rule 1125: • Two-Piece Interior Body Spray = 420 g/L (440 g/L in Rule 1125) • Three-Piece Interior Body Spray = 360 g/L (510g/L in Rule 1125)	Explore the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130	VOC	Graphic Arts (Amended 10/8/99)	VOC content limits: 80 g/l – 100 g/l for fountain solution, 150 g/l for adhesives, 225 g/l - 300 g/l for inks and coatings. In lieu of meeting specific emission limits, control device with overall control efficiency from 75% - 85% can be used to achieve equal or better emission reductions. VOC limits for cleaning solutions for printing presses are in Rule 1171 ranging from 25 g/l (0.21 lb/gal) for flexographic printing to 100 g/l (0.83 lb/gal) for lithographic printing (even though 500 g/l is allowed up to end of year 2007.)	The following limits in San Joaquin Valley Rule 4607 (Amended 12/18/08) are more stringent: 1) 95% control efficiency for heat-set web offset lithographic or letterpress printers that emit greater than 25 tons per year VOC; 2) 1.6% VOC content for fountain solution used in heat-set lithographic printers, 5% for fountain solution used in cold-set and sheet-fed lithographic printers, and 8% for fountain solution used in other presses. Sacramento Rule 450 is more stringent in the following: 1) overall control efficiency of 95% for heat-set web offset lithographic and letterpress printing and 80% for flexible package printing (Rule 1130 requires only 75% control efficiency) ; 2) VOC in fountain solution is lower, generally from 1.6% to 5%; 3) electronic circuit limit is 800 g/l (850 g/l in Rule 1130.1)	Further study to assess the feasibility of increasing the overall control efficiency and reducing the alcohol usage in fountain solution through the implementation of: MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130 (Cont.)				Bay Area, Regulation 8, Rule 20 (Amended 11/19/08) requires 8% VOC content in fountain solution. In addition, the rule requires recordkeeping for digital printing, cleaning and stripping of UV or electron beam-cured inks for further study potential emission reductions in a near future. Ventura Rule 74.19 (Amended 6/14/11) requires low VOC content in fountain solution used in lithographic presses. In addition, the U.S. EPA CTG for lithographic and letterpress, September 2006, recommends: • Destruction efficiency of 90% to 95% depending on date of installation (or 20 ppmv outlet concentration) for heat-set web with potential to emit, prior to controls, of at least 25 tpy. • For operations emitting 15 lb/day, fountain solution must be 1) 1.6% alcohol or less, or	

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130 (Cont.)				2) 3% with refrigerated chiller or 3) 5% alcohol substitute for heat-set web presses; 4) 5% alcohol for sheet-fed presses; 5) 5% alcohol substitute and no alcohol in fountain solution for cold-set web presses. The EPA CTG for rotogravure and flexographic, adopted in September 2006, recommends control efficiency of 80% for presses installed after March 1995, and 65% - 75% for older presses.	
1130.1	VOC	Screen Printing Operations (Amended 12/13/96)	VOC content limits ranges from 400 g/l – 800 g/l for materials used in screen printing. In lieu of specific emission limits, control device can be used to achieve equal or better reductions, at least 95%.	Bay Area, Regulation 8, Rule 20 (Amended 11/19/08) has more stringent limit for adhesives at 150 g/L (400 g/L in Rule 1130.1). Sacramento Rule 450 (Amended 10/23/08) has more stringent limits than Rule 1130.1 in the following areas: 1) limit for electronic circuit ink is 800 g/L (850 g/L in Rule 1130.1); 2) limit for adhesives is 150 g/L (400 g/L in Rule 1130.1)	Further study to assess the feasibility of reducing the VOC limits for adhesives through: MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1132	VOC	Further Control of VOC from High Emitting Spray Booths (Amended 5/7/04)	Further reduce emissions by 65% from the baseline primarily through the installation of control devices, beyond and above the use of coatings that comply with existing coating rules.		
1136	VOC	Wood Products Coatings (Amended 6/14/96)	VOC content limits range from 2.3 – 6.3 lbs/gal VOC. Averaging provisions and add-on control are allowed. Transfer efficiency is at least 65%, or operator must use certain type of equipment (e.g. HVLP). Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.30 (Amended 6/27/06) has more stringent limit for high-solid stains on new wood products at 2 lbs/gal (2.9 lbs/gal in Rule 1136). In lieu of coating specific limits, control equipment achieving 90% efficiency is required. No averaging provisions in Ventura. San Joaquin Valley Rule 4606 (Amended 10/16/08) is more stringent in the following areas: • Rule 1136 allows the use of a stripper with limits higher than 350 g/L if the stripper has low vapor pressure of 2 mmHg. SJV does not have this allowance; • SJV Rule 4606 requires a min overall control efficiency of 85% - 90% for flat wood paneling products, whereas Rule 1136 does not have control efficiency requirement.	Explore the feasibility of lowering the VOC limits for wood products coatings through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1136 (Cont.)				Bay Area, Regulation 8, Rule 32, (Amended 8/5/09) has lower limits for surface preparation and cleanup, including stripping, at 0.21 lbs/gal.	
1144	VOC	Metalworking Fluids and Direct-contact Lubricants (Amended 7/9/2010)	Various limits from 50 g/L – 340 g/L. Add-on control at 90% capture efficiency, 95% control efficiency (or 5 ppmv outlet)		Further study the potential of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1151	VOC	Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations (Amended 12/2/05)	VOC content limits range from 250 – 840 grams VOC per liter. Averaging provisions are allowed. High transfer coating equipment (e.g. HVLP) is required. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4602 (Amended 9/17/09) is more stringent in the following areas: 1) adhesive at 250 g/L (540 g/L in Rule 1151), 2) gasket/gasket sealing at 200 g/L (400 g/L in Rule 1151), and 3) truck bed liner coating at 200 g/L (310 g/L in Rule 1151) Sacramento Rule 459 (Amended 8/25/11) is more stringent in the following areas: 1) multi-color coating at 520 g/L for mobile equipment driven on rails (680 g/L in Rule 1151), 2) truck bed liner coating at 200 g/L (310 g/L in Rule 1151) Bay Area, Regulation 8, Rule 45 (Amended 12/3/08) is more stringent in the following areas: 1) VOC limit for surface preparation and cleanup, including stripping, of 0.2 lbs/gal or 2) a minimum 85% overall control efficiency.	Further study the feasibility of lowering the VOC limits for coatings through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment
1162	VOC	Polyester Resin Operations (Amended 7/8/05)	VOC limits (monomer content) from 10-48% by weight or alternatively 90% control efficiency for add-on control	Regulation 8, Rule 50 (Amended 12/2/09) is similar to Rule 1162, except the limit for corrosion resistant resin is more stringent at 40% - 46% (48% in Rule 1162). The rule allows some usage of acetone	Further study the feasibility of lowering the VOC limits through: MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1168	VOC	Adhesive and Sealant Applications (Amended 1/7/05)	VOC limits for solvents range from 30 – 775 lbs VOC per gallon. Require the use of high transfer efficiency equipment (e.g. HVLP spray). In lieu of meeting the VOC limits, using add-on control with 80% control efficiency is allowed.	San Joaquin Valley Rule 4653 (Amended 9/16/2010) has more stringent limits in the following areas: • 100 g/L for Cellulosic Plastic Welding Adhesive, 100 g/L for Styrene Acrylonitrile Welding Adhesive, and 200 g/L for Reinforced Plastic Composite Adhesive (Rule 1168 limit is 250 g/L limits for all three categories) • Minimum overall control efficiency is 85% (80% in Rule 1168)	Further study the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1171	VOC	Solvent Cleaning Operations (Amended 5/1/2009)	VOC limits for solvents are 25 g/l in general, and have a 100-800 g/l VOC for specific cleaning operations. In lieu of meeting the VOC limits, add-on control having 90% collection efficiency and 95% destruction efficiency or meeting 50 ppmv outlet concentration can be used. The rule however only requires (70%)(95%) = 66.5% overall control efficiency for graphic arts and screen printing applications	The U.S. EPA RACT published in September 2006 limit is 50 g/l or an overall control efficiency of 85%. The U.S. EPA is not recommending limits beyond 50 g/l; but also recommends states to adopt higher limits based on individual performance requirements of specific applications. Rule 1171 meets the U.S. EPA RACT.	Further study the feasibility of lowering the VOC limits and increasing the overall control efficiency requirement for control devices located at graphic arts facilities through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants,
462	VOC	Organic Liquid Loading (Amended 5/14/99)	Limit in Rule 462 is 0.08 lbs per 1000 gallons of liquid loaded for Class A facility loading of 20,000 gallons or more. This limit is not applicable to small facilities (Class B and C).	Bay Area, Regulation 8, Rule 33 (Amended 4/15/09) has a limit of 0.04 lbs/1000 gallons of liquid loaded and requires stringent monitoring requirements	Further study to assess the feasibility of reducing the VOC limits through: MSC-01 – Application of All Feasible Measures Assessment

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations – VOC, PM Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1133, 1133.1, 1133.2	PM, VOC, NH3	Composting, Co-Composting, and Related Operations (Rule 1133, Adopted 1/10/2003; Rule 1133.1, Amended 7/8/2011; and Rule 1133.2, Adopted 1/10/2003)	Various performance standards. Air pollution control must have 80% control efficiency or greater. Existing operations must reduce up to 70% baseline VOC and ammonia emissions. Baseline emission factors are 1.78 lbs VOC/ton throughput and 2.93 lbs NH3/ton throughput.	San Joaquin Rule 4565 – Biosolids, Animal Manure, and Poultry Litter Operations (Adopted 3/15/07) and Rule 4566 – Organic Material Composting Operations (Adopted 8/18/11) have various operational requirements for these operations as well as the operators who landfills, composts, or co-composts these materials. The applicability of Rules 4565/4566 is broader than the applicability of Rule 1133.3. In addition, Rules 4565/4566 include additional mitigation measures to control VOC from composting active piles (e.g. maintain minimum oxygen concentration of 5%, moisture content of 40%-70%, carbon to nitrogen ratio of 20-1). San Joaquin's rule does not address chipping & grinding as in Rule 1133.1.	Further study the feasibility of further control through: MCS-02 – Further Emission Reductions from Green Waste Processing
1133.3	VOC NH_3	Emission Reductions from Greenwaste Composting Operations (Adopted 7/8/2011)	Include requirements for composting greenwaste, or greenwaste in combination of manure or foodwaste. Include various performance standards. Require air pollution control with efficiency of 80% or greater for operations greater than 5000 tons/year of foodwaste. For operations less than 5000 tons/year, require the composting piles to be covered, watered, and turned, or operated with measures that reduce at least 40% VOC emission and 20% NH_3 emissions.		

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - PM Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1138	PM	Control Of Emissions From Restaurant Operations (Amended 11/14/97)	Require catalytic oxidizer for chain-driven charbroilers. Exemption provided for under-fired charbroilers and units cooking less than 875 lbs/week, but does not contain any specific limits.	San Joaquin Valley Rule 4962 (Amended 9/17/09) requires the emissions from the restaurant charbroilers be controlled by catalytic oxidizer with minimum control efficiencies of 86% for VOC and 83% for PM10. Bay Area Regulation 6, Rule 2 (Adopted 12/5/07) sets limit for both chain-driven charbroilers at 1.3 lbs PM10 and 0.32 lbs ROG per 1000 lbs beef cooked) and under-fired charbroilers at 1 lbs PM10 per 1000 lbs beef cooked) Ventura Rule 74.25 (Adopted 10/12/04) which has equivalent requirements as in Rule 1138.	Further study the feasibility of regulating under-fired charbroilers through: BCM-03 – Emission Reductions from Under-Fired Charbroilers Note that the District has currently funded UCR - CE-CERT to investigate on the control technologies for under-fired charbroilers.

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - PM Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1155	PM	Particulate Matter Control Devices (Adopted 12/4/2009)	PM standards for PM control devices at 0.01 gr/dcsf for existing large baghouses >7500 square feet. Good operational practices to reduce PM emissions	Bay Area, Draft Regulation 12, Rule 13 is scheduled for a Public Hearing in summer of 2012. This rule is to implement Bay Area Control Measure SSM1 in the 2010 Clean Air Plan. The rule is applicable to facilities that melt or process metals (foundries, forges, heat treatment of metals, and metal recycling operations). The focus is to promote the use of high efficiency filters (e.g. Gore-Tex bags). Proposed limits are: • 0.002 gr/dscf for flow rate of 25,000 dscf per min or higher; and • 0.004 gr/dscf for flow rates less than 25,000 dscf per min.	Further study the feasibility of lowering the PM limits through: MCS-01 – Application of All Feasible Measures Assessment
444	All	Open Burning (Amended 11/7/2008)	Contains requirements and prohibitions for open burning to minimize emissions and smoke impacts to the public.	San Joaquin Valley Rule 4103 (Amended 4/15/2010) contains additional best management practices compared to Rule 444 such as best management practices to control open burning of weeds. Bay Area, Reg 5, sets requirements for open burning, and was to forbid recreational burning during curtailment periods.	Further study to include additional good management practices and a possibility of restricting burning during episodic curtailment periods through: BCM-02 – Further Reductions from Open Burning

TABLE VI-5 (continued)

Evaluation of SCAQMD Rules and Regulations - PM Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
404, 468, and 469	PM	Rule 404 – Particulate Concentration (Amended 2/7/86) Rule 468 – Sulfur Recovery Units (Amended 10/8/76) Rule 469 – Sulfuric Acid Units (Amended 2/13/81)	PM limits vary from 0.01gr/dscf to 0.19 gr/dscf in Rule 404 depending on exhaust flow rates. Sulfuric acid mist limit in Rule 469 is 0.3 lbs per ton of acid produced (approximately 0.1 gr/dscf) Rule 468 for sulfur recovery units does not contain any PM standard.	Bay Area, Regulation 6, Rule 1 (Adopted 12/5/07) contains the following limits: • Generally, PM limit is 0.15 gr/dscf • Sulfuric Acid Manufacturing Plants: limit sulfur trioxide or sulfuric acid mist, or both, expressed as 100% sulfuric acid, to 0.04 gr/dscf • Sulfur Recovery Units: limit sulfur trioxide or sulfuric acid mist, or both, expressed as 100% sulfuric acid, to 0.08 gr/dscf	Further study the feasibility of reducing the emission limits through: MCS-01 – Application of All Feasible Measures Assessment
445	PM	Wood Burning Devices (Adopted 3/7/08)	Contains requirements for wood burning devices to minimize emissions and smoke impacts to the public.	San Joaquin Valley Rule 4901 (Amended 10/16/2008) contains additional best management practices compared to Rule 445.	Further study to include additional good management practices and the possibility of restricting burning during the episodic curtailment periods through: BCM-01 – Further Reductions from Residential Wood Burning Devices

ATTACHMENT

CALIFORNIA AIR RESOURCES BOARD
Mobile Source RACM Analysis for the South Coast 2012 Final AQMP

Given the significant emission reductions needed for attainment in California, ARB has adopted some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them. These measures target both new and in-use equipment. And while California first focused on cleaning up cars – new car emissions have been reduced by 99 percent – the scope of California's program is vast. The State has implemented regulations and programs to reduce emissions from freight transport equipment, including heavy-duty trucks, ocean going vessels, locomotives, harbor craft, and cargo handling equipment. In addition, the State has standards for lawn and garden equipment, recreational vehicles and boats, and other newly manufactured off-road equipment. California has also adopted many measures that focus on achieving reductions from in-use mobile sources that include accelerated replacement of older equipment with newer, less polluting equipment; more stringent inspection and maintenance requirements; and operational requirements such as truck and bus idling restrictions and speed reduction requirements for ocean going vessels.

California has unique authority under Clean Air Act section 209 to adopt and implement new emission standards for many categories of on-road vehicles and engines, and new and in-use off-road vehicles and engines. Use of this authority is subject to U.S. EPA waiving the applicable federal standard upon their finding that the standards adopted by California are, in the aggregate, at least as stringent as the comparable federal standard.

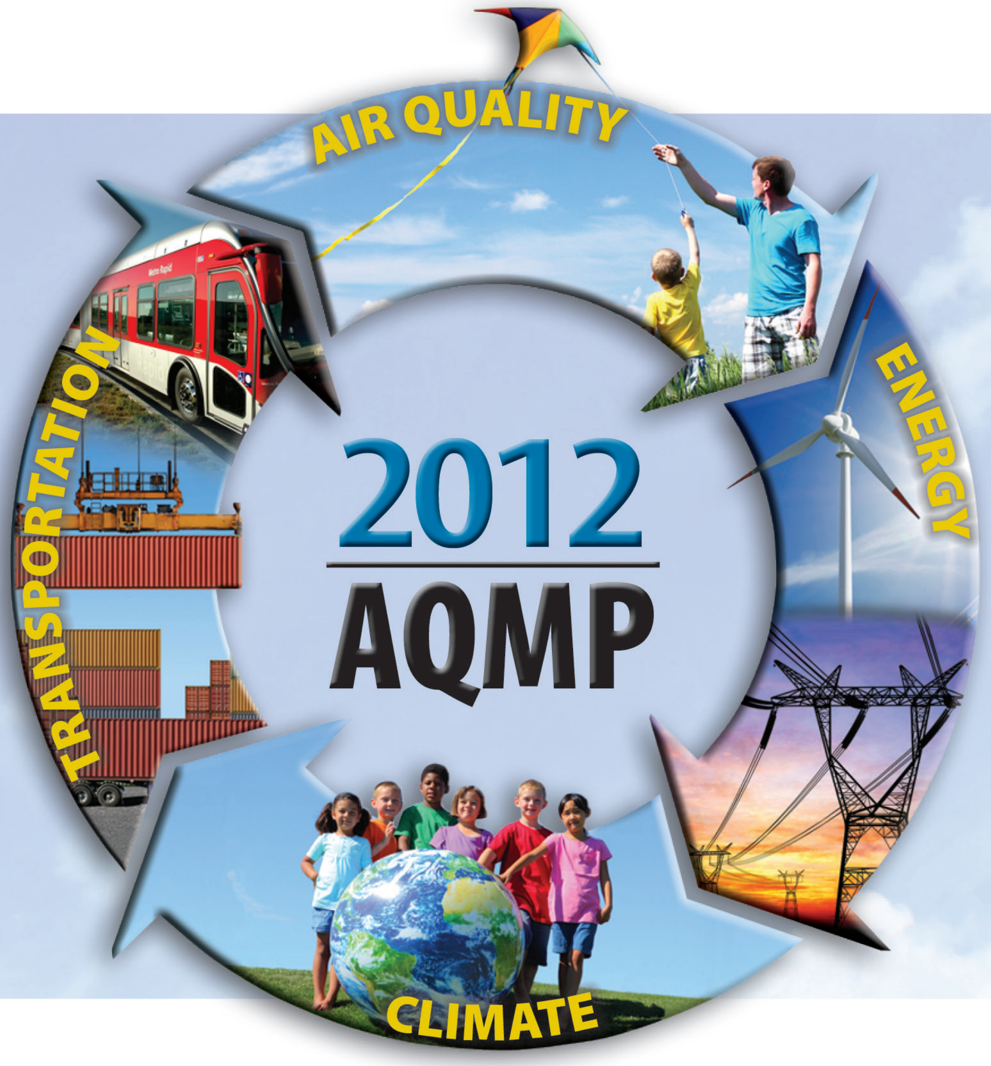
To support the attainment plans submitted to U.S. EPA in 2007 for 8-hour ozone and PM2.5, ARB undertook an extensive public consultation process to identify potential SIP measures. New measures developed by ARB as part of this 2007 State Strategy focused on cleaning up the in-use fleet, and increasing the stringency of emissions standards for a number of engine categories, fuels, and consumer products. These measures build on ARB's already comprehensive program that addresses emissions from all types of mobile sources.

In 2011, U.S. EPA approved the State mobile source control program as being RACM in the context of the 2007 and 2008 South Coast and San Joaquin Valley PM2.5 plans (76 FR 69928 at 69933). In its proposed approval of the 2007 South Coast PM2.5 Attainment Plan, U.S. EPA recognized that the "State of California has been a leader in the development of some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them" (76 FR 41562 at 41570). In the 2007 State Strategy, ARB identified and committed to propose new defined measures for the sources under its jurisdiction. Of these new measures, U.S. EPA noted that "many, if not most, of these measures are being proposed for adoption for the first time anywhere in the nation" (76 FR 41562 at 41570).

California's comprehensive mobile source program continues to be RACM as it expands and further reduces emissions. The 2012 PM2.5 SIPs rely on additional regulations adopted since the State's last major SIP revision in 2007. In January 2012, ARB adopted the Advanced Clean Cars program, which combines the control of smog-causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2017 through 2025. The program was developed in tandem with the federal government over several years, including a joint fact-finding process with shared engineering and technical studies. Benefits from this new program are reflected in emission inventories used in the 2012 PM2.5 attainment plans.

Appendix VII

Air Quality Management Plan



1-Hour Ozone Attainment Demonstration

February 2013

South Coast Air Quality Management District
Cleaning the air that we breathe...™

FINAL 2012 AQMP
APPENDIX VII

2012 1-HOUR OZONE
ATTAINMENT DEMONSTRATION

FEBRUARY 2013

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
GOVERNING BOARD

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SECTION 1

INTRODUCTION

PURPOSE AND SCOPE

The purpose of the 2012 1-hour ozone SIP revision is to provide an attainment demonstration to respond to the U.S. EPA's published "SIP call" proposal on September 19, 2012, finding the existing approved 1-hour ozone SIP substantially inadequate to provide for attainment of the revoked 1-hour ozone standard by the applicable attainment date of November 15, 2010. U.S. EPA's proposed SIP call was in turn a response to the decision of the Ninth Circuit Court of Appeals in *Association of Irritated Residents, et al, v. United States Environmental Protection Agency, et al.*, 686 F. 2d 668 (Amended January 12, 2012).

The only new information presented in this Appendix is the 1-hour ozone attainment demonstration described in Section 5. The other sections of this appendix are largely summaries or replications of information presented in the main volume or other appendices of the Final 2012 AQMP. This information is repeated here to provide context and completeness in support of the 1-hour ozone attainment demonstration.

BACKGROUND

In 1979, U.S. EPA established a primary health-based national ambient air quality standard (NAAQS) for ozone at 0.12 parts per million (ppm) averaged over a 1-hour period. See 44 Fed. Reg. 8220 (February 9, 1979). The Clean Air Act (CAA), as amended in 1990, classified areas that had not yet attained that standard, based on the severity of their ozone problem, ranging from Marginal to Extreme. Extreme Areas were provided the most time to attain the standard, until November 15, 2010. On November 6, 1991, U.S. EPA classified the South Coast Air Basin (Basin) as "Extreme" nonattainment. As required under the 1990 amendments to the CAA, in 1994 the District and California Air Resources Board (CARB) submitted a 1-hour ozone "state implementation plan" (SIP) revision. In 1997, U.S. EPA approved the 1-hour ozone SIP for the South Coast. 62 Fed. Reg. 1150 (January 8, 1997). In 1997 and 1999, CARB submitted revisions to the 1994 South Coast 1-hour ozone SIP, which U.S. EPA approved in 2000. 65 Fed. Reg. 18903 (April 10, 2000).

In 2004, CARB submitted the 2003 revisions to the 1-hour ozone SIP which included updated emissions inventories showing higher mobile source emissions than had previously been projected and a lower "carrying capacity" than previously predicted, along with new commitments to achieve specified amounts of VOC and NOx reductions needed to attain by the applicable date. 73 Fed. Reg. 63408, 63410, 63416 (October 24, 2008).

NEW OZONE STANDARD

In 1997 U.S. EPA promulgated a new 8-hour ozone standard of 0.08 ppm to replace the 1-hour standard**.** 62 Fed. Reg. 38856 (July 18, 1997). U.S. EPA promulgated rules to implement that standard. The "Phase 1" rule, promulgated on April 30, 2004

(69 Fed. Reg. 23951) established anti-backsliding requirements that would continue to remain in effect even though the existing 1-hour standard was revoked effective June 2005. See 40 CFR §51.905(a)(1) and §51.900(f). An Extreme area was required to have a fully-approved attainment demonstration in effect. (Id.).

U.S. EPA ACTION ON 2003 1-HOUR OZONE SIP REVISION

In 2008, CARB withdrew key components of its emission reduction commitments in the 2003 South Coast 1-hour ozone SIP. See 73 Fed. Reg. at 63410-12. In 2009, U.S. EPA approved certain elements of the 2003 South Coast 1-Hour Ozone SIP but disapproved the attainment demonstration, largely because CARB's 2008 withdrawal of emission reduction commitments rendered the plan insufficient to demonstrate attainment. 74 Fed. Reg. 10176, 10181 (March 10, 2009). U.S. EPA also concluded that this disapproval did not trigger a sanctions clock or a FIP (federal implementation plan) because the approved SIP already contained an approved 1-hour attainment demonstration meeting CAA requirements, which was all that was necessary regarding the revoked 1-hour standard. 74 Fed. Reg. at 10177, 10181.

LITIGATION OVER U.S. EPA'S 2009 ACTION

Several environmental and community groups petitioned for review of U.S. EPA's action in the Ninth Circuit Court of Appeals. On February 2, 2011, the Ninth Circuit ruled in favor of petitioners. As pertinent here, the Court held that U.S. EPA must promulgate a FIP or issue a SIP call where U.S. EPA disapproves a new attainment demonstration unless the Agency determines that the SIP as approved remains adequate to demonstrate attainment of the relevant NAAQS. On May 5, 2011, U.S. EPA petitioned for panel rehearing, and amicus briefs were filed in support of U.S. EPA by the District, CARB, and Southern California Association of Governments (SCAG). On January 27, 2012, the Ninth Circuit denied the petition for rehearing but modified its opinion to delete references to sanctions. The court remanded the case to U.S. EPA, stating that "U.S. EPA should have ordered California to submit a revised attainment plan for the South Coast after it disapproved the 2003 Attainment Plan". *Association of Irritated Residents v. U.S. EPA*, 632 F. 3d. 668, 681 (9th Cir., reprinted as amended January 27, 2012, further amended February 13, 2012.) The Court also issued a ruling regarding transportation control measures for ozone under CAA §182(d)(1)(A), which is discussed in Appendix VIII of the Final 2012 AQMP.

U.S. EPA PROPOSED SIP CALL

On September 19, 2012, U.S. EPA published a proposed SIP call under Section 110(k)(5) of the CAA, based on a determination that the applicable implementation plan (here, the 1997/99 plan approved April 10, 2000) "is substantially inadequate to attain or maintain the relevant NAAQS…" The proposed SIP call is based on evidence submitted in the form of the 2003 South Coast 1-hour Ozone Plan that the

1997/1999 plan was substantially inadequate to provide for attainment. That plan noted that “this revision points to the urgent need for additional emission reductions (beyond those incorporated in the 1997-99 Plan) to offset increased emissions estimates from mobile sources…” (See 2003 Air Quality Management Plan, pages ES-1 and ES-2.) However, many of those additional emission reduction commitments were withdrawn by CARB in 2008. U.S. EPA also notes that on December 30, 2011, U.S. EPA determined that the South Coast Air Basin had failed to attain the 1-hour ozone standard by the applicable date of November 15, 2010, thus triggering a fee program or equivalent under CAA §185. 76 Fed. Reg. 82133 (December 30, 2011). This determination provides further support for the present SIP call because it establishes that the approved SIP did not in fact lead to attainment for the 1-hour ozone NAAQS by the applicable date.

As a result, the state must submit an attainment demonstration for the South Coast for the 1-hour ozone standard showing attainment as expeditiously as practicable but no later than five years from the effective date of the final SIP call, unless the state can demonstrate a need for a later date, not to exceed 10 years beyond the effective date of the SIP call, considering the severity of the remaining nonattainment problem and the availability and feasibility of pollution control measures. CAA §172(a)(2).

U.S. EPA’s proposed SIP call would give the state up to one year after the effective date of the SIP call to submit the revised attainment demonstration. The District intends to demonstrate that a period of the full 10 years allowed by law is needed to attain the 1-hour standard. The District plans to submit the updated 1-hour ozone attainment demonstration as part of the Final 2012 AQMP.

SECTION 2

OZONE AIR QUALITY IN THE BASIN

INTRODUCTION

The U.S EPA has designated the Basin as extreme nonattainment for the revoked federal 1-hour ozone (O_3) standard of 0.12 ppm. The Basin had the highest number of days exceeding the federal 1-hour ozone standard of any urban area nationwide in 2011. The following information on 1-hour ozone air quality is taken from Chapter 2 and Appendix II of the Final 2012 AQMP, and is repeated here for completeness. The 1-hour ozone air quality data is used to support the 1-hour ozone attainment demonstration.

OZONE HEALTH EFFECTS

The adverse effects of ozone air pollution exposure on health have been studied for many years, as is documented by a significant body of peer-reviewed scientific research, including studies conducted in southern California which shows that even relatively low concentrations of ozone can significantly reduce lung function in normal healthy people.

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered the most susceptible sub-groups to ozone effects. Short-term exposures to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences and daily hospital admission rates. An increased risk for asthma has been found in children who participate in multiple sports and live in high ozone communities.

Ozone exposure under exercising conditions is known to increase the severity of the above-mentioned observed responses. Animal studies suggest that exposures to a combination of pollutants which include ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

OZONE EPISODES

While the 1-hour ozone episode levels and the related health warnings still exist, they have been largely superseded by the more protective health warnings associated with the current 8-hour ozone NAAQS. The 1-hour O_3 episode warning levels include the state Health Advisory (0.15 ppm), Stage 1 (0.20 ppm), Stage 2 (0.35 ppm) and Stage 3 (0.50 ppm). Only the lowest of these 1-hour episode thresholds, the state Health Advisory, was exceeded in 2011. The last 1-hour O_3 Stage 1 episode occurred in

2003. The last Stage 2 episode occurred in 1988, and the last Stage 3 episode occurred in 1974.

1-HOUR OZONE LEVELS IN THE SOUTH COAST AIR BASIN

In 2011, the District regularly monitored ozone concentrations at 29 locations in the Basin and the Coachella Valley portion of the Salton Sea Air Basin (SSAB). All areas monitored measured 1-hour average ozone levels well below the Stage 1 episode level, but the maximum concentrations measured in the Basin exceeded the health advisory level in San Bernardino County. The maximum ozone concentrations in the Los Angeles, Riverside and San Bernardino Counties all exceeded the former 1-hour federal standard in 2011; Orange County and the Coachella Valley did not exceed that standard. Maximum ozone concentrations in the SSAB areas monitored by the District were lower than in the Basin and were below the health advisory level. Table VII-2-1 shows maximum 1-hour ozone concentrations by air basin and county.

TABLE VII-2-1

2011 Maximum 1-Hour Average Ozone Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 1-HR AVERAGE (PPM)	PERCENT OF FEDERAL STANDARD (0.12 PPM)	AREA
South Coast Air Basin			
Los Angeles	0.144	115	Santa Clarita Valley
Orange	0.095	76	North Orange County
Riverside	0.133	106	Lake Elsinore
San Bernardino	0.160	128	Central San Bernardino Mountains
Salton Sea Air Basin			
Riverside	0.124	99	Coachella Valley

The number of days exceeding the former federal 1-hour ozone standard in the Basin varies widely by area (Figure VII-2-1). The former 1-hour federal standard was not exceeded in areas along or near the coast in the Counties of Los Angeles and Orange, due in large part to the prevailing sea breeze which transports emissions inland before high ozone concentrations are reached. The standard was exceeded most frequently in the Central San Bernardino Mountains. Ozone exceedances also extended through San Bernardino and Riverside County valleys in the eastern Basin, as well as the northeast and northwest portions of Los Angeles County in the foothill and valley areas. The Central San Bernardino Mountains area recorded the greatest number of exceedances of the former 1-hour federal standard (8 days). The Coachella Valley did not exceed the former 1-hour ozone standard in 2011.

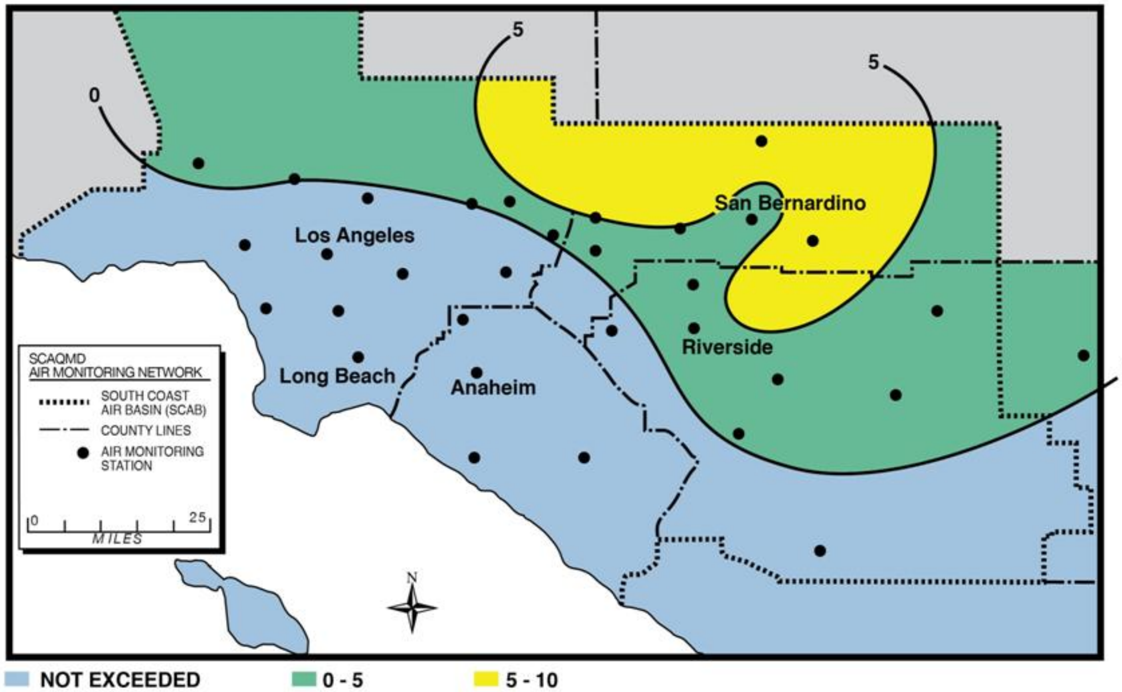


FIGURE VII-2-1

Number of Days in 2011 Exceeding the 1979 1-Hour Federal Ozone Standard
(1-hour average O_3 > 0.12 ppm)

AMBIENT AIR QUALITY STANDARDS

Federal Ozone Standards

The federal government has adopted ambient air quality standards, which define the concentration below which long-term or short-term exposure to a pollutant is not expected to cause adverse effects to public health and welfare. The current and revoked federal ozone ambient air quality standards and the effect of ozone on health are summarized in Table VII-2-2. As noted above, the federal 1-hour ozone standard was revoked in favor of the 8-hour ozone standard in 1997.

TABLE VII-2-2

Federal Ozone Ambient Air Quality Standards and Health Effects

Federal Standard (NAAQS) **Concentration, Averaging Time**	**Relevant Health and Welfare Effects#**
0.075 ppm, 8-Hour (2008) 0.08 ppm 8-Hour (1997) 0.12 ppm, 1-hour (1979, revoked in 1997)	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) 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; (e) Vegetation damage; (f) Property damage

ppm – parts per million by volume
Federal standards follow the design value form of the NAAQS
More detailed health effect information can be found in the Final 2012 AQMP Appendix I or the U.S. EPA NAAQS documentation at http://www.epa.gov/ttn/naaqs/

Design Values and NAAQS Attainment Status

In 2011, 1- hour ozone levels exceeded federal standard concentration levels at one or more of the routine monitoring stations in the Basin. As shown in Table VII-2-1, maximum 1-hour ozone concentrations of 0.160 ppm recorded in the Central San Bernardino Mountains area were 128 percent of the former 1-hour federal standard. However, an exceedance of the concentration level does not necessarily mean a violation of the NAAQS, given that the form of the standard must be considered. Air quality statistics can be presented in terms of maximum concentrations measured at monitoring stations or in air basins, as well as the number of days exceeding state or federal standards.

Attainment of the NAAQS is measured with three-year design values that take into account the form of the federal standards and multi-year averages. For 1-hour O_3, the form of the standard is the 4th highest measured 1-hour average concentration at each station over a three-year period. The overall design value for an air basin is the highest design value of all the stations in that basin. Figure VII-2-2 shows the trends in the 1-hour ozone design values and the annual Basin days exceeding the former 1-hour ozone NAAQS over the past two decades.

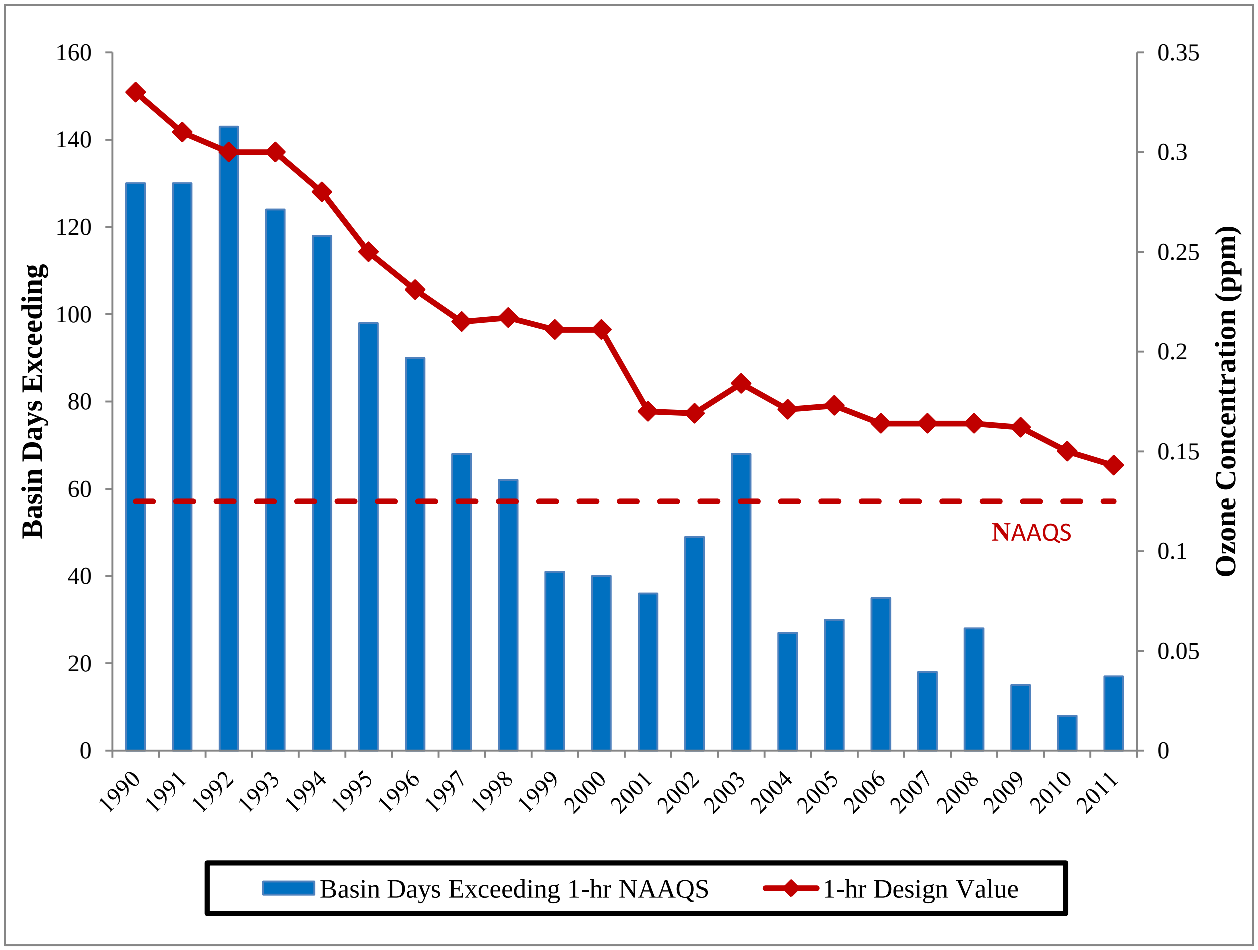


FIGURE VII-2-2

South Coast Air Basin Trends in Ozone Design Value and Annual Basin Days Exceeding the Former 1-hour NAAQS

Air Quality Compared to Other U.S. Metropolitan Areas

Despite significant improvement, the Basin still has some of the worst air quality in the nation in terms of the number of days per year exceeding the revoked federal 1-hour ozone standard. Figures VII-2-3 and VII-2-4 show maximum 1-hour ozone concentrations in 2011 for the Basin compared to other urban areas in the U.S. and California, respectively. It is important to note that maximum pollutant concentrations do not necessarily indicate potential NAAQS violations and subsequent nonattainment designations, as the design values that are used for attainment status are based on the form of the standard.

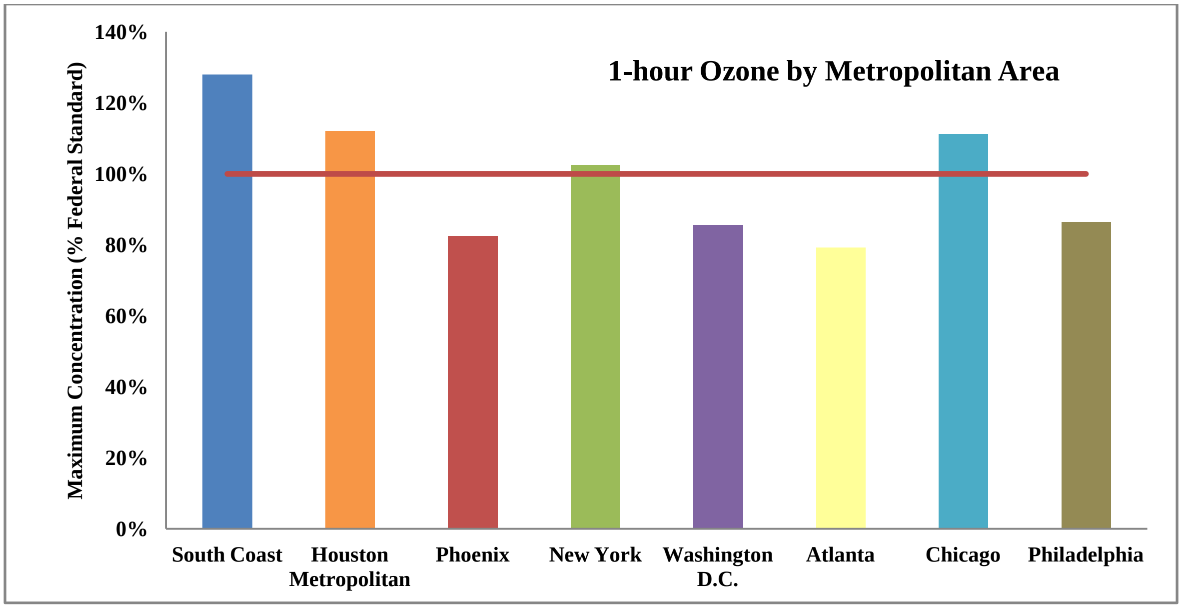


FIGURE VII-2-3

2011 South Coast Air Basin 1-hour Ozone Air Quality Compared to Other U.S. Metropolitan Areas (Maximum Pollutant Concentrations as Percentage of the Federal Standard)

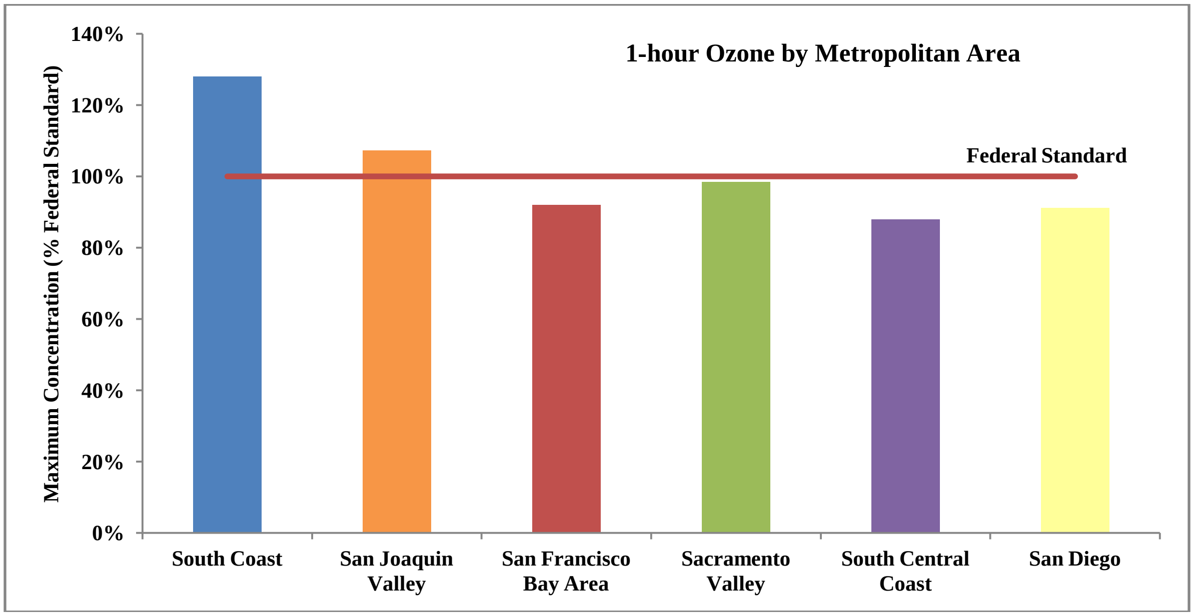


FIGURE VII-2-4

2011 South Coast Air Basin 1-hour Ozone Air Quality Compared to Other California Metropolitan Areas (Maximum Pollutant Concentrations as Percentage of the Federal Standard)

SECTION 3

BASE YEAR AND FUTURE YEAR EMISSIONS

INTRODUCTION

The 1-hour ozone attainment demonstration is based on the latest emissions inventories for the base year (2008) and projected future years developed as part of the Final 2012 AQMP. For specific details and descriptions of inventory development methodology, please refer to Chapter 3 and Appendix III of the Final 2012 AQMP.

BASE YEAR AND FUTURE YEAR EMISSIONS

Summaries of the summer planning inventory (ozone precursors) emissions that occurred in the Basin in the 2008 base year and that are projected for the 2022 attainment year are provided in the Tables VII-3-1 and VII-3-2. Note that the 2008 Base year inventory is identical to that in the Final 2012 AQMP (Chapter 3, Appendix III). Table VII-3-3 provides the complete 2022 summer planning emissions inventory by major source category in the South Coast Air Basin.

TABLE VII-3-1

Summary of Emissions By Major Source Category: **2008** Base Year
Summer Planning Inventory (tpd[1]) *

SOURCE CATEGORY	SUMMER OZONE PRECURSORS	
	VOC	**NOx**
STATIONARY SOURCES		
Fuel Combustion	14	41
Waste Disposal	12	2
Cleaning and Surface Coatings	43	0
Petroleum Production and Marketing	41	0
Industrial Processes	19	0
Solvent Evaporation		
Consumer Products	99	0
Architectural Coatings	25	0
Others	2	0
Misc. Processes	9	20
RECLAIM Sources	0	24
Total Stationary Sources	**264**	**87**
MOBILE SOURCES		
On-Road Vehicles	213	426
Off-Road Vehicles	162	208
Total Mobile Sources	**375**	**634**
TOTAL	**639**	**721**

[1] Values are rounded to nearest integer.

* Values represent inventory developed for Final 2012 AQMP.

TABLE VII-3-2

Summary of Emissions By Major Source Category: **2022** Baseline
Summer Planning Inventory (tpd[1])

SOURCE CATEGORY	SUMMER OZONE PRECURSORS	
	VOC	**NOx**
STATIONARY SOURCES		
Fuel Combustion	14	27
Waste Disposal	14	2
Cleaning and Surface Coatings	55	0
Petroleum Production and Marketing	36	0
Industrial Processes	17	0
Solvent Evaporation		
Consumer Products	90	0
Architectural Coatings	19	0
Others	2	0
Misc. Processes	9	13
RECLAIM Sources	0	27
Total Stationary Sources	**258**	**70**
MOBILE SOURCES		
On-Road Vehicles	73	135
Off-Road Vehicles	109	136
Total Mobile Sources	**182**	**271**
TOTAL	**440**	**341**

[1] Values are rounded to nearest integer.

TABLE VII-3-3

2022 Baseline Summer Planning Emissions by Source Category
in the South Coast Air Basin (tpd)

CODE	SOURCE CATEGORY	VOC	NOx	CO
10	Electric Utilities	0.88	0.23	8.51
20	Cogeneration	0.05	0.01	0.41
30	Oil and Gas Production (Combustion)	0.12	0.81	0.64
40	Petroleum Refining (Combustion)	1.28	0.00	5.06
50	Manufacturing and Industrial	6.80	13.91	21.21
52	Food and Agricultural Processing	0.07	0.08	1.28
60	Service and Commercial	4.45	9.25	17.37
99	Other (Fuel Combustion)	0.31	3.09	2.90
Total Fuel Combustion		**13.96**	**27.38**	**57.37**
Waste Disposal				
110	Sewage Treatment	0.05	0.01	0.02
120	Landfills	9.72	0.66	0.62
130	Incinerators	0.09	1.05	0.47
140	Soil Remediation	0.01	0.01	0.00
199	Other (Waste Disposal)	3.97	0.00	0.01
Total Waste Disposal		**13.84**	**1.73**	**1.12**
Cleaning and Surface Coatings				
210	Laundering	0.17	0.00	0.00
220	Degreasing	14.94	0.00	0.00
230	Coatings and Related Process Solvents	31.91	0.01	0.02
240	Printing	2.23	0.00	0.00
250	Sealants & Adhesives	5.24	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.74	0.03	0.04
Total Cleaning and Surface Coatings		**55.23**	**0.04**	**0.06**
Petroleum Production and Marketing				
310	Oil and Gas Production	1.57	0.10	0.08
320	Petroleum Refining	4.11	0.19	4.98
330	Petroleum Marketing	30.68	0.01	0.00
399	Other (Petroleum Production and Marketing)	0.02	0.01	0.00
Total Petroleum Production and Marketing		**36.38**	**0.31**	**5.06**
Industrial Processes				
410	Chemical	9.80	0.00	0.21
420	Food and Agriculture	1.69	0.00	0.00
430	Mineral Processes	0.47	0.03	1.05
440	Metal Processes	0.18	0.04	0.25
450	Wood and Paper	0.19	0.00	0.00
460	Glass and Related Products	0.02	0.00	0.00
470	Electronics	0.00	0.00	0.00
499	Other (Industrial Processes)	5.07	0.04	0.30
Total Industrial Processes		**17.42**	**0.11**	**1.81**
Solvent Evaporation				
510	Consumer Products	90.32	0.00	0.00
520	Architectural Coatings and Related Solvents	19.39	0.00	0.00
530	Pesticides/Fertilizers	1.00	0.00	0.00
540	Asphalt Paving/Roofing	1.49	0.00	0.00
Total Solvent Evaporation		**112.20**	**0.00**	**0.00**

TABLE VII-3-3 (Continued)

2022 Baseline Summer Planning Emissions by Source Category
in the South Coast Air Basin (tpd)

CODE	SOURCE CATEGORY	VOC	NOx	CO
Miscellaneous Processes				
610	Residential Fuel Combustion	2.29	11.55	15.00
620	Farming Operations	2.19	0.00	0.00
630	Construction and Demolition	0.00	0.00	0.00
640	Paved Road Dust	0.00	0.00	0.00
645	Unpaved Road and Travel Dust	0.00	0.00	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00
660	Fires	0.24	0.08	3.02
670	Waste Burning and Disposal	2.64	1.24	41.28
690	Cooking	1.98	0.00	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00
	RECLAIM		27.23	
Total Miscellaneous Processes		**9.34**	**40.10**	**59.30**
On-Road Motor Vehicles				
710	Light Duty Passenger	19.63	13.36	199.00
722	Light Duty Trucks 1 (T1)	8.21	4.68	60.43
723	Light Duty Trucks 2 (T2)	11.27	8.33	100.70
724	Medium Duty Trucks (T3)	15.31	12.83	128.76
732	Light Heavy Duty Gas Trucks 1 (T4)	4.90	11.36	34.30
733	Light Heavy Duty Gas Trucks 2 (T5)	0.41	1.03	2.39
734	Medium Heavy Duty Gas Trucks (T6)	0.63	1.28	7.37
736	Heavy Heavy Duty Gas Trucks (HHD)	0.10	0.88	7.15
742	Light Heavy Duty Diesel Trucks 1 (T4)	0.40	10.47	3.28
743	Light Heavy Duty Diesel Trucks 2 (T5)	0.14	3.43	1.36
744	Medium Heavy Duty Diesel Trucks (T6)	0.49	6.55	2.33
746	Heavy Heavy Duty Diesel Trucks (HHD)	3.42	43.03	19.80
750	Motorcycles (MCY)	6.59	2.04	49.47
760	Heavy Duty Diesel Urban Buses	0.43	10.48	2.08
762	Heavy Duty Gas Urban Buses	0.30	0.62	3.05
771	School Buses - Gas	0.05	0.09	0.75
772	School Buses - Diesel	0.03	1.77	0.13
777	Other Buses - Gas	0.29	0.53	2.82
779	All Other Buses - Diesel	0.10	1.06	0.52
780	Motor Homes	0.07	1.00	1.07
Total On-Road Motor Vehicles		**72.77**	**134.82**	**626.73**
Other Mobile Sources				
810	Aircraft	4.41	15.44	41.75
820	Trains	1.32	22.60	8.40
833	Ocean Going Vessels	3.09	32.93	5.48
835	Commercial Harbor Craft	1.05	9.30	7.31
840	Recreational Boats	35.18	8.22	159.73
850	Off-Road Recreational Vehicles	9.04	0.17	8.58
860	Commercial/Industrial Mobile Equipment	46.80	44.64	668.44
870	Farm Equipment	0.56	2.80	8.07
890	Fuel Storage and Handling	7.35	0.00	0.00
Total Other Mobile Sources		**108.80**	**136.10**	**907.76**

TABLE VII-3-3 (Concluded)

2022 Baseline Summer Planning Emissions by Source Category
in South Coast Air Basin (tpd)

CODE	SOURCE CATEGORY	VOC	NOx	CO
	Total Stationary and Area Sources	258.34	63.78	209.89
	Total On-Road Vehicles	72.77	134.82	622.73
	Total Other Mobile	108.80	136.10	707.37
	Total	**439.97**	**340.57**	**1659.23**

[CO inventory changed from the previous annual average emissions inventory to the appropriate summer planning emissions inventory]

SECTION 4

1-HOUR OZONE SIP CONTROL STRATEGY

INTRODUCTION

This section sets forth the proposed control strategy and implementation schedule to demonstrate attainment with the former 1-hour ozone NAAQS by 2022. Given the approximate alignment of the attainment dates, the control strategy for the 1-hour ozone standard is identical to the control strategy for the 1997 federal 8-hour ozone standard. The control strategy for the 8-hour ozone standard is described in the 2007 AQMP with updates proposed in the Final 2012 AQMP. The following sections discuss the proposed control measures for attainment of the 1-hour ozone NAAQS that include:

- 2007 8-hour ozone SIP control measures carried forward for the 1-hour ozone attainment demonstration; and
- Proposed 8-hour ozone control measures from the Final 2012 AQMP (taken from Chapter 4 of the Final 2012 AQMP and repeated in this Section for completeness.)

2007 SIP CONTROL MEASURES CARRIED FORWARD FOR THE 1-HOUR OZONE ATTAINMENT DEMONSTRATION

As provided in Table 1-3 of the Final 2012 AQMP, the emission reduction commitments provided in the 2007 SIP have been met with the implementation of the majority of control measures identified in the 2007 SIP. For the 1-hour ozone attainment demonstration, the proposed control strategy is the continued implementation of the 2007 SIP control strategy for the 8-hour ozone attainment demonstration. As such, seven mobile source control measures (four on-road mobile source measures and three off-road measures) are proposed to be carried forward. The seven mobile source control measures are listed in Table VII-4-1 along with the specific reference pages from the 2007 SIP. The emission reductions associated with each measure are also provided in Table VII-4-1. These are not new measures and the emissions reductions commitments for these measures have already been approved in U.S. EPA's approval of the 2007 8-hour ozone SIP.

TABLE VII-4-1

List of 2007 SIP Mobile Source Control Measures Proposed to be
Included in the 1-Hour Ozone Attainment Demonstration

2007 SIP Mobile Source Control Measures		
Title	**2007 SIP Reference (released April 26, 2007)**	**Reduction (tpd) by 2022**
Smog Check Improvements (BAR) - Annual Inspection of Older Vehicles	Pgs. 90 & 94	1.6 [VOC] 3.9 [NOx]
Smog Check Improvements (BAR) - Annual Inspection of High Mileage Vehicles	Pgs. 90 & 94	0.3 [VOC] 0.8 [NOx]
Smog Check for Motorcycles	Pgs. 91 & 95	1.2 [VOC] 0.4 [NOx]
Expanded Passenger Vehicle Retirement Program	Pgs. 91 & 100-101	0.4 [VOC] 0.3 [NOx]
Cleaner Main Ship Engines and Fuel - Main Engines	Pgs. 91 & 107-110	6.2 [NOx]
Accelerated Intro. of Cleaner Line-Haul Locomotives	Pgs. 92 & 113-114	12.1 [NOx]
Off-Road Recreational Vehicle Expanded Emission Standards	Pgs. 92 & 123-124	3.6 [VOC]
Total		**7.1 [VOC]** **23.7 [NOx]**

FINAL 2012 AQMP PROPOSED 8-HOUR OZONE CONTROL MEASURES FOR THE 1-HOUR OZONE ATTAINMENT DEMONSTRATION

As stated above, the control strategy for attainment of the 1997 federal 8-hour ozone standard is identical to the control strategy being proposed for attainment of the former 1-hour ozone standard. The proposed 8-hour ozone control measures identified in the Final 2012 AQMP are repeated below for completeness, and are taken directly from Chapter 4 of the Final 2012 AQMP. A more detailed description of each control measure is provided in Appendices IV-A and IV-B.

The Final 2012 AQMP is proposing a control strategy that includes emission reductions from both stationary and mobile sources. The proposed stationary source control measures in the Final 2012 AQMP are based on implementation of all feasible control measures through the application of available cleaner technologies, best management practices, incentive programs, as well as development and implementation of zero- and near-zero technologies and control methods. The stationary source control measures presented in the Plan are proposed to further reduce emissions from both point sources (permitted facilities) and area sources (generally small and non-permitted in addition to smaller permitted sources with emissions less than the reporting threshold in the District's Annual Emissions Reporting Program). The basic principles followed in developing the District's stationary source control measures call for initiating programs or rule making activities for VOC and further NOx control strategies aiming at maximum reductions by the applicable timeframe to further implement the federal ozone standards.

The mobile source strategy includes actions seeking further emission reductions from both on-road and off-road mobile sources, such as accelerated penetration of zero- and near-zero emission vehicles and early retirement of older vehicles. In addition, the mobile source strategy includes research and development of advanced control technologies from various mobile sources. Some of the proposed actions need to be implemented by several agencies that currently have the statutory authority to implement such measures.

For each control measure, the District will seek to achieve the maximum reduction potential that is technically feasible and cost-effective. Significant challenges remain in meeting the federal ozone standards. Ozone reduction strategies and programs need to be continued and accelerated to ensure that the air basin will meet the 1-hour ozone standards by 2022. Proposed measures to reduce ozone include emission reductions from coatings, and RECLAIM facilities as well as early transitions to cleaner technologies.

To ultimately achieve the ozone ambient air quality standards, significant additional emissions reductions will be necessary from a variety of sources, including those primarily under the jurisdiction of CARB (e.g., on-road motor vehicles, off-road equipment, and consumer products) and U.S. EPA (e.g., aircraft, ships, trains, and pre-empted off-road equipment). Without an adequate and fair-share level of reductions from all sources, the emission reduction burden would unfairly be shifted to sources that have already been doing their part for clean air. Moreover, the District will continue to use its available regulatory authority to further control mobile source emissions where federal or State actions do not meet regional needs.

Overall, the Final 2012 AQMP includes 15 stationary and 17 mobile source measures for ozone. The following two sections discuss the control measures as outlined below:

- SCAG's Regional Transportation Strategy and Transportation Control Measures (see Appendix IV-C for detailed descriptions of the regional transportation strategy and control measures)

- Proposed Ozone measures (see Appendix IV-A for detailed descriptions of the District's stationary source control measures and Appendix IV-B for detailed descriptions of the District's mobile source measures)

For District's SIP emission reduction commitments, overall emission reductions and implementation, please refer to Chapter 4 of the Final 2012 AQMP.

SCAG's REGIONAL TRANSPORTATION STRATEGY AND TRANSPORTATION CONTROL MEASURES

The Southern California Association of Governments (SCAG), the Metropolitan Planning Organization (MPO) for Southern California, is mandated to comply with federal and state transportation and air quality regulations. Federal transportation law authorizes federal funding for highway, highway safety, transit, and other surface transportation programs. The federal CAA establishes air quality standards and planning requirements for various criteria air pollutants.

Transportation conformity is required under CAA Section 176(c) to ensure that federally supported highway and transit project activities "conform to" the purpose of the SIP. Conformity currently applies to areas that are designated non-attainment, and those re-designated to attainment after 1990 ("maintenance areas" with plans developed under CAA Section 175[A]) for the specific transportation-related criteria pollutants. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS. The transportation conformity regulation is found in 40 CFR Part 93.

Pursuant to California Health and Safety Code section 40460, SCAG has the responsibility of preparing and approving the portions of the AQMP relating to regional demographic projections and integrated regional land use, housing, employment, and transportation programs, measures, and strategies. The District combines its portion of the Plan with those prepared by SCAG.

The transportation strategy and transportation control measures (TCMs), included as part of the Final 2012 AQMP and SIP for the South Coast Air Basin, are based on SCAG's adopted 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and 2011 Federal Transportation Improvement Program (FTIP). This was developed in consultation with federal, state and local transportation and air quality planning agencies and other stakeholders.

The Regional Transportation Strategy and Transportation Control Measures portion of the Final 2012 AQMP/SIP consists of the following three related sections.

Section I. Linking Regional Transportation Planning to Air Quality Planning

As required by federal and state laws, SCAG is responsible for ensuring that the regional transportation plan, program, and projects are supportive of the goals and objectives of AQMPs/SIPs. SCAG is also required to develop demographic projections and a regional transportation strategy and control measures for the AQMPs/SIPs.

The RTP/SCS, updated every four years, is a long-range regional transportation plan that provides a vision for transportation investments throughout the SCAG Region. The 2012-2035 RTP/SCS also integrates land use and transportation planning to achieve regional greenhouse gas (GHG) reduction targets set by CARB pursuant to SB375.

SCAG also develops the biennial FTIP. The FTIP is a multimodal program of capital improvement projects to be implemented over a six year period. The FTIP implements the programs and projects in the RTP/SCS.

Section II. Regional Transportation Strategy and Transportation Control Measures

The SCAG Region faces daunting mobility, air quality, and transportation funding challenges. Under the guidance of the goals and objectives adopted by SCAG's Regional Council, the 2012-2035 RTP/SCS was developed to provide a blueprint to integrate land use and transportation strategies to help achieve a coordinated and balanced regional transportation system. The 2012-2035 RTP/SCS represents the culmination of more than two years of work involving dozens of public agencies, 191 cities, hundreds of local, county, regional and state officials, the business community, environmental groups, as well as various nonprofit organizations. The 2012-2035 RTP/SCS was formally adopted by the SCAG Regional Council on April 4, 2012.
The 2012-2035 RTP/SCS contains a host of improvements to every component of the regional multimodal transportation system including:

- Active transportation (non-motorized transportation, such as biking and walking)
- Transportation demand management (TDM)
- Transportation system management (TSM)
- Transit
- Passenger and high-speed rail
- Goods movement
- Aviation and airport ground access
- Highways
- Arterials

- Operations and maintenance

Included within these transportation system improvements are TCM projects that reduce vehicle use or change traffic flow or congestion conditions. TCMs include the following three main categories of transportation improvement projects and programs:

- High occupancy vehicle (HOV) measures,
- Transit and systems management measures, and
- Information-based transportation strategies.

New to this cycle of the RTP is the inclusion of the SCS as required by SB 375. The primary goal of the SCS is to provide a vision for future growth in Southern California that will decrease per capita GHG emissions from passenger vehicles. However, the strategies contained in the 2012-2035 RTP/SCS will produce benefits for the region far beyond simply reducing GHG emissions. The SCS integrates the transportation network and related strategies with an overall land use pattern that responds to projected growth, housing needs, changing demographics, and transportation demands. The regional vision of the SCS maximizes current voluntary local efforts that support the goals of SB 375. The SCS focuses the majority of new housing and job growth in high-quality transit areas and other opportunity areas on existing main streets, in downtowns, and commercial corridors, resulting in an improved jobs-housing balance and more opportunity for transit-oriented development. In addition, SCAG is a strategic partner in a regional effort to accelerate fleet conversion to near-zero and zero-emission transportation technologies, including planning for the expansion of alternative-fuel infrastructure to accommodate the anticipated increase in alternative fueled vehicles.

Section III. Reasonably Available Control Measure (RACM) Analysis for Transportation Control Measures

As required by the CAA, a RACM analysis must be included as part of the overall control strategy in the AQMP/SIP to ensure that all potential control measures are evaluated for implementation and that justification is provided for those measures that are not implemented. Appendix IV-C contains the RACM TCM component for the Final 2012 AQMP control strategy. In accordance with U.S. EPA procedures, this analysis considers TCMs in the 2012-2035 RTP/SCS, measures identified by the CAA, and relevant measures adopted in other non-attainment areas of the country. Based on this comprehensive review, it is determined that the TCMs being implemented in the Basin are inclusive of all TCM RACM. None of the candidate measures reviewed and determined to be infeasible meets the criteria for RACM implementation.

The emission benefits associated with the RTP/SCS are reflected in the Final 2012 AQMP projected emissions. For a detailed discussion of the regional transportation strategy, refer to Appendix IV-C: Regional Transportation Strategy and Control Measures.

PROPOSED OZONE CONTROL MEASURES

The 2007 State Implementation Plan for the 8-hour ozone NAAQS contains commitments for emission reductions that rely on advancement of technologies, as authorized under Section 182(e)(5) of the federal CAA. These measures, which have come to be known as the "black box", account for a substantial portion of the NOx emission reductions needed to attain the federal ozone standards – over 200 tons/day. Attaining these standards will require substantial reductions in emissions of NOx well beyond reductions resulting from current rules, programs, and commercially available technologies. The 8-hour ozone measures included in the Final 2012 AQMP as an implementation update for the 8-hour ozone plan are also being submitted as the control strategy for the 1-hour ozone attainment demonstration.

Mobile sources emit over 80 percent of regional NOx and therefore must be the largest part of the solution. On-road truck categories are projected to comprise the single largest contributor to regional NOx. Other equipment involved in goods movement, such as marine vessels, locomotives and aircraft, are also substantial NOx sources.

Since NOx emissions from most significant sources are already controlled by over 90%, attainment of the ozone standards will require broad deployment of zero and near zero[1] emission technologies. On-land transportation sources such as trucks, locomotives and cargo handling equipment have technological potential to achieve zero- and near-zero emission levels. Current and potential technologies include hybrid-electric, hybrid with all electric range, battery-electric, and hydrogen fuel cell on-road vehicle technologies. New types of hybrids could also serve long-term needs while providing additional fuel diversity. These could include, for example, natural gas-electric hybrid technologies for on-road and other applications, particularly if coupled with improved after-treatment technologies. Equipment powered solely by alternative fuels such as natural gas may also play a long-term role in some applications, if those applications are found to pose technological barriers to

[1] The term "near zero emissions" refers to emissions approaching zero and will be delineated for individual source categories through the process of developing and implementing the Air Quality Management Plan/State Implementation Plan. Based on current analyses, on-land transportation sources will need to achieve zero emissions where possible, and otherwise will need to be substantially below adopted emission standards — including standards with future effective dates. Near zero emissions technologies can help meet this need, particularly if they support a path toward zero emissions (e.g. electric/fossil fuel hybrids with all- electric range).

achieving zero or near-zero emissions. Even in such applications, however, substantial additional emission reductions will be needed through development of new, advanced after-treatment technologies. In addition, alternative fuels will likely play a transitional near-term role. Alternative fuels such as natural gas have historically helped the region make progress toward attaining air quality standards, and -- while not achieving zero or near-zero NOx emission levels -- they are generally cleaner than conventional fuels. Given the region's need to attain air quality standards in a few short years, alternative fueled engines will continue to play a role. Finally, we emphasize that air quality regulatory agencies have traditionally set policies and requirements that are performance based and technology and fuel neutral -- a policy that the District intends to continue. In short, all technologies and fuels should be able to compete on an equal footing to meet environmental needs.

While there has been much progress in developing and deploying transportation technologies with zero- and near-zero emissions (particularly for light-duty vehicles and passenger transit), additional technology development, demonstration and commercialization will be required prior to broad deployment in freight and other applications. This section describes a path to evaluate, develop, demonstrate, fund and deploy such technologies for land-based transportation sources. It also proposes near-term measures to accelerate fleet turnover to the lowest emission units, and require deployment of zero-emission technologies where most feasible.

The District staff believes that a combination of regulatory actions and public funding is the most effective means of achieving these emission reductions. Voluntary incentive programs such as the Carl Moyer Program can help accelerate turnover to the cleanest commercially available equipment. A majority of the on-road and off-road measures proposed are based on existing funding programs implemented by the District or the CARB. However, several of the existing funding programs will sunset in the 2014 – 2015 timeframe. Continued funding beyond 2015 will be needed to reduce the emissions associated with the black box. Developing, demonstrating and deploying new technologies will require public/private partnerships and, in some cases, regulatory actions.

The measures described in this section are a relatively small down payment on the total emission reductions needed to attain the 8-hour and 1-hour NAAQS for ozone. The measures proposed in this section and further discussed in Appendix IV-A and IV-B are feasible steps that must commence in the near-term to establish a path toward a broader transition to the technologies that will be needed to attain federal air quality standards. Between now and 2015, the additional measures needed to attain the ozone NAAQS will be fleshed out in greater detail as required under the federal CAA as part of the next AQMP revision. Given the magnitude of needed emission reductions, and the time remaining until attainment deadlines, it is important to incorporate progress and momentum to identify, develop, and deploy needed technologies to be sustained and accelerated.

The District staff recognizes that these are very difficult policy choices the Basin is facing. Transitioning over the next 10 to 20 years to cleaner transportation technologies will involve major costs and effects on the economy. However, adopting sufficient plan measures to attain the ozone air quality standards by the applicable dates is required by federal law and therefore, failing to do so is not an acceptable public policy. Such failure would also risk adverse health consequences highlighted in recent health studies, not to mention the potential adverse economic impacts on the region due to potential federal sanctions. The following sections summarize the ozone measures. More detailed discussions are provided in Appendix IV-A and IV-B.

Clean Air Act Section 182(e)(5)

The District's 1-hour ozone SIP submittal relies in part on the ability to use advanced technology measures as authorized under CAA § 182(e)(5). U.S. EPA has already approved the reliance on § 182(e)(5) in the South Coast 8-hour ozone plan. 77 Fed. Reg. 12674, 12693 (Mar. 1, 2012). The present 1-hour ozone SIP submittal includes a number of ozone measures which reduce reliance on § 182(e)(5). Under the plain language of the CAA, the District may rely on § 182(e)(5) measures, as long as the reductions to be obtained from them are not needed for the first ten years after November 15, 1990. 42 U.S.C. § 7511a(e)(5)(B). The District's initial 1-hour ozone plan complied with this requirement, and U.S. EPA approved the § 182(e)(5) measures in 1995. 62 Fed. Reg. 1150, 1178 (Jan. 8, 1997), citing 60 Fed. Reg. 43379 (Aug. 21, 1995).

Since the present 1-hour SIP submission does not rely on § 182(e)(5) for emission reductions prior to November 15, 2000, it complies with § 182(e)(5). There is no textual or policy basis for concluding that § 182(e)(5) is not available. Because the present SIP submission addresses 1-hour ozone, there is no textual basis for deviation from the plain language of the CAA: Section 182(e)(5) is available for reductions needed after November 15, 2000. Nor is there any policy basis to do so. The CAA clearly authorizes U.S. EPA to grant up to 10 years to attain the standard. Therefore, under § 182(e)(5), contingency measures would need to be in place which attain the needed reductions by three years before the attainment deadline. This provides adequate assurance that the § 182(e)(5) measure, or the contingency measures, will be implemented in time to attain the 1-hour ozone standard.

The fact that U.S. EPA has interpreted § 182(e)(5) somewhat differently in the context of the 8-hour ozone standard is irrelevant here. U.S. EPA was required to deviate from the literal language of the CAA in the case of the 8-hour ozone standard because it did not literally apply. However, the U.S. Supreme Court held that U.S.

EPA may not simply ignore Subpart 2 (relative to 1-hour ozone) as to do so produced unreasonable results (e.g., Los Angeles needing to attain the more stringent 8-hour standard *at least as quickly as* it attained the less stringent 1-hour standard.) *Whitman v. American Trucking*. 531 U.S. 457, 486 (2001). As a result, U.S. EPA was required to "interpret" Subpart 2. In contrast, when considering the 1-hour ozone standard, the plain language of § 182(e)(5) applies, leaving no room for interpretation. Certainly nothing in § 179(d), dealing with plan submittals on failure to attain, remotely suggests that the plain language of § 182(e)(5) is no longer applicable. That being the case, U.S. EPA is not authorized to "interpret away" the provisions of § 182(e)(5). Even if the language were ambiguous, there is no policy reason to interpret it to prohibit reliance on § 182(e)(5).

As noted above, U.S. EPA has already approved the District's reliance on § 182(e)(5) for the 8-hour standard. It would make no sense to prohibit reliance on § 182(e)(5) for a standard *that has been revoked*. The District has already established in the 2007 AQMP and the 2012 1-hour ozone submittal that it is impossible to attain the standards without § 182(e)(5) measures, and all reasonable or feasibly available measures have been identified and scheduled for adoption. To say the District must attain a *revoked* standard, which U.S. EPA repeatedly described as not necessary to protect public health, (69 Fed. Reg. 23951, 23971, 23976 (April 30, 2004)), without reliance on measures undisputedly available for the existing, *more* health protective 8-hour standard, produces absurd results. Any such conclusion must be rejected. See e.g., *Logan v. United States, 522 U.S. 23, 26 (2007); United States v. X-Citement Video, Inc.*, 513 U.S. 64, 69 (1994).

Finally, U.S. EPA must consider the fact that for 8 years, all parties believed an attainment demonstration for the 1-hour standard *was not required*.

U.S. EPA stated in revoking the standard: "attainment of the 1-hour NAAQS would no longer be a goal…." 69 Fed. Reg. 23951 23970 (Apr. 30, 2004). U.S. EPA explained that it is not appropriate to "mandate states to perform an attainment demonstration for a NAAQS that is not needed to protect public health." 69 Fed. Reg. 23951, 23976. In disapproving the SCAQMD's 2003 attainment demonstration because it relied on withdrawn CARB measures, U.S. EPA explained that states no longer needed to attain the 1-hour standard. Responding to a comment that U.S. EPA must assure a viable path to attainment, U.S. EPA said: "…U.S. EPA's responsibility at the present time is to ensure that states adopt viable paths toward attainment of the 8-hour NAAQS, rather than the revoked 1-hour ozone NAAQS…." 74 Fed. Reg. 10176, 10179 (Mar. 10, 2009).

Only when the AIR case became final, was this position rejected. (Jan. 27, 2012.) *Ass'n of Irritated Residents v. U.S. EPA*, 686 F.3d 668 (9th Cir. 2012). That being the case, it would be unreasonable to say the District must now attain that standard without relying on future technology advancements, as authorized by § 182(e)(5).

Had it been clear when U.S. EPA revoked the standard that the District would still have to attain it, CARB may not have withdrawn the 2003 AQMP measures. The region may have been closer to attainment of the 1-hour standard by now. Absent the ability to rely on § 182(e)(5), District would have no choice but to seek to amend the CAA to eliminate such obligations relative to revoked standards.

Contingency Measures

CAA section 182(e)(5) authorizes U.S. EPA to "approve provisions of an implementation plan for an Extreme Area which anticipate development of new control techniques or improvement of existing control techniques, and an attainment demonstration based on such provisions," if the State meets certain criteria. Such plan provisions may include enforceable commitments to submit, at a later date, contingency measures for failure to attain under CAA section 172(c)(9), in addition to the contingency measures to be implemented if the anticipated technologies approved under section 182(e)(5) do not achieve planned reductions. These contingency measures must be submitted no later than three years before proposed implementation of the plan provisions and approved or disapproved by U.S. EPA in accordance with CAA section 110.

CARB and the District have satisfied the criteria in section 182(e)(5) for reliance on the new technology provision as part of the attainment demonstration in the South Coast 8-Hour ozone SIP and in this 1-hour ozone SIP. Based on the State's anticipated development of these new technologies, CARB has submitted an enforceable commitment to submit, no later than 2020, additional contingency measures under CAA section 182(e)(5) that meet the requirements for attainment contingency measures in CAA section 172(c)(9), in addition to contingency measures to be implemented if the anticipated long-term measures approved pursuant to section 182(e)(5) do not achieve planned reductions. See CARB Resolution 11–22, July 2011 and letter dated November 18, 2011 from James Goldstene, CARB, to Jared Blumenfeld, U.S. EPA. Similarly, when submitting this 1-hour ozone demonstration to U.S. EPA, CARB is expected to submit enforceable commitments no later than 2019 (no later than three years prior to the attainment year of 2022), additional contingency measures under CAA section 182(e)(5) that meet the requirements for attainment contingency measures in CAA section 172(c)(9), in addition to contingency measures to be implemented if the anticipated long-term measures approved pursuant to section 182(e)(5) do not achieve planned reductions need for attainment of the 1-hour ozone standard.

RACT/RACM

The CAA, Section 172(c)(1), sets the overall framework for the Reasonably Available Control Measures (RACM) analysis. The CAA requires the nonattainment air districts to:

> *"provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology (RACT)) and shall provide for attainment of the national primary ambient air quality standards."*

The U.S. EPA recommends that nonattainment air districts first identify the emission reduction programs that have already been implemented at the federal level, and by other states and local air districts. Next, the U.S. EPA recommends the air districts to examine additional RACM/RACTs adopted for other nonattainment areas to attain the ambient air quality standards as expeditiously as practicable. The RACT/RACM analysis for the 1-hour ozone attainment demonstration can be found in Attachment 4 of this Appendix.

Proposed Ozone Stationary Source Measures

The proposed stationary source implementation measures are designed to assist in the attainment of the 8-hour ozone standard. These measures will also assist in attaining the 1-hour standard. The measures target a number of source categories including Coatings and Solvents (CTS), Combustion Sources (CMB), Petroleum Operations and Fugitive VOC Emissions (FUG), Multiple Component Sources (MCS), Incentive Programs (INC) and Educational Programs (EDU). There are 15 stationary source measures with the majority anticipated to be adopted in the next 2 – 3 years and implemented after 2015. These measures include two incentive programs and one educational measure.

There are two measures that were continued from the 2007 AQMP. The remaining 13 control measures are new ideas or revised previous measures (e.g., further reductions from an existing rule).

Table VII-4-2 provides a list of the District's ozone measures for stationary sources along with the anticipated adoption date, implementation date and emission reduction.

TABLE VII-4-2

List of the District's Adoption/Implementation Dates and Estimated Emission Reductions from Ozone Measures for Stationary Sources

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
CTS-01	Further VOC Reductions from Architectural Coatings (R1113) [VOC]	2015 - 2016	2018 – 2020	2-4
CTS-02	Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants [VOC]	2013 - 2016		1-2
CTS-03	Further VOC Reductions from Mold Release Products [VOC]	2014	2016	0.8 – 2
CMB-01	Further NOx Reductions from RECLAIM [NOx]	2015	2017 – 2020	3-5[b]
CMB-02	NOx Reductions from Biogas Flares [NOx]	2015	Beginning 2017	Pending[c]
CMB-03	Reductions from Commercial Space Heating [NOx]	Phase I – 2014 (Tech Assessment) Phase II - 2016	Beginning 2018	0.18 by 2023 0.6 (total)
FUG-01	VOC Reductions from Vacuum Trucks [VOC]	2014	2016	1d
FUG-02	Emission Reduction from LPG Transfer and Dispensing [VOC] – Phase II	2015	2017	1-2
FUG-03	Further Reductions from Fugitive VOC Emissions [VOC]	2015 -2016	2017-2018	1-2
MCS-01	Application of All Feasible Measures Assessment [All Pollutants]	Ongoing	Ongoing	TBD[e]
MCS-02	Further Emission Reductions from Greenwaste Processing (Chipping and Grinding Operations not associated with composting) [VOC]	2015	2016	1[d]
MCS-03 (formerly MCS-06)	Improved Start-up, Shutdown and Turnaround Procedures [All Pollutants]	Phase I – 2012 (Tech Assessment) Phase II - TBD	Phase I – 2013 (Tech Assessment) Phase II – TBD	TBD[e]

TABLE VII-4-2 (concluded)

List of the District's Adoption/Implementation Dates and Estimated Emission Reductions from Ozone Measures for Stationary Sources

NUMBER	TITLE	ADOPTION	IMPLEMENTATION PERIOD	REDUCTION (TPD)
INC-01	Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]	2014	Within 12 months after funding availability	TBD[e]
INC-02	Expedited Permitting and CEQA Preparation Facilitating the Manufacturing of Zero and Near-Zero Technologies [All Pollutants]	2014-2015	Beginning 2015	N/A[a]
EDU-01 (*formerly MCS-02, MCS-03*)	Further Criteria Pollutant Reductions from Education, Outreach and Incentives [All Pollutants]	Ongoing	Ongoing	N/A[a]

a. N/A are reductions that cannot be quantified due to the nature of the measure (e.g., outreach, incentive programs) or if the measure is designed to ensure reductions that have been assumed to occur will in fact occur.
b. CMB-01 will target a cumulative 3-5 TPD of NOx emission reductions, including any CMB-01 PM2.5 contingency measure emission reductions.
c. Pending because emission reductions will be provided prior to the Final.
d. Reductions submitted in SIP once emission inventories are included in the SIP.
e. TBD are reductions to be determined once the inventory and control approach are identified.

The following text provides a brief description of the proposed ozone stationary source control measures and is taken directly from Chapter 4 of the Final 2012 AQMP.

Coatings and Solvents

The category of coatings and solvents is primarily targeted at reducing VOC emissions from these VOC-containing products. This category includes three proposed control measures that are based on additional emission reductions from architectural coatings; miscellaneous coatings, solvents, adhesives and lubricants; and mold release products.

CTS-01 – FURTHER VOC REDUCTIONS FROM ARCHITECTURAL COATINGS: The District adopted Rule 1113 – Architectural Coatings, in 1977 and it has since undergone numerous amendments. This proposed control measure seeks to reduce the VOC emissions from large volume coating categories such as flat, non-flat and primer, sealer, undercoaters (PSU) and from phasing out the currently exempt use of high-VOC architectural coatings sold in one liter containers or smaller. Additional emission reductions could be achieved from the application of architectural coatings by use of application techniques with greater transfer efficiency. Such transfer efficiency improvements could be achieved through the use of a laser paint targeting system, which has been shown to improve transfer efficiency on average by 30% over equipment not using a targeting system, depending on the size, shape and configuration of the substrate. The proposal is anticipated to be accomplished with a multi-phase adoption and implementation schedule.

CTS-02 – FURTHER VOC REDUCTIONS FROM MISCELLANEOUS COATINGS, ADHESIVES, SOLVENTS, AND LUBRICANTS: This control measure seeks VOC emission reductions by focusing on select coating, adhesive, solvent and lubricant categories by further limiting the allowable VOC content in formulations. Examples of the categories to be considered include but are not limited to, coatings used in certain aerospace applications; adhesives used in a variety of sealing applications; solvents for graffiti abatement activities; and lubricants used as metalworking fluids to reduce heat and friction to prolong life of the tool, improve product quality and carry away debris. Reductions would be achieved by lowering the VOC content of the coatings, adhesives and lubricants. For solvents, reductions could be achieved with the use of alternative low-VOC products or non-VOC product/equipment at industrial facilities. The proposal is anticipated to be accomplished with a multi-phase adoption and implementation schedule.

CTS-03 – FURTHER VOC REDUCTION FROM MOLD RELEASE PRODUCTS: Metal, fiberglass, composite and plastic products are often manufactured using molds which form the product into a particular configuration. Mold release agents are used to ensure that the parts, as they are made, can be released easily and quickly from the molds. These agents often contain VOC solvent carriers and may also contain toxic components like toluene and xylene. Mold release products are also used for concrete stamping operations to keep the mold from adhering to the fresh concrete. Residential and commercial concrete stamping is a rapidly growing industry, and overall VOC emissions are estimated to be significant. This control measure seeks to reduce emissions from mold release products on metal, fiberglass, composite and plastic products, as well as concrete stamping operations, by requiring the use of low-VOC mold release products.

<u>Combustion Sources</u>

This category includes three proposed measures for stationary combustion equipment. There is one control measure that further reduces NOx emissions from RECLAIM facilities. A second proposed measure seeks a reduction from biogas flares, and a third proposed control measure seeks to reduce NOx emissions from commercial space heaters.

CMB-01 – FURTHER NOX REDUCTIONS FROM RECLAIM: This proposed control measure will seek cumulative reductions of 3-5 tpd of NOx allocations by the year 2020, via implementation of periodic BARCT evaluation as required under the state law. If triggered, the PM2.5 contingency measure provision of CMB-01 would achieve 2-3 tpd of NOx allocation reductions in 2015, with the remaining 1-2 tpd implemented in the 2017-2020 timeframe. If the contingency measure is not triggered, then the entire 3-5 tpd of NOx reductions will be implemented in 2017-2020 timeframe. The control measure has the ability to produce co-benefits in the reduction of PM2.5 and ozone.

CMB-02 – NOX REDUCTIONS FROM BIOGAS FLARES: There are no source-specific rules regulating NOx emissions from biogas flares. Flare NOx emissions are regulated through new source review and BACT. This control measure proposes that, consistent with the all feasible measures measure, older biogas flares be gradually replaced with flares that meet current BACT. Strategies that minimize flaring and associated emissions can also be considered as alternative control options.

CMB-03 – REDUCTIONS FROM COMMERCIAL SPACE HEATING: This control measure applies to natural gas-fired commercial space heaters used for comfort heating. District Rule 1111 - NOx Emissions from Natural Gas-Fired Fan Type Central Furnaces, regulates space heaters with input rates less than 175,000 Btu/hr. This measure proposes to establish a NOx emission limit for new space heaters for commercial applications, which can be achieved through the use of low-NOx burners or other technologies.

Petroleum Operations and Fugitive VOC Emissions

This category pertains primarily to operations and materials associated with the petroleum, chemical, and other industries. Within this category, there is one proposed control measure targeting fugitive VOC emissions with improved leak detection and repair. Other proposed measures include reductions from vacuum truck venting, and propane transfer and dispensing.

FUG-01 – VOC REDUCTIONS FROM VACUUM TRUCKS: This control measure seeks to reduce emissions from the venting of vacuum trucks. Emissions from such operations can be further reduced through the utilization of control technologies, including but not limited to, carbon adsorption systems, internal combustion engines, thermal oxidizers, refrigerated condensers and liquid scrubbers. Additionally, implementation of a leak detection and repair (LDAR) program may further reduce fugitive emissions.

FUG-02 - EMISSION REDUCTION FROM LPG TRANSFER AND DISPENSING: The District recently adopted Rule 1177 - Liquefied Petroleum Gas (LPG) Transfer and Dispensing (June 2012). The rule requires use of low-emission fixed liquid level gauges or equivalent alternatives during filling of LPG-containing tanks and cylinders, use of low-emission connectors, routine leak checks and repairs of LPG transfer and dispensing equipment. The purpose of this control measure is to reduce fugitive VOC emissions associated with the transfer and dispensing of LPG by expanding rule applicability to include LPG transfer and dispensing at currently exempted facilities such as refineries, marine terminals, natural gas processing plants and pipeline transfer stations, as well as facilities that conduct fill-by-weight techniques.

FUG-03 – FURTHER REDUCTIONS FROM FUGITIVE VOC EMISSIONS: This control measure seeks to broaden the applicability of improved leak detection and repair (LDAR) programs to remove additional fugitive VOC emissions. Areas for further study may include, but are not limited to, Rule 1142 - Marine Vessel Tank Operations, and wastewater separators. This control measure would explore the opportunity of incorporating a recently developed advanced optical gas imaging technology to detect leaks (Smart LDAR) to more easily identify and repair leaks in a manner that is less time consuming and labor intensive. Additionally, vapor recovery systems are currently required to be 95% control efficient. In an effort to further reduce emissions from these operations, this control measure would explore opportunities and the feasibility of further improving the collection/control efficiency of existing control systems resulting in additional VOC reductions.

Multiple Component Sources

There are a total of three stationary source measures proposed in this category. The first measure seeks reductions of all feasible measures after such an assessment is made. Another measure seeks further emission reductions from greenwaste processing, which is chipping and grinding not associated with composting. The third measure seeks to minimize emissions during equipment startup and shutdown and to reduce emissions by applying the state requirement of all feasible control measures.

MCS-01 – APPLICATION OF ALL FEASIBLE MEASURES ASSESSMENT: This control measure is to address the state law requirement for all feasible measures for ozone. Existing rules and regulations for pollutants such as VOC, NOx, SOx and PM reflect current best available retrofit control technology (BARCT). However, BARCT continually evolves as new technology becomes available that is feasible and cost-effective. Through this proposed control measure, the District would commit to the adoption and implementation of the new retrofit control technology standards. Finally, staff will review actions taken by other air districts for applicability in our region.

MCS-02 - FURTHER EMISSION REDUCTIONS FROM GREENWASTE PROCESSING (CHIPPING AND GRINDING NOT ASSOCIATED WITH COMPOSTING): Chipped or ground greenwaste and/or wood waste has a potential to emit VOCs when being stockpiled or land-applied for various purposes. Chipping and grinding is a process to mechanically reduce the size of greenwaste and wood waste. The District rules currently establish best management practices (BMPs) for greenwaste composting and related operations under Rule 1133.1 – Chipping and Grinding Activities, and Rule 1133.3 – Greenwaste Composting Operations. During rule development, stakeholders raised the need to develop a holistic approach to identifying and accounting for emissions from all greenwaste streams and reducing potential emissions from greenwaste material handling operations at chipping and grinding facilities and other related facilities, and not just the ones associated with composting operations. This control measure would seek to establish additional Best Management Practices (BMPs) for handling processed or unprocessed greenwaste material by greenwaste processors, haulers, and operators who inappropriately stockpile material or directly apply the material to land. The implementation of the control measure would be in two phases. First, the existing database would be reviewed to refine the greenwaste material inventory, and second, staff would potentially develop a rule to incorporate technically feasible and cost-effective BMPs or controls.

MCS-03 - IMPROVED START-UP, SHUTDOWN AND TURNAROUND PROCEDURES: This proposed control measure seeks to reduce emissions during equipment startup, shutdown, and turnaround. Opportunities for further reducing emissions from start-up, shut-down and turnaround activities potentially may exist at refineries as well as other industries. Examples of possible areas for improvement may include best management practices, better engineering and equipment design, diverting or eliminating process streams that are vented to flares, and installation of redundant equipment to increase operational reliability. This measure will be implemented through a two-phase effort to first collect/refine emissions and related data and then, based on the data collected, assess viable controls, if appropriate.

Incentive Programs

There are two proposed incentive programs within this category. The first program seeks to provide incentives for new and existing facilities to install and operate clean, more-efficient combustion equipment beyond what is currently required. The second program provides expedited permitting processing and development of applicable CEQA documentation if a company manufactures zero or near-zero emission technology.

INC-01: ECONOMIC INCENTIVE PROGRAMS TO ADOPT ZERO AND NEAR-ZERO TECHNOLOGIES: The primary objective of this measure is to develop programs that promote and encourage adoption and installation of cleaner, more-efficient combustion equipment with a focus on zero and near-zero technologies, such as boilers, water heaters and commercial space heating, through economic incentive programs, subject to the availability of public funding. Incentives may include grants for new purchases of equipment as well as loan programs in areas where long-term cost savings from increased efficiency are achieved.

INC-02: EXPEDITED PERMITTING AND CEQA PREPARATION FACILITATING THE MANUFACTURING OF ZERO AND NEAR-ZERO TECHNOLOGIES: This proposed measure is aimed at providing incentives for companies to manufacture zero and near-zero emission technologies locally, thus populating the market, potentially lowering the purchase cost, and increasing demand. With availability and usage of such technologies, air quality benefits will be achieved. This proposed measure focuses on two elements: 1) process the required air permit(s) in an expedited procedure; and 2) prioritize the preparation, circulation and certification of the applicable CEQA document. A stakeholder process will be initiated to design the program and collaborate with other existing District or local programs.

Educational Programs

There is one proposed educational program within this category.

EDU-01: FURTHER CRITERIA POLLUTANT REDUCTIONS FROM EDUCATION, OUTREACH AND INCENTIVES: This proposed control measure seeks to provide educational outreach and incentives for consumers to contribute to clean air efforts. Examples include the usage of energy efficient products, new lighting technology, "super compliant" coatings, tree planting, and the use of lighter colored roofing and paving materials which reduce energy usage by lowering the ambient temperature. In addition, this proposed measure intends to increase the effectiveness of energy conservation programs through public education and awareness as to the environmental effects and benefits from conservation. Finally, educational and incentive tools to be used include comparison of energy usage and efficiency, social media, public/private partnerships.

Proposed Ozone Mobile Source Measures

Depending on the mobile source sector and the proposed control approach, District staff analyzed the need to accelerate the penetration of cleaner engine technologies. The proposed ozone measures are based upon a variety of control technologies that are commercially available and/or technologically feasible to implement in the next several years. The focus of these measures includes accelerated retrofits or replacement of existing vehicles or equipment, acceleration of vehicle turnover through voluntary vehicle retirement programs, and greater use of cleaner fuels in the near-term. In the longer-term, in order to attain the federal ozone ambient air quality standard, there is a need to increase the penetration and deployment of near-zero and zero-emission vehicles such as plug-in hybrids, battery-electric, and fuel cells, even further use of cleaner fuels (either alternative fuels or new formulations of gasoline and diesel fuels), and additional emission reductions from locomotive and aircraft engines.

Ten measures are proposed as actions to reduce mobile source emissions and seven additional measures are proposed to accelerate the development and deployment of near-zero and zero-emission technologies for goods movement related sources and off-road equipment. The measures call for greater emission reductions through accelerated turnover of older vehicles to the cleanest vehicles currently available and increased penetration of commercially-available near-zero and zero-emission technologies through existing incentives programs.

Drawing upon the recent draft "Vision for Clean Air: A Framework for Air Quality and Climate Planning" (or Vision), a document produced jointly between the District staff, the California Air Resources Board, and the San Joaquin Valley Air Pollution Control District, seven measures are proposed to further the development of zero- and near-zero emission technologies for on-road and off-road mobile sources. The draft Vision document discusses the need to accelerate deployment of the cleanest combustion technologies and zero- and near-zero emission technologies earlier to meet federal ambient air quality standards and long-term climate goals. The document provides actions for several key transportation sectors and off-road equipment.

Partial-zero and zero-emission technologies are rapidly being introduced into the on-road light- and medium-duty vehicle categories in large part due to the CARB Low Emission Vehicle (LEV) and the Zero-Emission Vehicle (ZEV) Regulations. In addition, next-generation electric hybrid trucks are being commercialized for light-heavy and medium-heavy heavy-duty on-road vehicles. However, additional research and demonstration are needed to commercialize zero- and near-zero emission technologies for the heavier heavy-duty vehicles (with gross vehicle weight ratings greater than 26,000 lbs.).

For many of the off-road mobile sources such as locomotives, cargo handling equipment, commercial harbor craft, and off-road equipment, some form of "all zero-emission range" is feasible to demonstrate and implement beginning in the latter part of this decade. For other sectors such as marine vessels and aircraft, the development of cleaner combustion technologies beyond existing emission standards will be needed. The Vision document provides a broad discussion of the potential zero- and near-zero technologies or cleaner combustion technologies that could be demonstrated in the near-term. The potential technologies are discussed further in each of the "ADV" measures. A summary of the 17 measures is provided in Table VII-4-4.

TABLE VII-4-4

List of Adoption/Implementation Dates and Estimated Emission Reductions from Ozone Measures for Mobile Sources

ON-ROAD MOBILE SOURCES					
Number	**Title**	**Adoption**	**Implementation Period**	**Implementing Agency**	**Reduction (tpd) by 2023**
ONRD-01	Accelerated Penetration of Partial Zero-Emission and Zero-Emission Vehicles [VOC, NOx, PM]	N/A	Ongoing	CARB, SCAQMD	TBD [a]
ONRD-02	Accelerated Retirement of Older Light- and Medium-Duty Vehicles [VOC, NOx, PM]	N/A	Ongoing	CARB, Bureau of Automotive Repair, SCAQMD	TBD [a]
ONRD-03	Accelerated Penetration of Partial Zero-Emission and Zero-Emission Light-Heavy- and Medium-Heavy-Duty Vehicles [NOx, PM]	N/A	Ongoing	CARB, SCAQMD	TBD [a]
ONRD-04	Accelerated Retirement of Older On-Road Heavy-Duty Vehicles [NOx, PM]	2014	2015-2023	CARB, SCAQMD	TBD [a,b]
ONRD-05	Further Emission Reductions from Heavy-Duty Vehicles Serving Near-Dock Railyards [NOx, PM]	2014	2015-2020	CARB	0.75 [NOx] 0.025 [PM2.5]

TABLE VII-4-4 (continued)
List of Adoption/Implementation Dates and Estimated Emission Reductions from Ozone Measures for Mobile Sources

OFF-ROAD MOBILE SOURCES					
Number	**Title**	**Adoption**	**Implementation Period**	**Implementing Agency**	**Reduction (tpd) by 2023**
OFFRD-01	Extension of the SOON Provision for Construction/Industrial Equipment [NOx]	N/A	Ongoing	SCAQMD	7.5
OFFRD-02	Further Emission Reductions from Freight Locomotives [NOx, PM]	Ongoing	2015 – 2023	CARB, U.S. EPA, San Pedro Bay Ports	12.7 [NOx][c] 0.32 [PM2.5][c]
OFFRD-03	Further Emission Reductions from Passenger Locomotives [NOx, PM]	Ongoing	Beginning 2014-2023	SoCal Regional Rail Authority	3.0 [NOx][d] 0.06 [PM2.5][d]
OFFRD-04	Further Emission Reductions from Ocean-Going Marine Vessels While at Berth [NOx, SOx, PM]	2014	Ongoing	San Pedro Bay Ports, CARB, SCAQMD	TBD[a]
OFFRD-05	Emission Reductions from Ocean-Going Marine Vessels [NOx]	N/A	Ongoing	San Pedro Bay Ports, CARB, U.S. EPA	TBD[a]

TABLE VII-4-4 (concluded)

List of Adoption/Implementation Dates and Estimated Emission Reductions
from Ozone Measures for Mobile Sources

ADVANCED CONTROL TECHNOLOGIES					
Number	**Title**	**Adoption**	**Implementation Period**	**Implementing Agency**	**Reduction (tpd) by 2023**
ADV-01	Actions for the Deployment of Zero- and Near-Zero Emission On-Road Heavy-Duty Vehicles [NOx]	N/A	2012 and on	SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA	TBD [e]
ADV-02	Actions for the Deployment of Zero- and Near-Zero Emission Locomotives [NOx]	N/A	2012 and on	SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA	TBD [e]
ADV-03	Actions for the Deployment of Zero- and Near-Zero Emission Cargo Handling Equipment [NOx]	N/A	2012 and on	SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA	TBD [e]
ADV-04	Actions for the Deployment of Cleaner Commercial Harborcraft [NOx]	N/A	2012 and on	SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA	TBD [e]
ADV-05	Actions for the Deployment of Cleaner Ocean-Going Marine Vessels [NOx]	N/A	2012 and on	SCAQMD, San Pedro Bay Ports, CARB, U.S. EPA	TBD [e]
ADV-06	Actions for the Deployment of Cleaner Off-Road Equipment [NOx]	N/A	2012 and on	SCAQMD, CARB, U.S. EPA	TBD [e]
ADV-07	Actions for the Deployment of Cleaner Aircraft Engines [NOx]	N/A	2012 and on	SCAQMD, CARB, FAA, U.S. EPA	TBD [e]

a. Emission reductions will be determined after projects are identified and implemented.
b. Reductions achieved locally in Mira Loma region.
c. Emission reductions provided are updated from the 2007 SIP values reflecting a revised future year base emission levels. The reductions are not included in the Final 2012 AQMP SIP submittal
d. Submitted into the SIP once technically feasible and cost effective options are confirmed.
e. Emission reduction will be quantified after projects are demonstrated.

On-Road Mobile Source Measures

Five on-road mobile source control measures are proposed. The first two measures focus on on-road light- and medium-duty vehicles operating in the South Coast Air

Basin. By 2023, it is estimated that about 12 million vehicles will be operating in the Basin. The first measure would implement programs to accelerate the penetration and deployment of partial zero-emission and zero-emission vehicles in the light- and medium-duty vehicles categories. The second control measure would seek to accelerate retirement of older gasoline and diesel powered vehicles up to 8,500 gross vehicle weight (GVW). These vehicles include passenger cars, sports utility vehicles, vans, and light duty pick-up trucks.

The remaining three measures focus on heavy-duty vehicles. The first of these measures seeks additional emission reductions from the early deployment of partial zero-emission and zero-emission light- and medium-heavy-duty vehicles with gross vehicle weights between 8,501 pounds to 26,000 pounds. The second control measure for heavy-duty vehicles seeks additional emissions reductions from older, pre-2010 heavy-duty vehicles beyond the emission reductions targeted in CARB's Truck and Bus Regulation. Additional emission reductions could be achieved if an additional percentage of the oldest, pre-2010 heavy duty vehicles not subject to the Truck and Bus Regulation are targeted. The fifth on-road measure seeks emission reductions at near-dock railyards through the deployment of zero-emission heavy-duty vehicles. District staff is recommending a minimum funding level of $85 million per year for incentives to implement on-road mobile source measures.

<u>Off-Road Mobile Source Measures</u>

Five control measures that seek further emission reductions from off-road mobile sources and industrial equipment are proposed. Transportation sources such as aircraft, locomotives, and marine vessels are associated with anticipated economic growth not only in the Basin, but also nationwide. These sources are principally regulated by federal and state agencies. In addition, certain local actions can result in emission reductions beyond the emissions standard setting authority of the state and U.S. EPA. The first measure calls for the continuation of the Surplus Off-Road Opt-In for NOx (SOON) provision of the statewide In-Use Off-Road Diesel Fleet Regulation beyond 2014. The SOON provision implemented to-date has realized additional NOx reductions beyond the statewide regulation. The second and third measures call for additional emission reductions from freight and passenger locomotives. The fourth measure seeks additional emission reductions from ocean-going vessels while at berth. The fifth measure recognizes the efforts that the Ports of Los Angeles and Long Beach are implementing to incentivize Tier 2 and Tier 3 ocean-going vessels to call at the ports. District staff is recommending a minimum funding level of $30 million per year for incentives to implement off-road mobile source measures.

Actions to Deploy Advanced Control Technologies

Seven additional measures are proposed to deploy the cleanest control technologies as early as possible and to foster the development and deployment of near-zero and zero-emission technologies. Many of these actions have already begun. However, additional research and development will be needed that will lead to commercial deployment of control technologies that achieve emission levels below current adopted emission standards. Other near-zero and zero-emission technologies that are commercially available will require infrastructure development to facilitate their deployment.

The term "near-zero" technology is not defined in these actions. The term's specific meaning could depend on the source category and feasible technologies. The actions needed to deploy zero-emission technologies, "near-zero" emission technologies, and the next generation of cleaner combustion engines will be discussed in the development of the proposed measures and future AQMPs. To initiate the development of cleaner engines (either through in-cylinder or after-treatment controls or in combination with hybrid systems that lead to further criteria pollutant emission reductions), District staff is proposing that optional NOx standards be adopted. Having such optional standards will facilitate the early development of cleaner technologies and assist to deploy these technologies as soon as possible. They would be set by the level of emission reductions commercially achievable in the near-term. Several of the technologies to achieve emission levels lower than current standards, or zero-emission levels, are currently available and are potentially transferrable to various vehicle vocations and in-use applications. However, further research and demonstration are needed for many of these technologies to evaluate their performance prior to commercialization. Each measure contains a timeline for actions to bring about the zero-emission or cleaner technologies.

The District staff, U.S. Department of Energy, U.S. Environmental Protection Agency, Federal Aviation Administration, California Air Resources Board, California Energy Commission, engine manufacturers, advanced engine control developers, and electric hybrid systems developers have been discussing potential technologies to further reduce engine exhaust emissions or eliminate exhaust emissions entirely. Public forums such as technology symposiums will be used to solicit public input on technology development as part of the proposed actions.

The following text provides a brief description of the District staff's proposed mobile source measures:

ONRD-01 – ACCELERATED PENETRATION OF PARTIAL ZERO-EMISSION AND ZERO EMISSION VEHICLES: This measure proposes to continue incentives for the purchase of zero-emission vehicles and hybrid vehicles with a portion of their operation in an "all electric range" mode. The state Clean

Vehicle Rebate Pilot (CVRP) program is proposed to continue from 2015 to 2023 with a proposed funding for up to $5,000 per vehicle. The proposed measure seeks to provide funding assistance for up to 1,000 zero-emission or partial-zero emission vehicles per year.

ONRD-02 – ACCELERATED RETIREMENT OF OLDER LIGHT- AND MEDIUM-DUTY VEHICLES: This proposed measure calls for promoting the permanent retirement of older eligible vehicles through financial incentives currently offered through local funding incentive programs and the AB 118 Enhanced Fleet Modernization Program (EFMP). The proposed measure seeks to retire up to 2,000 older light- and medium-duty vehicles (up to 8,500 lbs gross vehicle weight) per year. Funding incentives of up to $2,500 per vehicle are proposed for the scrapping of the vehicle, which may include a replacement voucher for a newer or new vehicle.

ONRD-03 – ACCELERATED PENETRATION OF PARTIAL ZERO-EMISSION AND ZERO-EMISSION LIGHT-HEAVY- AND MEDIUM-HEAVY-DUTY VEHICLES: The objective of the proposed action is to accelerate the introduction of advanced hybrid and zero-emission technologies for Class 4 through 6 heavy-duty vehicles. The state is currently implementing a Hybrid Vehicle Incentives Project (HVIP) program to promote zero-emission and hybrid heavy-duty vehicles. The proposed measure seeks to continue the program from 2015 to 2023 to deploy up to 1,000 zero- and partial-zero emission vehicles per year with up to $25,000 funding assistance per vehicle. Zero-emission vehicles and hybrid vehicles with a portion of their operation in an “all electric range” mode would be given the highest priority.

ONRD-04 – ACCELERATED RETIREMENT OF OLDER ON-ROAD HEAVY-DUTY VEHICLES: This proposed measure seeks to replace up to 1,000 heavy-duty vehicles per year with newer or new vehicles that at a minimum, meet the 2010 on-road heavy-duty NOx exhaust emissions standard of 0.2 g/bhp-hr. Given that exceedances of the 24-hour PM2.5 air quality standard occur in the Mira Loma region, priority will be placed on replacing older diesel trucks that operate primarily at the warehouse and distribution centers located in the Mira Loma area. Funding assistance of up to $35,000 per vehicle is proposed and the level of funding will depend upon the NOx emissions certification level of the replacement vehicle. In addition, a provision similar to the Surplus Off-Road Option for NOx (SOON) provision of the statewide In-Use Off-Road Fleet Vehicle Regulation will be sought to ensure that additional NOx emission reduction benefits are achieved.

ONRD-05 – FURTHER EMISSION REDUCTIONS FROM HEAVY-DUTY VEHICLES SERVING NEAR-DOCK RAILYARDS: This proposed control measure calls for a requirement that any cargo container moved between the Ports of Los Angeles and Long Beach to the nearby railyards (the Intermodal Container Transfer Facility and the proposed Southern California International Gateway) be with zero-emission technologies. The measure would be fully implemented by 2020 through the deployment of zero-emission trucks or any alternative zero-emission container movement system such as a fixed guideway system. The measure calls for CARB to either adopt a new regulation or amend an existing regulation to require such deployment by 2020. To the extent the measure can feasibly be extended beyond near-dock railyards, this would be considered for adoption by CARB.

OFFRD-01 – EXTENSION OF THE SOON PROVISION FOR CONSTRUCTION/INDUSTRIAL EQUIPMENT: This measure seeks to continue the Surplus Off-Road Option for NOx (SOON) provision of the statewide In-Use Off-Road Fleet Vehicle Regulation beyond 2014 through the 2023 timeframe. In order to implement the SOON program in this timeframe, funding of up to $30 million per year would be sought to help fund the repower or replacement of older Tier 0 and Tier 1 equipment, with reductions that are considered surplus to the statewide regulation with Tier 4 or cleaner engines.

OFFRD-02 – FURTHER EMISSION REDUCTIONS FROM FREIGHT LOCOMOTIVES: The proposed control measure is to meet the commitment in the 2007 SIP for the accelerated use of Tier 4 locomotives in the South Coast Air Basin. The measure calls for CARB to seek further emission reductions from freight locomotives through enforceable mechanisms within its authority to achieve 95 percent or greater introduction of Tier 4 locomotives by 2023.

OFFRD-03 – FURTHER EMISSION REDUCTIONS FROM PASSENGER LOCOMOTIVES: This measure recognizes the recent actions by the Southern California Regional Rail Authority (SCRRA or Metrolink) to consider replacement of their existing Tier 0 passenger locomotives with Tier 4 locomotives. The SCRRA adopted a plan that contains a schedule to replace their older existing passenger locomotives with Tier 4 locomotives by 2017. More recently, SCRRA released a Request for Quotes on the cost of new or newly manufactured passenger locomotives with locomotive engines that meet Tier 4 emission levels.

OFFRD-04 – FURTHER EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS WHILE AT BERTH: This measure seeks additional emission reductions from ocean-going marine vessels while at berth. The actions would affect ocean-going vessels that are not subject to the statewide Shorepower Regulation or vessel calls that are considered surplus to the statewide regulation. The measure seeks at a minimum to have an additional 25 percent of vessel calls beyond the statewide regulation to deploy shorepower technologies or alternative forms of emissions reduction as early as possible. Such actions could be implemented through additional incentives programs or through the San Pedro Bay Ports as part of the implementation of the Ports Clean Air Action Plan.

OFFRD-05 – EMISSION REDUCTIONS FROM OCEAN-GOING MARINE VESSELS: This measure recognizes the recent actions at the Ports of Los Angeles and Long Beach to initiate an incentives program for cleaner ocean-going vessels to call at the ports. The program has been initiated as part of the San Pedro Bay Ports Clean Air Action Plan. The program will provide financial incentives for cleaner Tier 2 and Tier 3 ocean-going vessels to call at the ports. This measure also recognizes the need to monitor progress under such programs and augment them as necessary to ensure sufficient results. The program will be monitored on annual basis and, if necessary, any adjustments to the program will be made.

ADV-01 –ACTIONS FOR THE DEPLOYMENT OF ZERO- AND NEAR-ZERO EMISSION ON-ROAD HEAVY-DUTY VEHICLES: This measure would continue the efforts underway to develop zero-emission and near-zero emission technologies for on-road heavy-duty vehicle applications. Such technologies include, but not limited to, fuel cell, battery-electric, hybrid-electric with all electric range, and overhead catenary systems. Hybrid-electric systems incorporate an engine powered by conventional fuels or alternative fuels such as natural gas. The actions provided in the proposed measure are based on the SCAG 2012 Regional Transportation Plan.

ADV-02 –ACTIONS FOR THE DEPLOYMENT OF ZERO- AND NEAR-ZERO EMISSION LOCOMOTIVES: This measure calls for the development and deployment of zero-emission and near-zero emission technologies for locomotives. Such technologies include overhead catenary systems, hybrid locomotives that have some portion of their operation in an "all electric range" mode, and alternative forms of external power such as a battery tender car. The actions provided in the proposed measure are based on the SCAG 2012 Regional Transportation Plan. The zero-emission technologies could apply to freight and passenger locomotives.

ADV-03 –ACTIONS FOR THE DEPLOYMENT OF ZERO- AND NEAR-ZERO EMISSION CARGO HANDLING EQUIPMENT: This measure recognizes the actions underway to develop and deploy zero- and near-zero emission technologies for various cargo handling equipment. The San Pedro Bay Ports are currently demonstrating battery-electric yard tractors. In addition, battery-electric, fuel cell, and hybridized systems could be deployed on smaller cargo handling equipment. In addition, the use of alternative fuels for conventional combustion engines could potentially result in greater emissions benefits.

ADV-04 –ACTIONS FOR THE DEPLOYMENT OF CLEANER EMISSION COMMERCIAL HARBORCRAFT: Several commercial harbor craft operators have begun deployment of hybrid systems in their harbor craft to further reduce criteria pollutant emissions and improve fuel efficiency. Other cleaner technologies include the use of alternative fuels, retrofit of existing older marine engines with selective catalytic converters, and diesel particulate filters. This measure recognizes several efforts between the District and the Ports of Los Angeles and Long Beach to further demonstrate control technologies that could be deployed on commercial harbor craft that could go beyond the statewide Harbor Craft Regulation.

ADV-05 –ACTIONS FOR THE DEPLOYMENT OF CLEANER OCEAN-GOING MARINE VESSELS: The Ports of Los Angeles and Long Beach, CARB, and the District have sponsored research and demonstration of various control technologies to further reduce emissions from ocean-going vessels. In addition, the San Pedro Bay Ports Clean Air Action Plan contains a measure to further demonstrate such technologies on ocean-going vessels. This measure recognizes many of these efforts and the need to further demonstrate retrofit technologies on existing ocean-going vessels.

ADV-06 –ACTIONS FOR THE DEPLOYMENT OF CLEANER OFF-ROAD EQUIPMENT: The District, Mobile Source Air Pollution Reduction Review Committee (MSRC), and CARB have been conducting an off-road "showcase" program for retrofit technologies to further reduce emissions from older off-road equipment. In addition, several major off-road engine manufacturers are investigating the potential use of hybrid systems to further reduce criteria pollutant and greenhouse gas emissions. Potential advanced technologies include hybrid systems that utilize batteries, fuel cells, or plug-in capabilities, which could result in lower emissions compared to Tier 4 emission levels when combined with future Tier 4 compliant engines. The measure is implemented by the District, CARB and U.S. EPA.

ADV-07 –ACTIONS FOR THE DEPLOYMENT OF CLEANER AIRCRAFT ENGINES: This measure recognizes the efforts of the Federal Aviation Administration's Continuous Lower Energy, Emissions and Noise (CLEEN) Program. The goal of the CLEEN Program is the development of new aircraft engines that potentially can be up to 60 percent cleaner in NOx emissions than current aircraft engines. The actions under this measure are to continue the development of cleaner aircraft engines and work with the airlines and local airport authorities to develop mechanisms to route the cleanest aircraft to serve the South Coast Air Basin.

OVERALL EMISSION REDUCTIONS

A summary of emission reductions for the proposed 1-hour ozone control measures for the year 2022, based on the summer planning inventory for VOC and NOx, is provided in Table VII-4-5. These reductions reflect the emission reductions associated with implementation of control measures under local, State, and federal jurisdiction. Emission reductions represent the difference between the projected baseline and the remaining emissions. Note the inclusion in Table VII-4-5 of long term ("black box") measures under CAA Section 182(e)(5) provisions.

TABLE VII-4-5

Emission Reductions for 2022 Based on
Summer Planning Inventory (Tons per Day)

SOURCES	VOC	NOx
Year 2022 Baseline [1]	440	335
Emission Reductions:		
Stationary Sources (2012 Proposed Measures)	6	3
Mobile Sources (2012 Proposed Measures)	---	8
Mobile Sources (2007 SIP Carried Forward) [2]	7	24
Long Term Measures [3]	17	150
Total 1-hour Ozone SIP Reductions	30	185
2022 Remaining Emissions	**410**	**150**

[1] Emission assumptions from SCAG's 2012 regional transportation plan are already reflected in the AQMP baseline, including TCMs.

[2] Emissions reductions already committed in the 2007 8-hour ozone SIP

[3] CAA Section 182(e)(5) long-term emission reduction measures. Note that the U.S. EPA approved 2007 8-hour ozone SIP included 40 tpd VOC and 241 tpd NOx emissions reductions (based on the emissions inventories from the 2007 SIP) as long term measures under CAA Section 182(e)(5). See 77 Fed. Reg. 12674 (March 1, 2012). Thus, the 1-hour ozone long term emissions reductions are not new emissions reductions as they are a subset of the previous 2007 SIP emissions reductions from long-term measures.

SECTION 5

1-hour Ozone Attainment Demonstration

INTRODUCTION

On September 19, 2012, in response to a California Ninth Circuit Court of Appeals remand, U.S. EPA published a proposed rule to require California to provide a new 1-hour ozone attainment demonstration for the South Coast Air Basin and the San Joaquin Valley non-attainment areas. The proposed rule made a finding of substantial inadequacy of the State Implementation Plan for the two areas. The proposed rule is anticipated to be approved early in 2013 and will allow five years, with a total of up to ten years for attainment of the now revoked 1-hour standard, if the state shows that ten years are needed. That will require a demonstration of attainment of the 0.12 ppm standard by 2023, with emissions reductions in place by the end of 2022. Background discussion on the reasoning for the required revision to the 1-hour ozone SIP as well as a description of the control strategy approach is provided in earlier sections of this Appendix. This section provides the details of the 2012 1-hour ozone modeling attainment demonstration.

BACKGROUND

For a full background discussion regarding the 1-hour ozone attainment demonstration, see the Introduction to this Appendix. The most recently approved SIP for the 1-hour ozone standard is the 1997/99 Plan, approved by U.S. EPA in April 2000. There have been changes to the motor vehicle emissions inventories and model since that time. U.S. EPA disapproved the attainment demonstration in the 2003 SIP revision because it relied in large part on control measures that had been withdrawn by CARB following revocation of the 1-hour standard. This disapproval led to the litigation which resulted in the SIP call proposed by U.S. EPA on September 19, 2012. In that proposal U.S. EPA calls for a revised and updated 1-hour ozone attainment demonstration.

Modeling platforms, meteorological models and chemistry packages have also undergone significant enhancements since the 1997 AQMP attainment demonstration when the Urban Airshed Model (UAM) with CB-IV chemistry was the primary tool for projecting air quality. During the development of the 2003 AQMP, the District convened a panel of seven experts to independently review the regional air quality modeling for ozone. The consensus of the panel was for the District to move to more current state-of-the-art dispersion platforms and chemistry modules. At that time, the model selected for the 2007 AQMP ozone attainment demonstrations was the Comprehensive Air Quality Model with Extensions (CAMx) [Environ, 2002], using SAPRC99 chemistry. The Final 2012 AQMP has continued to move forward to incorporate current state-of-the-art modeling platforms to conduct regional modeling analyses. The Final 2012 AQMP PM2.5 attainment demonstration and ozone implementation update has been developed using the U.S. EPA supported Community Multiscale Air Quality (CMAQ) (version 4.7) air quality modeling platform with SAPRC99 chemistry, and the Weather Research and Forecasting Model (WRF) (version 3.3) meteorological fields. Appendix V of the Final 2012 AQMP provides an expanded discussion of the current modeling platform.

ATTAINMENT DEMONSTRATION STRUCTURE: DETERMINISTIC VS. TIERED RELATIVE RESPONSE FACTOR (RRF)

The 1997 AQMP and 2003 AQMP 1-hour ozone attainment demonstrations relied on direct output from model simulations to project future year air quality and design values. This "deterministic" approach was based on the premise that future year projected baseline inventories were accurate and the impacts of implementing the control program were well simulated. In addition, the form of the 1-hour ozone standard was directed at the fourth highest concentration in a three year period for a given air monitoring station. In essence, the analysis looked at the 2nd highest concentration in a given year, typically occurring during the worst-case meteorological scenario. The 2007 AQMP and the Final 2012 AQMP have relied on the use of relative response factors (RRF) determined from the ratio of future to base year simulation projections to estimate attainment. Since shifting to the 8-hour ozone standard, the RRF estimated from multiple meteorological episodes has been the primary methodology to project future year station specific design values calculated as the three year averages of the 4th highest 8-hour concentration. Both approaches, (deterministic or RRF), have their limitations: the deterministic method relies on accurate modeling and the proper selection of a meteorological episode while the RRF approach tends to place less reliance on individual day model performance since the factor is based on an average of several events having similar meteorological profiles. However, basing the RRF on multiple days may mask the meteorological profile characteristics of an extreme event such as an annual second maximum concentration. Table VII-5-1 summarizes a comparison of the two approaches to demonstrate attainment of the standard.

No specific modeling guidance applies to this current analysis since the 1-hour standard has been revoked. As discussed above, the previous 1-hour ozone attainment demonstrations utilized the deterministic approach to demonstrate attainment of the standard. As modeling platforms (both dispersion and meteorological) and emissions inventories have greatly improved over the past two decades, ozone simulations have demonstrated an increasingly higher level of accuracy in recreating observed base year concentrations. The improved simulation performance has mitigated several of the concerns regarding using the deterministic approach to directly predict future year concentrations. As a result of the improved base year performance, this Basin 1-hour ozone attainment demonstration will be based on the deterministic modeling approach. As part of the weight of evidence discussion, the RRF approach will applied using a stratified or tiered approach to develop station specific projections of 2022 1-hr ozone concentrations.

TABLE VII-5-1

Comparison of Attainment Demonstration Methodologies

RRF	Deterministic
Targets 98th percentile – multiple year average standard	Targets annual 2nd maximum concentration
Designed to compensate for base year performance	Requires performance within established criteria thresholds
Projects future design values based on the base year design value applied to ratio of future to base year simulated ozone	Assumes accurate future year emissions inventory and directly predicts expected concentrations
Station specific evaluation	Day specific analysis requiring candidate episode meeting the "worst case" profile
Requires concentration threshold for inclusion in analysis and minimum number of valid simulation days	

MODELING PROTOCOL

Table VII-5-2 provides the Final 2012 AQMP 1-hour ozone modeling protocol. As previously discussed, the CMAQ/WRF/SAPRC99 modeling structure used for the 8-hour ozone update in the Final 2012 AQMP was used for the 1-hour ozone attainment demonstration. A comprehensive discussion of the 8-hour ozone modeling analysis is provided in Appendix V of the Final 2012 AQMP.

TABLE VII-5-2

Summary of Final 2012 AQMP 1-hour Ozone Model Selection and Modeling Protocol

Final 2012 AQMP 1-Hour Ozone Modeling Protocol
Ozone Dispersion Platform: CMAQ Chemistry: SAPRC99
Domain/ Coordinates Expanded SCOS97 Meteorology, Emissions and Model application: Lambert Conformal Grid: 4 Km X 4 Km Ozone: 18 layers

Emissions Inventories
• 2008 Base year
• Day-Specific Emissions
• Shipping emissions split into 2layers
• EMFAC2011
    o 3- modules
    o Modified DTIM
• Adjustments to fugitive PM2.5 Paved road U.S. EPA with CA modifications
• Day-Specific Biogenic emissions
• Revised Mexican emissions profile

Meteorology • WRF initialized with NCEP data with FDDA
Air Quality Model Performance • Assess model performance based on both 1-hour statistics: Normalized gross bias Normalized gross error Peak prediction accuracy • 60 ppb threshold (both indices) • 49 Cell averaging
2008 Base Year Simulations June – August 2008 92 days of simulations evaluated Peak Episode 6/18-6/21
Future Year Projections—Deterministic Approach /Tiered RRF Approach • 2022

MODELING EMISSIONS INVENTORY

Table VII-5-3 provides the baseline and controlled modeling emissions inventories used in the attainment demonstration. The CMAQ simulations were based on the summer planning inventory, with adjustments made for weekly and daily temperature variations. A brief characterization of the emissions used for the modeling analysis is presented in Section 3 of this Appendix and Chapter 3 of the Final 2012 AQMP. An extensive discussion of the overall emissions inventory is provided in the Final 2012 AQMP Appendix III.

TABLE VII-5-3

Summer Planning Emissions Inventory (tons/day)

Year	VOC	NOX	CO
(a) Baseline			
2008	593	754	2880
2022	440	335	1540
(b) Controlled			
2022	410	150	1540

EPISODE SELECTION AND DESIGN VALUES

Past ozone attainment demonstrations evaluated a set of days characterized by restrictive meteorology or episodes occurring during concurrent intensive field monitoring programs. Of great importance, these episode periods needed to be rated in terms of how representative they were relative to the ozone standard being evaluated. For the now revoked 1-hour ozone standard, the attainment demonstration focused on a limited number of days closely matching the annual design value. Typically, the analysis addressed fewer than 5 days of simulations. The 2003 1-hour ozone episode focused on the August 4-7, 1997 ozone meteorological episode that occurred during the Southern California Ozone Study and was the subject of an extensive field monitoring campaign.

This update to the future year ozone projection focuses on 92 days of ozone air quality observed during June through August of the base year 2008. Overall, the 92 day period provides a robust description of the 2008 ozone meteorological season. Table VII-5-4 lists the number of days each Basin station exceeded the revoked 1-hour ozone standard during the June through August 2008 period. Also listed in Table VII-5-4 are the 2008, 5-year weighted design values (also used in the RRF future year ozone projections). Figure VII-5-1 depicts the time series of the daily Basin maximum and the Crestline (the Basin design station) daily maximum 1-hour ozone concentrations during the three month period in 2008. During this period, seven well defined multi-day ozone episodes occurred in the Basin with 30 total days having daily Basin-wide 1-hour maximum ozone concentrations of 120 ppb or higher. More importantly, when assessed for a normalized meteorological ozone episode potential using a regression based weighting covering 30-years of data (1998-2010), the June 18 - 22, 2008 period was ranked in the 99th percentile. This episode contained the top four daily Basin ozone maximum concentrations for 2008 and has been selected as the focus of the attainment demonstration.

Table VII-5-5 summarizes the June 18 - 22 ozone meteorological episode. Three monitoring stations shared the distinction as having the daily maximum concentration including Crestline, Glendora and on the final day, Glendora and Santa Clarita. As indicated in Table VII-5-4, Crestline is the design site for the Basin with a 1-hour average design value of 158 ppb. Several locations in the San Bernardino and Riverside Valleys exhibit similar daily transport patterns as Crestline. Glendora, which exhibited the second highest design value (151 ppb) is located approximately 30 km downwind of Central Los Angeles along the same wind transport route. The peak Basin 2008 1-hour average ozone concentration observed at Santa Clarita was on August 2nd with a value of 150 ppb along a distinctly different transport route. As illustrated in Table VII-5-5, the observed Basin maximum ozone concentration for the episode closely matches the station design value for the station observing the maximum concentration. The exceptions occur on June 20th where the observed 1-hr maximum ozone concentration reached 176 PPB at Crestline, approximately 111 percent of the Crestline (and Basin) design value. Similarly, on Sunday June 22nd the observed maximum concentration was approximately 82and 87 percent of the Glendora and Santa Clarita design values, respectively.

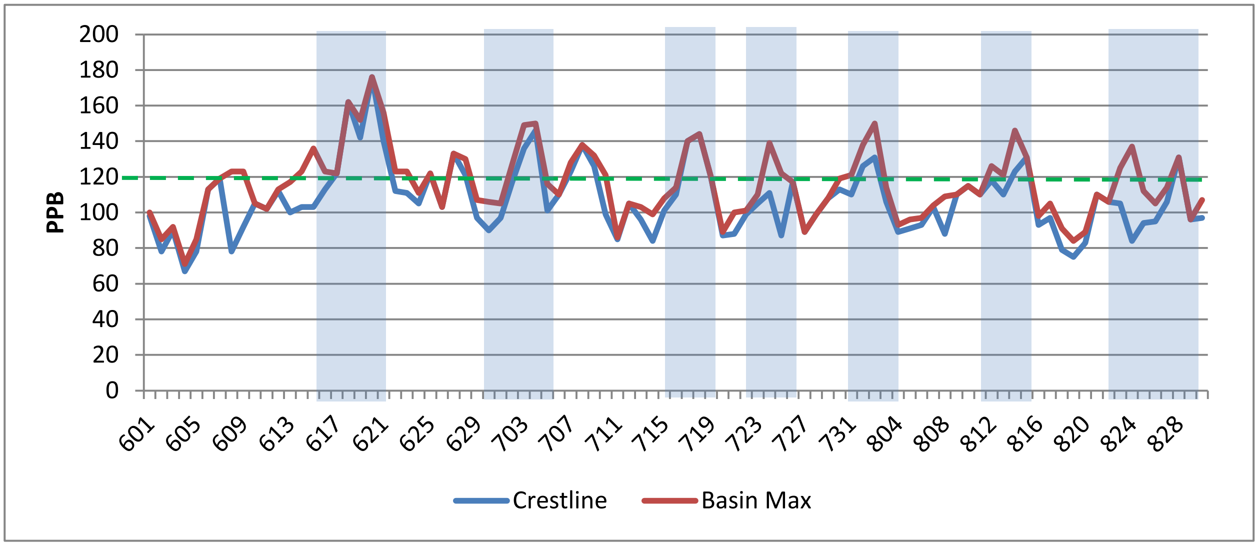


FIGURE VII-5-1

Observed Basin and Crestline Daily Maximum 1-Hr Ozone Concentrations: June 1 through August 31, 2008. (Shaded areas indicate multiple day regional ozone episodes).

TABLE VII-5-4

2008 Basin Weighted Design Values and Number of Days Daily 1-Hour Ozone Maximum Concentrations Exceeded 120 ppb*

Station	2008 5-Year Weighted Design (ppb)	Number of Days in 2008 with Observed 1-Hr Maximum Ozone > 120 ppb
Azusa	137	7
Burbank	127	0
Reseda	125	0
Pomona	138	5
Pasadena	130	1
Santa Clarita	141	8
Glendora	151	12
Rubidoux	137	8
Perris	134	4
Mira Loma	129	4
Lake Elsinore	133	6
Banning Airport	138	10
Upland	147	9
Crestline	158	16
Fontana	148	8
San Bernardino	150	11
Redlands	149	12

*Only Stations having design values greater than 120 ppb are listed

TABLE VII-5-5
Profile of the June 18-22, 2008 Meteorological-Ozone Episode

Date	Day of Week	Maximum Observed 1-Hr Ozone (PPB)	Design Value at Maximum Station (PPB)	Maximum Location
18-Jun-08	Wed	162	158	Crestline
19-Jun-08	Thu	152	151	Glendora
20-Jun-08	Fri	176	158	Crestline
21-Jun-08	Sat	156	151	Glendora
22-Jun-08	Sun	123	151	Glendora
			141	Santa Clarita

BASE-YEAR OZONE MODEL PERFORMANCE EVALUATION

For the CMAQ performance evaluation, the modeling domain is separated into nine sub-regions or zones. Figure VII-5-2 depicts the sub-regional zones used for base-year simulation performance. The different zones present unique air quality profiles. In previous ozone modeling attainment demonstrations using a smaller modeling domain, the number and size of the zones were different. Seven zones represented the Basin and portions of Ventura County, the Mojave Desert and the Coachella Valley.

For the current analysis the Basin is represented by three of the zones: Zone 3 – the San Fernando Valley, Zone 4 – the Eastern San Gabriel, Riverside and San Bernardino Valleys, and Zone 5 – the Los Angeles and Orange County emissions source areas. Of the three areas, Zone 4 represents the Basin maximum ozone concentrations and the primary downwind impact zone. As such, the priority in evaluating model performance is focused on Zone 4.

The statistics used to evaluate 1-hour average CMAQ ozone performance do not change from previous AQMPs and include the following:

Statistic for O_3	Criteria (%)	Comparison Basis
Normalized Gross Bias	≤ ±15	Paired in space and time
Normalized Gross Error	≤ 35	Paired in space (+2 grid cells) and time
Peak Prediction Accuracy	≤ ± 20	Unpaired in space and time

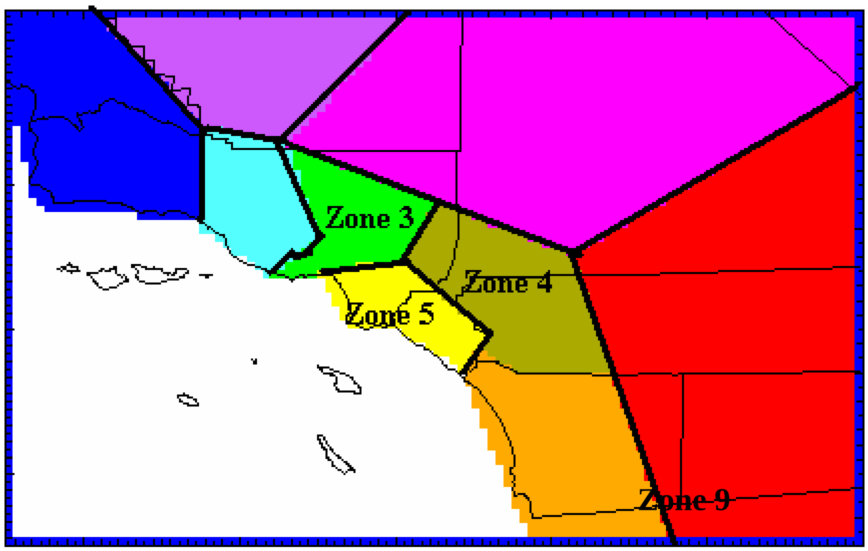


FIGURE VII-5-2

Performance Evaluation Zones

The base year average regional model performance for the June 2008 episode for Zones 3, 4, and 5 is presented in Table VII-5-6. Performance statistics are presented for observed concentrations of 60 ppb or greater.

The CMAQ ozone simulations generally meet the 1-hour average unpaired peak on four of the five episode days in Zones 3 and 5 and on three of the days in Zone 4. The 2008 highest observed 1-hour ozone concentrations occurred on June 18th and June 20th in Zone 4. The ozone simulations were only able to recreate 76 and 73 percent of the observed concentrations on each of those days. Normalized bias tended to be negative in Zones 3 and 4. Zone-5 showed a tendency for over prediction on June 19th and 22nd. The normalized model error performance goal was consistently met in the three zones on June 19-21.

Figures VII-5-3 through VII-5-12 present the diurnal profiles of observed and CMAQ simulated 1-hour ozone and spatial plots of daily 1-hour maximum predicted ozone for the June 2008 episode. The diurnal trends depict station profiles grouped by evaluation zone with Zone 3 presented at the left side of the chart. The CMAQ predicted trend is highlighted by a dashed red line. The trend diagrams support the statistical analysis with June 19th and 21st depicting a close match with observations, particularly in Zone 4. The trend of predicted and observed diurnal ozone is also closely matched in Zones 3 and 5 for all days except June 22nd when the daily peak ozone concentrations were over predicted.

The corresponding spatial plots of daily ozone maximum demonstrate the extent and concentration ranges of CMAQ predicted ozone. The peak predicted concentrations occur in Zone 4 on June 21st followed by June 19th, with both days meeting the unpaired prediction criteria. On June 22nd, the same pattern persists but with an extension of higher predicted ozone concentrations occurring in Zone 5 as well. While June 18th and 20th are under predicted (unpaired peak ratio of 0. 76 and 0.73), the location of the projected daily 1-hour ozone maximum concentrations is correctly depicted in the spatial presentation.

Additional statistical characterizations of model performance and individual station diurnal trends of observed and predicted 1-hour ozone concentrations are presented as Attachments 1 and 2 to this Appendix.

TABLE VII-5-6

June 18-22, 2008 Base Year 1-Hour Average Ozone Performance
(Bold type indicates meeting statistical performance criteria).

Date	Zone 3				
	Observed (ppb)	**Predicted (ppb)**	**Unpaired Peak Ratio**	**Normalized Bias* (ppb)**	**Normalized Error* (ppb)**
618	87	93	1.07	-17	**25**
619	95	109	1.15	**4**	**18**
620	111	99	0.89	**-10**	**19**
621	122	107	0.87	-19	**20**
622	123	92	0.75	-29	**29**
Date	Zone 4				
	Observed (ppb)	**Predicted (ppb)**	**Unpaired Peak Ratio**	**Normalized Bias* (ppb)**	**Normalized Error* (ppb)**
618	162	123	0.76	-17	**20**
619	152	136	0.90	**-1**	**18**
620	176	129	0.73	**-12**	**16**
621	156	150	0.96	**-1**	**18**
622	123	134	1.09	**10**	**21**
Date	**Zone 5**				
	Observed (ppb)	**Predicted (ppb)**	**Unpaired Peak Ratio**	**Normalized Bias* (ppb)**	**Normalized Error* (ppb)**
618	118	107	0.91	**0**	**22**
619	110	111	1.01	**11**	**15**
620	114	106	0.93	**0**	**13**
621	107	115	1.07	**4**	**12**
622	107	121	1.13	**13**	**19**

*Normalized bias and normalized error calculated for hours where observations > 60 ppb

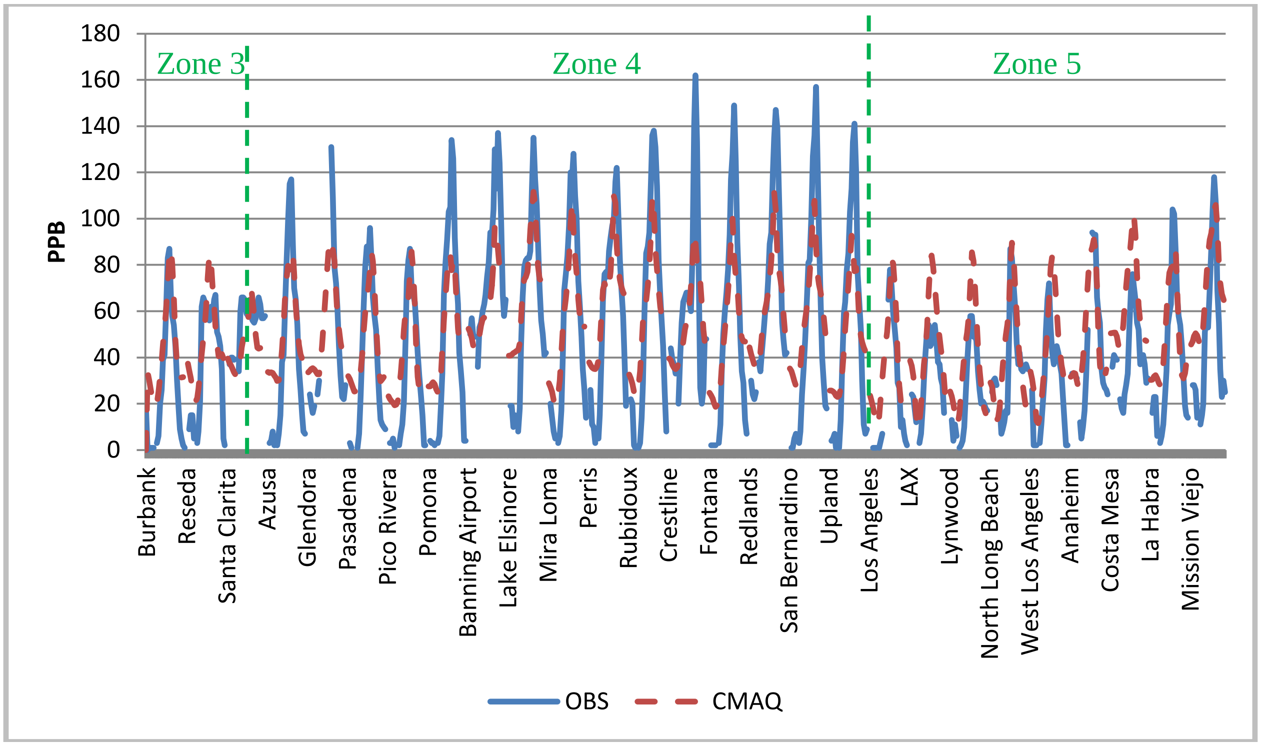


FIGURE VII-5-3
CMAQ predicted and observed diurnal trends of 1-hour ozone for June 18, 2008

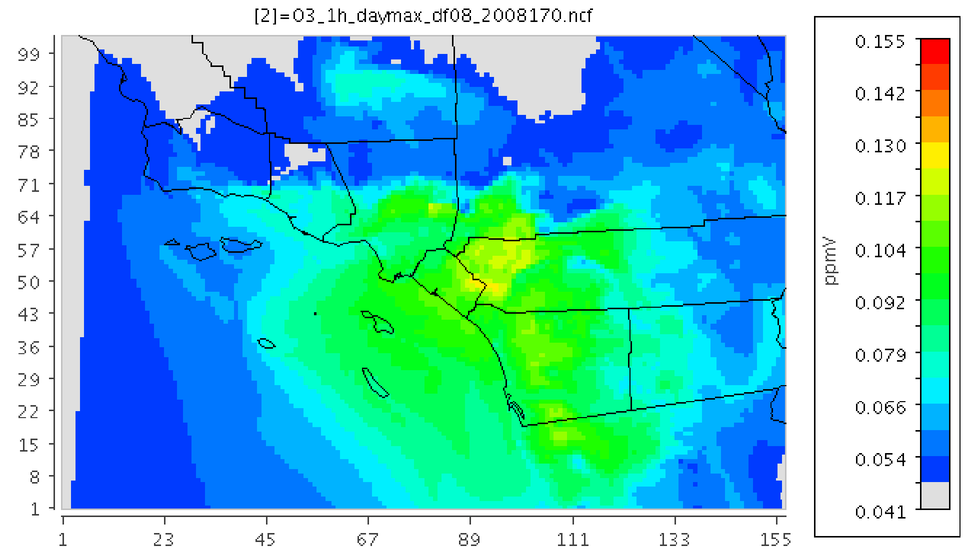


FIGURE VII-5-4
CMAQ predicted maximum 1-hour ozone (PPB) for June 18, 2008

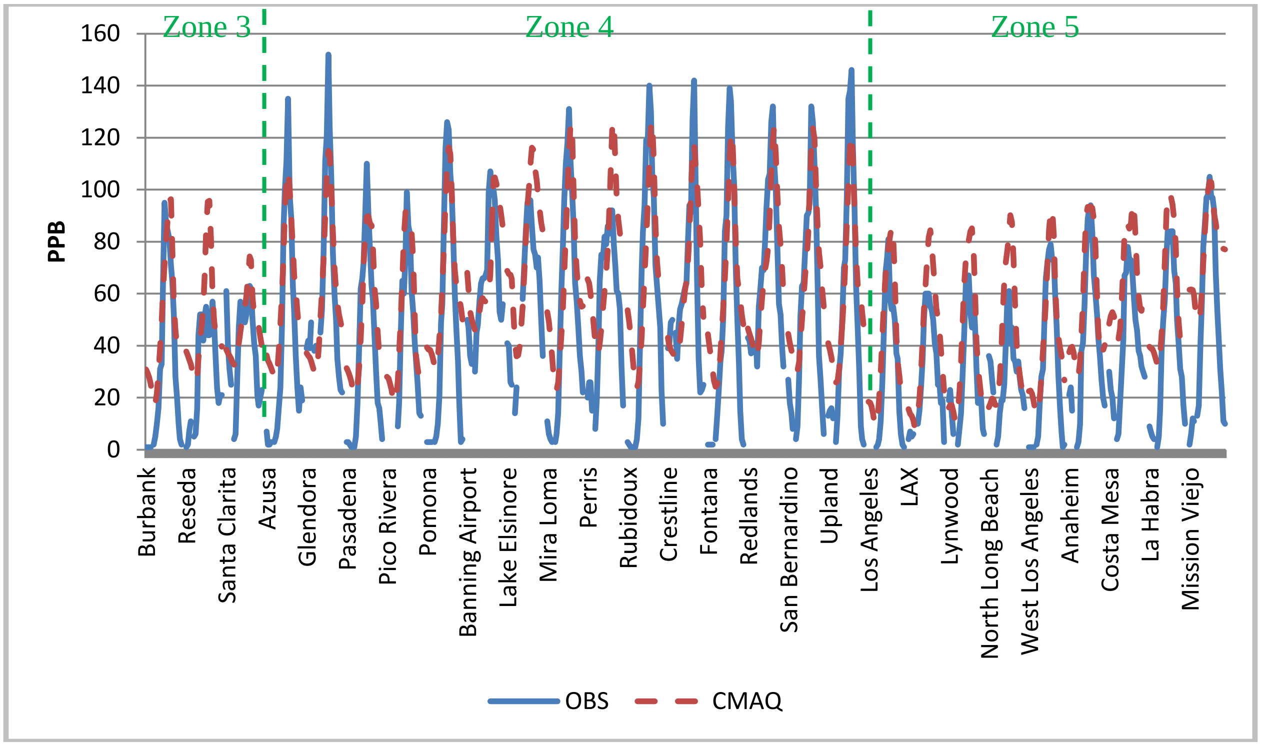


FIGURE VII-5-5

CMAQ predicted and observed diurnal trends of 1-hour ozone for June 19, 2008

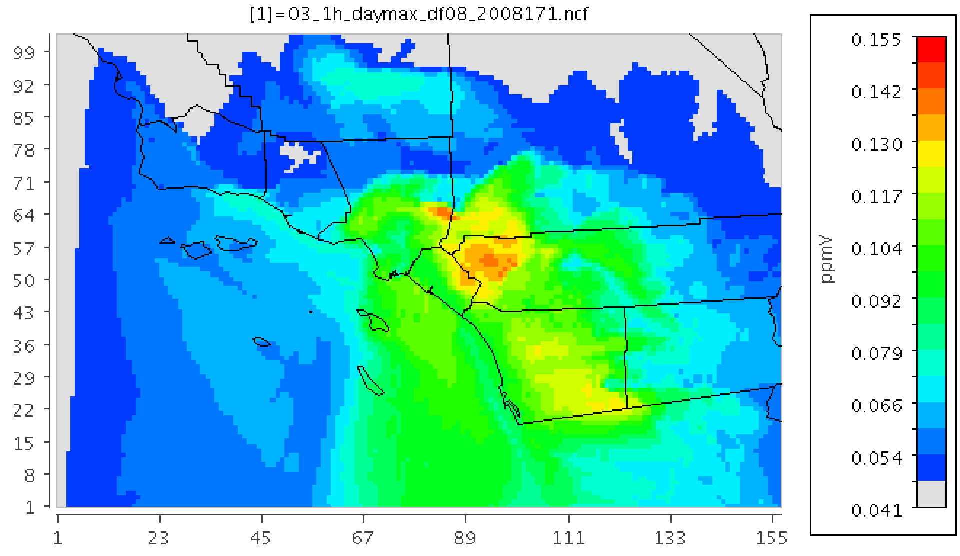


FIGURE VII-5-6

CMAQ predicted maximum 1-hour ozone (PPB) for June 19, 2008

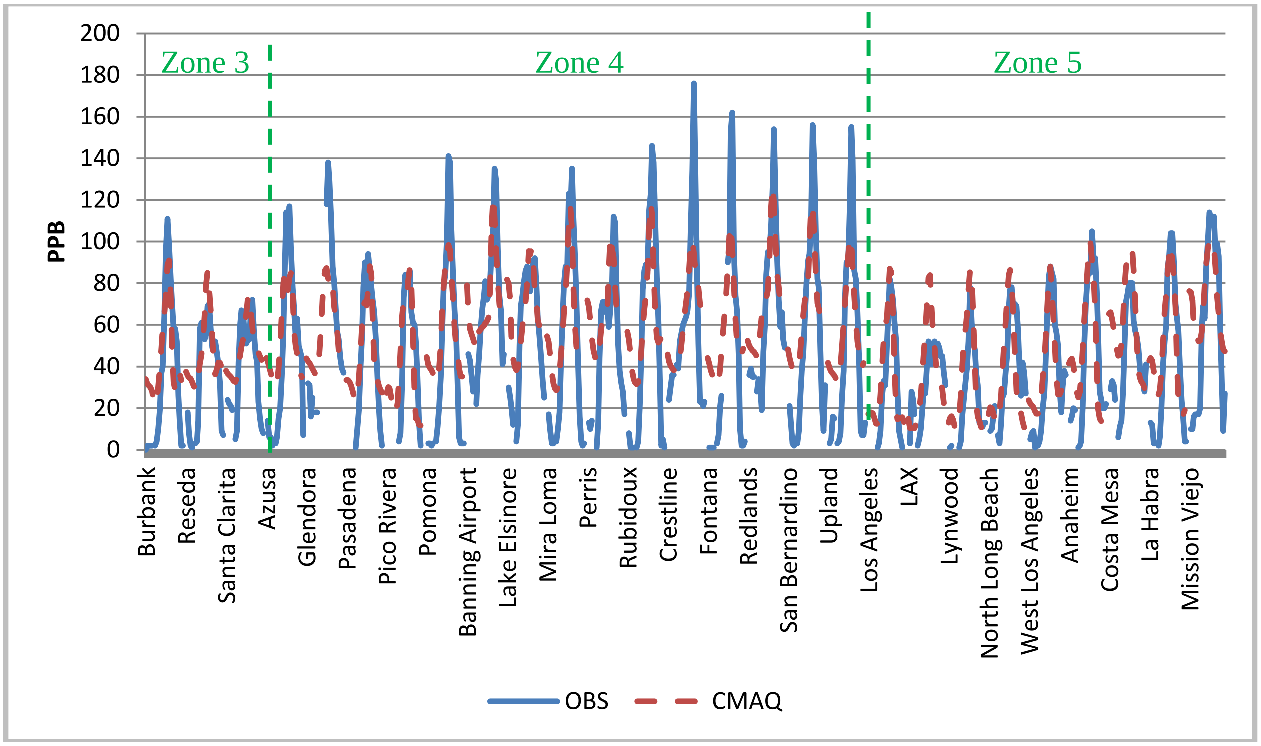


FIGURE VII-5-7
CMAQ predicted and observed diurnal trends of 1-hour ozone for June 20, 2008

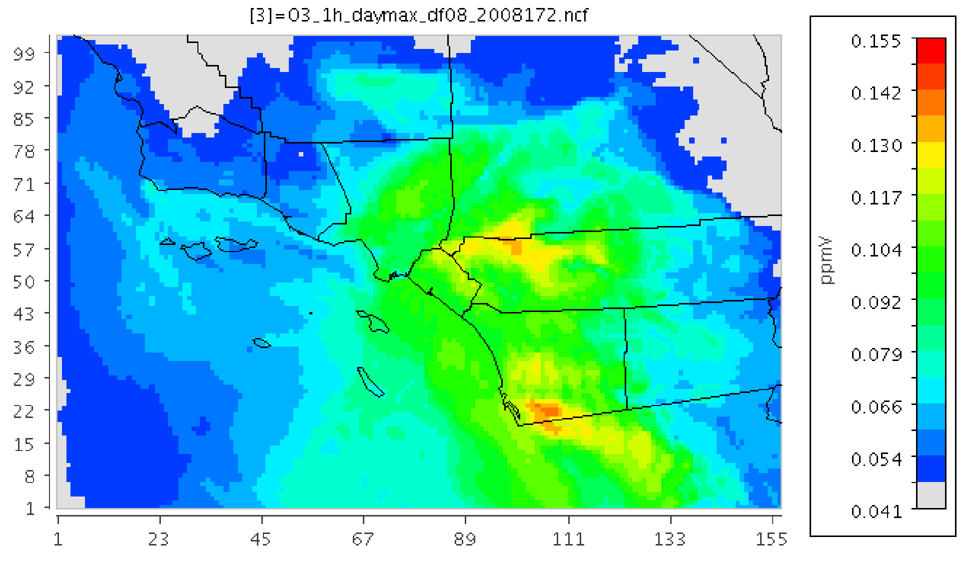


FIGURE VII-5-8
CMAQ predicted maximum 1-hour ozone (PPB) for for June 20, 2008

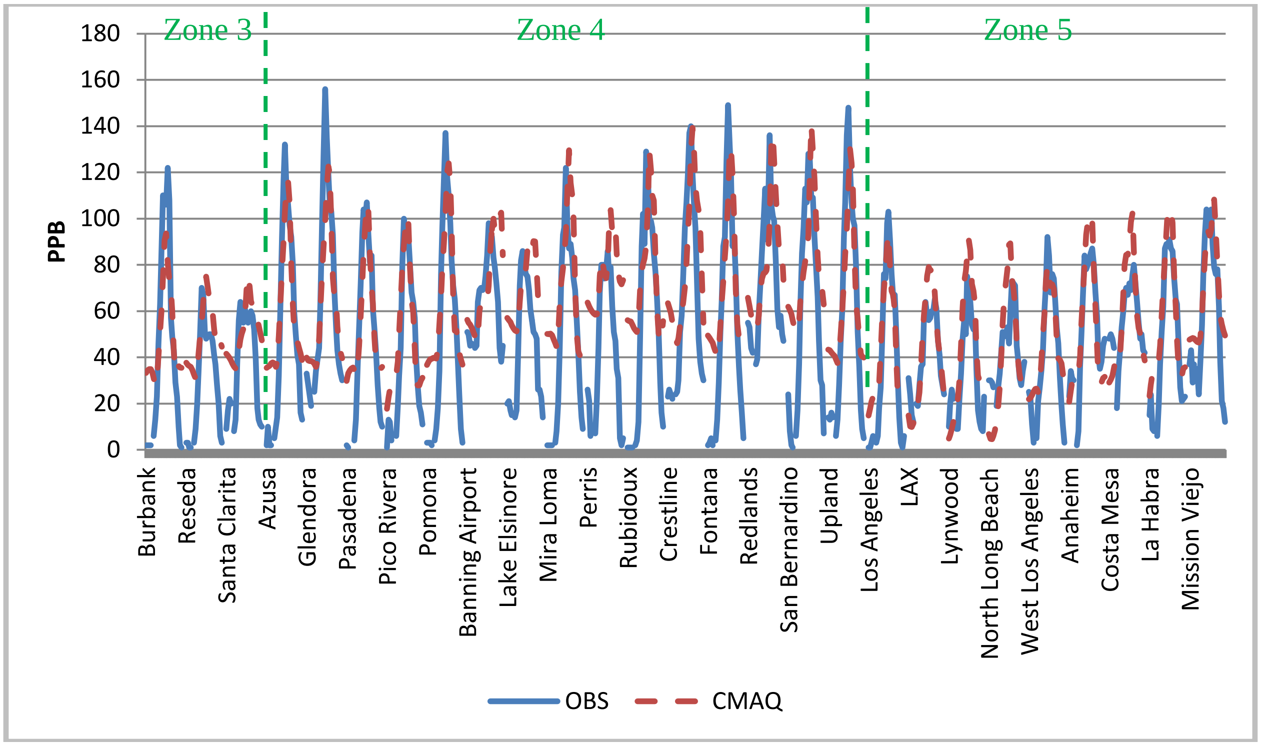


FIGURE VII-5-9

CMAQ predicted and observed diurnal trends of 1-hour ozone for June 21, 2008

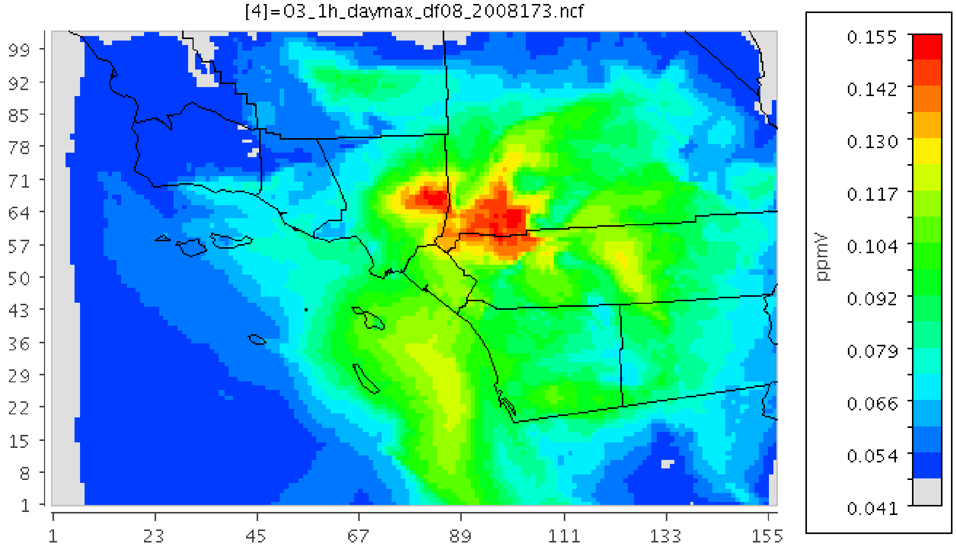


FIGURE VII-5-10

CMAQ predicted maximum 1-hour ozone (PPB) for June 21, 2008

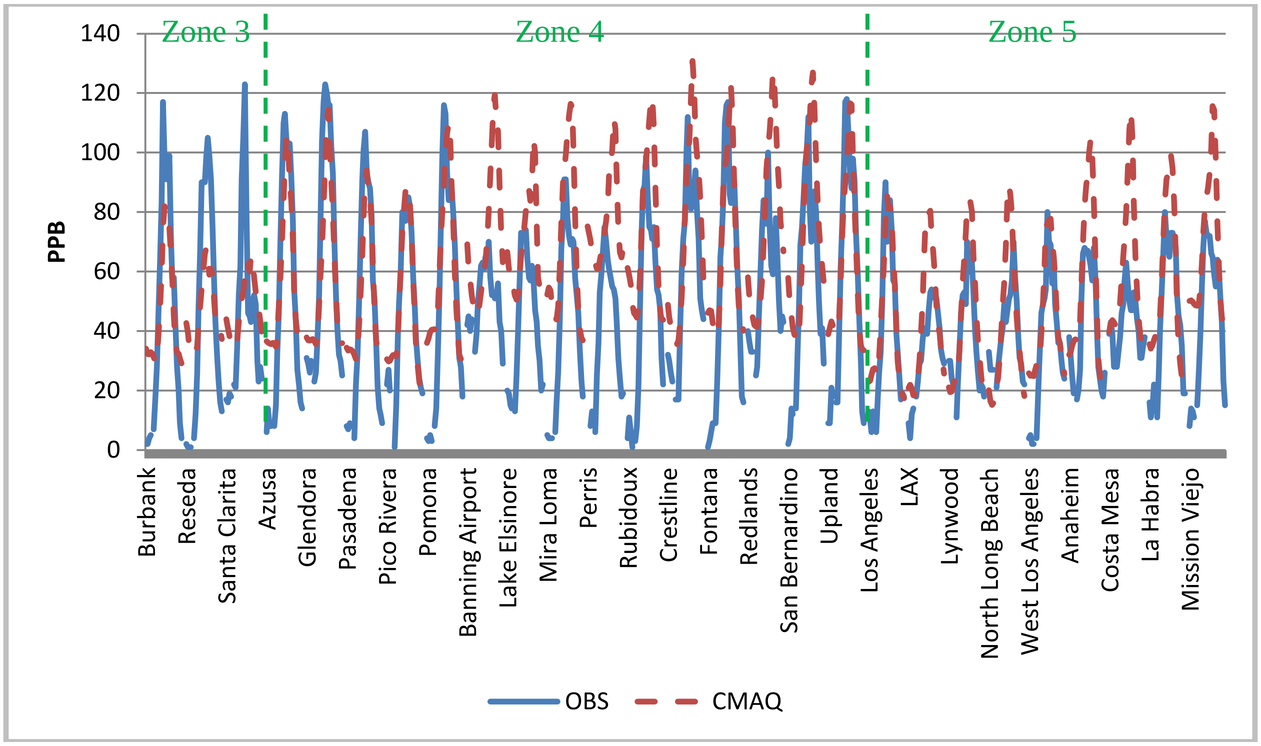


FIGURE VII-5-11
CMAQ predicted and observed diurnal trends of 1-hour ozone for June 22, 2008

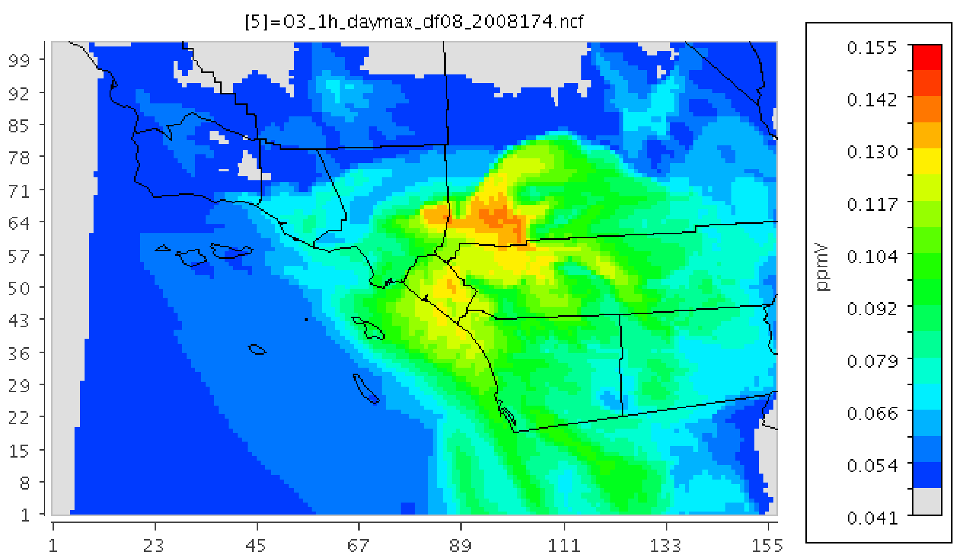


FIGURE VII-5-12
CMAQ predicted maximum 1-hour ozone (PPB) for June 22, 2008

ATTAINMENT DEMONSTRATION

Table VII-5-7 provides the summary of the 1-hour ozone attainment demonstration using the CMAQ modeling platform and the 2022 controlled emissions inventory (410 TPD VOC, 150 TPD NOx). The Controlled Emissions Projection Algorithm (CEPA) summary is provided as Attachment 3 to this document. The maximum predicted 1-hour ozone concentration on 125.6 ppb occurs on June 19th at Pasadena. All other predicted concentrations during the five day episode are projected to be below the attainment demonstration concentration threshold of 124.4 ppb. (Note: both June 18th and June 20th failed to meet all of the model acceptance criteria, more specifically the unpaired peak analysis. As a result, the attainment demonstration is focusing on the June 19th and 21st, days with observed peak concentrations that closely matched the design values).

The final two columns in Table VII-5-7 provide the maximum of the 2022 predicted daily maximum 1-hour ozone concentrations for all 92 days simulated with the controlled emissions as well as the number of occurrences the daily maximum was predicted to exceed 124.4 ppb. The analysis demonstrated that throughout the June through August smog season, only Pasadena on June 19th has a 2022 predicted 1-hour daily maximum ozone concentrations that would exceed the attainment threshold. All other predicted maximum 1-hour average concentrations during the 92 day summer ozone season are projected to be at least 10 percent below the attainment threshold. This is illustrated by the time series of predicted daily maximum 1-hour ozone concentrations in Figure VII-5-13. Regional temperatures during the June episode were extremely warm, giving rise to extensive evaporative and biogenic emissions. Midday temperatures in the San Gabriel Valley exceeded 100 degrees Fahrenheit on each day during the episode. Table VII-5-8 lists a summary of 4 model simulations for June 19th which include the 2022 predicted maximum 1-hour ozone for that day, the maximum predicted 1-hour ozone over all 92 simulated days, and the number of days the standard was projected to be violated at each station. The simulations included 2022 baseline emissions, and model analyses with reaming emissions of 410 TPD VOC and 180, 160 and 150 TPD NOx.

The analysis shows that when NOx emissions are reduced from the 2022 baseline values to 180 TPD, only 4 sites have one day exceeding the standard throughout the season. Three violations are projected to occur on June 19th while the violation at Upland is projected to occur on June 20th. When simulated with 160 TPD NOx, only Burbank and Pasadena are projected to exceed the standard on June 19th, and with 150 TPD NOx, only Pasadena is projected to exceed the standard on one day. The high biogenic emissions during this episode may have contributed to an increasing VOC/NOx ratio in this area which is directly downwind of the metropolitan Los Angeles emissions sources. As biogenic emissions remain constant, NOx emissions are lowered leading to the increased reactivity and ozone forming potential. By the

150 TPD NOx emissions level, the impact appears to be isolated only to Pasadena which remained above the 124.4 ppb level. It is important to note that variations in the local wind field and deeper atmospheric mixing responding to the surface heating on June 18th and June 20th may have ameliorated the impact to the San Gabriel Valley on those days.

The form of the 1-hour standard allows for a single exceedance at a station annually. Given the form of the standard, the 410 TPD VOC and 150 TPD NOx emissions carrying capacity satisfies the Basin 1-hour ozone attainment demonstration. The 410 TPD VOC and 150 TPD NOx level emissions carrying capacity translates to a 30 TPD (7 percent) reduction in VOC emissions beyond the 2022 baseline and a 185 TPD (55 percent) reduction in NOx emissions beyond 2022 baseline. The 150 TPD NOx level represents a conservative estimate of the carrying capacity. Since the form of the standard allows for one exceedance per station per year, it may be possible to meet the standard at NOx levels as high as 180 TPD as demonstrated in Table VII-5-8.

Figures VII-5-14 through VII-5-23 provide the gridded daily 1-hour maximum ozone simulated for the 2022 baseline (440 TPD VOC and 335 TPD NOx) and controlled emissions (410 TPD VOC and 150 TPD NOx).

TABLE VII-5-7

Predicted Maximum 1-Hour Ozone (PPB) for the June 18-22 Episode for the 2022 Controlled Summer Planning Day Emissions

Station	June 18 Wed	June 19 Thu	June 20 Fri	June 21 Sat	June 22 Sun	92 Days Simulated Maximum PPB	Number of Days > 124.4 PPB
Azusa	112.7	116.1	112.8	119.5	93.4	119.5	0
Burbank	107.5	121.9	97.6	91.3	78.6	121.9	0
Glendora	115.6	113.0	113.7	115.6	91.4	115.6	0
Pasadena	112.4	125.6	109.3	108.6	89.7	125.6	1
Pomona	122.1	89.5	101.3	112.2	99.0	122.1	0
Reseda	66.0	97.6	79.9	58.9	54.8	97.6	0
Santa Clarita	55.3	61.8	58.4	58.2	56.2	93.8	0
Banning Airport	104.7	83.0	103.2	93.8	104.9	104.9	0
Lake Elsinore	83.5	81.2	69.4	62.3	72.9	98.0	0
Mira Loma	111.9	90.9	106.7	100.2	105.1	111.9	0
Perris	97.6	90.9	77.8	92.3	101.1	101.1	0
Rubidoux	110.8	90.5	106.8	104.8	109.9	110.8	0
Crestline	99.5	83.4	106.7	116.4	96.1	116.4	0
Fontana	120.1	89.0	102.0	116.1	103.4	120.1	0
Redlands	115.1	94.5	109.1	104.1	107.6	115.1	0
San Bernardino	117.8	95.1	107.4	99.7	108.2	117.8	0
Upland	122.0	89.8	104.1	112.6	94.7	122.0	0

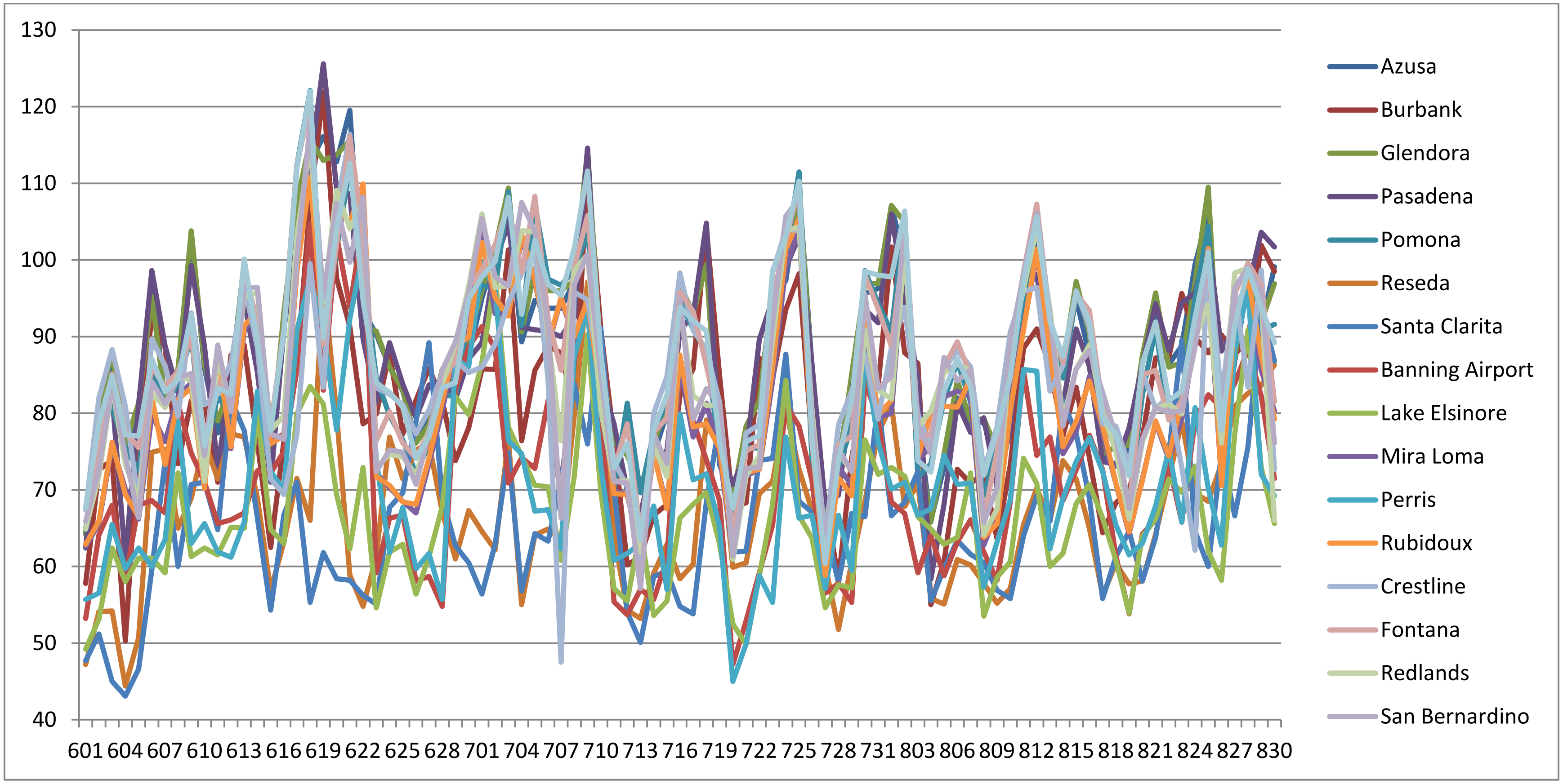


FIGURE VII-5-13

CMAQ Simulated Daily 1-Hour Maximum Ozone for June through August 2022 with the 2022 Controlled Summer Emissions. (The green dashed line depicts the 124.4 PPB threshold for the attainment demonstration).

TABLE VII-5-8

Predicted Maximum 1-Hour Ozone (PPB) for the June 19th Episode for the 2022 Baseline and Selected Controlled Summer Planning Day Emissions

Station	Baseline Emissions June 19 Max (PPB)	92 Day Max (PPB)	Days > 124.4 (PPB)	NOx 180 TPD June 19 Max (PPB)	92 Day Max (PPB)	Days > 124.4 (PPB)	NOx 160 TPD June 19 Max (PPB)	92 Day Max (PPB)	Days > 124.4 (PPB)	NOx 150 TPD June 19 Max (PPB)	92 Day Max (PPB)	Days > 124.4 (PPB)
Azusa	113.5	133.1	1	120.1	124.8	1	119.1	121.9	0	116.1	119.5	0
Burbank	129.3	129.3	1	127.0	127.0	1	124.5	124.5	1	121.9	121.9	0
Glendora	112.9	132.4	1	117.0	121.3	0	115.8	118.4	0	113.0	115.6	0
Pasadena	122.4	122.4	0	128.4	128.4	1	127.2	127.2	1	125.6	125.6	1
Pomona	104.8	126.1	1	92.4	123.7	0	92.5	123.0	0	89.5	122.1	0
Reseda	111.4	111.4	0	101.8	101.8	0	99.6	99.7	0	97.6	97.6	0
Santa Clarita	67.7	108.2	0	63.2	105.1	0	62.3	104.4	0	61.8	93.8	0
Banning Airport	96.4	124.5	1	86.8	111.6	0	85.2	109.7	0	83.0	104.9	0
Lake Elsinore	98.8	107.7	0	85.2	102.3	0	82.8	100.7	0	81.2	98.0	0
Mira Loma	110.6	126.4	2	94.3	116.7	0	91.4	114.8	0	90.9	111.9	0
Perris	110.6	115.6	0	94.4	107.8	0	91.6	106.9	0	90.9	101.1	0
Rubidoux	109.8	127.1	2	93.8	116.6	0	90.8	115	0	90.5	110.8	0
Crestline	102.9	136.7	2	86.9	123.9	0	84.1	121.1	0	83.4	116.4	0
Fontana	106.0	131.7	1	92.5	123.6	0	89.9	121.6	0	89.0	120.1	0
Redlands	114.0	131.0	2	98.1	119.8	0	95	117.5	0	94.5	115.1	0
San Bernardino	113.5	127.8	4	98.4	121.9	0	95.3	120.4	0	95.1	117.8	0
Upland	107.4	127.0	1	93.3	124.5	1	90.6	123.4	0	89.8	122.0	0

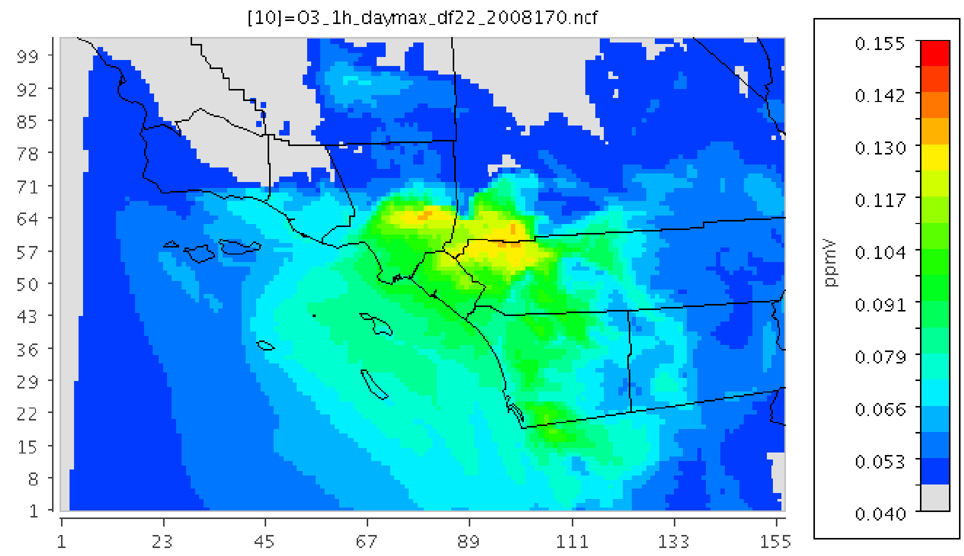


FIGURE VII-5-14

CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 18, 2008: Baseline Emissions

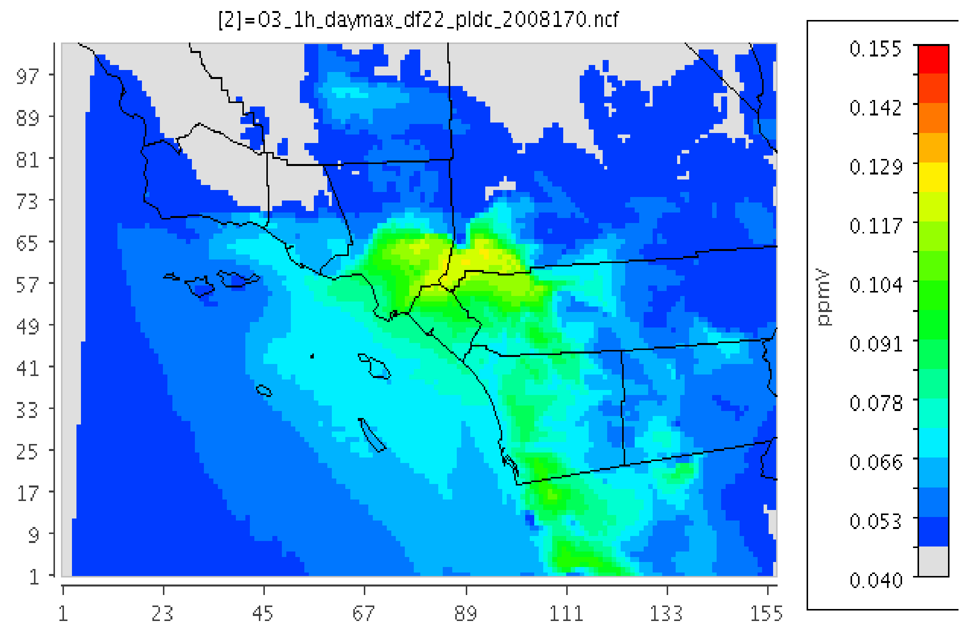


FIGURE VII-5-15

CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 18, 2008: Controlled Emissions

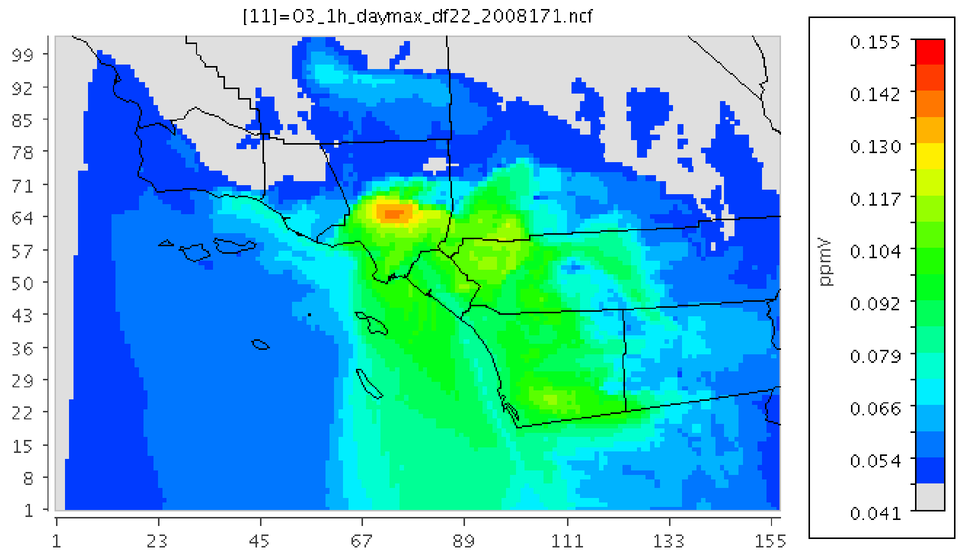


FIGURE VII-5-16
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 19, 2008: Baseline Emissions

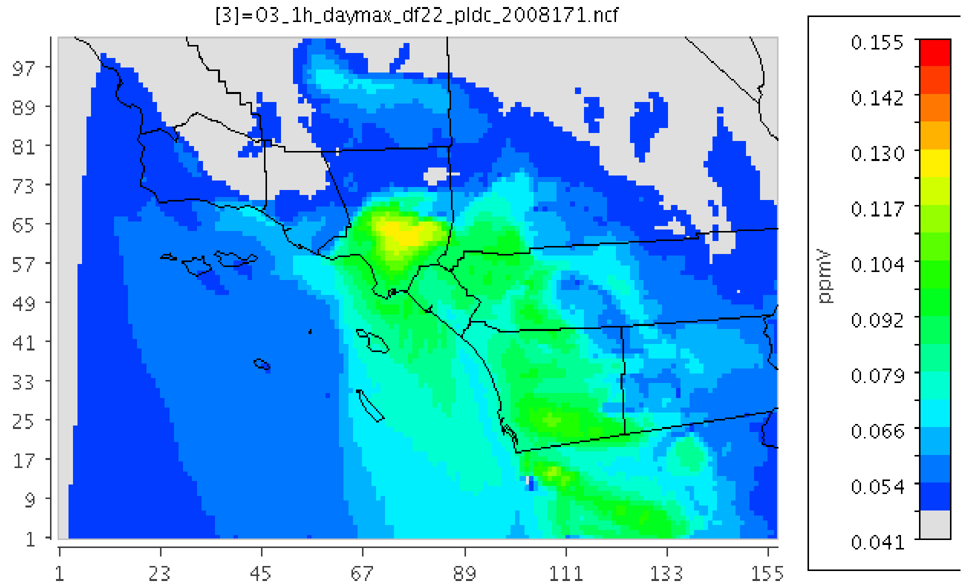


FIGURE VII-5-17
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 19, 2008: Controlled Emissions

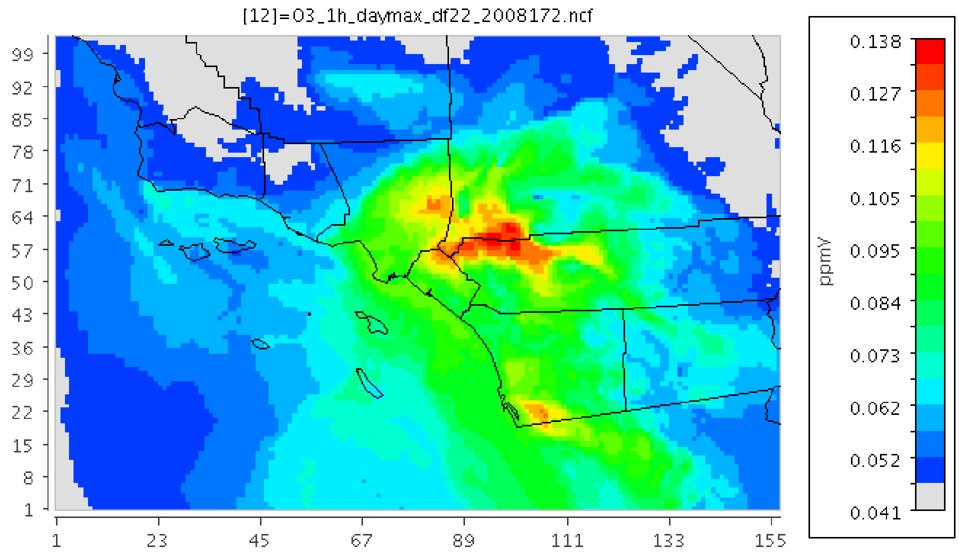


FIGURE VII-5-18
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 20, 2008: Baseline Emissions

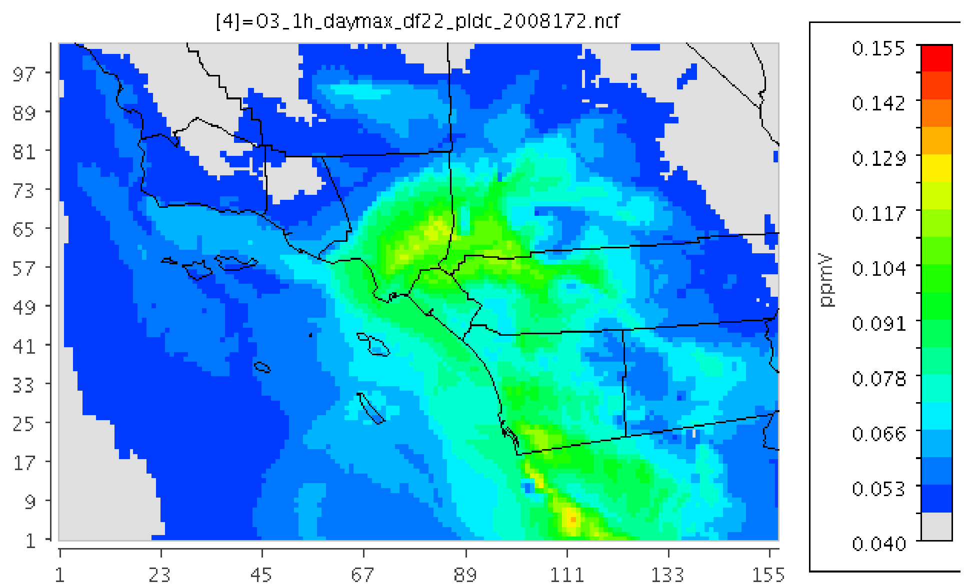


FIGURE VII-5-19
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 20, 2008: Controlled Emissions

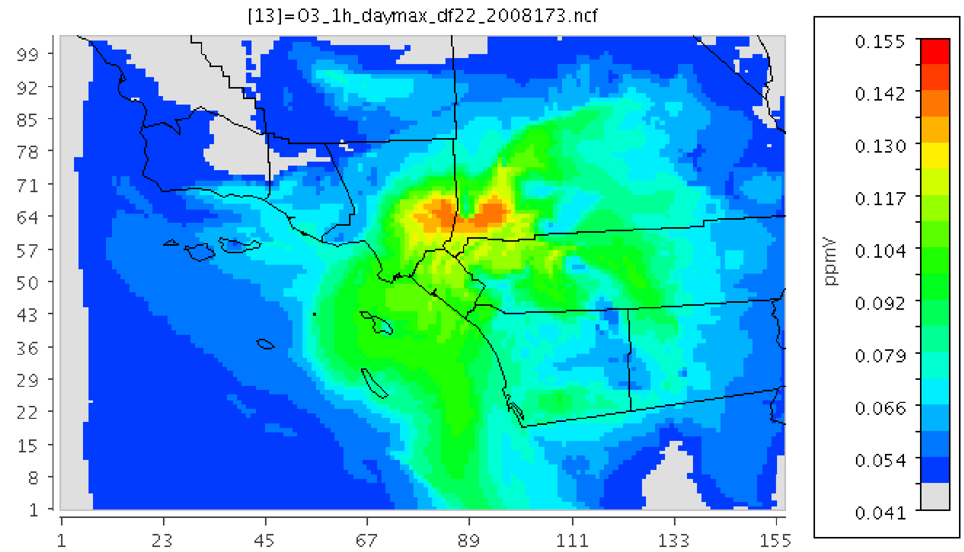


FIGURE VII-5-20

CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 21, 2008: Baseline Emissions

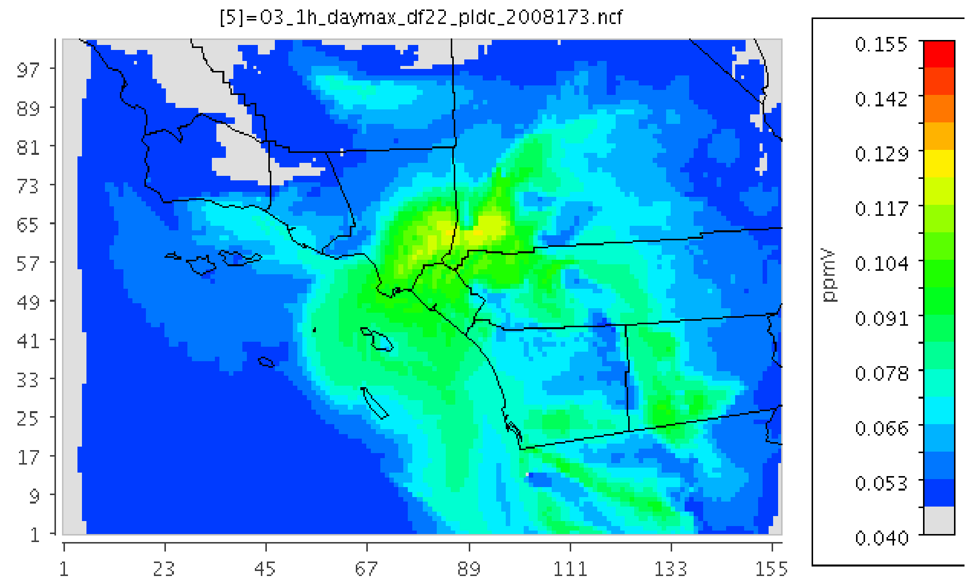


FIGURE VII-5-21

CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 21, 2008: Controlled Emissions

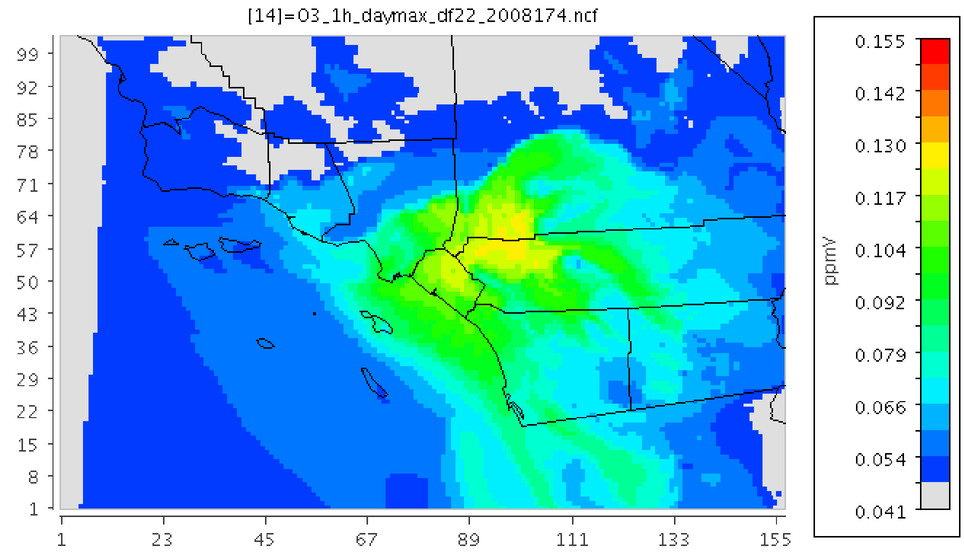


FIGURE VII-5-22
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 22, 2008: Baseline Emissions

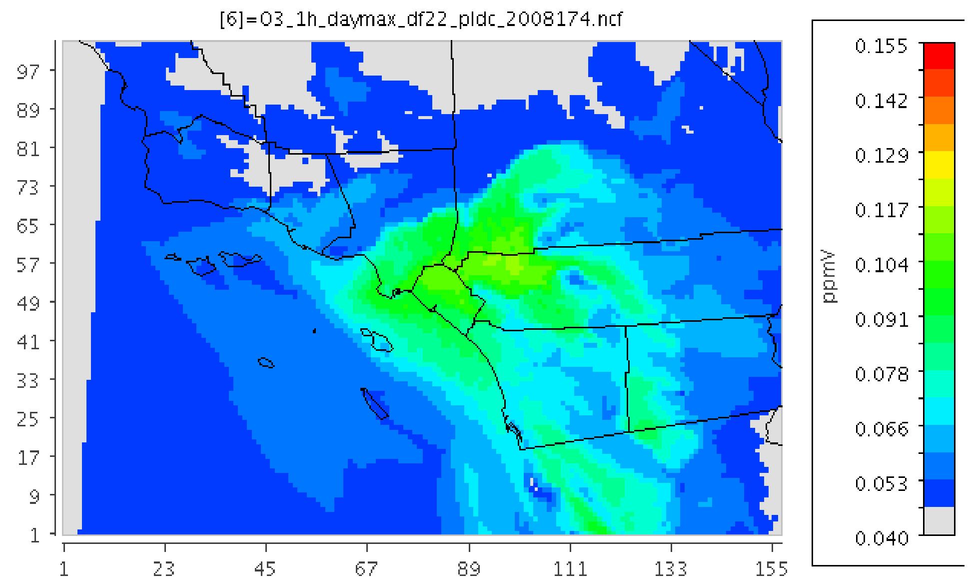
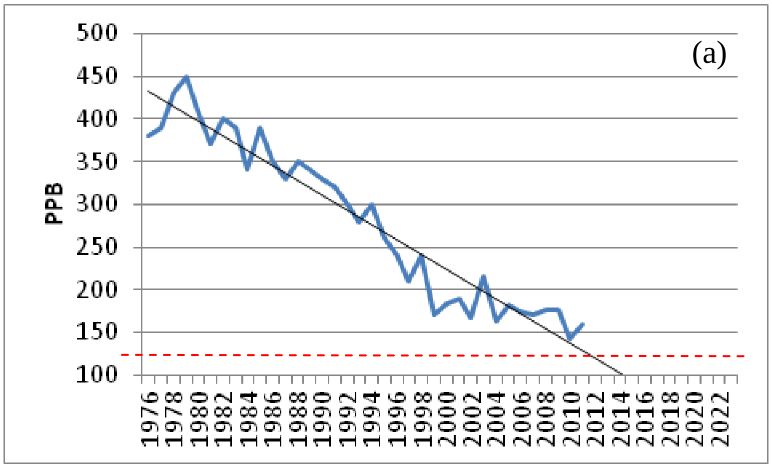


FIGURE VII-5-23
CMAQ predicted 2022 maximum 1-hour ozone (PPB) for June 22, 2008: Controlled Emissions

WEIGHT OF EVIDENCE

The U.S. EPA recommends that a weight of evidence discussion be incorporated with air quality attainment demonstrations, particularly if the future year simulated ozone concentrations are within a certain percent of the standard in question. For 8-hour ozone, U.S. EPA requires a weight of evidence discussion to provide aggregate supplemental analyses to support the modeled attainment test if the future projected concentration falls within 3 percent of the acceptance threshold. Applying this criterion for the 1-hour standard would require a weight of evidence discussion if the projected maximum concentration fell within 4 ppb of the 124.4 threshold. As such, the weight of evidence discussion presented in this section addresses two lines of reasoning why the proposed control strategy and associated emissions reductions will achieve attainment of the 1-hour ozone standard. The first analysis examines the trends of observed ozone and precursor emissions and then projecting those trends forward in time to determine when an empirically projected attainment date would take place and if the emissions trends continued. As previously stated, the second analysis employs a tiered RRF approach to determine if the emissions reductions using the simulation ratio and design value methodology provides further support for the demonstration of attainment.

Figures VII-5-24 and VII-5-25 present the trends of observed annual 1-hour maximum ozone concentrations and the projections of the trend through 2023. Figure VII-5-24(a) depicts the long term trend beginning with 1976 and including all years through 2011. The linear regression best fit line indicates that if the trend is projected forward in time, the Basin would be expected to meet the one hour standard as early as 2013. However, a close examination of the long term trend shows an inflection that occurred post 1996 California Phase II Reformulation creating a "hockey stick" appearance. Reexamining the blade of the hockey stick in Figure VII-5-24(b) from 2000 through 2011, the best fit projection suggests attainment would take until 2023 which is consistent with the attainment demonstration. Similarly, by 2022 the trends of Basin VOC and NOx emissions with full implementation of the 2007 AQMP will be very consistent with the targeted carrying capacity (410 TPD VOC and 150 TPD NOx) .



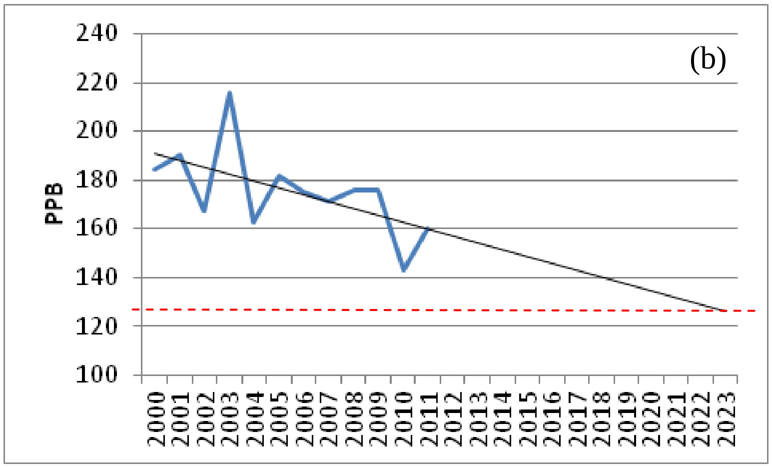


FIGURE VII-5-24

Trends of Annual Basin 1-Hour Maximum Ozone Concentrations with Projections to 2023: (a) 1976 – 2011, (b) Post Phase II Fuel Reformulation: 2000 – 2011. (The dashed red line depicts the attainment threshold 124 PPB).

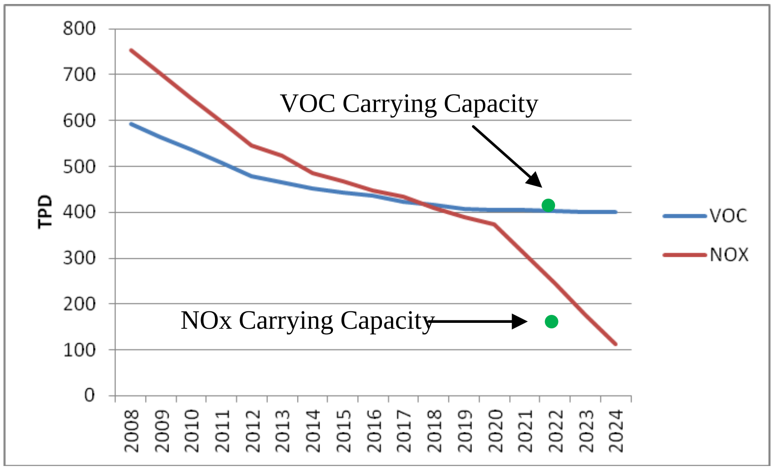


FIGURE VII-5-25

Trends of Annual Basin 1-Hour Maximum Ozone Concentrations with Projections to 2023: (a) 1976 – 2011, (b) Post Phase II Fuel Reformulation: 2000 – 2011. (The dashed red line depicts the attainment threshold 124 PPB).

The second element of the weight of evidence discussion utilizes the tiered RRF approach to determine station specific future year design concentrations based on base year 2008 emissions and 2022 controlled emissions. The proposed methodology tiers the concentration threshold for accepting a simulation station day based on three criteria for evaluation: (1) the base year daily maximum concentration absolute prediction error (calculated for a station per episode day) must be 20 percent or less; (2) the observed station concentration must be within 25 percent of the design value; and (3) a minimum of four station specific days simulated must meet the error at the set concentration threshold for the RRF to be calculated. The 20 percent error criteria is the same level used in the 8-hour ozone analysis and the four day minimum was iteratively determined to provide a measure of robustness to the RRF calculation. Basically, the four day criteria represented a balance between an analyses based on a higher error criteria with potentially more days included at a higher concentration threshold vs. a limited set of better simulated station days with lower prediction error. Table VII-5-9 lists the impacted stations and the threshold concentration used for the RRF calculation. Also listed in Table VII-5-9 are the base year average percentage prediction bias and error for those days included in the future year projection. Overall, the base year tendency is towards under prediction.

It is important to note that the analysis included both weekdays and weekend days. For example, the RRF calculation for the design site, Crestline, included 4 days with observed concentrations above 140 ppb including one Thursday, two Fridays and one Saturday. In contrast, the RRF for Fontana met the four day criteria at the 120 ppb threshold with one Thursday, two Saturdays and two Sunday episodes respectively. For both Azusa and Glendora, one of the four days included in the analysis was a weekday.

TABLE VII-5-9

Ozone Episode Selection Criteria: Four Days Above Threshold With Daily Absolute Percentage Prediction Error < 20%

Station	Zone	Tier (PPB)	No. Days	Avg Bias (PPB)	Avg Error (PPB)
Burbank	3	100	4	-8.4	8.4
Reseda	3	100	5	-8.0	9.5
Santa Clarita	3	110	6	-12.0	12.0
Azusa	4	115	4	-11.6	11.6
Glendora	4	120	4	-11.3	11.3
Pomona	4	115	5	-2.3	3.1
Banning Airport	4	100	5	-5.6	10.6
Lake Elsinore	4	115	7	-9.9	9.9
Mira Loma	4	120	4	4.3	4.9
Perris	4	115	6	-13.7	13.7
Rubidoux	4	125	4	-1.8	7.4
Crestline	4	140	5	-8.6	10.5
Fontana	4	120	5	-1.2	6.1
Redlands	4	130	4	0.3	4.7
San Bernardino	4	125	5	0.0	11.2
Upland	4	115	6	-4.8	7.0
Pasadena	5	100	5	-5.9	7.1

Tables VII-5-10 and VII-5-11 provide the summaries of the RRF analyses for the June through August period for 2022 baseline (440 TPD VOC and 335 TPD NOx) and 2022 controlled emissions (410 TPD VOC and 150 TPD NOx). The analyses provide future year projected 1-hour ozone design values for two scenarios: with and without the June 19th simulation day included. The difference between the projected future year design values assessed from the 17 and 18 day analyses provides an assessment of the impact a single day can have on the RRF attainment calculation.

The 2022 baseline analysis (Table VII-5-10) indicates that roughly half of the stations with 2008 weighted design values exceeding 120 ppb will not meet the attainment threshold of 124.4 ppb. Future year design values for the eastern portion of the Basin are projected to approach the standard at several sites. However, Crestline and Upland will remain upwards of 11 ppb over the attainment level. The San Gabriel Valley stations of Azusa, Pasadena and Glendora are all projected to be at least 15 ppb above the standard in the baseline scenario. Removing June 19th from the baseline analysis only impacts Pasadena, whereby, the projected future design value is lowered by more than 8 ppb. All other future year design values remain ± 1 ppb of the 18 station estimate.

When the controlled scenario is implemented in 2022 (TableVII-5-11), the predicted future year design values for the eastern portion of the Basin meet the attainment threshold. Only the San Gabriel Valley has projected design values exceeding the threshold. Removing June 19th from the analysis brings Pasadena into compliance and lowers the future design value at Azusa to within 3 ppb of the attainment goal. The removal of June 19th does not impact Glendora because that day was not included in the base year analysis. Of note, the removal of June 19th causes the Upland future year design value to nominally increase by 2 ppb. The RRF analysis demonstrates that the emissions reductions targeted through the implementation of the control program will cause future year air quality to meet the 1-hour standard at the majority of the areas in the Basin. Accounting for a particularly restrictive meteorological episode day, and excluding an episode such as June 19th, narrowed the gap between a projection of attainment and non-attainment. Overall, the 2022 17-day Tiered RRF analysis based on the controlled emissions closely mirrored the deterministic attainment demonstration.

While the tiered RRF analysis attainment projection can provide an approximation of the form of the 1-hour standard, the analysis does not provide an exact comparison. Day selection, the number of days included in the calculation, and the simulation performance for that day, all have critical impacts on the outcome of the future year projections.

The weight of evidence discussion provided in this section shows that the ongoing trends in air quality due to the implementation of the 2007 and 2012 control program and the control strategies already in place is expected to lower the future year 1-hour ozone design value such that the Basin will meet the standard by 2022. This is consistent with the Basin's projected attainment of the 8-hour ozone standard in 2023. Furthermore, while the tiered RRF analysis did not replicate the deterministic attainment projection, the analysis lends support to the level of emissions reduction need for attainment and the areas of the Basin expected to experience most air quality improvements from implementation of the control program.

TABLE VII-5-10

Summary of 2022 Tiered RRF Analysis for Baseline Emissions (440 TPD VOC and 335 TPD NOx)

Station	Days Included	Threshold to Enter Analysis	2008 Design Value	RRF 18- Days	Future Design 18-Days	RRF 17-Days*	Future Design 17-Days*
Azusa	4	115	137	1.021	139.9	1.024	140.3
Burbank	4	100	127	0.969	123	0.969	123
Glendora	4	120	151	0.949	143.3	0.949	143.3
Pasadena	5	100	130	1.089	141.6	1.026	133.4
Pomona	5	115	138	0.902	124.5	0.907	125.2
Reseda	5	100	125	0.899	112.4	0.899	112.4
Santa Clarita	6	110	141	0.849	119.7	0.849	119.7
Banning Airport	5	100	138	0.868	119.7	0.876	120.9
Lake Elsinore	7	115	133	0.818	108.8	0.818	108.8
Mira Loma	4	120	129	0.844	108.9	0.841	108.5
Perris	6	115	134	0.832	111.5	0.832	111.5
Rubidoux	4	125	137	0.853	116.9	0.850	116.4
Crestline	5	140	158	0.854	134.9	0.858	135.6
Fontana	5	120	148	0.867	128.3	0.865	128
Redlands	4	130	149	0.854	127.2	0.842	125.5
San Bernardino	5	125	150	0.851	127.7	0.829	124.4
Upland	6	115	147	0.924	135.9	0.929	136.6

*June 19th is removed from the analysis

TABLE VII-5-11

Summary of 2022 Tiered RRF Analysis for 2022 Controlled Emissions (VOC 410 TPD, NOx 150 TPD)

Station	Days Included	Threshold to Enter Analysis	2008 Design Value	RRF 18- Days	Future Design 18-Days	RRF 17-Days*	Future Design 17-Days*
Azusa	4	115	137	0.956	131.0	0.930	127.4
Burbank	4	100	127	0.879	111.6	0.879	111.6
Glendora	4	120	151	0.884	133.5	0.884	133.5
Pasadena	5	100	130	1.035	134.6	0.950	123.5
Pomona	5	115	138	0.788	108.8	0.797	110.0
Reseda	5	100	125	0.808	101.0	0.808	101.0
Santa Clarita	6	110	141	0.747	105.3	0.747	105.3
Banning Airport	5	100	138	0.743	102.5	0.751	103.6
Lake Elsinore	7	115	133	0.683	90.9	0.683	90.9
Mira Loma	4	120	129	0.746	96.2	0.760	98.0
Perris	6	115	134	0.705	94.5	0.705	94.5
Rubidoux	4	125	137	0.758	103.8	0.773	105.9
Crestline	5	140	158	0.737	116.4	0.751	118.7
Fontana	5	120	148	0.749	110.8	0.752	111.2
Redlands	4	130	149	0.735	109.6	0.734	109.4
San Bernardino	5	125	150	0.739	110.9	0.727	109.0
Upland	6	115	147	0.824	121.1	0.838	123.2

*June 19th is removed from the analysis

SUMMARY AND CONCLUSIONS

CMAQ regional air quality simulations, conducted for the severe June 18 - 22, 2008 meteorological episode, demonstrate that the Basin will be in attainment of the revoked 1-hour ozone standard with controlled emissions of 410 TPD VOC and 150 TPD NOx in 2022. The form of the 1-hour standard allows for one day at each station to exceed the threshold of 120 ppb (124.4 for the modeling attainment threshhold). When the deterministic modeling was expanded to include 92 days of simulations from June 1 through August 31, the projected number of violations of the standard totaled one station day at Pasadena. The attainment demonstration is supported by the air quality trend analysis and a companion attainment analysis based on a tiered RRF methodology.

The 1997 SIP's 1-hour ozone attainment demonstration defined a 2010 VOC and NOx emissions carrying capacity 413 and 530 TPD, respectively. The 2003 AQMP's updated attainment demonstration revised the projection to 313 TPD VOC and 541 TPD NOx. The contribution of the long term emissions reductions measures to the attainment demonstration were 46 percent in 1997 and 76 percent in 2003. The 2007 federally approved 8-hour ozone attainment demonstration defined a 2023 carrying capacity of 420 TPD VOC and 114 TPD NOx. As presented above, the 1-hour ozone attainment demonstration defines a 2022 carrying capacity of 410 TPD VOC and 150 TPD NOx. For both the current 8-hour and revoked 1-hour ozone standards, require a control strategy that significantly reduces NOx emissions and thus a continued reliance on long term measures (CAA Section 182(e)(5) "black box" measures). For the 1-hour ozone attainment demonstration, the "black box" control measures account for 43 percent of the total emissions reductions from the 2022 baseline needed for attainment.

This current 1-hour ozone attainment demonstration requires 7 percent VOC and 55 percent NOx emissions reductions from 2022 baseline emissions. The targeted emissions reductions to achieve 1-hour ozone attainment are consistent in both the amount of emissions reduction and timing of those reductions with the approved 2007 8-hour ozone SIP inventory. Table VII-5-12 summarizes the emissions reductions required for attainment of the 1-hour ozone standard.

TABLE-VII-5-12

1-hour Ozone Attainment Demonstration Emissions Summary

Scenario	VOC (TPD)	NOx (TPD)	CO (TPD)
2022 Baseline	440	335	1540
2022 Attainment	410	150	1540
Total Reduction	30	185	0
Percentage Reduction From Baseline	7	55	0

SECTION 6

Environmental and Socioeconomic Impacts

California Environmental Quality Act (CEQA)

In anticipation that U.S. EPA would likely request that the District prepare a one-hour ozone SIP, the Program Environmental Impact Report (EIR) for the Final 2012 AQMP included a total of 11 project objectives[2] including the following:

- Continue making expeditious progress towards attaining the federal eight-hour ozone standard and demonstrate attainment of the federal one-hour ozone standard (revoked) by 2022 – 2023;
- Reduce population exposure to ozone through continued progress towards attaining the federal one-hour (revoked) and eight-hour ozone standards by 2022 – 2023;

The Final 2012 AQMP reflects a multi-agency effort to identify the Final 2012 AQMP control measures that specifically address the District's efforts to attain the federal 24-hour PM2.5 standard and the federal one-hour (revoked) and eight-hour ozone standards by 2022 – 2023, respectively. Consistent with CEQA requirements to analyze the whole of the actions from a project, the Program EIR prepared for the Final 2012 AQMP includes an environmental analysis of all PM2.5 control measures, as well as, all of the ozone-related control measures in the Final 2012 AQMP.

On September 19, 2012, U.S. EPA published in the Federal Register a proposed "SIP call" which, if finalized, would require the District to prepare a demonstration of attainment of the one-hour ozone standard, with attainment required by ten years from the date the SIP call is finalized. The same day, U.S. EPA published in the Federal Register a proposal to withdraw its approval of, and then to disapprove, the transportation control measure (TCM) demonstrations, also referred to as VMT emissions offset demonstrations, in the 2003 one-hour ozone plan and the 2007 eight-hour ozone plan. As explained by U.S. EPA, both of these actions were taken in response to a decision of the Ninth Circuit Court of Appeals in Association of Irritated Residents v U.S. EPA, January 27, 2012.

In response to U.S. EPA's "SIP call" and in anticipation that it will be finalized, District staff has prepared this 1-*hour Ozone Attainment Demonstration*, which demonstrates attainment of the federal one-hour (revoked) ozone standard by the year 2022. The federal one-hour ozone attainment demonstration in this document contains all of the same ozone control measures that are included in the Final 2012

2 CEQA Guidelines §15124(b)

AQMP, as well as the seven remaining mobile source control measures from the 2007 AQMP. No new measures are proposed beyond those in the Final 2012 AQMP.

Similarly, in connection with the proposed disapproval of the TCM demonstrations for the South Coast Air Basin, U.S. EPA prepared a guidance document[3] for Severe and Extreme ozone nonattainment areas on how to address CAA §182(d)(1)(A) (VMT emissions offset demonstrations). District staff conducted a VMT emissions offset analysis pursuant to U.S. EPA guidance and concluded that actual emissions with controls and VMT growth were substantially less than emissions assuming no new measures and no VMT growth ("ceiling"). Based on this conclusion, no new TCMs are required for the one-hour ozone SIP. District staff has prepared the *VMT Offset Requirement Demonstration* (Final 2012 AQMP Appendix VIII) to provide the results of the VMT emissions offset analysis to the public.

With regard to the seven mobile source control measures from the 2007 AQMP, potential environmental impacts from these control measures along with all other 2007 AQMP ozone and PM2.5 control measures were evaluated in the Final Program EIR for the 2007 AQMP (Sch. #2006111064), certified by the District Governing Board on June 1, 2007. These remaining measures would be implemented even without the Final 2012 AQMP. For this reason, the seven mobile source control measures, as well as four other remaining control measures from the 2007 AQMP, were also evaluated as Alternative 1, the No Project Alternative, in the Final 2012 AQMP Program EIR, which concluded that implementation of the remaining 2007 AQMP control measures would not generate any significant adverse environmental impacts. The inclusion of existing 2007 AQMP control measures in this 1-*hour Ozone Attainment Demonstration* does not require additional environmental review where no changes are being proposed to the 2007 measures.

Based on the above information, no additional control measures or TCMs to address progress in attaining the federal one-hour (revoked) and eight-hour ozone standards by 2022 – 2023 have been identified beyond those listed in the Final 2012 AQMP. This means that this 1-*hour Ozone Attainment Demonstration* includes all of the same ozone-related control measures that are currently in the Final 2012 AQMP. Further, the timing or implementation dates of the ozone control measures in this 1-*hour Ozone Attainment Demonstration* compared to timing and implementation dates in the Final 2012 AQMP would not change to meet the one-hour standard.

[3] U.S. EPA. Office of Transportation and Air Quality. 2012. *Implementing CAA Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Travelled*. U.S. EPA-420-B-12-053. August. http://www.epa.gov/otaq/stateresources/policy/general/420b12053.pdf.

Therefore, by analyzing the Final 2012 AQMP ozone-related control measures in the Program EIR, the Program EIR also serves as the CEQA document for this 1-*hour Ozone Attainment Demonstration* and the *VMT Offset Requirement Demonstration* (Final 2012 AQMP Appendix VIII). Finally, potential impacts from the seven remaining mobile source ozone control measures from the 2007 AQMP have been disclosed to the public in the 2007 AQMP and as part of the alternatives analysis in the Program EIR for the Final 2012 AQMP. Since no changes are being proposed to those existing measures, no additional environmental analysis of the 2007 AQMP control measures is required.

Socioeconomic Analysis

The *1-hour ozone attainment demonstration* provided in this Appendix does not include any new measures beyond those proposed for the 8-hour ozone plan in the Final 2012 AQMP. The socioeconomic impacts of the included new measures are fully analyzed in the Socioeconomic Report for the Final 2012 AQMP. The impacts of the 2007 AQMP ozone attainment strategy and the benefits of ozone attainment were discussed in the Socioeconomic Report associated with the 2007 AQMP. Therefore, no additional socioeconomic impact analysis is necessary.

District staff assesses the socioeconomic impacts of proposed rule amendments or proposed rules pursuant to the Board resolutions and state legislative requirements. As additional information on control requirements becomes more well-defined during the rulemaking process, a detailed assessment of their socioeconomic and environmental impacts will be conducted.

Attachment-1

CMAQ Performance

Observed Vs. Predicted

Concentration, Bias & Error

June 18-22, 2008

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Azusa	3	33.76	7	36.29	14	44.03	2	35.37	6	36.56
1	Azusa	4	33.38	2	34.33	6	42.53	10	35.8	14	36.15
2	Azusa	8	33.54	2	33.07	6	39.65	2	36.21	8	35.86
3	Azusa	2	33.28	3	31.47	2	36.77	2	37.35	8	35.64
4	Azusa	-999	32.16	-999	29.74	-999	34.1	-999	37.84	-999	35.99
5	Azusa	2	31.2	3	28.29	3	32.05	5	37.31	8	35.57
6	Azusa	7	29.84	5	27.28	6	30.45	10	35.85	15	34.72
7	Azusa	15	30.17	8	29.7	15	31.63	14	38.2	32	38.25
8	Azusa	38	35.25	16	38.17	20	39.05	32	49.09	46	48.26
9	Azusa	41	43.26	24	48.35	35	50.1	62	63.12	70	57.94
10	Azusa	59	53.94	48	59.82	56	65.29	92	77.82	92	70.35
11	Azusa	80	64.54	86	74.93	85	80.05	117	90.07	110	84.17
12	Azusa	99	73.98	100	91.83	114	84.58	132	102.71	113	96.8
13	Azusa	115	79.66	111	103.84	105	81.06	113	113.45	104	105.87
14	Azusa	117	78.06	135	107.18	117	76.38	106	116.08	103	102.5
15	Azusa	89	81.24	98	100.46	95	82.84	97	106.64	103	90.69
16	Azusa	70	85.47	89	88.59	78	84.96	92	80.13	92	83.95
17	Azusa	65	76.13	63	78.16	69	75.58	80	62.45	77	70.7
18	Azusa	54	62.41	53	67.02	55	57.4	60	52.39	54	53.74
19	Azusa	35	53.55	36	61.67	63	50.33	50	50.39	44	43.91
20	Azusa	26	45.48	24	53.23	50	45.95	41	46.79	27	39.19
21	Azusa	15	41.27	15	46.97	47	40.19	37	44.09	22	36.93
22	Azusa	8	39.34	24	46.17	44	36.55	16	41.66	16	35.32
23	Azusa	7	37.77	19	45.08	7	34.8	13	38.46	14	33.73
	Max	117	85.47	135	107.18	117	84.96	132	116.08	113	105.87

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Burbank	1	33.61	1	30.93	2	33.99	2	33.26	2	34.06
1	Burbank	1	30.17	1	29.58	2	31.67	2	34.3	2	32.26
2	Burbank	1	26.02	1	27.78	2	30.75	2	34.94	4	32.15
3	Burbank	1	22.17	1	25.06	2	29.9	2	34.84	5	32.92
4	Burbank	-999	19.36	-999	20.56	-999	27.93	-999	33.35	-999	32.36
5	Burbank	3	18.91	2	17.67	2	24.17	6	31.01	7	31.34
6	Burbank	6	20.1	5	17.73	4	21.76	13	28.14	17	29.55
7	Burbank	20	25.04	10	21.67	10	23.1	23	30.13	28	31.09
8	Burbank	26	31.64	16	29.72	19	30.48	46	40.57	46	38.74
9	Burbank	39	38.62	31	39.06	37	39.06	63	51.14	64	47.92
10	Burbank	41	45.56	33	49.42	40	49.03	89	61.35	84	59.82
11	Burbank	61	52.41	63	60.32	64	58.44	110	74.38	117	74.6
12	Burbank	83	60.92	95	71.19	96	65.15	106	90.54	98	82
13	Burbank	87	72.17	87	80.71	111	75.47	106	93.55	91	79.9
14	Burbank	66	84.15	84	89.13	98	89.12	122	80.86	93	80.03
15	Burbank	58	86.99	81	95.9	82	90.98	108	73.2	99	75.1
16	Burbank	54	80.48	71	96.32	71	74.08	57	68.88	71	65.32
17	Burbank	45	66.3	65	78.56	58	49.67	49	60.13	58	57.9
18	Burbank	30	47.31	52	55.53	58	32.57	43	42.03	58	44.8
19	Burbank	18	36.97	28	46.16	52	28.58	29	33.41	42	35.49
20	Burbank	9	31.64	20	39.6	26	32	23	35.45	28	32.76
21	Burbank	5	31.29	10	37.44	14	35.99	10	36.2	20	32.37
22	Burbank	2	31.33	4	37.84	2	36.63	2	35.57	9	30.78
23	Burbank	1	31.46	2	36.8	2	33.52	1	35.38	4	29.12
	Max	87	86.99	95	96.32	111	90.98	122	93.55	117	82

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Glendora	24	33.63	39	37.12	32	44	33	39.84	31	37.86
1	Glendora	20	34.26	42	36.16	31	42.62	28	38.64	29	36.84
2	Glendora	16	35.02	39	35.41	16	41.68	23	38.29	26	36.77
3	Glendora	19	35.36	49	34.08	25	40.38	19	38.38	30	37.12
4	Glendora	-999	34.82	-999	32	-999	38.8	-999	38.1	-999	37.34
5	Glendora	24	33.92	38	29.95	18	37.42	25	37.19	23	36.68
6	Glendora	30	32.75	40	29.34	18	36	34	35.85	26	35.63
7	Glendora	-999	32.74	-999	32.63	-999	37.18	39	38.18	38	38.44
8	Glendora	-999	37.53	-999	41.24	-999	43.16	44	47.99	52	48.7
9	Glendora	-999	44.82	45	50.52	-999	51.89	64	60.71	75	58.07
10	Glendora	-999	54.66	54	60.81	-999	65.01	97	75.47	104	67.83
11	Glendora	87	64.9	76	73.58	-999	80.12	128	88.02	117	81.84
12	Glendora	-999	75.49	111	89.99	118	86.22	156	99.05	123	96.75
13	Glendora	-999	85.44	121	105.48	138	87.25	135	113.63	120	111.13
14	Glendora	131	87.15	152	114.89	129	82.22	119	122.46	116	114.48
15	Glendora	109	82.57	124	114.08	112	81.58	107	119.68	116	101.96
16	Glendora	79	86.62	105	101.05	88	83.52	103	99.69	102	90.33
17	Glendora	72	81.68	76	83.94	80	79.32	93	74.16	93	79.54
18	Glendora	62	68.44	60	69.98	67	68.37	68	65.88	69	64.64
19	Glendora	45	58.61	50	61.31	57	63.53	53	64.71	51	52.06
20	Glendora	32	52.27	35	56.48	53	57.24	43	53.42	41	42.64
21	Glendora	23	46.57	28	52.07	44	47.47	37	45.45	32	39.07
22	Glendora	22	42.71	23	49.24	39	42.53	33	42.03	30	37
23	Glendora	28	39.34	22	46.09	37	40.52	30	39.54	25	35.9
	Max	131	87.15	152	114.89	138	87.25	156	122.46	123	114.48

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Los Angeles	-999	23.56	-999	18.41	-999	17.17	1	14.82	13	22.88
1	Los Angeles	1	21.42	-999	18.07	-999	17.19	1	17.88	10	23.36
2	Los Angeles	1	18.44	-999	16.85	-999	17.92	3	20.79	6	25.2
3	Los Angeles	1	14.91	1	13.92	-999	17.48	6	22.83	13	27.17
4	Los Angeles	-999	10.85	-999	9.67	-999	15.12	-999	23.32	-999	27.49
5	Los Angeles	1	10.59	1	9.5	1	12.63	3	23.73	6	26.47
6	Los Angeles	4	14.24	2	12.74	3	12.48	6	23.16	18	25.45
7	Los Angeles	7	22.61	4	19.67	9	16.26	18	28.7	26	31.08
8	Los Angeles	-999	30.8	11	29.51	26	26.67	27	42.48	33	41.84
9	Los Angeles	-999	38.6	26	43.27	33	39.98	50	57.91	51	52.14
10	Los Angeles	-999	45.51	46	56.86	31	52.66	76	69.39	79	62.75
11	Los Angeles	65	51.03	68	66.63	50	59.48	74	77.53	90	76.68
12	Los Angeles	78	58.43	74	73.24	64	63.18	98	88.6	70	85.4
13	Los Angeles	71	70.5	81	77.64	82	73.99	103	93.26	80	81.12
14	Los Angeles	59	82.46	58	81.9	78	86.99	91	79.62	84	81.79
15	Los Angeles	52	80.47	54	85.64	72	85.32	76	68.66	75	78.88
16	Los Angeles	44	70.73	55	82.07	61	65.35	66	66.81	57	65.5
17	Los Angeles	29	57.76	50	66.04	52	38.21	67	60.18	56	55.68
18	Los Angeles	27	39.43	37	43.44	29	18.99	49	38.22	39	41.32
19	Los Angeles	10	27.93	35	33.83	9	14.53	32	25.03	33	29.78
20	Los Angeles	13	21.03	15	28.79	5	15.03	14	23.21	25	24.46
21	Los Angeles	7	17.32	6	22.92	1	15.28	3	23.73	17	20.4
22	Los Angeles	4	16.42	2	20.04	-999	15.63	1	23.18	19	18.42
23	Los Angeles	2	17.54	1	18.67	1	13.32	6	23.29	18	17.37
	Max	78	82.46	81	85.64	82	86.99	103	93.26	90	85.4

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	LAX	24	38.53	4	15.66	3	14.84	31	14.78	9	20.85
1	LAX	23	36.29	7	13.76	28	10.37	24	10.04	4	21.94
2	LAX	18	31.98	5	13.1	24	10.52	15	9.83	12	20.74
3	LAX	12	24.74	6	11.29	17	10.64	12	11.37	14	18.42
4	LAX	-999	14.45	-999	9	-999	10.22	-999	14.02	-999	18.42
5	LAX	3	9.14	10	10.05	2	12.35	20	17.61	18	20.8
6	LAX	7	12.4	10	13.46	5	15.08	19	19.79	23	23.69
7	LAX	18	19.48	15	19.71	10	18.82	28	24.75	29	29.94
8	LAX	30	28.52	24	29.35	20	25.96	36	36.47	30	39.67
9	LAX	42	36.97	35	42.42	28	37.29	37	49.83	37	49.7
10	LAX	52	43.25	50	53.89	27	45.97	56	58.12	41	62.81
11	LAX	54	53.31	60	63.03	40	56.48	64	65.74	41	77.13
12	LAX	45	68.56	60	73.28	52	69.79	58	75.15	39	79.57
13	LAX	46	81.31	60	81.7	51	82.73	56	79	47	79.46
14	LAX	52	84.11	55	84.4	41	83.82	57	77.51	53	80.48
15	LAX	54	78.91	54	79.63	44	70.01	60	77.98	54	72.22
16	LAX	47	71.29	50	70.95	52	56.66	60	75.79	53	66.8
17	LAX	38	62.61	41	62.39	49	49.38	65	67.74	51	59.05
18	LAX	37	53.9	37	54.3	51	40.03	61	55.89	51	48.6
19	LAX	31	48.53	25	50.16	49	35.71	47	47.2	46	42.33
20	LAX	28	43.76	25	45.42	45	34.41	41	41.66	41	39.24
21	LAX	16	38.52	18	39.01	45	31.9	32	37.68	34	34.83
22	LAX	-999	30.2	19	31.02	37	29.19	28	30.49	31	29.91
23	LAX	1	20.47	3	22.8	31	22.39	24	23.41	29	25.73
	Max	54	84.11	60	84.4	52	83.82	65	79	54	80.48

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Lynwood	13	25.28	19	16.23	1	13.05	10	4.9	30	21.04
1	Lynwood	4	23.27	23	17.26	2	15.18	20	6.42	30	19.43
2	Lynwood	11	19.91	14	17.09	-999	16.18	26	8.93	24	19.63
3	Lynwood	6	15.74	6	14.67	-999	14.44	22	12.06	22	22.07
4	Lynwood	-999	11.17	-999	11.46	-999	11.05	-999	14.91	-999	24.17
5	Lynwood	1	11.06	-999	11.28	-999	10.03	9	18.51	11	24.95
6	Lynwood	2	15.89	2	14.38	1	11.51	9	21.95	22	25.66
7	Lynwood	4	24.66	8	22.3	4	15.9	22	30.04	34	33.25
8	Lynwood	10	32.74	14	33.7	17	26.15	33	45.23	46	45.12
9	Lynwood	25	40.62	29	49.09	25	41.09	48	61.71	52	56.2
10	Lynwood	37	47.12	45	63.78	33	53.72	56	72.86	53	64.44
11	Lynwood	49	50.68	64	73.1	39	58.16	50	77.22	49	73.01
12	Lynwood	58	57.36	65	77.02	52	64.69	75	83.41	70	83.07
13	Lynwood	58	71.75	67	80.38	78	77	71	90.89	60	83.78
14	Lynwood	49	85.41	53	83.96	61	86.47	64	86.33	62	83.42
15	Lynwood	50	81.74	47	85.17	52	83.96	54	71.69	63	80.26
16	Lynwood	47	69.63	59	77.35	48	63.59	52	68.7	52	64.75
17	Lynwood	34	58.04	47	60.29	37	40.64	54	62.63	40	55.66
18	Lynwood	26	44.97	32	42.11	31	22.28	35	43.88	33	45.49
19	Lynwood	20	34.61	18	31.91	13	15.76	17	31.97	26	36.62
20	Lynwood	21	27.52	23	25.94	12	14.01	12	30.07	20	31.29
21	Lynwood	20	22.1	19	20.47	11	11.06	9	28.63	22	24.97
22	Lynwood	18	17.91	8	17.01	13	9.77	8	24.92	21	20.17
23	Lynwood	17	15.82	6	13.8	13	7.13	23	22.94	18	16.92
	Max	58	85.41	67	85.17	78	86.47	75	90.89	70	83.78

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Long Beach	25	29.23	36	16.36	9	17.21	30	6.79	33	20.09
1	Long Beach	30	27.34	34	17.85	10	20.35	30	4.69	27	16.35
2	Long Beach	31	22.69	27	19.69	15	19.94	29	4.5	27	15.16
3	Long Beach	28	16.16	22	19.38	21	17.81	27	5.89	27	15.83
4	Long Beach	-999	12.67	-999	17.29	-999	14.7	-999	8.43	-999	18.67
5	Long Beach	19	13.98	2	17.08	7	13.21	19	13.26	21	21.69
6	Long Beach	7	18.98	5	19.99	3	14.55	27	18.44	28	24.29
7	Long Beach	9	27.25	14	27.31	13	18.42	33	27.18	33	31.32
8	Long Beach	12	35.74	19	38.03	25	26.42	43	40.91	38	40.08
9	Long Beach	17	43.32	19	51.67	27	37.82	51	54.61	41	48.72
10	Long Beach	16	49.63	25	64.24	37	50.06	49	65.63	49	56.36
11	Long Beach	48	54.49	41	72.18	46	60.95	50	72.08	43	68.38
12	Long Beach	87	62.54	59	77.02	68	73.74	53	78.26	47	84.96
13	Long Beach	83	78.79	61	83.5	77	84.1	46	88.78	51	88.98
14	Long Beach	72	89.63	41	90.21	78	86.39	59	89.3	52	85.9
15	Long Beach	62	84.44	47	87.65	67	80.97	73	74.17	57	79.63
16	Long Beach	46	70.84	35	73.62	70	64.56	72	69.31	70	63.6
17	Long Beach	37	58.66	34	55.32	69	45.32	71	61.93	58	54.6
18	Long Beach	42	47.48	30	40.43	57	28.34	45	46.67	50	44.4
19	Long Beach	35	39.42	34	33.5	41	20.67	38	37.47	38	37.28
20	Long Beach	34	33.45	28	29.27	26	20.86	31	32.54	31	33.38
21	Long Beach	36	28.08	23	24.8	42	17.83	28	28.92	29	27.77
22	Long Beach	37	22.83	21	22.28	37	13.73	34	26.43	23	20.87
23	Long Beach	35	17.93	16	18.19	27	10.76	38	24.27	22	18.12
	Max	87	89.63	61	90.21	78	86.39	73	89.3	70	88.98

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pasadena	3	31.97	3	31.35	-999	33.44	2	29.82	8	34.36
1	Pasadena	1	30.65	3	30.05	-999	33.42	1	33.05	7	33.49
2	Pasadena	-999	28.75	2	28.32	-999	32.59	-999	34.29	9	33.88
3	Pasadena	-999	26.88	1	26.07	-999	30.64	2	35.22	8	33.7
4	Pasadena	-999	25.33	-999	22.65	-999	28.01	-999	35.59	-999	33.04
5	Pasadena	1	25.37	1	21.27	1	25.14	4	34.44	4	32.02
6	Pasadena	7	26.07	5	21.85	10	23.81	13	32.53	22	30.53
7	Pasadena	24	29.13	18	24.91	19	25.93	34	35.23	32	33.74
8	Pasadena	44	34.26	39	31.61	39	34.51	53	44.93	50	42.34
9	Pasadena	61	41.64	62	42.69	55	46.29	72	58.12	72	53.29
10	Pasadena	79	50.84	66	55.92	78	60.29	94	72.59	91	65.92
11	Pasadena	88	59.37	72	70.76	90	69.62	104	85.21	101	79
12	Pasadena	82	65.44	90	83.38	73	70.96	100	96.82	107	91.43
13	Pasadena	96	70.44	110	89.62	94	69.28	107	106.23	93	93.97
14	Pasadena	81	78.04	91	89.84	86	77.31	93	103.07	90	87.31
15	Pasadena	66	85.33	77	87.01	78	88.16	81	83.66	88	85.27
16	Pasadena	58	81.6	63	86.27	72	84.42	84	70.77	79	76.87
17	Pasadena	52	70.36	58	78.8	66	63.15	61	63.19	57	62.74
18	Pasadena	36	54.42	44	62.12	53	41.56	52	48.16	51	47.24
19	Pasadena	22	42.06	30	56.32	35	35.97	42	37.34	37	36.96
20	Pasadena	13	32.68	18	45.28	19	33.54	28	35.41	21	33.77
21	Pasadena	11	29.77	16	36.45	9	30.53	18	35.66	14	32.21
22	Pasadena	10	30.53	11	35.26	2	29.02	12	35.08	12	29.91
23	Pasadena	9	31.58	4	34.51	-999	27.56	10	35.79	9	28.43
	Max	96	85.33	110	89.84	94	88.16	107	106.23	107	93.97

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pico Rivera	3	23.17	2	28.06	-999	27.37	1	17.67	22	30.57
1	Pico Rivera	3	22.17	-999	27.42	-999	30.13	13	22.74	27	29.8
2	Pico Rivera	5	21.19	-999	25.74	-999	29.51	12	25.85	20	29.99
3	Pico Rivera	1	20.5	-999	23.27	-999	25.15	4	28.85	-999	31.07
4	Pico Rivera	-999	19.39	-999	19.39	-999	20.76	-999	30.41	-999	31.92
5	Pico Rivera	-999	19.63	-999	18.12	-999	18.13	-999	31.59	1	31.83
6	Pico Rivera	2	21.24	-999	20.06	-999	17.98	6	32.43	15	31.62
7	Pico Rivera	7	26.59	9	26.55	4	22.6	19	38.26	38	37.65
8	Pico Rivera	11	32.88	18	37	8	33.24	32	50.53	50	48.37
9	Pico Rivera	21	41.54	44	50.25	32	47.45	44	64.62	60	61.34
10	Pico Rivera	47	52.08	65	65.69	73	64.12	80	78.74	80	73.19
11	Pico Rivera	73	59.44	60	81.88	84	72.07	100	88.89	78	80.58
12	Pico Rivera	82	62.35	75	91.39	79	72	88	95.97	77	87.11
13	Pico Rivera	87	65.69	99	90.84	80	72.58	96	100.82	83	88.26
14	Pico Rivera	70	76.72	86	87.39	86	81.12	92	97.95	85	84.52
15	Pico Rivera	67	85.75	83	85.39	66	87.08	80	78.75	82	82.39
16	Pico Rivera	64	77.53	61	83.75	61	79.08	68	64.38	73	72.57
17	Pico Rivera	55	63.03	53	73.15	60	54.69	64	59.56	58	57.3
18	Pico Rivera	42	45.22	41	50.78	52	26.39	57	43.62	48	44.64
19	Pico Rivera	32	31.7	34	36.01	35	15.11	40	30.29	37	34.16
20	Pico Rivera	24	26.24	25	31.28	13	14.59	28	27.78	30	28.36
21	Pico Rivera	15	23.75	14	27.78	2	11.99	19	27.84	24	23.03
22	Pico Rivera	2	24.47	13	27.3	-999	11.71	16	29.93	21	19.94
23	Pico Rivera	2	26.26	-999	26.58	-999	12.62	11	31.13	19	18.83
	Max	87	85.75	99	91.39	86	87.08	100	100.82	85	88.26

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pomona	4	27.5	3	39.43	3	44.59	3	36.65	4	36.06
1	Pomona	3	27.45	3	38.5	3	40.66	3	38.01	3	37.49
2	Pomona	3	28.59	3	38.43	2	39.33	3	39.13	5	39.72
3	Pomona	2	29.36	3	36.76	3	38.18	2	39.35	3	40.42
4	Pomona	-999	28.52	-999	34.88	-999	36.91	-999	39.79	-999	40.53
5	Pomona	3	26.25	3	32.07	4	35.08	4	39.89	8	40.56
6	Pomona	6	24.92	5	31.19	11	32.7	9	39.48	14	41.47
7	Pomona	20	26.33	10	34.96	21	33.25	18	43.46	32	46.85
8	Pomona	33	33.17	21	43.27	35	39.77	34	54.62	52	59.58
9	Pomona	67	43.65	49	51.54	56	50.62	76	65.98	78	72.36
10	Pomona	81	56.11	56	62.67	79	65.59	96	78.17	99	80.25
11	Pomona	91	66.16	87	77.82	84	78.85	117	89.21	116	89.77
12	Pomona	103	75.63	116	95.22	101	88.45	137	102.7	113	100.46
13	Pomona	105	84.13	126	110.18	141	95.17	118	120.26	93	106.56
14	Pomona	134	84.71	123	116.32	138	98.33	110	123.92	84	109.91
15	Pomona	126	77.72	106	113.75	106	95.91	98	115.45	86	103.84
16	Pomona	92	82.38	100	100.82	85	83.96	82	97.05	88	89.21
17	Pomona	74	80.02	82	82.05	67	73.33	71	65.8	80	76.97
18	Pomona	63	64.93	60	69.05	55	58.61	65	51.52	69	59.74
19	Pomona	42	52.42	46	63.24	29	49.56	53	51.62	54	47.2
20	Pomona	34	47.04	34	58.79	6	46.47	37	48.21	41	37.98
21	Pomona	25	45.91	18	57.92	3	39.28	24	41.86	31	32.07
22	Pomona	4	44.8	3	54.85	3	35.37	9	39.22	28	30.66
23	Pomona	4	42.16	4	50.04	3	35.17	3	36.79	18	29.95
	Max	134	84.71	126	116.32	141	98.33	137	123.92	116	109.91

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Reseda	9	37.3	1	37.73	18	37.4	3	37.64	2	42.69
1	Reseda	15	34.36	2	36.13	8	35.58	3	36.68	1	39.43
2	Reseda	15	31.09	7	34.74	2	34.71	1	36.32	1	35.14
3	Reseda	5	26.7	11	33.02	1	34.23	1	35.8	1	33.21
4	Reseda	-999	21.97	-999	30.44	-999	32.61	-999	34.49	-999	33.92
5	Reseda	3	20.96	5	27.52	3	30.6	3	32.49	4	34.33
6	Reseda	8	22.39	6	26.26	4	29.11	9	30.85	12	33.21
7	Reseda	21	26.5	16	27.76	14	29.17	20	32.37	26	34.84
8	Reseda	62	34.04	44	35.35	58	35.57	33	41.31	47	41.76
9	Reseda	66	41.38	52	42.14	61	41.29	50	48.8	66	48.1
10	Reseda	64	48.02	52	47.73	59	45.58	70	54.82	90	54.24
11	Reseda	62	54.06	42	55.24	53	53.33	67	64.05	90	60.5
12	Reseda	60	62.12	52	68.61	56	64.89	51	72.73	90	65.92
13	Reseda	56	74.85	55	84.71	69	78.6	48	74.88	98	67.83
14	Reseda	62	84.43	44	95.35	70	85.61	49	70.14	105	64.68
15	Reseda	58	81.88	44	95.77	58	77.4	50	65.03	99	58.95
16	Reseda	65	70.62	46	81.17	49	67.02	50	61.39	91	60.94
17	Reseda	67	62.02	57	59.67	48	54.26	47	59.61	75	59.1
18	Reseda	51	53.49	48	49.5	52	39.77	41	51.98	56	50.11
19	Reseda	49	45.91	37	45.46	47	36.2	37	47.83	43	44.07
20	Reseda	45	40.51	24	44.85	41	38.67	28	49.92	32	43.06
21	Reseda	35	41.5	18	45.18	32	41.9	20	49.58	23	41.48
22	Reseda	5	41.45	21	42.92	9	41.83	6	46.77	16	40.07
23	Reseda	2	39.71	21	39.63	7	39.69	3	44.56	13	37.29
	Max	67	84.43	57	95.77	70	85.61	70	74.88	105	67.83

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Santa Clarita	37	39.55	61	38.5	24	37.96	9	41.53	17	43.98
1	Santa Clarita	40	37.63	40	37.2	22	36.57	17	40.66	16	40.96
2	Santa Clarita	40	36.5	31	36.16	21	35.79	22	39.71	19	38.28
3	Santa Clarita	39	35.21	25	35.01	19	35.08	20	38.48	18	36.52
4	Santa Clarita	-999	33.62	-999	33.73	-999	34.08	-999	37.22	-999	35.41
5	Santa Clarita	34	32.53	4	32.71	5	32.96	8	35.98	22	34.69
6	Santa Clarita	34	31.9	6	32.62	9	32.59	13	35.16	21	34.39
7	Santa Clarita	60	33.29	27	34.65	42	34.76	37	36.95	35	36.8
8	Santa Clarita	66	39.01	47	40.79	60	40.74	56	43.09	52	43.02
9	Santa Clarita	66	44.21	57	45.43	67	45.63	64	47.72	62	48
10	Santa Clarita	65	47.96	55	48.82	66	49.44	58	50.05	91	50.74
11	Santa Clarita	59	50.48	50	51.42	55	53.05	55	52.16	105	53.29
12	Santa Clarita	58	52.35	49	54.48	51	58.86	61	56.81	123	59.01
13	Santa Clarita	60	55.53	52	59.43	53	65	56	68.92	80	63.35
14	Santa Clarita	58	64.62	60	66.77	53	72.76	55	75.22	46	62.18
15	Santa Clarita	56	71.18	63	74.31	66	73.92	58	70.4	45	60.02
16	Santa Clarita	55	64.83	62	72.99	72	67.54	60	64.35	43	64.93
17	Santa Clarita	57	58.35	50	58.51	57	59.17	58	62.11	50	64.47
18	Santa Clarita	62	49.45	41	51.66	46	50.82	52	58.3	52	57.87
19	Santa Clarita	66	44.24	36	49.03	42	49.32	39	56.68	49	53.13
20	Santa Clarita	63	43.83	21	48.99	23	47.36	18	55.82	30	50.73
21	Santa Clarita	57	44.12	17	47.46	15	46.77	13	53.79	23	47.65
22	Santa Clarita	57	42.75	20	43.5	10	44.9	11	50.62	28	43.42
23	Santa Clarita	58	40.42	23	40.03	8	43.19	10	47.34	24	38.8
	Max	66	71.18	63	74.31	72	73.92	64	75.22	123	64.93

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	West LA	26	33.81	1	22.56	5	23.84	25	21.86	4	25.79
1	West LA	2	30.72	1	22.76	8	22.32	22	22.46	5	24.97
2	West LA	2	25.92	1	21.48	9	21.33	11	23.66	2	25.11
3	West LA	2	19.26	1	18.6	1	20.37	3	25.26	2	24.87
4	West LA	-999	12.54	-999	15.11	-999	18.44	-999	26.25	-999	27.07
5	West LA	3	11.58	2	13.88	2	17.36	5	26.43	4	28.59
6	West LA	11	14.35	5	15.27	4	17.27	21	24.92	19	28.39
7	West LA	21	20.46	18	19.72	9	18.7	27	27.32	33	30.82
8	West LA	31	28.49	28	28.1	20	25.05	34	38.07	46	39.3
9	West LA	51	36.33	31	38.01	27	34.36	43	49.49	49	49
10	West LA	65	43.09	51	47.51	42	42.2	61	59.41	51	62.14
11	West LA	72	52.26	66	57.01	65	53.15	71	72.7	54	74.96
12	West LA	53	65.12	72	70.98	83	67.85	92	79.55	80	76.25
13	West LA	42	78.82	77	84.48	88	84.04	84	74.06	70	77.32
14	West LA	37	83.88	79	91.73	85	87.97	68	70.75	69	77.75
15	West LA	41	80.19	73	92.59	82	75.28	76	71.49	56	69.73
16	West LA	45	71.7	73	82.45	60	61.46	74	69.63	63	64.74
17	West LA	42	60.69	60	64.5	56	49.62	65	62.54	49	58.36
18	West LA	37	49.39	47	50.31	50	34.04	53	47.81	43	45.98
19	West LA	33	43.38	29	43.72	29	26.55	46	39.38	36	37.94
20	West LA	24	36.78	17	39.37	18	26.58	31	38.94	36	35.77
21	West LA	13	33.88	7	36.27	30	28.41	19	37.44	30	32.13
22	West LA	2	28.95	1	31.57	38	29.35	11	33.24	26	28.68
23	West LA	2	23.17	2	26.7	36	24.86	3	28.31	24	25.6
	Max	72	83.88	79	92.59	88	87.97	92	79.55	80	77.75

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Anaheim	33	31.68	21	37.5	14	41.45	23	20.76	38	31.99
1	Anaheim	33	32.24	24	39.28	16	43.14	34	25.47	31	33
2	Anaheim	32	33.27	15	39.56	20	43.72	31	29.05	25	35.08
3	Anaheim	31	33.02	-999	37.31	19	40.36	30	31.12	19	36.57
4	Anaheim	-999	29.85	-999	32.95	-999	33.9	-999	31.19	-999	37.26
5	Anaheim	12	26.88	1	29.63	1	27.99	2	31.25	17	37.13
6	Anaheim	5	27.05	3	28.57	2	25.14	8	33.07	20	36.77
7	Anaheim	10	32.24	10	33.95	4	27.63	36	40.4	27	43.72
8	Anaheim	17	38.89	38	43.96	21	35.67	49	54.46	50	55.39
9	Anaheim	32	48.71	41	56.65	51	48.77	67	67.28	66	69.34
10	Anaheim	52	60.61	56	75.67	71	63.04	84	80.3	68	81.7
11	Anaheim	-999	71.79	76	90.34	83	75.14	78	93.01	67	88.74
12	Anaheim	-999	80.44	89	93.4	86	86.9	80	98.24	67	93.06
13	Anaheim	94	85.45	92	93.23	85	98.24	82	96.97	65	99.65
14	Anaheim	93	87.74	94	93.53	105	99.51	85	100.59	62	104.52
15	Anaheim	93	91.04	84	93.07	92	90.81	87	99.08	57	99.43
16	Anaheim	66	86.41	67	88.7	92	82.99	80	78.24	68	83.49
17	Anaheim	60	70.56	60	78.08	76	66.43	68	61.98	58	64.31
18	Anaheim	55	50.58	52	59.19	57	39.44	58	44.99	40	45.13
19	Anaheim	35	36.94	43	45.66	28	19.63	41	32.49	28	30.87
20	Anaheim	29	31.04	36	38.3	24	15.04	35	29.24	24	25.19
21	Anaheim	27	29.78	27	36.51	20	13.66	38	29.16	20	21.85
22	Anaheim	26	31.56	20	38.24	20	13.97	45	30.96	18	20.32
23	Anaheim	24	34.88	17	40.24	22	16.61	48	31.49	26	20.68
	Max	94	91.04	94	93.53	105	99.51	87	100.59	68	104.52

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Costa Mesa	36	50.48	30	48.45	29	65.3	48	29.03	39	39.67
1	Costa Mesa	41	50.59	23	51.37	33	66.05	50	30.3	43	42.57
2	Costa Mesa	40	50.69	20	52.86	31	62.63	48	32.02	39	43.62
3	Costa Mesa	39	50.8	12	51.43	24	57.7	44	35.38	28	42.91
4	Costa Mesa	-999	49.14	-999	47.54	-999	53.82	-999	37.88	-999	42.02
5	Costa Mesa	22	45.27	4	43.63	6	48.7	18	37.62	28	42.69
6	Costa Mesa	18	44.3	6	42.61	11	45.09	34	37.01	33	44.1
7	Costa Mesa	16	48.28	18	46.57	14	45.66	43	40.7	38	49.69
8	Costa Mesa	24	53.87	30	56.93	28	50.86	53	52.35	46	57.52
9	Costa Mesa	28	61.62	42	70.39	47	62.24	60	67.16	49	65.1
10	Costa Mesa	33	70.74	67	83.43	71	76.89	67	79.86	57	71.05
11	Costa Mesa	53	78.23	68	87.32	75	87.38	70	84.23	63	79.88
12	Costa Mesa	69	82.85	78	86.43	80	92.31	67	84.34	56	93.56
13	Costa Mesa	76	90.4	73	85.03	80	94.73	72	89.87	50	107.67
14	Costa Mesa	71	98.64	73	87.13	80	96.63	69	98.57	47	113.92
15	Costa Mesa	65	101.98	67	94.77	62	95.56	76	102.47	47	104.17
16	Costa Mesa	55	93.05	59	93.57	57	86.44	80	86.27	53	82.67
17	Costa Mesa	52	75.86	50	82.75	54	70.65	72	70.83	50	65.27
18	Costa Mesa	37	62.41	46	67.99	49	51.37	64	58.18	44	53.4
19	Costa Mesa	38	55.42	38	58.95	39	37.86	55	52.62	40	44.29
20	Costa Mesa	41	50.66	36	54	34	34.44	48	50.21	31	38.57
21	Costa Mesa	37	48.31	32	53.41	33	32.76	50	45.53	31	36.82
22	Costa Mesa	29	47.55	30	57.24	28	31.65	43	41.77	35	37.21
23	Costa Mesa	31	47.11	28	61.71	41	29.67	42	38.62	38	36.67
	Max	76	101.98	78	94.77	80	96.63	80	102.47	63	113.92

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	La Habra	16	30.24	9	39.62	13	42.88	15	23.27	16	35.64
1	La Habra	23	30.39	7	39.06	12	44.03	24	28.05	11	34.12
2	La Habra	23	31.85	5	38.73	3	42.78	9	32.63	14	35.15
3	La Habra	6	32.4	4	37.22	3	37.84	8	35.95	22	36.96
4	La Habra	-999	30.98	-999	35.14	-999	32.83	-999	37.09	-999	38.55
5	La Habra	3	29.03	1	33.02	2	28.69	6	37.49	11	39.14
6	La Habra	6	27.99	5	32.09	6	26.49	20	38.8	26	39.47
7	La Habra	11	30.9	15	36.08	20	28.76	37	44.98	41	45.68
8	La Habra	22	37.07	39	44.82	41	37.45	51	58.09	53	56.81
9	La Habra	34	47.29	50	55.85	52	51.7	62	70.68	66	70.54
10	La Habra	54	59.32	58	73.12	60	66.7	87	82.57	80	83.53
11	La Habra	59	69.17	75	90.97	87	75.3	89	94.54	72	91.04
12	La Habra	63	76.65	84	98.43	93	84.77	88	103.84	70	92.58
13	La Habra	104	78.51	80	98.53	104	93.89	91	103.57	65	95.71
14	La Habra	102	79.31	84	97.23	104	98.39	87	103.57	73	99.12
15	La Habra	85	86.78	84	94.3	90	90.67	86	98.11	73	94.8
16	La Habra	67	86.06	69	88.5	70	83.36	74	75.91	71	83.11
17	La Habra	58	71.81	64	78.7	64	68.03	65	61.66	68	65.77
18	La Habra	54	52.79	50	62.1	57	43.42	63	47.4	52	47.63
19	La Habra	45	38.43	41	49.39	39	24.16	45	35.16	45	34.61
20	La Habra	32	32.37	31	41.85	24	19.35	27	31.5	42	28.92
21	La Habra	19	30.96	28	40.19	15	17.05	21	32.16	35	24.56
22	La Habra	15	33.22	17	40.8	4	16.84	22	35.28	19	22.28
23	La Habra	14	37.49	10	41.72	4	19.01	23	35.74	19	21.9
	Max	104	86.78	84	98.53	104	98.39	91	103.84	80	99.12

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Mission Viejo	28	45.58	2	61.54	10	76.19	37	47.57	8	50.13
1	Mission Viejo	28	47.06	6	61.65	10	75.75	43	48.08	14	50.3
2	Mission Viejo	26	49.28	12	61.45	16	71.65	29	48.24	13	49.8
3	Mission Viejo	14	50.53	11	59.53	17	59.56	37	48.13	11	49.14
4	Mission Viejo	-999	49.47	-999	53.15	-999	56.37	-999	47.36	-999	48.56
5	Mission Viejo	11	47.13	13	49.92	17	54.25	35	46.58	15	48.54
6	Mission Viejo	15	45.19	17	49.59	20	52.13	24	46.35	26	49.1
7	Mission Viejo	20	46.61	40	52.72	58	52.35	38	48.75	39	54.01
8	Mission Viejo	51	53.81	58	61.78	69	56.69	54	58.26	56	63.47
9	Mission Viejo	57	63.67	78	72.14	63	65.36	75	70.14	68	73.11
10	Mission Viejo	53	74.85	87	83.77	88	78.89	93	82.79	77	81.04
11	Mission Viejo	69	84.73	97	93.9	100	89.48	104	93.21	73	85.16
12	Mission Viejo	87	90.83	98	99.64	114	96.61	94	94.66	72	88.28
13	Mission Viejo	103	93.79	105	103.05	111	100.31	100	92.57	72	93.04
14	Mission Viejo	118	98.27	97	102.87	111	100.56	104	95.23	66	101.6
15	Mission Viejo	107	104.05	97	97.76	112	100.69	89	103.05	65	115.62
16	Mission Viejo	69	105.95	92	90.59	94	97.5	79	108.25	59	114.31
17	Mission Viejo	55	96.42	68	87.22	99	87.06	76	95.12	55	98.18
18	Mission Viejo	35	80.11	53	82.57	93	73.3	78	80.51	64	76.94
19	Mission Viejo	23	72.33	41	81.2	62	65.16	62	67.5	60	61.45
20	Mission Viejo	30	67.42	31	79.19	36	57.56	38	57.89	52	50.85
21	Mission Viejo	25	65.33	22	77.9	9	52.57	21	54.22	43	44.71
22	Mission Viejo	16	62.84	11	77.31	27	48.2	18	51.44	23	41.75
23	Mission Viejo	7	61.14	10	76.98	39	47.35	12	49.37	15	39.91
	Max	118	105.95	105	103.05	114	100.69	104	108.25	77	115.62

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Banning	50	52.37	50	68.07	46	78.93	51	56.23	42	69.13
1	Banning	57	50.86	47	61.51	43	65.93	50	55.01	45	61.64
2	Banning	49	48.36	36	53.09	36	58.04	45	54.17	40	57.24
3	Banning	49	44.85	33	50.06	28	55.67	46	52.7	44	52.1
4	Banning	-999	43.07	-999	47.85	-999	53.34	-999	50.87	-999	48.73
5	Banning	36	43.33	30	46.06	22	50.63	44	49.08	33	47.33
6	Banning	53	45.3	45	45.65	36	48.84	45	46.75	39	46.08
7	Banning	55	49.69	48	47.66	46	50.23	64	49.01	49	45.51
8	Banning	60	53.72	57	52.89	59	56.92	69	60.01	55	48.91
9	Banning	63	56.5	64	57.09	68	57.88	70	63.44	62	52.98
10	Banning	67	57.27	66	58.33	74	58.77	69	63.99	63	57.27
11	Banning	75	57.05	66	57.33	81	59.65	70	64.71	61	59.71
12	Banning	81	58.31	67	56.93	72	60.87	75	64.21	65	63.68
13	Banning	94	61.09	69	58.22	74	61.82	84	64.16	62	70.38
14	Banning	93	64.9	99	60.39	81	63.49	98	70.96	70	80.08
15	Banning	104	71.16	107	67.36	96	77.15	95	86.37	58	92.61
16	Banning	130	81.34	99	85.76	107	108.23	92	95.27	52	104.26
17	Banning	113	97.04	100	104.29	135	121.79	83	99.89	53	116.26
18	Banning	137	96.22	96	104.75	129	111.84	79	94.98	51	119.4
19	Banning	124	86.42	82	102.36	97	95.61	72	96.8	51	111.68
20	Banning	98	78.85	73	98.48	74	81.75	64	99.79	56	107.26
21	Banning	67	74.6	53	94.56	67	70.03	44	101.32	43	88.94
22	Banning	58	73.06	50	90.27	41	62.97	38	102.56	40	73.16
23	Banning	65	72.02	56	85.5	46	59.33	45	84.18	29	63.18
	Max	137	97.04	107	104.75	135	121.79	98	102.56	70	119.4

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Lake Elsinore	19	40.73	41	68.77	30	81.68	20	57.09	20	66.54
1	Lake Elsinore	19	40.79	40	67.51	25	79.87	21	56.08	19	61.07
2	Lake Elsinore	10	41.14	26	67.27	20	71.72	17	55.29	15	58.19
3	Lake Elsinore	15	41.86	25	65.71	12	52.02	15	53.79	14	57.54
4	Lake Elsinore	-999	42.37	-999	53.16	-999	43.74	-999	52.59	-999	54.78
5	Lake Elsinore	8	42.83	14	40.97	4	39.89	14	51.64	13	51.8
6	Lake Elsinore	18	43.17	24	35.95	12	38.28	17	51.26	25	50.56
7	Lake Elsinore	45	45.99	-999	36.28	50	39.41	42	54.56	41	52.54
8	Lake Elsinore	66	56.61	-999	40.01	69	44.61	71	63.84	58	59.09
9	Lake Elsinore	79	68.51	-999	46.31	74	51.75	82	71.01	73	64.92
10	Lake Elsinore	82	73.69	58	55.04	81	59.11	86	73.54	72	70.32
11	Lake Elsinore	83	74.86	71	67.07	86	66.33	80	74.39	73	74.68
12	Lake Elsinore	83	76.97	84	81.35	88	71.16	76	78.39	74	80.31
13	Lake Elsinore	86	85.09	95	93.57	86	80.73	75	86.41	64	86.25
14	Lake Elsinore	113	95.09	89	101.12	76	95.42	69	88.02	58	87.55
15	Lake Elsinore	135	104	96	109.23	83	93.71	61	84.92	57	83.83
16	Lake Elsinore	117	111.58	86	116.19	91	96.84	56	87.1	62	89.42
17	Lake Elsinore	106	106.53	77	115.32	92	90.02	51	90.25	57	104.88
18	Lake Elsinore	90	90.6	75	107.87	78	75.51	50	90.16	47	99.71
19	Lake Elsinore	70	79.53	70	103.68	63	71.14	48	77.48	43	75.93
20	Lake Elsinore	56	73.84	74	98.13	55	62.26	26	66.5	35	58.04
21	Lake Elsinore	50	73.46	65	92.57	45	59.51	26	64.3	30	54.93
22	Lake Elsinore	41	73.69	50	87.34	34	60.53	23	65.65	20	54.82
23	Lake Elsinore	42	71.41	36	83.87	25	59.2	14	67.09	22	55.72
	Max	135	111.58	96	116.19	92	96.84	86	90.25	74	104.88

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Mira Loma	20	28.82	11	52.94	17	54.46	2	50.07	5	52.31
1	Mira Loma	14	27.2	6	49.31	9	51.72	2	49.97	4	54.66
2	Mira Loma	8	25.14	4	42.98	3	44.78	2	50.23	4	53.62
3	Mira Loma	5	21.62	3	35.99	3	36.96	2	49.52	4	48.06
4	Mira Loma	-999	19.15	-999	28.11	-999	31.74	-999	47.82	-999	44.93
5	Mira Loma	3	20.87	3	23.46	4	29.37	3	46.11	6	44.38
6	Mira Loma	6	23.98	6	22.96	10	28.49	8	44.61	16	43.87
7	Mira Loma	17	30.03	14	25.8	18	29.92	20	49.36	26	48.18
8	Mira Loma	43	41.89	38	34.21	44	37.05	44	63.52	43	61.03
9	Mira Loma	69	53.24	61	43.92	65	46.41	77	72.81	68	76.61
10	Mira Loma	76	59.69	79	54.79	80	56.79	93	78.31	77	89.76
11	Mira Loma	84	65.34	96	67.92	88	66.41	96	84.42	91	94
12	Mira Loma	97	72.47	110	82.6	87	74.55	122	93.14	91	99.37
13	Mira Loma	120	83.14	118	98.7	123	89.3	96	113.03	78	106.78
14	Mira Loma	119	98.38	131	115.06	114	109.48	87	129.56	72	112.4
15	Mira Loma	128	107.25	110	125.57	135	116.73	89	115.46	69	116.43
16	Mira Loma	110	94.54	98	120.91	113	105.52	83	110.05	71	115.27
17	Mira Loma	99	83.55	87	101.09	94	79.86	74	100.79	70	100.48
18	Mira Loma	73	75.78	64	80	71	60.43	69	70.39	58	78.41
19	Mira Loma	62	65.19	57	68.93	42	49.07	56	50.07	52	59.38
20	Mira Loma	49	57.4	47	62.02	16	45.18	42	42.43	46	47.36
21	Mira Loma	35	52.16	36	57.25	4	45.35	25	40.8	33	40.45
22	Mira Loma	26	51.46	30	55.04	2	46.26	14	42.51	23	37.59
23	Mira Loma	14	53.4	22	55.18	3	48.34	9	47.14	18	36.87
	Max	128	107.25	131	125.57	135	116.73	122	129.56	91	116.43

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Perris	26	37.9	20	65.54	13	71.72	26	63.7	4	75.22
1	Perris	11	36.71	26	63.98	10	68.33	21	62.01	-999	72.63
2	Perris	10	35.72	26	60.17	14	61.9	6	60.93	8	70.4
3	Perris	3	35.07	15	54.78	-999	53.77	10	59.79	13	66.48
4	Perris	-999	35.03	-999	48.14	-999	47.98	-999	58.95	-999	64.65
5	Perris	5	36.13	8	41.18	1	44.55	7	58.39	6	62.73
6	Perris	15	38.72	20	37.28	13	42.54	22	58.55	25	60.94
7	Perris	39	44.91	41	37.31	44	43.3	44	63.11	36	61.02
8	Perris	65	57.46	65	41.03	67	49.53	68	74.98	53	63.81
9	Perris	76	69.28	75	46.69	71	57.67	80	82.8	59	66.34
10	Perris	77	72	74	54.09	71	63.55	80	80.04	67	70.15
11	Perris	75	69.67	82	61.17	66	66.46	74	75.69	75	73.39
12	Perris	86	68.36	79	68.08	67	67.14	78	74.23	70	77.11
13	Perris	92	70.87	86	76.9	59	69.97	86	80.26	64	82.45
14	Perris	97	77.35	83	89.38	68	86.85	76	96.21	61	92.31
15	Perris	100	90.84	92	106.7	78	102.98	79	103.62	58	96.05
16	Perris	116	109.69	92	123.52	112	96.71	62	94.43	55	100.95
17	Perris	122	106.89	79	126.19	109	92.46	51	94.23	54	111.47
18	Perris	102	88.18	70	109.83	79	77.94	47	96.78	51	108.13
19	Perris	82	78.86	61	96.57	51	68.36	35	84.74	43	91.5
20	Perris	69	73.55	60	88.45	38	64.75	31	76.43	31	74.91
21	Perris	58	70.35	54	83.27	32	65.14	5	72.76	24	66.52
22	Perris	37	68.22	32	78.29	28	67.21	2	71.59	18	64.73
23	Perris	19	66.94	17	74.28	17	66.29	5	73.32	19	67.68
	Max	122	109.69	92	126.19	112	102.98	86	103.62	75	111.47

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Rubidoux	22	32.64	3	53.66	8	56.71	1	56.1	4	61.15
1	Rubidoux	20	30.97	2	49.18	1	52.65	1	55.69	11	58.67
2	Rubidoux	2	28.55	1	42.95	1	45.17	1	55.5	6	55.63
3	Rubidoux	1	25.17	1	36.69	1	37.73	1	54.15	1	49
4	Rubidoux	-999	23.12	-999	29.56	-999	33.74	-999	52.62	-999	46.02
5	Rubidoux	1	24.55	1	24.53	1	32.23	2	51.76	3	45.48
6	Rubidoux	3	27.7	4	23.69	4	31.47	4	51	8	44.57
7	Rubidoux	14	34.06	12	25.98	22	32.38	12	55.86	22	47.85
8	Rubidoux	29	45.49	42	33.95	48	39.11	48	69.25	49	59.41
9	Rubidoux	61	55.6	69	43.44	77	48.7	88	77.34	74	74.09
10	Rubidoux	85	60.39	84	54.2	86	58.7	102	80.09	87	86.62
11	Rubidoux	88	64.61	94	66.51	89	67.43	89	82.76	89	93.08
12	Rubidoux	94	71	119	79.98	86	74.03	129	87.97	99	97.16
13	Rubidoux	116	79.49	119	94.7	115	84.82	122	103.53	85	104.51
14	Rubidoux	136	93.37	140	110.57	123	106.88	98	129.16	75	111.18
15	Rubidoux	138	109.73	130	124.52	146	118.42	99	121.08	74	117.76
16	Rubidoux	131	103.36	106	126.49	138	113.21	96	109.98	71	118.69
17	Rubidoux	114	86.67	97	110.67	110	87.33	85	107.89	75	108.77
18	Rubidoux	82	77.91	71	86.85	83	65.32	77	83.14	63	88.05
19	Rubidoux	67	69.39	63	72.23	62	53.73	65	61.01	54	68.26
20	Rubidoux	57	61.93	55	65	31	51.39	51	50.16	52	54.53
21	Rubidoux	45	58.31	47	61.24	2	52.73	29	47.04	47	46.51
22	Rubidoux	25	59.37	23	59.82	5	53.81	16	49.43	31	44.02
23	Rubidoux	8	58.03	10	59.27	1	55.66	10	55.71	22	43.76
	Max	138	109.73	140	126.49	146	118.42	129	129.16	99	118.69

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Indio	49	52.14	68	57.78	61	59.12	62	47.34	51	63.88
1	Indio	52	50.85	61	55.69	55	58.77	54	48.73	49	54.15
2	Indio	48	46.23	55	52.98	54	56.09	50	49.61	46	50.91
3	Indio	35	40.58	54	52.1	47	52.15	49	49.03	45	49.69
4	Indio	-999	36.82	-999	49.73	-999	48.94	-999	47.42	-999	52.22
5	Indio	3	34.43	46	46.3	36	46.13	11	45.6	29	54.96
6	Indio	9	33.72	30	43	37	43.84	30	43.69	19	54.96
7	Indio	23	36.91	43	43.1	40	43.01	55	48.06	20	57.6
8	Indio	53	45.52	53	48.41	54	48.46	67	59.66	23	61.66
9	Indio	65	53.45	69	52.84	66	52.96	75	68.77	29	66.83
10	Indio	71	60.79	79	57.12	76	57.19	70	75.12	38	70.4
11	Indio	78	66.98	68	60.94	79	63.36	71	79.47	50	72.55
12	Indio	81	71.97	63	63.8	75	65.37	77	81.24	61	74.65
13	Indio	81	74.43	61	65.53	74	63.46	74	83.83	67	75.41
14	Indio	78	72.19	64	65.72	76	60.93	69	84.19	65	75.31
15	Indio	76	69.24	65	64.29	76	59.67	66	82.3	64	75.12
16	Indio	70	66.93	64	62.53	75	59.44	63	81.12	67	75.92
17	Indio	81	63.09	62	59.25	69	59	66	76.74	61	75.74
18	Indio	93	61.64	73	56.55	80	72.92	60	68.48	52	76.26
19	Indio	102	71.07	85	67.11	111	90.99	57	79.32	45	88.53
20	Indio	115	77.23	76	80.21	101	78.9	62	92.8	43	89.27
21	Indio	100	74.1	79	78.28	88	62.7	61	87.83	45	81.92
22	Indio	90	67.14	73	68.69	74	51.39	56	78.83	47	70.8
23	Indio	74	60.14	67	61.13	61	47.09	54	71.54	44	56.63
	Max	115	77.23	85	80.21	111	90.99	77	92.8	67	89.27

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Palm Springs	32	49.22	67	62.99	65	66.19	55	41.16	52	49.61
1	Palm Springs	32	47.96	65	63.43	52	57.69	50	41.83	51	47.31
2	Palm Springs	29	44.97	62	57.89	47	52.92	50	42.96	51	44.12
3	Palm Springs	27	40.75	60	52.78	48	49.68	41	44.25	48	41.89
4	Palm Springs	-999	37.6	-999	48.68	-999	47.83	-999	43.7	-999	40.44
5	Palm Springs	55	36.34	53	44.96	47	46.91	40	42.56	43	39.41
6	Palm Springs	57	36.98	49	42.53	51	46.07	47	41.25	36	40.85
7	Palm Springs	61	39.95	59	42.71	53	46.32	60	43.24	21	47.83
8	Palm Springs	62	45.3	61	48.12	52	51.66	63	52.07	28	54.31
9	Palm Springs	64	48.53	60	52.62	56	53.48	78	59.72	38	60.3
10	Palm Springs	66	50.87	60	54.07	63	55.55	81	67.49	54	65.05
11	Palm Springs	69	53.09	63	55.78	71	57.77	76	71.58	67	68.91
12	Palm Springs	70	55.65	61	57.88	73	59.12	71	73.92	69	71.75
13	Palm Springs	64	58.55	61	59.58	74	60.23	70	76.01	66	72.35
14	Palm Springs	73	61.03	65	60.61	75	61.18	69	76.72	69	73.79
15	Palm Springs	86	62.63	79	61.65	79	61.94	83	79.62	66	77.26
16	Palm Springs	90	65.18	105	63.23	89	69.47	76	79.84	61	85.56
17	Palm Springs	99	72.97	100	67.89	104	99.08	70	76.15	54	93.14
18	Palm Springs	93	80.83	95	77.4	109	100.73	50	79.93	50	91.66
19	Palm Springs	97	79.62	75	81.59	102	74.73	47	89.89	46	88.35
20	Palm Springs	103	74.4	72	76.7	92	60.49	43	92.86	45	82.89
21	Palm Springs	88	69.78	70	68.45	76	50.31	43	79.83	41	70.14
22	Palm Springs	79	67.3	73	70.6	67	44.24	45	68.82	39	49.96
23	Palm Springs	68	64.89	69	73.35	59	42.79	52	59.53	39	45.01
	Max	103	80.83	105	81.59	109	100.73	83	92.86	69	93.14

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Crestline	44	39.57	39	43.01	24	45.72	23	63.41	32	48.85
1	Crestline	39	38.79	40	40.16	30	42.41	26	61.55	30	44.69
2	Crestline	37	36.79	49	38.44	36	40.41	24	59.23	26	41.71
3	Crestline	33	35.47	50	37.39	36	39.18	22	55.23	23	39.48
4	Crestline	-999	35.04	-999	36.46	-999	38.31	-999	50.87	-999	37.83
5	Crestline	20	35.71	45	35.52	41	38.04	24	47.58	17	36.62
6	Crestline	39	37.47	35	35.28	39	37.87	25	46.14	17	35.55
7	Crestline	55	39.75	47	37.27	52	39.39	30	48.33	17	36.89
8	Crestline	64	42.77	54	42.06	56	43.94	51	53.67	40	42.71
9	Crestline	66	46.89	56	48.25	60	50.52	58	58.89	60	51.26
10	Crestline	68	51.99	59	55.02	62	57.84	76	63.99	71	63.45
11	Crestline	68	55.14	62	60.84	64	65.31	96	70.21	77	78.37
12	Crestline	64	57.71	64	65.09	67	71.5	107	80.49	100	90.8
13	Crestline	60	62.23	78	70.71	75	76.64	118	92.33	112	97.82
14	Crestline	86	70.68	94	82.54	106	86.82	137	105.91	85	104.19
15	Crestline	140	82.57	91	99.42	134	99.46	140	129.67	81	118.48
16	Crestline	162	93.74	127	113.31	176	100.97	119	139.28	85	130.76
17	Crestline	133	90.28	142	117.78	138	94.22	105	128.45	88	122.05
18	Crestline	79	80.74	108	110.28	90	86.97	96	114.06	94	105.79
19	Crestline	27	76.05	66	102.26	51	81.68	72	107.53	80	98.91
20	Crestline	20	72.83	35	91.97	23	77.82	48	103.59	71	93.89
21	Crestline	26	62.87	22	79.59	23	70.06	38	95.73	51	84.9
22	Crestline	48	51.9	23	61.2	21	68.17	33	75.08	47	71.62
23	Crestline	48	46.88	25	51.1	23	66.69	30	54.91	44	57.17
	Max	162	93.74	142	117.78	176	100.97	140	139.28	112	130.76

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Fontana	2	24.69	2	44.38	1	44.04	2	49.41	1	46.15
1	Fontana	2	23.63	2	39.65	1	41.25	3	48.41	3	47.03
2	Fontana	2	22.18	2	35.06	1	37.94	5	47.4	6	46.73
3	Fontana	2	20.34	2	30.41	1	35.78	2	46.25	9	42.85
4	Fontana	-999	18.69	-999	26.47	-999	33.35	-999	44.35	-999	40.02
5	Fontana	3	19.55	4	24.28	3	32.08	4	42.35	9	39.04
6	Fontana	11	22.39	13	25.01	7	31.21	13	40.36	23	38.65
7	Fontana	33	27.03	23	28.5	21	32.31	29	42.72	41	42.77
8	Fontana	50	35.59	34	36.63	26	39.15	51	53.95	65	55.96
9	Fontana	60	44.27	38	45.29	-999	47.63	64	63.53	71	72.74
10	Fontana	68	51.79	51	54.75	59	56.49	88	72.82	84	88.25
11	Fontana	78	60.24	84	65.92	-999	65.81	92	83.42	110	95.14
12	Fontana	93	68.55	90	79.18	90	75.2	125	93.07	116	98.09
13	Fontana	117	79.22	124	95.35	97	88.21	149	107.86	117	104.75
14	Fontana	128	92.39	139	111.89	153	103.69	132	130.48	86	116.6
15	Fontana	149	99.97	134	122.08	162	107.73	120	130.76	83	122.38
16	Fontana	125	83.24	114	118.9	95	96.68	88	118.85	92	111.75
17	Fontana	90	75.15	102	101.97	74	78.62	92	99.79	91	90.1
18	Fontana	71	70.84	70	80.07	66	62.24	75	69.06	77	72.4
19	Fontana	50	59.54	50	65.78	45	50.38	51	54.2	61	57.01
20	Fontana	34	51.93	33	61.35	10	46.9	36	48.57	50	47.48
21	Fontana	29	48.53	15	57.69	2	45.94	26	47.51	36	43.46
22	Fontana	13	46.96	4	51.8	2	46.13	16	48.33	18	42.32
23	Fontana	7	46.93	2	47.88	4	48.47	5	45.86	16	40.09
	Max	149	99.97	139	122.08	162	107.73	149	130.76	117	122.38

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Redlands	30	44.34	43	46.66	36	52.45	55	65.78	40	58.05
1	Redlands	24	41.52	42	44.59	39	49.97	53	62.1	36	50.79
2	Redlands	22	39.16	37	42.69	35	48.63	44	58.29	33	49.05
3	Redlands	25	36.72	40	40.31	35	47.6	42	54.82	33	44.61
4	Redlands	-999	35.07	-999	37.63	-999	46.94	-999	52.91	-999	42.09
5	Redlands	38	35.08	41	35.44	28	45.71	37	52.01	25	41.46
6	Redlands	34	37.04	32	35.86	34	44.69	39	52.59	28	41.51
7	Redlands	43	42.1	55	40.92	30	46.9	59	57.97	44	43.97
8	Redlands	51	50.3	62	50.26	19	56.18	72	69.17	59	49.59
9	Redlands	60	56.85	70	57.95	47	64.73	86	74.01	74	56.86
10	Redlands	61	60.77	69	64.76	60	69.47	99	76.25	84	69.07
11	Redlands	73	63.56	81	69.6	84	71.39	113	76.63	80	83.13
12	Redlands	89	67.9	93	72.21	95	72.77	91	77.53	76	94.67
13	Redlands	94	74.46	104	77.46	95	76.62	104	83.75	100	101.2
14	Redlands	120	81.69	106	89.73	107	91.52	136	99.38	75	107.19
15	Redlands	135	94.74	126	106.45	126	116.34	106	131.29	62	115.56
16	Redlands	147	111.36	132	119.13	154	126.82	101	136.19	59	126.93
17	Redlands	139	103.72	111	124.3	121	119.04	99	124.94	63	125.07
18	Redlands	111	84.36	100	114.19	92	100.36	82	111.25	78	111.19
19	Redlands	84	77.56	78	98.39	72	84.34	61	98.01	65	97.75
20	Redlands	55	73.39	56	86.04	59	78.38	53	87.08	50	88.75
21	Redlands	48	67.98	52	78.62	66	70.48	58	86.54	40	76.71
22	Redlands	41	59.17	39	69.4	53	66.69	50	85.01	45	71.51
23	Redlands	42	50.7	32	59.72	49	67.04	47	73.43	43	66.84
	Max	147	111.36	132	124.3	154	126.82	136	136.19	100	126.93

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	San Bernardino	1	35.23	27	44.48	21	48.28	24	61.82	2	57.91
1	San Bernardino	1	34.1	18	40.95	11	44.07	8	60.53	4	48.87
2	San Bernardino	5	32.34	14	38.3	3	41.02	2	58.69	14	45.04
3	San Bernardino	7	29.91	8	35.54	2	38.86	1	55.93	12	41.33
4	San Bernardino	-999	27.8	-999	32.67	-999	37.93	-999	53.13	-999	38.9
5	San Bernardino	3	28.01	4	30.38	3	38.19	6	51.41	14	37.81
6	San Bernardino	8	30.96	9	30.47	9	38.06	17	51.19	32	36.73
7	San Bernardino	24	36.12	28	33.7	24	39.41	37	55.25	50	39.55
8	San Bernardino	35	44.31	51	41.62	38	46.74	63	64.89	69	49.7
9	San Bernardino	48	51.3	63	49.77	47	56.21	85	71.39	75	63.41
10	San Bernardino	64	56.61	64	58.61	65	65.41	96	76.97	85	79.38
11	San Bernardino	81	61.56	77	67.38	81	72.58	113	81.38	96	93.99
12	San Bernardino	82	67.91	90	73.95	91	75.88	107	85.63	101	101.37
13	San Bernardino	100	76.08	91	84.16	94	81.56	128	92.72	112	104.84
14	San Bernardino	127	86.5	95	100.35	109	98.64	127	116.53	82	110.48
15	San Bernardino	136	102.46	132	115.03	156	116.59	109	140.8	70	122.32
16	San Bernardino	157	107.73	126	123.63	138	117.5	109	129.29	71	126.98
17	San Bernardino	122	87.97	110	119.6	104	103.65	92	117.55	87	114.85
18	San Bernardino	94	75.6	92	100.99	82	83.72	79	99.31	80	97.21
19	San Bernardino	66	71.56	63	84.86	78	70.39	66	83.64	62	83.71
20	San Bernardino	40	68.37	36	76.05	49	68	47	74.95	50	74.73
21	San Bernardino	29	64.3	27	70.27	22	64.36	30	73.25	39	67.14
22	San Bernardino	19	57.58	16	61.58	9	61.85	28	69.21	41	61.84
23	San Bernardino	18	50.43	6	55.1	31	62.37	7	62.82	29	56.33
	Max	157	107.73	132	123.63	156	117.5	128	140.8	112	126.98

Hour	Station	18		19		20		21		22	
		OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ	OBS	CMAQ
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Upland	4	25.73	13	40.98	3	41.82	14	43.26	9	38.98
1	Upland	5	25.69	15	38.56	5	39.19	13	43.06	9	41.08
2	Upland	7	25.31	16	35.59	16	37.48	16	42.07	21	43.27
3	Upland	1	24.63	12	31.76	15	36.55	14	41.21	18	41.77
4	Upland	-999	23.54	-999	28.45	-999	35.58	-999	40.61	-999	40.17
5	Upland	1	22.91	3	25.83	3	34.46	6	39.18	16	39.68
6	Upland	13	23.53	13	26.41	4	32.92	13	37.55	16	40.09
7	Upland	38	26.71	30	31.06	8	33.9	28	40.47	39	44.39
8	Upland	59	34.03	37	39.6	26	40.39	47	50.35	62	57.01
9	Upland	64	43.01	51	48.31	38	50.27	61	60.72	77	72.98
10	Upland	78	52.34	70	58.66	73	60.76	92	72.77	96	84.22
11	Upland	85	61.76	73	71.17	90	70.25	107	84.6	117	89.53
12	Upland	103	71.13	97	86.32	90	81.43	136	94.96	118	96.51
13	Upland	113	82	135	103.15	116	93.24	148	113.58	107	106.87
14	Upland	133	92.63	138	116.85	155	102.07	122	130.21	93	116.65
15	Upland	141	87.57	146	121.15	139	99.55	107	123.95	88	116.17
16	Upland	121	77.34	117	112.9	86	87.08	100	113.67	98	99.58
17	Upland	76	78.77	94	92.84	82	73.86	97	84.38	91	82.45
18	Upland	64	69.71	63	74.83	66	61.39	79	63.17	72	68.35
19	Upland	52	55.2	47	63.69	44	51.91	51	56.55	60	53.13
20	Upland	30	49.23	30	60.89	9	47.14	36	47.98	44	40.72
21	Upland	11	46.55	9	58.89	7	41.02	17	41.42	30	35.24
22	Upland	7	44.33	4	52.78	7	39.42	9	40.31	13	33.85
23	Upland	9	42.74	2	46.94	13	41.63	5	39.8	9	33.5
	Max	141	92.63	146	121.15	155	102.07	148	130.21	118	116.65

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Azusa	-999	-999	-999	-999	-999	-999	1.12	1.12	-12.06	12.06
10	Azusa	-999	-999	-999	-999	-999	-999	-14.18	14.18	-21.65	21.65
11	Azusa	-15.46	15.46	-11.07	11.07	-4.95	4.95	-26.93	26.93	-25.83	25.83
12	Azusa	-25.02	25.02	-8.17	8.17	-29.42	29.42	-29.29	29.29	-16.2	16.2
13	Azusa	-35.34	35.34	-7.16	7.16	-23.94	23.94	0.45	0.45	1.87	1.87
14	Azusa	-38.94	38.94	-27.82	27.82	-40.62	40.62	10.08	10.08	-0.5	0.5
15	Azusa	-7.76	7.76	2.46	2.46	-12.16	12.16	9.64	9.64	-12.31	12.31
16	Azusa	15.47	15.47	-0.41	0.41	6.96	6.96	-11.87	11.87	-8.05	8.05
17	Azusa	11.13	11.13	15.16	15.16	6.58	6.58	-17.55	17.55	-6.3	6.3
18	Azusa	-999	-999	-999	-999	-999	-999	-7.61	7.61	-999	-999
19	Azusa	-999	-999	-999	-999	-12.67	12.67	-999	-999	-999	-999
20	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Azusa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-13.702857	21.302857	-5.2871429	10.321429	-13.7775	17.1625	-8.614	12.872	-11.225556	11.641111

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Burbank	-999	-999	-999	-999	-999	-999	-11.86	11.86	-16.08	16.08
10	Burbank	-999	-999	-999	-999	-999	-999	-27.65	27.65	-24.18	24.18
11	Burbank	-8.59	8.59	-2.68	2.68	-5.56	5.56	-35.62	35.62	-42.4	42.4
12	Burbank	-22.08	22.08	-23.81	23.81	-30.85	30.85	-15.46	15.46	-16	16
13	Burbank	-14.83	14.83	-6.29	6.29	-35.53	35.53	-12.45	12.45	-11.1	11.1
14	Burbank	18.15	18.15	5.13	5.13	-8.88	8.88	-41.14	41.14	-12.97	12.97
15	Burbank	-999	-999	14.9	14.9	8.98	8.98	-34.8	34.8	-23.9	23.9
16	Burbank	-999	-999	25.32	25.32	3.08	3.08	-999	-999	-5.68	5.68
17	Burbank	-999	-999	13.56	13.56	-999	-999	-999	-999	-999	-999
18	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Burbank	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-6.8375	15.9125	3.7328571	13.098571	-11.46	15.48	-25.568571	25.568571	-19.03875	19.03875

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Glendora	-999	-999	-999	-999	-999	-999	-3.29	3.29	-16.93	16.93
10	Glendora	-999	-999	-999	-999	-999	-999	-21.53	21.53	-36.17	36.17
11	Glendora	-22.1	22.1	-2.42	2.42	-999	-999	-39.98	39.98	-35.16	35.16
12	Glendora	-999	-999	-21.01	21.01	-31.78	31.78	-56.95	56.95	-26.25	26.25
13	Glendora	-999	-999	-15.52	15.52	-50.75	50.75	-21.37	21.37	-8.87	8.87
14	Glendora	-43.85	43.85	-37.11	37.11	-46.78	46.78	3.46	3.46	-1.52	1.52
15	Glendora	-26.43	26.43	-9.92	9.92	-30.42	30.42	12.68	12.68	-14.04	14.04
16	Glendora	7.62	7.62	-3.95	3.95	-4.48	4.48	-3.31	3.31	-11.67	11.67
17	Glendora	9.68	9.68	7.94	7.94	-0.68	0.68	-18.84	18.84	-13.46	13.46
18	Glendora	6.44	6.44	9.98	9.98	1.37	1.37	-2.12	2.12	-4.36	4.36
19	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Glendora	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-11.44	19.353333	-9.00125	13.48125	-23.36	23.751429	-15.125	18.353	-16.843	16.843

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
10	Los Angeles	-999	-999	-999	-999	-999	-999	-6.61	6.61	-16.25	16.25
11	Los Angeles	-13.97	13.97	-1.37	1.37	-999	-999	3.53	3.53	-13.32	13.32
12	Los Angeles	-19.57	19.57	-0.76	0.76	-0.82	0.82	-9.4	9.4	15.4	15.4
13	Los Angeles	-0.5	0.5	-3.36	3.36	-8.01	8.01	-9.74	9.74	1.12	1.12
14	Los Angeles	-999	-999	-999	-999	8.99	8.99	-11.38	11.38	-2.21	2.21
15	Los Angeles	-999	-999	-999	-999	13.32	13.32	-7.34	7.34	3.88	3.88
16	Los Angeles	-999	-999	-999	-999	4.35	4.35	0.81	0.81	-999	-999
17	Los Angeles	-999	-999	-999	-999	-999	-999	-6.82	6.82	-999	-999
18	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Los Angeles	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-11.346667	11.346667	-1.83	1.83	3.566	7.098	-5.86875	6.95375	-1.8966667	8.6966667

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
10	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
11	LAX	-999	-999	3.03	3.03	-999	-999	1.74	1.74	-999	-999
12	LAX	-999	-999	13.28	13.28	-999	-999	-999	-999	-999	-999
13	LAX	-999	-999	21.7	21.7	-999	-999	-999	-999	-999	-999
14	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
15	LAX	-999	-999	-999	-999	-999	-999	17.98	17.98	-999	-999
16	LAX	-999	-999	-999	-999	-999	-999	15.79	15.79	-999	-999
17	LAX	-999	-999	-999	-999	-999	-999	2.74	2.74	-999	-999
18	LAX	-999	-999	-999	-999	-999	-999	-5.11	5.11	-999	-999
19	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	LAX	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	N/A	N/A	12.67	12.67	N/A	N/A	6.628	8.672	N/A	N/A

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
10	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
11	Lynwood	-999	-999	9.1	9.1	-999	-999	-999	-999	-999	-999
12	Lynwood	-999	-999	12.02	12.02	-999	-999	8.41	8.41	13.07	13.07
13	Lynwood	-999	-999	13.38	13.38	-1	1	19.89	19.89	23.78	23.78
14	Lynwood	-999	-999	-999	-999	25.47	25.47	22.33	22.33	21.42	21.42
15	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	17.26	17.26
16	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
17	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
18	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Lynwood	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	N/A	N/A	11.5	11.5	12.235	13.235	16.876667	16.876667	18.8825	18.8825

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
10	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
11	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
12	North Long Beach	-24.46	24.46	-999	-999	5.74	5.74	-999	-999	-999	-999
13	North Long Beach	-4.21	4.21	22.5	22.5	7.1	7.1	-999	-999	-999	-999
14	North Long Beach	17.63	17.63	-999	-999	8.39	8.39	-999	-999	-999	-999
15	North Long Beach	22.44	22.44	-999	-999	13.97	13.97	1.17	1.17	-999	-999
16	North Long Beach	-999	-999	-999	-999	-5.44	5.44	-2.69	2.69	-6.4	6.4
17	North Long Beach	-999	-999	-999	-999	-23.68	23.68	-9.07	9.07	-999	-999
18	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	North Long Beach	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	2.85	17.185	22.5	22.5	1.0133333	10.72	-3.53	4.31	-6.4	6.4

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Pasadena	-19.36	19.36	-19.31	19.31	-999	-999	-13.88	13.88	-18.71	18.71
10	Pasadena	-28.16	28.16	-10.08	10.08	-17.71	17.71	-21.41	21.41	-25.08	25.08
11	Pasadena	-28.63	28.63	-1.24	1.24	-20.38	20.38	-18.79	18.79	-22	22
12	Pasadena	-16.56	16.56	-6.62	6.62	-2.04	2.04	-3.18	3.18	-15.57	15.57
13	Pasadena	-25.56	25.56	-20.38	20.38	-24.72	24.72	-0.77	0.77	0.97	0.97
14	Pasadena	-2.96	2.96	-1.16	1.16	-8.69	8.69	10.07	10.07	-2.69	2.69
15	Pasadena	19.33	19.33	10.01	10.01	10.16	10.16	2.66	2.66	-2.73	2.73
16	Pasadena	-999	-999	23.27	23.27	12.42	12.42	-13.23	13.23	-2.13	2.13
17	Pasadena	-999	-999	-999	-999	-2.85	2.85	2.19	2.19	-999	-999
18	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Pasadena	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-14.557143	20.08	-3.18875	11.50875	-6.72625	12.37125	-6.26	9.5755556	-10.9925	11.235

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	1.34	1.34
10	Pico Rivera	-999	-999	0.69	0.69	-8.88	8.88	-1.26	1.26	-6.81	6.81
11	Pico Rivera	-13.56	13.56	21.88	21.88	-11.93	11.93	-11.11	11.11	2.58	2.58
12	Pico Rivera	-19.65	19.65	16.39	16.39	-7	7	7.97	7.97	10.11	10.11
13	Pico Rivera	-21.31	21.31	-8.16	8.16	-7.42	7.42	4.82	4.82	5.26	5.26
14	Pico Rivera	6.72	6.72	1.39	1.39	-4.88	4.88	5.95	5.95	-0.48	0.48
15	Pico Rivera	18.75	18.75	2.39	2.39	21.08	21.08	-1.25	1.25	0.39	0.39
16	Pico Rivera	13.53	13.53	22.75	22.75	18.08	18.08	-3.62	3.62	-0.43	0.43
17	Pico Rivera	-999	-999	-999	-999	-5.31	5.31	-4.44	4.44	-999	-999
18	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Pico Rivera	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-2.5866667	15.586667	8.19	10.521429	-0.7825	10.5725	-0.3675	5.0525	1.495	3.425

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Pomona	-23.35	23.35	-999	-999	-999	-999	-10.02	10.02	-5.64	5.64
10	Pomona	-24.89	24.89	-999	-999	-13.41	13.41	-17.83	17.83	-18.75	18.75
11	Pomona	-24.84	24.84	-9.18	9.18	-5.15	5.15	-27.79	27.79	-26.23	26.23
12	Pomona	-27.37	27.37	-20.78	20.78	-12.55	12.55	-34.3	34.3	-12.54	12.54
13	Pomona	-20.87	20.87	-15.82	15.82	-45.83	45.83	2.26	2.26	13.56	13.56
14	Pomona	-49.29	49.29	-6.68	6.68	-39.67	39.67	13.92	13.92	25.91	25.91
15	Pomona	-48.28	48.28	7.75	7.75	-10.09	10.09	17.45	17.45	17.84	17.84
16	Pomona	-9.62	9.62	0.82	0.82	-1.04	1.04	15.05	15.05	1.21	1.21
17	Pomona	6.02	6.02	0.05	0.05	6.33	6.33	-5.2	5.2	-3.03	3.03
18	Pomona	1.93	1.93	9.05	9.05	-999	-999	-13.48	13.48	-9.26	9.26
19	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Pomona	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-22.056	23.646	-4.34875	8.76625	-15.17625	16.75875	-5.994	15.73	-1.693	13.397

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Reseda	-27.96	27.96	-999	-999	-999	-999	-999	-999	-999	-999
9	Reseda	-24.62	24.62	-999	-999	-19.71	19.71	-999	-999	-17.9	17.9
10	Reseda	-15.98	15.98	-999	-999	-999	-999	-15.18	15.18	-35.76	35.76
11	Reseda	-7.94	7.94	-999	-999	-999	-999	-2.95	2.95	-29.5	29.5
12	Reseda	2.12	2.12	-999	-999	-999	-999	-999	-999	-24.08	24.08
13	Reseda	-999	-999	-999	-999	9.6	9.6	-999	-999	-30.17	30.17
14	Reseda	22.43	22.43	-999	-999	15.61	15.61	-999	-999	-40.32	40.32
15	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-40.05	40.05
16	Reseda	5.62	5.62	-999	-999	-999	-999	-999	-999	-30.06	30.06
17	Reseda	-4.98	4.98	-999	-999	-999	-999	-999	-999	-15.9	15.9
18	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Reseda	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-6.41375	13.95625	N/A	N/A	1.8333333	14.973333	-9.065	9.065	-29.304444	29.304444

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Santa Clarita	-999	-999	-22.5	22.5	-999	-999	-999	-999	-999	-999
1	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Santa Clarita	-26.71	26.71	-999	-999	-999	-999	-999	-999	-999	-999
8	Santa Clarita	-26.99	26.99	-999	-999	-19.26	19.26	-999	-999	-999	-999
9	Santa Clarita	-21.79	21.79	-999	-999	-21.37	21.37	-16.28	16.28	-14	14
10	Santa Clarita	-17.04	17.04	-999	-999	-16.56	16.56	-999	-999	-40.26	40.26
11	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-51.71	51.71
12	Santa Clarita	-999	-999	-999	-999	-999	-999	-4.19	4.19	-63.99	63.99
13	Santa Clarita	-4.47	4.47	-999	-999	-999	-999	-999	-999	-16.65	16.65
14	Santa Clarita	-999	-999	6.77	6.77	-999	-999	-999	-999	-999	-999
15	Santa Clarita	-999	-999	11.31	11.31	7.92	7.92	-999	-999	-999	-999
16	Santa Clarita	-999	-999	10.99	10.99	-4.46	4.46	4.35	4.35	-999	-999
17	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
18	Santa Clarita	-12.55	12.55	-999	-999	-999	-999	-999	-999	-999	-999
19	Santa Clarita	-21.76	21.76	-999	-999	-999	-999	-999	-999	-999	-999
20	Santa Clarita	-19.17	19.17	-999	-999	-999	-999	-999	-999	-999	-999
21	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Santa Clarita	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-18.81	18.81	1.6425	12.8925	-10.746	13.914	-5.3733333	8.2733333	-37.322	37.322

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
10	West LA	-21.91	21.91	-999	-999	-999	-999	-1.59	1.59	-999	-999
11	West LA	-19.74	19.74	-8.99	8.99	-11.85	11.85	1.7	1.7	-999	-999
12	West LA	-999	-999	-1.02	1.02	-15.15	15.15	-12.45	12.45	-3.75	3.75
13	West LA	-999	-999	7.48	7.48	-3.96	3.96	-9.94	9.94	7.32	7.32
14	West LA	-999	-999	12.73	12.73	2.97	2.97	2.75	2.75	8.75	8.75
15	West LA	-999	-999	19.59	19.59	-6.72	6.72	-4.51	4.51	-999	-999
16	West LA	-999	-999	9.45	9.45	1.46	1.46	-4.37	4.37	1.74	1.74
17	West LA	-999	-999	4.5	4.5	-999	-999	-2.46	2.46	-999	-999
18	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	West LA	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-20.825	20.825	6.2485714	9.1085714	-5.5416667	7.0183333	-3.85875	4.97125	3.515	5.39

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Anaheim	-999	-999	-999	-999	-999	-999	0.28	0.28	3.34	3.34
10	Anaheim	-999	-999	-999	-999	-7.96	7.96	-3.7	3.7	13.7	13.7
11	Anaheim	-999	-999	14.34	14.34	-7.86	7.86	15.01	15.01	21.74	21.74
12	Anaheim	-999	-999	4.4	4.4	0.9	0.9	18.24	18.24	26.06	26.06
13	Anaheim	-8.55	8.55	1.23	1.23	13.24	13.24	14.97	14.97	34.65	34.65
14	Anaheim	-5.26	5.26	-0.47	0.47	-5.49	5.49	15.59	15.59	42.52	42.52
15	Anaheim	-1.96	1.96	9.07	9.07	-1.19	1.19	12.08	12.08	-999	-999
16	Anaheim	20.41	20.41	21.7	21.7	-9.01	9.01	-1.76	1.76	15.49	15.49
17	Anaheim	10.56	10.56	18.08	18.08	-9.57	9.57	-6.02	6.02	-999	-999
18	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
19	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Anaheim	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	3.04	9.348	9.7642857	9.8985714	-3.3675	6.9025	7.1877778	9.7388889	22.5	22.5

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Costa Mesa	-999	-999	-999	-999	-999	-999	7.16	7.16	-999	-999
10	Costa Mesa	-999	-999	16.43	16.43	5.89	5.89	12.86	12.86	-999	-999
11	Costa Mesa	-999	-999	19.32	19.32	12.38	12.38	14.23	14.23	16.88	16.88
12	Costa Mesa	13.85	13.85	8.43	8.43	12.31	12.31	17.34	17.34	-999	-999
13	Costa Mesa	14.4	14.4	12.03	12.03	14.73	14.73	17.87	17.87	-999	-999
14	Costa Mesa	27.64	27.64	14.13	14.13	16.63	16.63	29.57	29.57	-999	-999
15	Costa Mesa	36.98	36.98	27.77	27.77	33.56	33.56	26.47	26.47	-999	-999
16	Costa Mesa	-999	-999	-999	-999	-999	-999	6.27	6.27	-999	-999
17	Costa Mesa	-999	-999	-999	-999	-999	-999	-1.17	1.17	-999	-999
18	Costa Mesa	-999	-999	-999	-999	-999	-999	-5.82	5.82	-999	-999
19	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Costa Mesa	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	23.2175	23.2175	16.351667	16.351667	15.916667	15.916667	12.478	13.876	16.88	16.88

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	La Habra	-999	-999	-999	-999	-999	-999	8.68	8.68	4.54	4.54
10	La Habra	-999	-999	-999	-999	6.7	6.7	-4.43	4.43	3.53	3.53
11	La Habra	-999	-999	15.97	15.97	-11.7	11.7	5.54	5.54	19.04	19.04
12	La Habra	13.65	13.65	14.43	14.43	-8.23	8.23	15.84	15.84	22.58	22.58
13	La Habra	-25.49	25.49	18.53	18.53	-10.11	10.11	12.57	12.57	30.71	30.71
14	La Habra	-22.69	22.69	13.23	13.23	-5.61	5.61	16.57	16.57	26.12	26.12
15	La Habra	1.78	1.78	10.3	10.3	0.67	0.67	12.11	12.11	21.8	21.8
16	La Habra	19.06	19.06	19.5	19.5	13.36	13.36	1.91	1.91	12.11	12.11
17	La Habra	-999	-999	14.7	14.7	4.03	4.03	-3.34	3.34	-2.23	2.23
18	La Habra	-999	-999	-999	-999	-999	-999	-15.6	15.6	-999	-999
19	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
20	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	La Habra	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-2.738	16.534	15.237143	15.237143	-1.36125	7.55125	4.985	9.659	15.355556	15.851111

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Mission Viejo	-999	-999	-999	-999	-12.31	12.31	-999	-999	-999	-999
9	Mission Viejo	-999	-999	-5.86	5.86	2.36	2.36	-4.86	4.86	5.11	5.11
10	Mission Viejo	-999	-999	-3.23	3.23	-9.11	9.11	-10.21	10.21	4.04	4.04
11	Mission Viejo	15.73	15.73	-3.1	3.1	-10.52	10.52	-10.79	10.79	12.16	12.16
12	Mission Viejo	3.83	3.83	1.64	1.64	-17.39	17.39	0.66	0.66	16.28	16.28
13	Mission Viejo	-9.21	9.21	-1.95	1.95	-10.69	10.69	-7.43	7.43	21.04	21.04
14	Mission Viejo	-19.73	19.73	5.87	5.87	-10.44	10.44	-8.77	8.77	35.6	35.6
15	Mission Viejo	-2.95	2.95	0.76	0.76	-11.31	11.31	14.05	14.05	50.62	50.62
16	Mission Viejo	36.95	36.95	-1.41	1.41	3.5	3.5	29.25	29.25	-999	-999
17	Mission Viejo	-999	-999	19.22	19.22	-11.94	11.94	19.12	19.12	-999	-999
18	Mission Viejo	-999	-999	-999	-999	-19.7	19.7	2.51	2.51	12.94	12.94
19	Mission Viejo	-999	-999	-999	-999	3.16	3.16	5.5	5.5	1.45	1.45
20	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Mission Viejo	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	4.1033333	14.733333	1.3266667	4.7822222	-8.6991667	10.2025	2.6390909	10.286364	17.693333	17.693333

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Banning Airport	-999	-999	-999	-999	-999	-999	-14.99	14.99	-999	-999
8	Banning Airport	-6.28	6.28	-999	-999	-999	-999	-8.99	8.99	-999	-999
9	Banning Airport	-6.5	6.5	-6.91	6.91	-10.12	10.12	-6.56	6.56	-9.02	9.02
10	Banning Airport	-9.73	9.73	-7.67	7.67	-15.23	15.23	-5.01	5.01	-5.73	5.73
11	Banning Airport	-17.95	17.95	-8.67	8.67	-21.35	21.35	-5.29	5.29	-1.29	1.29
12	Banning Airport	-22.69	22.69	-10.07	10.07	-11.13	11.13	-10.79	10.79	-1.32	1.32
13	Banning Airport	-32.91	32.91	-10.78	10.78	-12.18	12.18	-19.84	19.84	8.38	8.38
14	Banning Airport	-28.1	28.1	-38.61	38.61	-17.51	17.51	-27.04	27.04	10.08	10.08
15	Banning Airport	-32.84	32.84	-39.64	39.64	-18.85	18.85	-8.63	8.63	-999	-999
16	Banning Airport	-48.66	48.66	-13.24	13.24	1.23	1.23	3.27	3.27	-999	-999
17	Banning Airport	-15.96	15.96	4.29	4.29	-13.21	13.21	16.89	16.89	-999	-999
18	Banning Airport	-40.78	40.78	8.75	8.75	-17.16	17.16	15.98	15.98	-999	-999
19	Banning Airport	-37.58	37.58	20.36	20.36	-1.39	1.39	24.8	24.8	-999	-999
20	Banning Airport	-19.15	19.15	25.48	25.48	7.75	7.75	35.79	35.79	-999	-999
21	Banning Airport	7.6	7.6	-999	-999	3.03	3.03	-999	-999	-999	-999
22	Banning Airport	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Banning Airport	7.02	7.02	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-20.300667	22.25	-6.3925	16.205833	-9.7015385	11.549231	-0.7435714	14.562143	0.1833333	5.97

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Lake Elsinore	-9.39	9.39	-999	-999	-24.39	24.39	-7.16	7.16	-999	-999
9	Lake Elsinore	-10.49	10.49	-999	-999	-22.25	22.25	-10.99	10.99	-8.08	8.08
10	Lake Elsinore	-8.31	8.31	-999	-999	-21.89	21.89	-12.46	12.46	-1.68	1.68
11	Lake Elsinore	-8.14	8.14	-3.93	3.93	-19.67	19.67	-5.61	5.61	1.68	1.68
12	Lake Elsinore	-6.03	6.03	-2.65	2.65	-16.84	16.84	2.39	2.39	6.31	6.31
13	Lake Elsinore	-0.91	0.91	-1.43	1.43	-5.27	5.27	11.41	11.41	22.25	22.25
14	Lake Elsinore	-17.91	17.91	12.12	12.12	19.42	19.42	19.02	19.02	-999	-999
15	Lake Elsinore	-31	31	13.23	13.23	10.71	10.71	23.92	23.92	-999	-999
16	Lake Elsinore	-5.42	5.42	30.19	30.19	5.84	5.84	-999	-999	27.42	27.42
17	Lake Elsinore	0.53	0.53	38.32	38.32	-1.98	1.98	-999	-999	-999	-999
18	Lake Elsinore	0.6	0.6	32.87	32.87	-2.49	2.49	-999	-999	-999	-999
19	Lake Elsinore	9.53	9.53	33.68	33.68	8.14	8.14	-999	-999	-999	-999
20	Lake Elsinore	-999	-999	24.13	24.13	-999	-999	-999	-999	-999	-999
21	Lake Elsinore	-999	-999	27.57	27.57	-999	-999	-999	-999	-999	-999
22	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Lake Elsinore	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-7.245	9.0216667	18.554545	20.010909	-5.8891667	13.240833	2.565	11.62	7.9833333	11.236667

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Mira Loma	-15.76	15.76	-17.08	17.08	-18.59	18.59	-4.19	4.19	8.61	8.61
10	Mira Loma	-16.31	16.31	-24.21	24.21	-23.21	23.21	-14.69	14.69	12.76	12.76
11	Mira Loma	-18.66	18.66	-28.08	28.08	-21.59	21.59	-11.58	11.58	3	3
12	Mira Loma	-24.53	24.53	-27.4	27.4	-12.45	12.45	-28.86	28.86	8.37	8.37
13	Mira Loma	-36.86	36.86	-19.3	19.3	-33.7	33.7	17.03	17.03	28.78	28.78
14	Mira Loma	-20.62	20.62	-15.94	15.94	-4.52	4.52	42.56	42.56	40.4	40.4
15	Mira Loma	-20.75	20.75	15.57	15.57	-18.27	18.27	26.46	26.46	47.43	47.43
16	Mira Loma	-15.46	15.46	22.91	22.91	-7.48	7.48	27.05	27.05	44.27	44.27
17	Mira Loma	-15.45	15.45	14.09	14.09	-14.14	14.14	26.79	26.79	30.48	30.48
18	Mira Loma	2.78	2.78	16	16	-10.57	10.57	1.39	1.39	-999	-999
19	Mira Loma	3.19	3.19	-999	-999	-999	-999	-999	-999	-999	-999
20	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Mira Loma	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-16.220909	17.306364	-6.344	20.058	-16.452	16.452	8.196	20.06	24.9	24.9

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Perris	-7.54	7.54	-23.97	23.97	-17.47	17.47	6.98	6.98	-999	-999
9	Perris	-6.72	6.72	-28.31	28.31	-13.33	13.33	2.8	2.8	-999	-999
10	Perris	-5	5	-19.91	19.91	-7.45	7.45	0.04	0.04	3.15	3.15
11	Perris	-5.33	5.33	-20.83	20.83	0.46	0.46	1.69	1.69	-1.61	1.61
12	Perris	-17.64	17.64	-10.92	10.92	0.14	0.14	-3.77	3.77	7.11	7.11
13	Perris	-21.13	21.13	-9.1	9.1	-999	-999	-5.74	5.74	18.45	18.45
14	Perris	-19.65	19.65	6.38	6.38	18.85	18.85	20.21	20.21	31.31	31.31
15	Perris	-9.16	9.16	14.7	14.7	24.98	24.98	24.62	24.62	-999	-999
16	Perris	-6.31	6.31	31.52	31.52	-15.29	15.29	32.43	32.43	-999	-999
17	Perris	-15.11	15.11	47.19	47.19	-16.54	16.54	-999	-999	-999	-999
18	Perris	-13.82	13.82	39.83	39.83	-1.06	1.06	-999	-999	-999	-999
19	Perris	-3.14	3.14	35.57	35.57	-999	-999	-999	-999	-999	-999
20	Perris	4.55	4.55	28.45	28.45	-999	-999	-999	-999	-999	-999
21	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Perris	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-9.6923077	10.392308	6.9692308	24.36	-2.671	11.557	8.8066667	10.92	11.682	12.326

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
9	Rubidoux	-5.4	5.4	-25.56	25.56	-28.3	28.3	-10.66	10.66	0.09	0.09
10	Rubidoux	-24.61	24.61	-29.8	29.8	-27.3	27.3	-21.91	21.91	-0.38	0.38
11	Rubidoux	-23.39	23.39	-27.49	27.49	-21.57	21.57	-6.24	6.24	4.08	4.08
12	Rubidoux	-23	23	-39.02	39.02	-11.97	11.97	-41.03	41.03	-1.84	1.84
13	Rubidoux	-36.51	36.51	-24.3	24.3	-30.18	30.18	-18.47	18.47	19.51	19.51
14	Rubidoux	-42.63	42.63	-29.43	29.43	-16.12	16.12	31.16	31.16	36.18	36.18
15	Rubidoux	-28.27	28.27	-5.48	5.48	-27.58	27.58	22.08	22.08	43.76	43.76
16	Rubidoux	-27.64	27.64	20.49	20.49	-24.79	24.79	13.98	13.98	47.69	47.69
17	Rubidoux	-27.33	27.33	13.67	13.67	-22.67	22.67	22.89	22.89	33.77	33.77
18	Rubidoux	-4.09	4.09	15.85	15.85	-17.68	17.68	6.14	6.14	25.05	25.05
19	Rubidoux	2.39	2.39	9.23	9.23	-8.27	8.27	-3.99	3.99	-999	-999
20	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Rubidoux	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-21.861818	22.296364	-11.076364	21.847273	-21.493636	21.493636	-0.55	18.05	20.791	21.235

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Indio	-999	-999	-10.22	10.22	-1.88	1.88	-14.66	14.66	-999	-999
1	Indio	-999	-999	-5.31	5.31	-999	-999	-999	-999	-999	-999
2	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Indio	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Indio	-999	-999	-999	-999	-999	-999	-7.34	7.34	-999	-999
9	Indio	-11.55	11.55	-16.16	16.16	-13.04	13.04	-6.23	6.23	-999	-999
10	Indio	-10.21	10.21	-21.88	21.88	-18.81	18.81	5.12	5.12	-999	-999
11	Indio	-11.02	11.02	-7.06	7.06	-15.64	15.64	8.47	8.47	-999	-999
12	Indio	-9.03	9.03	0.8	0.8	-9.63	9.63	4.24	4.24	13.65	13.65
13	Indio	-6.57	6.57	4.53	4.53	-10.54	10.54	9.83	9.83	8.41	8.41
14	Indio	-5.81	5.81	1.72	1.72	-15.07	15.07	15.19	15.19	10.31	10.31
15	Indio	-6.76	6.76	-0.71	0.71	-16.33	16.33	16.3	16.3	11.12	11.12
16	Indio	-3.07	3.07	-1.47	1.47	-15.56	15.56	18.12	18.12	8.92	8.92
17	Indio	-17.91	17.91	-2.75	2.75	-10	10	10.74	10.74	14.74	14.74
18	Indio	-31.36	31.36	-16.45	16.45	-7.08	7.08	8.48	8.48	-999	-999
19	Indio	-30.93	30.93	-17.89	17.89	-20.01	20.01	-999	-999	-999	-999
20	Indio	-37.77	37.77	4.21	4.21	-22.1	22.1	30.8	30.8	-999	-999
21	Indio	-25.9	25.9	-0.72	0.72	-25.3	25.3	26.83	26.83	-999	-999
22	Indio	-22.86	22.86	-4.31	4.31	-22.61	22.61	-999	-999	-999	-999
23	Indio	-13.86	13.86	-5.87	5.87	-13.91	13.91	-999	-999	-999	-999
	Average	-16.307333	16.307333	-5.8552941	7.18	-14.844375	14.844375	8.9921429	13.025	11.191667	11.191667

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Palm Springs	-999	-999	-4.01	4.01	1.19	1.19	-999	-999	-999	-999
1	Palm Springs	-999	-999	-1.57	1.57	-999	-999	-999	-999	-999	-999
2	Palm Springs	-999	-999	-4.11	4.11	-999	-999	-999	-999	-999	-999
3	Palm Springs	-999	-999	-7.22	7.22	-999	-999	-999	-999	-999	-999
4	Palm Springs	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Palm Springs	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Palm Springs	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Palm Springs	-21.05	21.05	-999	-999	-999	-999	-16.76	16.76	-999	-999
8	Palm Springs	-16.7	16.7	-12.88	12.88	-999	-999	-10.93	10.93	-999	-999
9	Palm Springs	-15.47	15.47	-7.38	7.38	-999	-999	-18.28	18.28	-999	-999
10	Palm Springs	-15.13	15.13	-5.93	5.93	-7.45	7.45	-13.51	13.51	-999	-999
11	Palm Springs	-15.91	15.91	-7.22	7.22	-13.23	13.23	-4.42	4.42	1.91	1.91
12	Palm Springs	-14.35	14.35	-3.12	3.12	-13.88	13.88	2.92	2.92	2.75	2.75
13	Palm Springs	-5.45	5.45	-1.42	1.42	-13.77	13.77	6.01	6.01	6.35	6.35
14	Palm Springs	-11.97	11.97	-4.39	4.39	-13.82	13.82	7.72	7.72	4.79	4.79
15	Palm Springs	-23.37	23.37	-17.35	17.35	-17.06	17.06	-3.38	3.38	11.26	11.26
16	Palm Springs	-24.82	24.82	-41.77	41.77	-19.53	19.53	3.84	3.84	24.56	24.56
17	Palm Springs	-26.03	26.03	-32.11	32.11	-4.92	4.92	6.15	6.15	-999	-999
18	Palm Springs	-12.17	12.17	-17.6	17.6	-8.27	8.27	-999	-999	-999	-999
19	Palm Springs	-17.38	17.38	6.59	6.59	-27.27	27.27	-999	-999	-999	-999
20	Palm Springs	-28.6	28.6	4.7	4.7	-31.51	31.51	-999	-999	-999	-999
21	Palm Springs	-18.22	18.22	-1.55	1.55	-25.69	25.69	-999	-999	-999	-999
22	Palm Springs	-11.7	11.7	-2.4	2.4	-22.76	22.76	-999	-999	-999	-999
23	Palm Springs	-3.11	3.11	4.35	4.35	-999	-999	-999	-999	-999	-999
	Average	-16.554706	16.554706	-7.8195	9.3835	-15.569286	15.739286	-3.6945455	8.5381818	8.6033333	8.6033333

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Crestline	-21.23	21.23	-999	-999	-999	-999	-999	-999	-999	-999
9	Crestline	-19.11	19.11	-999	-999	-9.48	9.48	-999	-999	-8.74	8.74
10	Crestline	-16.01	16.01	-999	-999	-4.16	4.16	-12.01	12.01	-7.55	7.55
11	Crestline	-12.86	12.86	-1.16	1.16	1.31	1.31	-25.79	25.79	1.37	1.37
12	Crestline	-6.29	6.29	1.09	1.09	4.5	4.5	-26.51	26.51	-9.2	9.2
13	Crestline	2.23	2.23	-7.29	7.29	1.64	1.64	-25.67	25.67	-14.18	14.18
14	Crestline	-15.32	15.32	-11.46	11.46	-19.18	19.18	-31.09	31.09	19.19	19.19
15	Crestline	-57.43	57.43	8.42	8.42	-34.54	34.54	-10.33	10.33	37.48	37.48
16	Crestline	-68.26	68.26	-13.69	13.69	-75.03	75.03	20.28	20.28	45.76	45.76
17	Crestline	-42.72	42.72	-24.22	24.22	-43.78	43.78	23.45	23.45	34.05	34.05
18	Crestline	1.74	1.74	2.28	2.28	-3.03	3.03	18.06	18.06	11.79	11.79
19	Crestline	-999	-999	36.26	36.26	-999	-999	35.53	35.53	18.91	18.91
20	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	22.89	22.89
21	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Crestline	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-23.205455	23.927273	-1.0855556	11.763333	-18.175	19.665	-3.408	22.872	12.6475	19.259167

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-9.04	9.04
9	Fontana	-15.73	15.73	-999	-999	-999	-999	-0.47	0.47	1.74	1.74
10	Fontana	-16.21	16.21	-999	-999	-999	-999	-15.18	15.18	4.25	4.25
11	Fontana	-17.76	17.76	-18.08	18.08	-999	-999	-8.58	8.58	-14.86	14.86
12	Fontana	-24.45	24.45	-10.82	10.82	-14.8	14.8	-31.93	31.93	-17.91	17.91
13	Fontana	-37.78	37.78	-28.65	28.65	-8.79	8.79	-41.14	41.14	-12.25	12.25
14	Fontana	-35.61	35.61	-27.11	27.11	-49.31	49.31	-1.52	1.52	30.6	30.6
15	Fontana	-49.03	49.03	-11.92	11.92	-54.27	54.27	10.76	10.76	39.38	39.38
16	Fontana	-41.76	41.76	4.9	4.9	1.68	1.68	30.85	30.85	19.75	19.75
17	Fontana	-14.85	14.85	-0.03	0.03	4.62	4.62	7.79	7.79	-0.9	0.9
18	Fontana	-0.16	0.16	10.07	10.07	-3.76	3.76	-5.94	5.94	-4.6	4.6
19	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-3.99	3.99
20	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Fontana	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-25.334	25.334	-10.205	13.9475	-17.804286	19.604286	-5.536	15.416	2.6808333	13.2725

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Redlands	-999	-999	-11.74	11.74	-999	-999	-2.83	2.83	-999	-999
9	Redlands	-3.15	3.15	-12.05	12.05	-999	-999	-11.99	11.99	-17.14	17.14
10	Redlands	-0.23	0.23	-4.24	4.24	9.47	9.47	-22.75	22.75	-14.93	14.93
11	Redlands	-9.44	9.44	-11.4	11.4	-12.61	12.61	-36.37	36.37	3.13	3.13
12	Redlands	-21.1	21.1	-20.79	20.79	-22.23	22.23	-13.47	13.47	18.67	18.67
13	Redlands	-19.54	19.54	-26.54	26.54	-18.38	18.38	-20.25	20.25	1.2	1.2
14	Redlands	-38.31	38.31	-16.27	16.27	-15.48	15.48	-36.62	36.62	32.19	32.19
15	Redlands	-40.26	40.26	-19.55	19.55	-9.66	9.66	25.29	25.29	53.56	53.56
16	Redlands	-35.64	35.64	-12.87	12.87	-27.18	27.18	35.19	35.19	-999	-999
17	Redlands	-35.28	35.28	13.3	13.3	-1.96	1.96	25.94	25.94	62.07	62.07
18	Redlands	-26.64	26.64	14.19	14.19	8.36	8.36	29.25	29.25	33.19	33.19
19	Redlands	-6.44	6.44	20.39	20.39	12.34	12.34	37.01	37.01	32.75	32.75
20	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Redlands	-999	-999	-999	-999	4.48	4.48	-999	-999	-999	-999
22	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Redlands	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-21.457273	21.457273	-7.2975	15.2775	-6.6227273	12.922727	0.7	24.746667	20.469	26.883

Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	San Bernardino	-999	-999	-999	-999	-999	-999	1.89	1.89	-19.3	19.3
9	San Bernardino	-999	-999	-13.23	13.23	-999	-999	-13.61	13.61	-11.59	11.59
10	San Bernardino	-7.39	7.39	-5.39	5.39	0.41	0.41	-19.03	19.03	-5.62	5.62
11	San Bernardino	-19.44	19.44	-9.62	9.62	-8.42	8.42	-31.62	31.62	-2.01	2.01
12	San Bernardino	-14.09	14.09	-16.05	16.05	-15.12	15.12	-21.37	21.37	0.37	0.37
13	San Bernardino	-23.92	23.92	-6.84	6.84	-12.44	12.44	-35.28	35.28	-7.16	7.16
14	San Bernardino	-40.5	40.5	5.35	5.35	-10.36	10.36	-10.47	10.47	28.48	28.48
15	San Bernardino	-33.54	33.54	-16.97	16.97	-39.41	39.41	31.8	31.8	52.32	52.32
16	San Bernardino	-49.27	49.27	-2.37	2.37	-20.5	20.5	20.29	20.29	55.98	55.98
17	San Bernardino	-34.03	34.03	9.6	9.6	-0.35	0.35	25.55	25.55	27.85	27.85
18	San Bernardino	-18.4	18.4	8.99	8.99	1.72	1.72	20.31	20.31	17.21	17.21
19	San Bernardino	5.56	5.56	21.86	21.86	-7.61	7.61	17.64	17.64	21.71	21.71
20	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	San Bernardino	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-23.502	24.614	-2.2427273	10.57	-11.208	11.634	-1.1583333	20.738333	13.186667	20.8

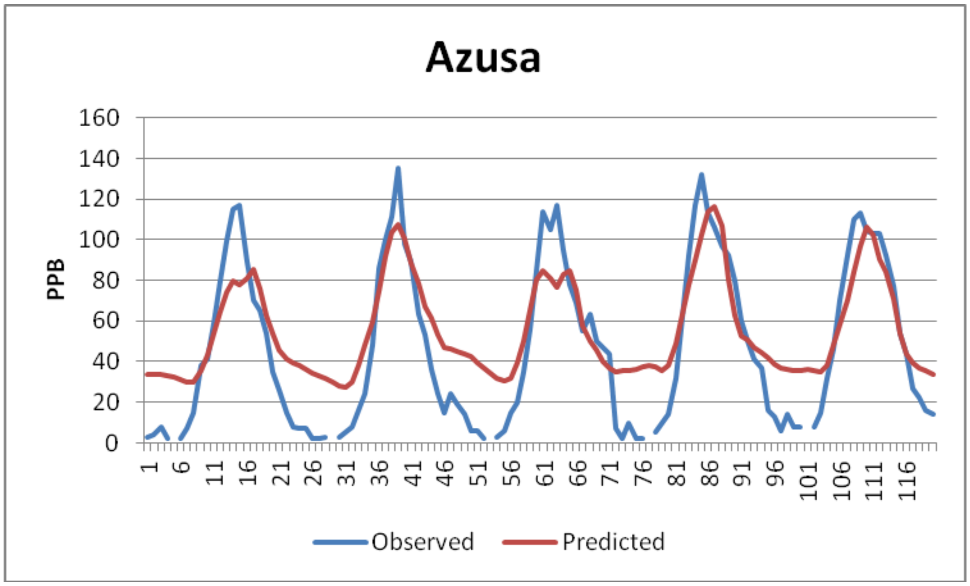
Hour	Station	18		19		20		21		22	
		Bias	Error	Bias	Error	Bias	Error	Bias	Error	Bias	Error
		PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB	PPB
0	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
1	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
2	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
3	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
4	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
5	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
6	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
7	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
8	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-4.99	4.99
9	Upland	-20.99	20.99	-999	-999	-999	-999	-0.28	0.28	-4.02	4.02
10	Upland	-25.66	25.66	-11.34	11.34	-12.24	12.24	-19.23	19.23	-11.78	11.78
11	Upland	-23.24	23.24	-1.83	1.83	-19.75	19.75	-22.4	22.4	-27.47	27.47
12	Upland	-31.87	31.87	-10.68	10.68	-8.57	8.57	-41.04	41.04	-21.49	21.49
13	Upland	-31	31	-31.85	31.85	-22.76	22.76	-34.42	34.42	-0.13	0.13
14	Upland	-40.37	40.37	-21.15	21.15	-52.93	52.93	8.21	8.21	23.65	23.65
15	Upland	-53.43	53.43	-24.85	24.85	-39.45	39.45	16.95	16.95	28.17	28.17
16	Upland	-43.66	43.66	-4.1	4.1	1.08	1.08	13.67	13.67	1.58	1.58
17	Upland	2.77	2.77	-1.16	1.16	-8.14	8.14	-12.62	12.62	-8.55	8.55
18	Upland	5.71	5.71	11.83	11.83	-4.61	4.61	-15.83	15.83	-3.65	3.65
19	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-6.87	6.87
20	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
21	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
22	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
23	Upland	-999	-999	-999	-999	-999	-999	-999	-999	-999	-999
	Average	-26.174	27.87	-10.57	13.198889	-18.596667	18.836667	-10.699	18.465	-2.9625	11.8625

Attachment-2

Diurnal Trends:

Observed Vs. Predicted

June 18-22, 2008


Azusa
PPB
160
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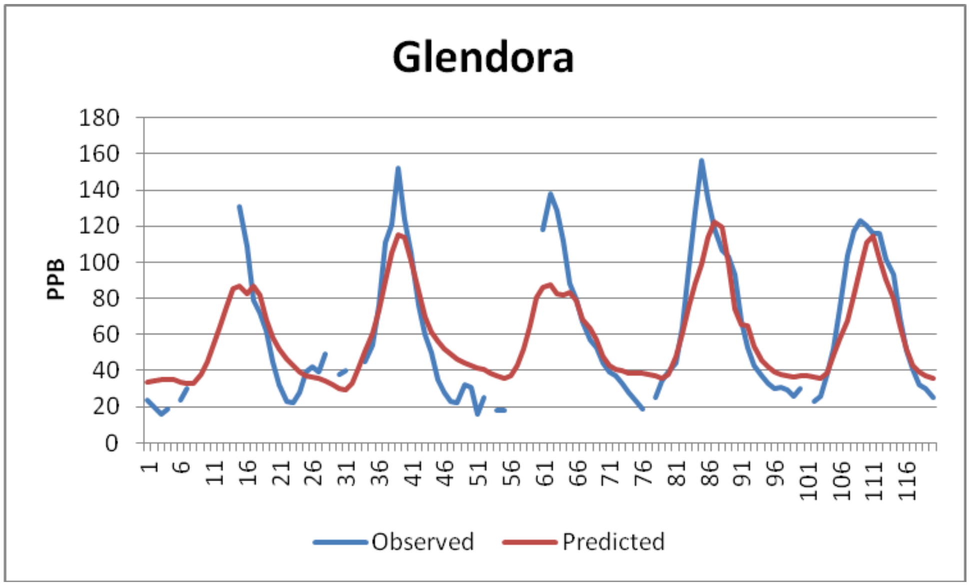
120
100
80
60
40
20
0
1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116
Observed
Predicted


Glendora
PPB
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120
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40
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0
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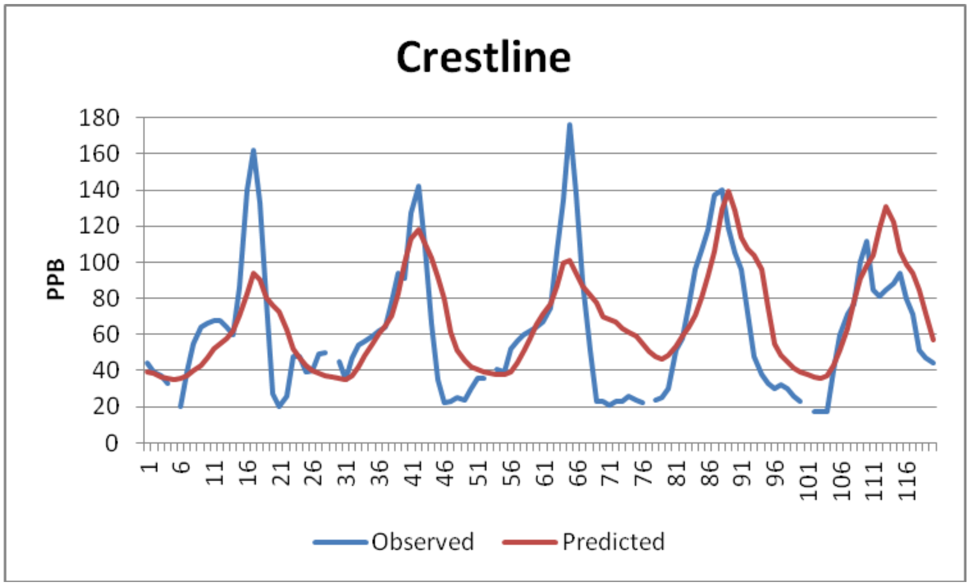
Observed
Predicted


Crestline
PPB
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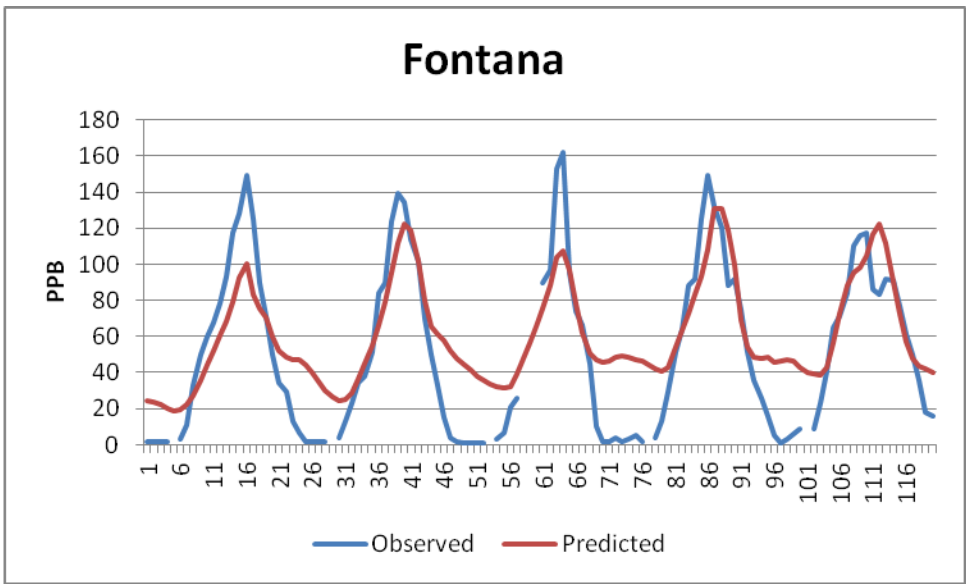
Observed
Predicted


Fontana
PPB
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160
140
120
100
80
60
40
20
0
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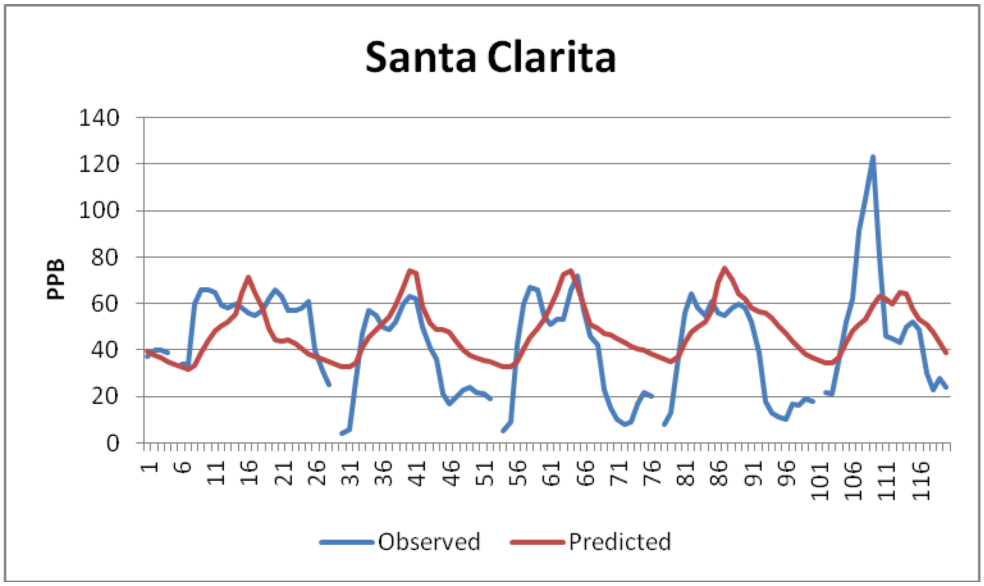
Observed
Predicted



Santa Clarita
PPB
140
120
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80
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40
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6
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21
26
31
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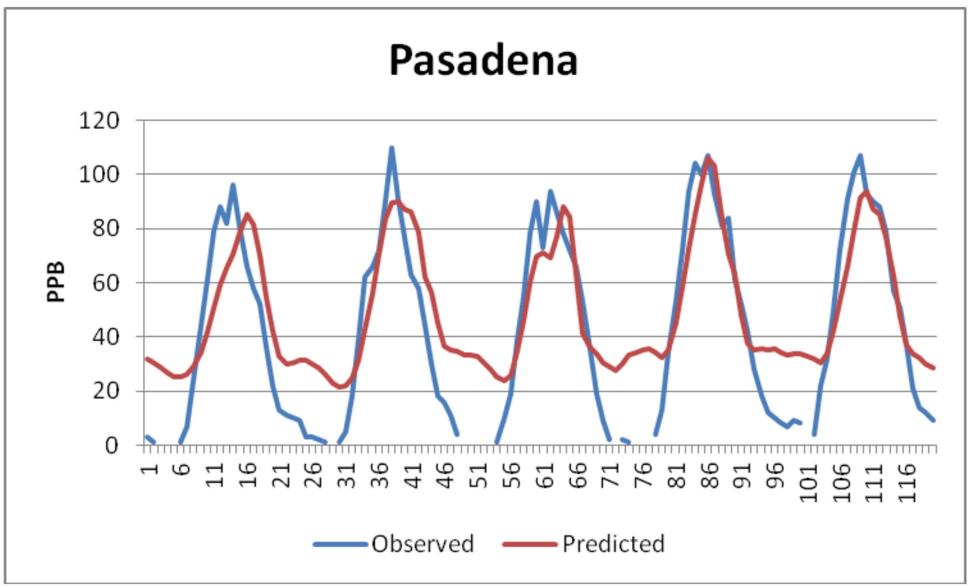
46
51
56
61
66
71
76
81
86
91
96
101
106
111
116
Observed
Predicted



Pasadena
PPB
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100
80
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20
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11
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26
31
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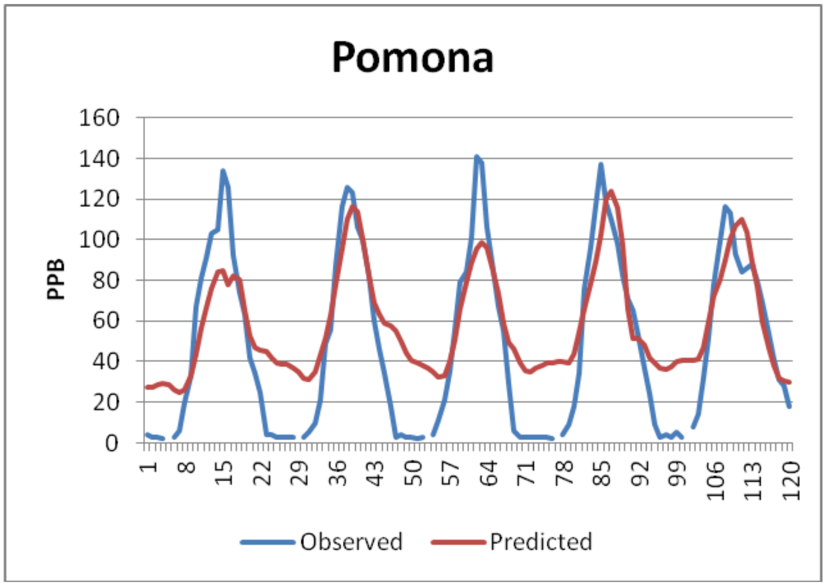
51
56
61
66
71
76
81
86
91
96
101
106
111
116
Observed
Predicted


Pomona
PPB
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64
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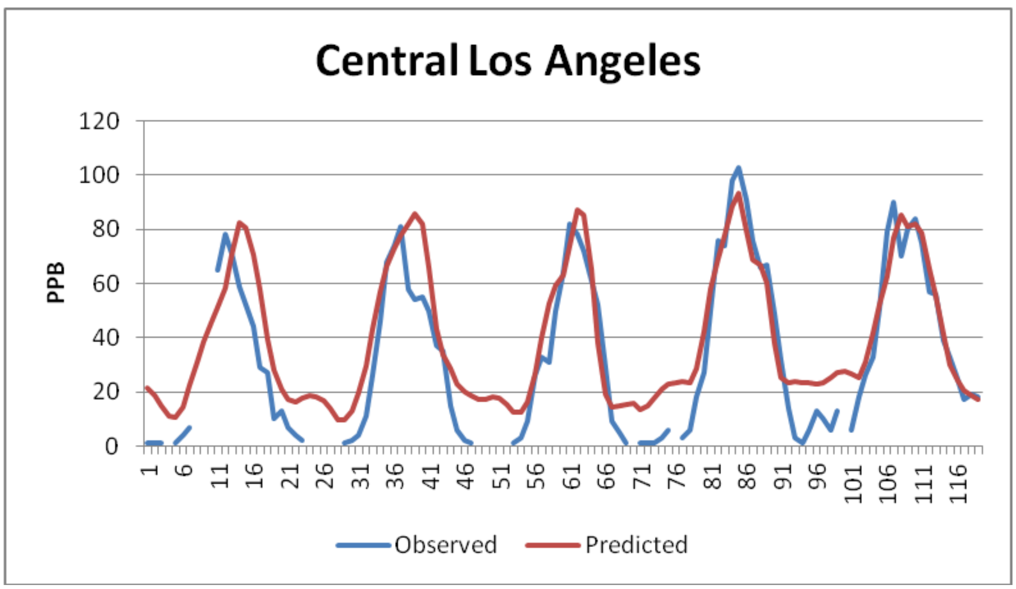
85
92
99
106
113
120
Observed
Predicted


Central Los Angeles
PPB
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80
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11
16
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26
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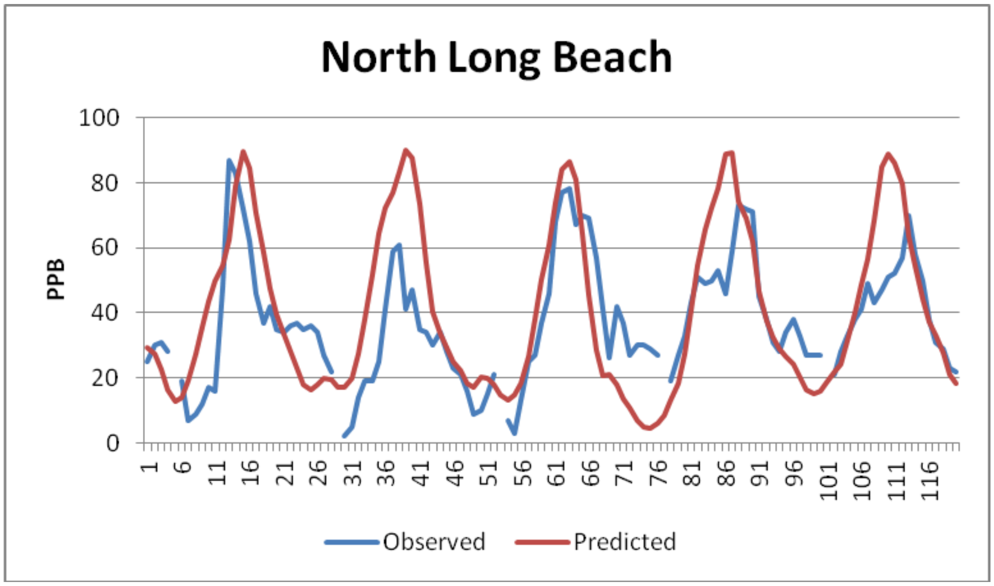
56
61
66
71
76
81
86
91
96
101
106
111
116
Observed
Predicted


North Long Beach
100
80
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20
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PPB
1
6
11
16
21
26
31
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41
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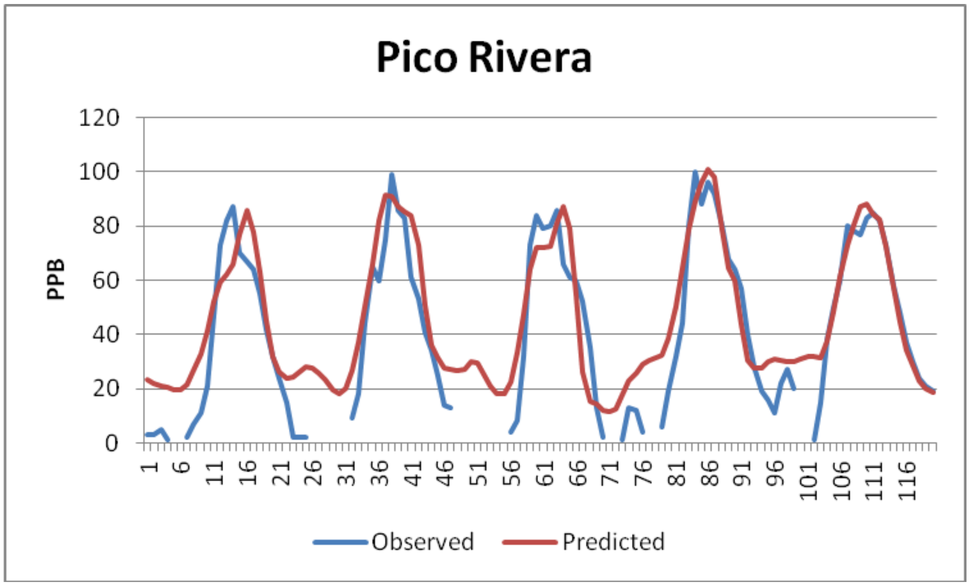
56
61
66
71
76
81
86
91
96
101
106
111
116
Observed
Predicted


Pico Rivera
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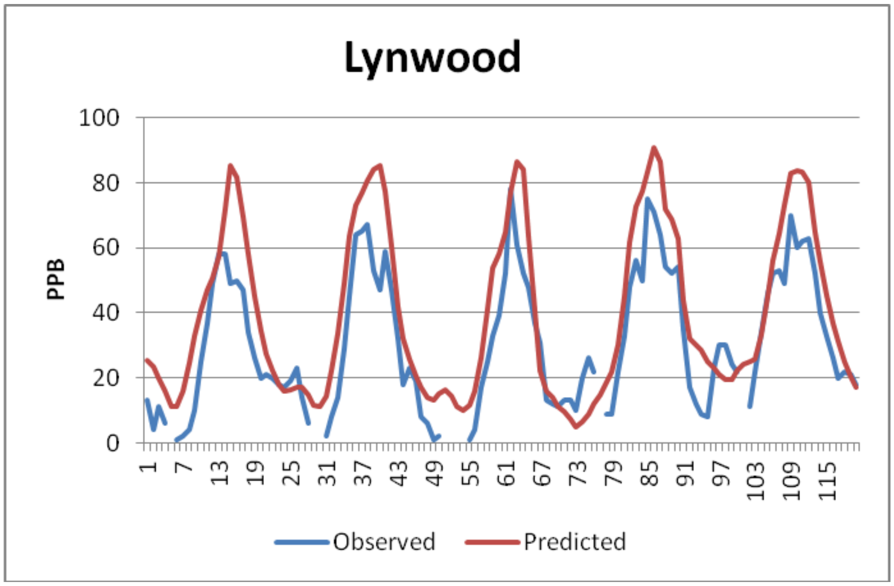
80
60
40
20
0
PPB
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
81
86
91
96
101
106
111
116
Observed
Predicted


Lynwood
PPB
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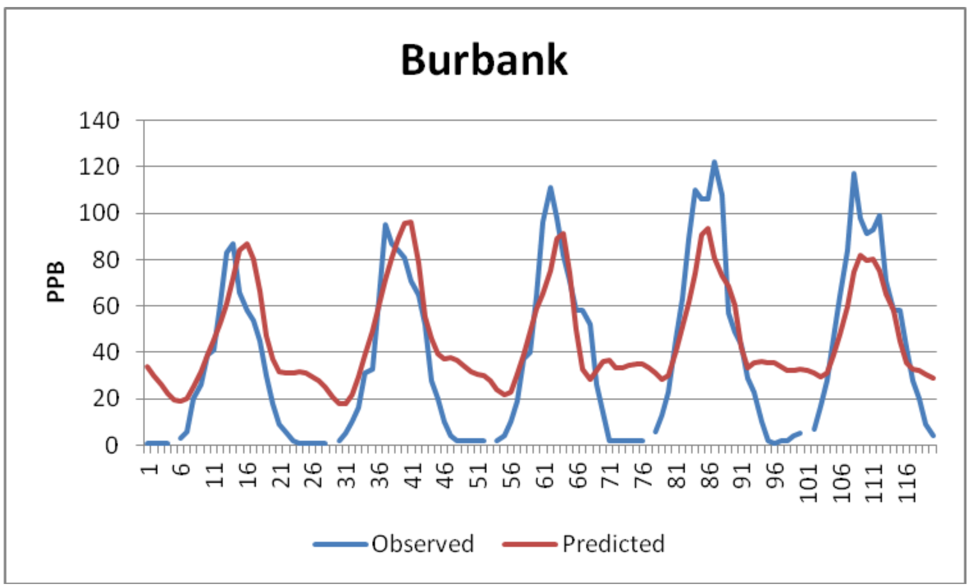
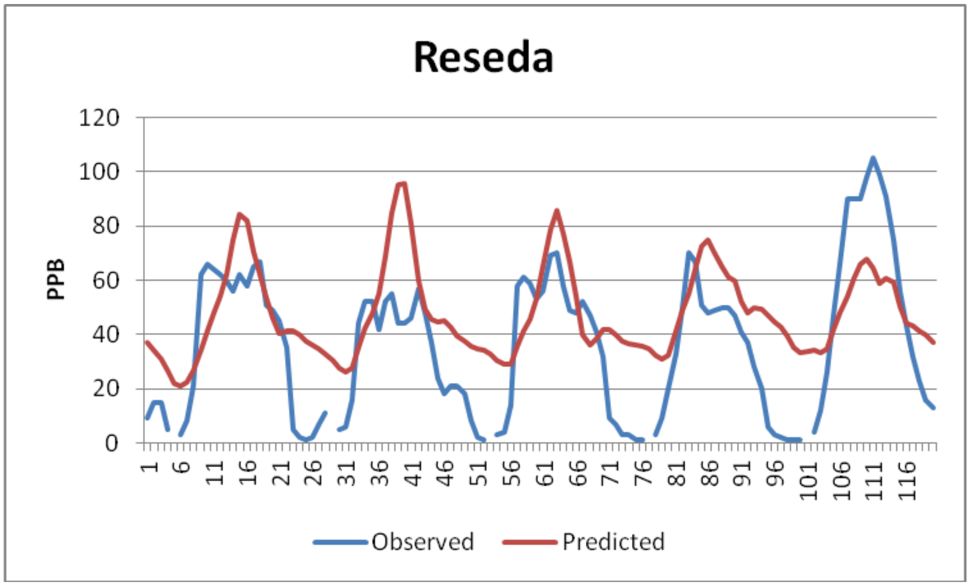
80
60
40
20
0
1 7 13 19 25 31 37 43 49 55 61 67 73 79 85 91 97 103 109 115
Observed
Predicted


Burbank
PPB
140
120
100
80
60
40
20
0
1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116
Observed
Predicted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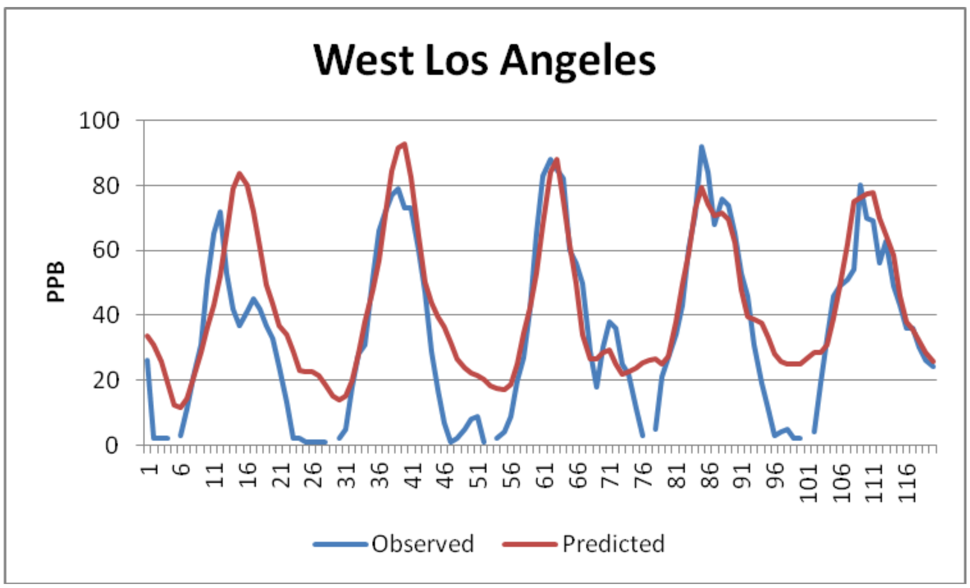
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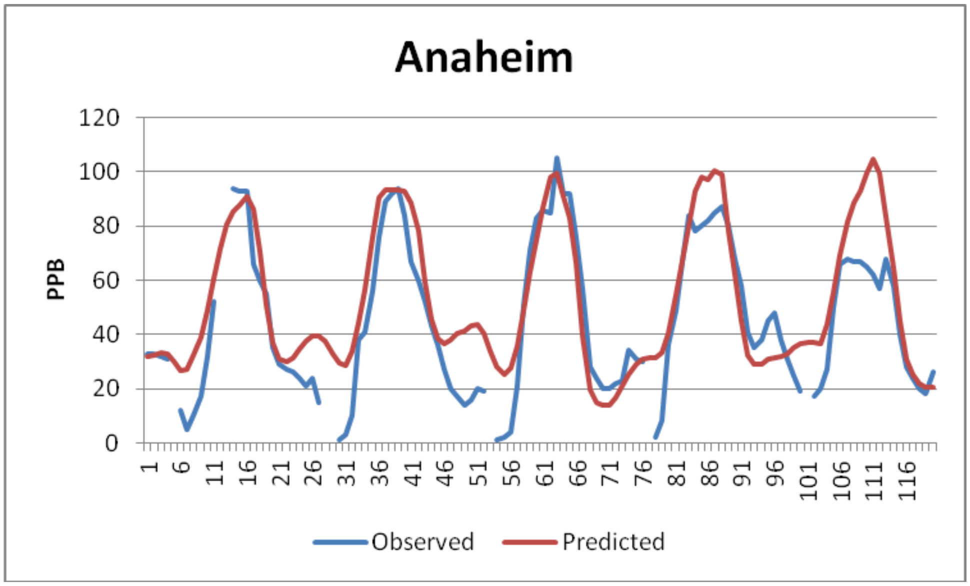
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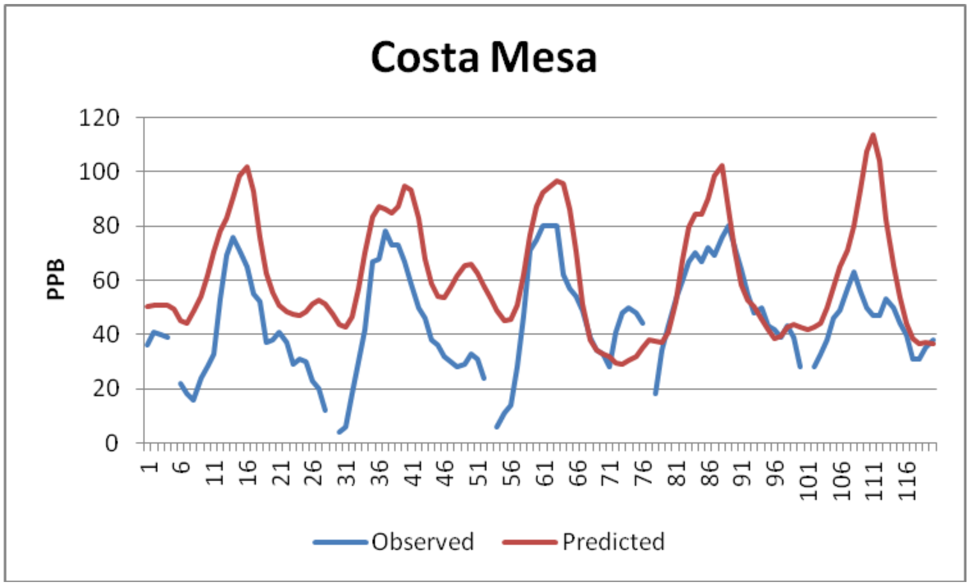
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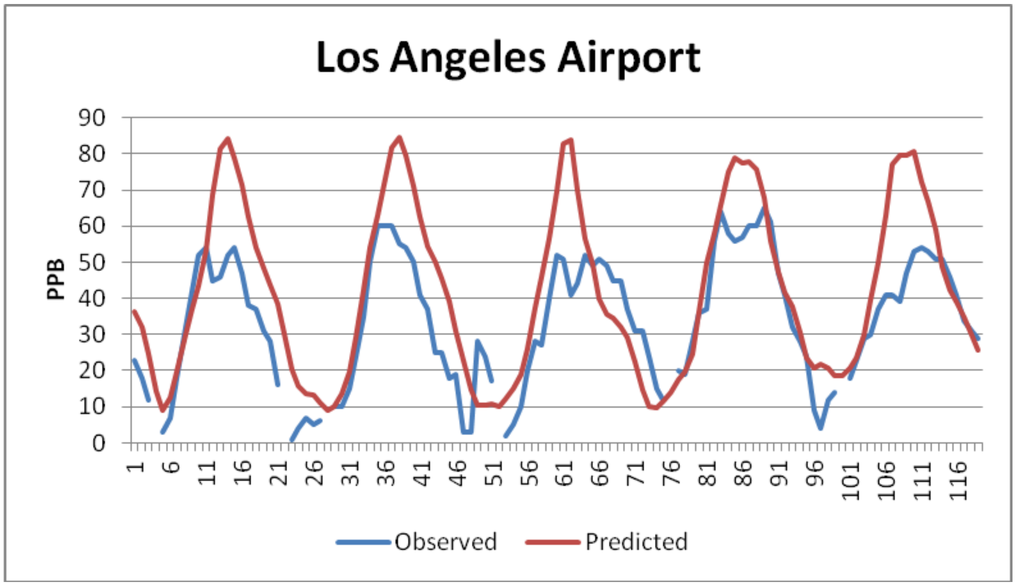
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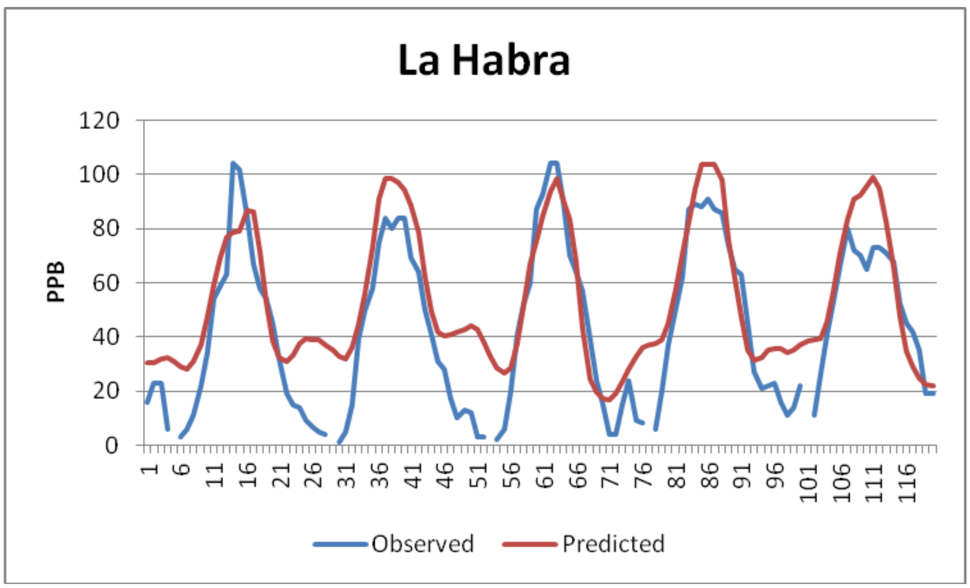
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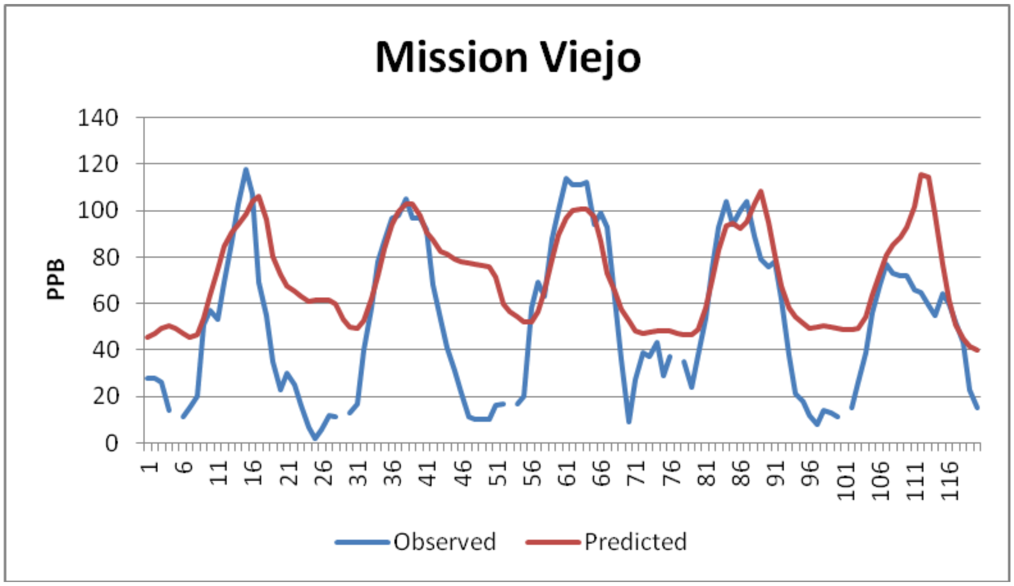
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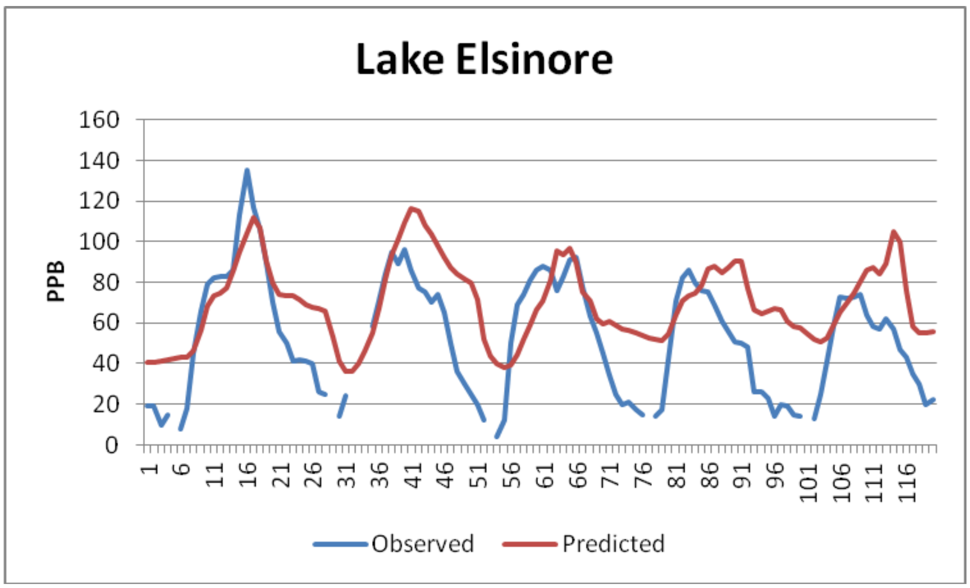
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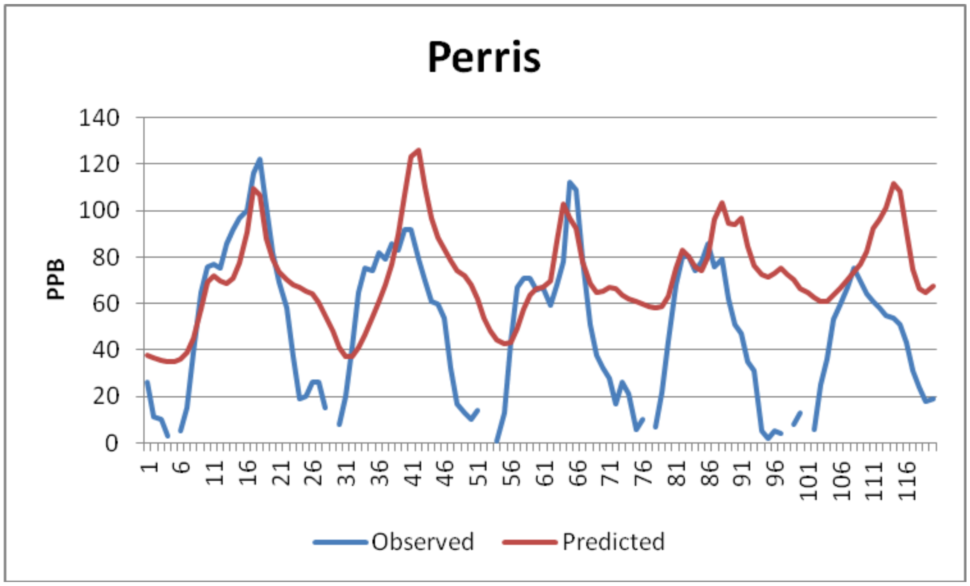
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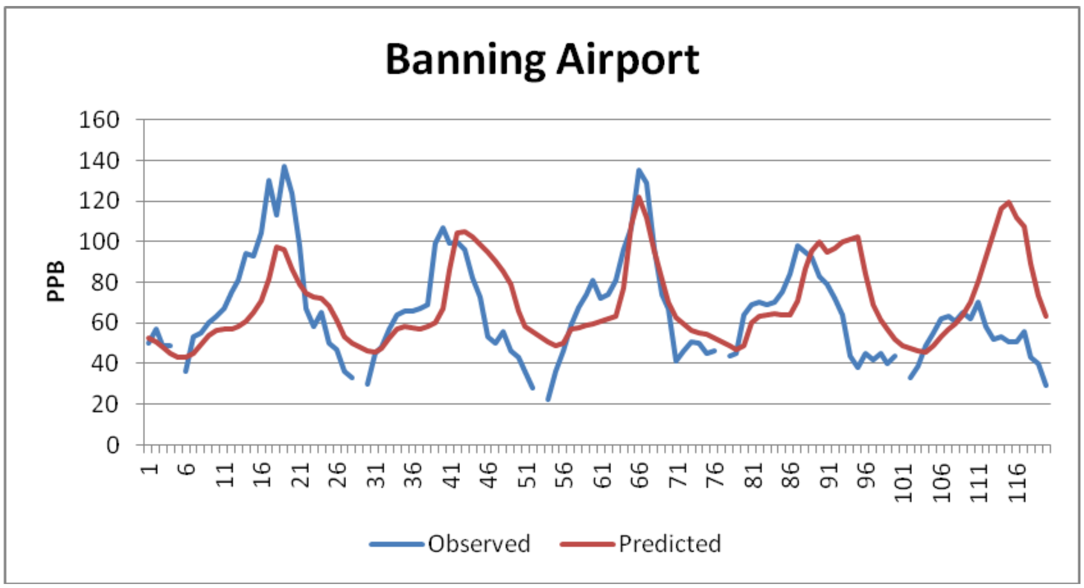
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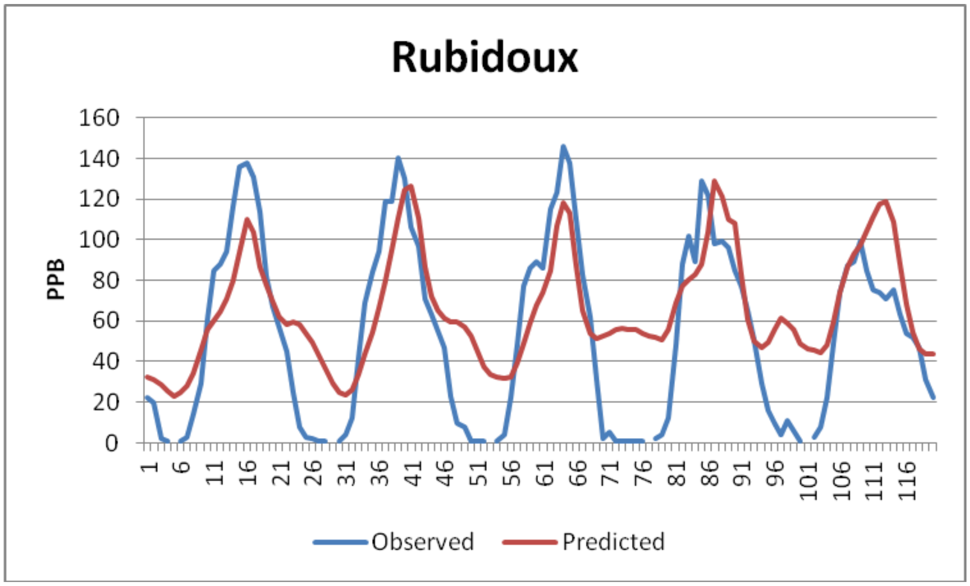
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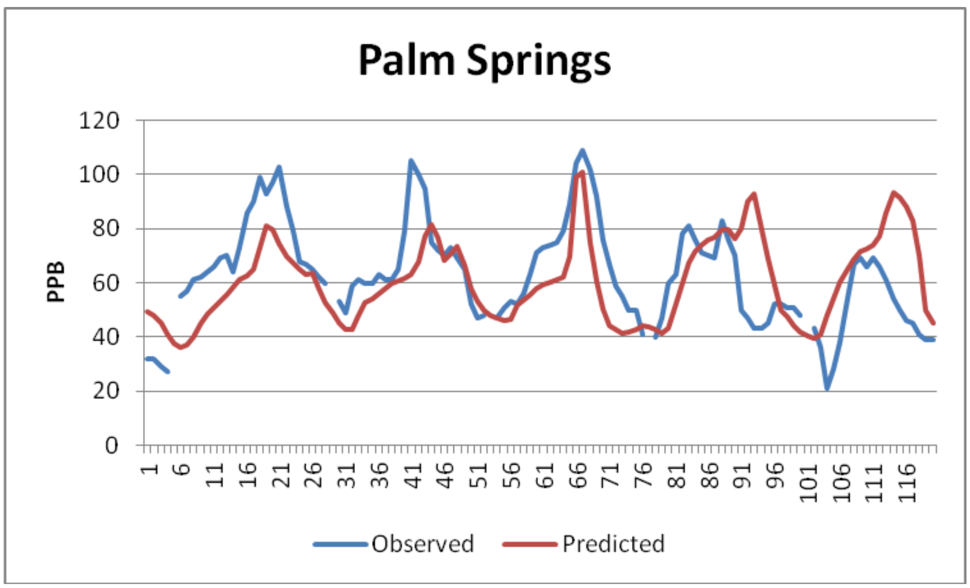
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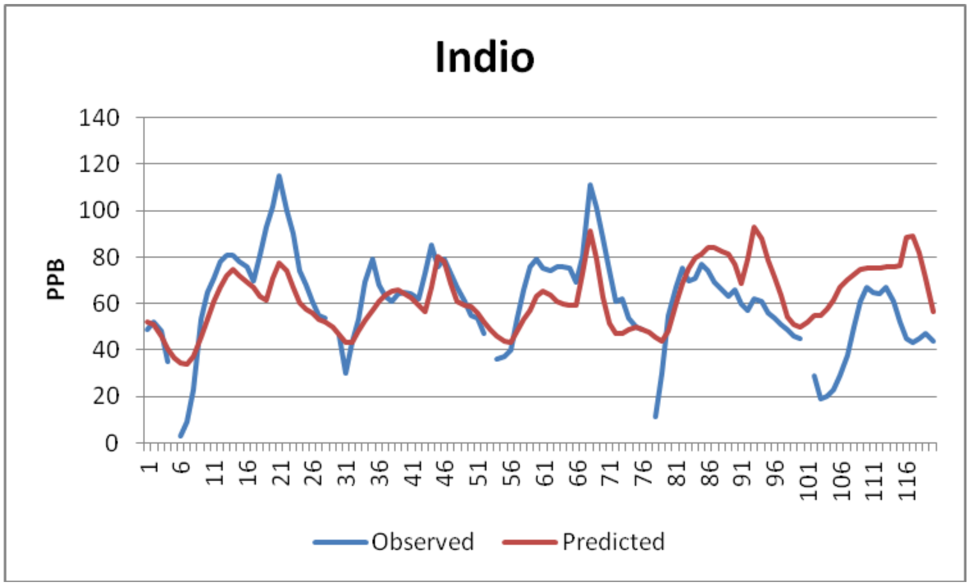

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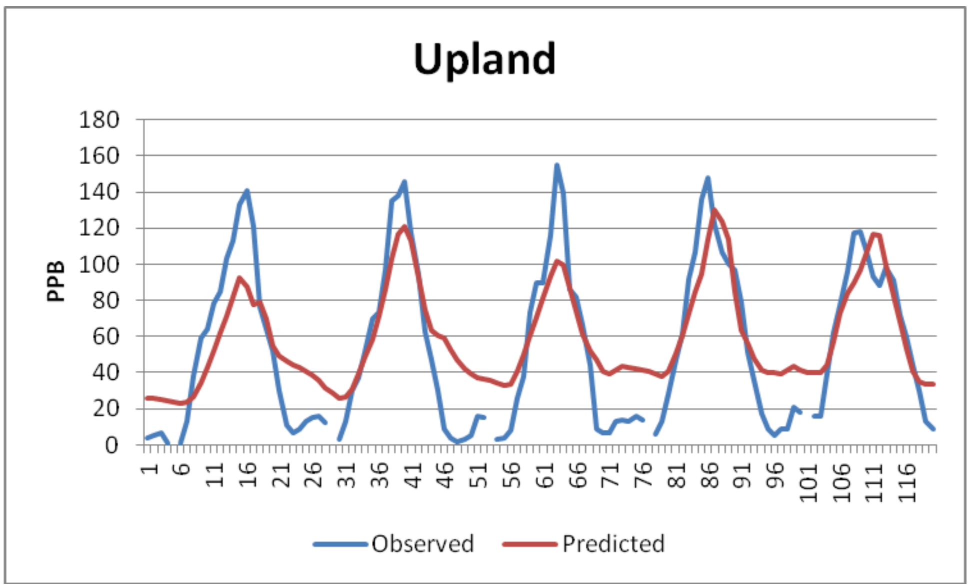

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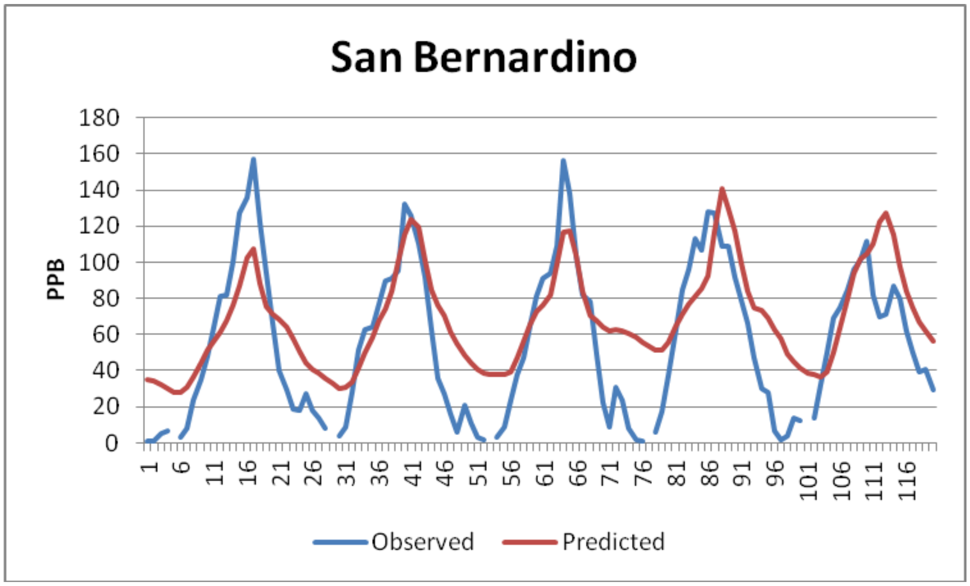

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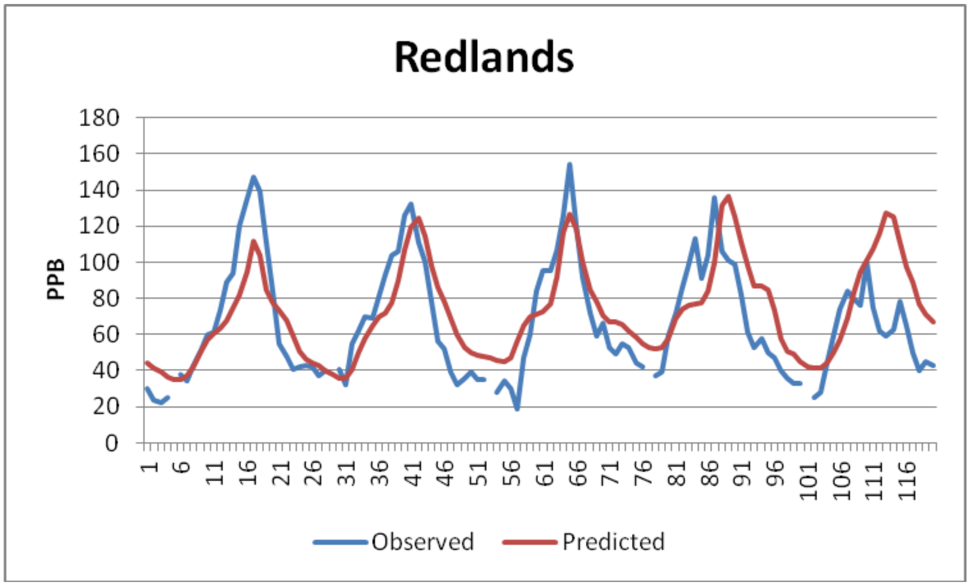

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Attachment-3

CEPA Analysis

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(PC-CEPA V4.4 / October 2008)
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Year 2022 Emission Reductions Excluding Natural Sources by Control Measure in the South Coast Air Basin (Planning Inventory - Tons/Day)

(A) Reductions Without Overlapping/Double-Counting With Other Control Measures (1)

		(Reductions - Tons/Day)			
Measure	Name	VOC	NOx	CO	NO2
BA-01	Revised Controls from R1118	0.00	0.13	0.00	0.13
BA-02	Adjustment for R1110.2	-0.03	-1.61	-0.07	-1.61
BA-03	Adjustment for R1147	0.00	-4.55	0.00	-4.55
BA-04	Adjustment for NonAgICE (CES89664)	0.00	0.15	0.04	0.15
CMB-01	Reclaim NOx Reductions	0.00	3.08	0.00	3.08
CMB-03	Commercial Space Heating [Nox]	0.00	0.15	0.00	0.15
CTS-01	Architectural Coatings [VOC]	2.52	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	1.04	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	1.14	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	0.99	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	1.01	0.00	0.00	0.00
P07SMOG1	Annual Inspection of Older Vehicles	1.63	3.93	0.00	4.24
P07SMOG2	Inspection of Motocycles	1.21	0.41	0.00	0.45
P07SMOG3	Annual Inspection of High Mileage Vehicles	0.29	0.80	0.00	0.86
P07RETIRE	Expanded Passenger Vehicle Retirement Program	0.42	0.32	0.00	0.35
P07LOCO1	Accelerated Intro. of Cleaner Line-Haul Locomotives	0.00	12.14	0.00	12.14
P07OGV1	OGV Cleaner Main Engines	0.00	6.21	0.00	6.20
P07OFRD1	Off-Road Recreational Vehicle Expanded Emissions Stds.	3.61	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	7.47	0.00	7.47
Black Box	Black Box (VOC:mobile+airc:0.882; NOx:Allsrce+RC:0.484>CC150)	20.58	157.93	0.00	161.71
Grand Total (Net)		34.42	186.55	-0.03	190.78

Year 2022 Emission Reductions Excluding Natural Sources by Control Measure in the South Coast Air Basin (Planning Inventory - Tons/Day)

(B) Reductions With Overlapping/Double-Counting With Other Control Measures (2)

Measure	Name	VOC	NOx	CO	NO2
		(Reductions - Tons/Day)			
BA-01	Revised Controls from R1118	0.00	0.13	0.00	0.13
BA-02	Adjustment for R1110.2	-0.03	-1.61	-0.07	-1.61
BA-03	Adjustment for R1147	0.00	-4.55	0.00	-4.55
BA-04	Adjustment for NonAgICE (CES89664)	0.00	0.15	0.04	0.15
CMB-01	Reclaim NOx Reduction	0.00	3.08	0.00	3.08
CMB-03	Commercial Space Heating [Nox]	0.00	0.15	0.00	0.15
CTS-01	Architectural Coatings [VOC]	2.52	0.00	0.00	0.00
CTS-02	Misc. Coatings, Adhesives, Solvents & Lubricants [VOC]	1.04	0.00	0.00	0.00
CTS-03	Mold Release[VOC]	1.14	0.00	0.00	0.00
FUG-02	LPG Transfer and Dispensing [VOC]	0.99	0.00	0.00	0.00
FUG-03	Fugitive Emissions [VOC]	1.01	0.00	0.00	0.00
P07SMOG1	Annual Inspection of Older Vehicles	1.63	3.93	0.00	4.24
P07SMOG2	Inspection of Motocycles	1.21	0.41	0.00	0.45
P07SMOG3	Annual Inspection of High Mileage Vehicles	0.30	0.85	0.00	0.92
P07RETIRE	Expanded Passenger Vehicle Retirement Program	0.43	0.34	0.00	0.38
P07LOCO1	Accelerated Intro. of Cleaner Line-Haul Locomotives	0.00	12.14	0.00	12.14
P07OGV1	OGV Cleaner Main Engines	0.00	6.21	0.00	6.20
P07OFRD1	Off-Road Recreational Vehicle Expanded Emissions Stds.	3.61	0.00	0.00	0.00
OFRD-01	SOON [NOX]	0.00	7.47	0.00	7.47
Black Box	Black Box (VOC:mobile+airc:0.882; NOx:Allsrce+RC:0.484>CC150)	21.43	174.14	0.00	178.15
Grand Total (with potential overlapping)		35.29	202.84	-0.03	207.31

EMISSION SUMMARY FOR
(POINT, AREA, MOBILE SOURCE, AND OFF-ROAD MV)

BASELINE EMISSIONS

	VOC	NOx	CO	NO2
Point source	40.05	5.59	37.94	5.59
Area source	218.32	30.94	171.97	40.12
RECLAIM	0.00	27.23	0.00	27.23
Total Stationary	258.37	63.77	209.90	72.94
On-road	72.78	134.81	622.73	142.19
Off-road	104.39	120.67	665.66	111.88
Aircraft	4.41	15.44	41.71	15.44
TOTAL	439.94	334.69	1540.00	342.46

EMISSION REDUCTIONS

	VOC	NOx	CO	NO2
Point source	2.12	2.17	-0.07	2.17
Area source	4.56	13.91	0.04	18.64
RECLAIM	0.00	15.54	0.00	15.54
Total Stationary	6.68	31.62	-0.03	36.35
On-road	11.72	72.20	0.00	76.23
Off-road	15.50	74.76	0.00	70.23
Aircraft	0.52	7.97	0.00	7.97
TOTAL	34.42	186.55	-0.03	190.78

REMAINING EMISSIONS

	VOC	NOx	CO	NO2
Point source	37.93	3.42	38.01	3.42
Area source	213.76	17.03	171.92	21.47
RECLAIM	0.00	11.69	0.00	11.69
Total Stationary	251.69	32.15	209.93	36.59
On-road	61.06	62.61	622.73	65.96
Off-road	88.88	45.91	665.66	41.66
Aircraft	3.89	7.47	41.71	7.47
TOTAL	405.52	148.14	1540.02	151.68
AQMP/Set-Aside	4.56	1.89	0.00	1.89
Public Funding	0.00	0.00	0.00	0.00
GRAND TOTAL (T/D)	410.08	150.03	1540.02	153.57
Mobility Adjustments	0.00	0.00	0.00	0.00

(1) Emission reductions for individual measures were estimated based on the sequence of listing contained here. When the sequence changes, reductions from each measure could be affected, but the net total remain the same. The purpose of this table is to estimate total emission reductions without overlapping or double-counting between measures.

(2) Emission reductions for individual measures were estimated in the absence of other measures. Therefore, the sequence of listing does not affect the reduction estimates. The purpose of this table is to provide emission reduction estimates for Appendix IV control measure summary tables as well as cost effectiveness analysis.

Attachment 4 of Appendix VII
Table of Contents

INTRODUCTION 2
IDENTIFYING AND EVALUATING REASONABLY AVAILABLE CONTROL MEASURES 4
Step 1 - Air Quality Technology Symposium 4
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INTRODUCTION

As discussed in Appendix VII of the Final 2012 AQMP, the purpose of the 2012 1-hour ozone SIP revision is to provide an attainment demonstration to respond to the U.S. EPA's published "SIP call" proposal on September 19, 2012, finding the existing approved 1-hour ozone SIP substantially inadequate to provide for attainment of the revoked 1-hour ozone standard by the applicable attainment date of November 15, 2010. U.S. EPA's proposed SIP call was in turn a response to the decision of the Ninth Circuit Court of Appeals in *Association of Irritated Residents, et al, v. United States Environmental Protection Agency, et al.*, 686 F. 2d 668 (Amended January 12, 2012). For further background details, please refer to Appendix VII of the Final 2012 AQMP. The U.S. EPA's proposed SIP call gives the State up to one year after the effective date of the SIP call to submit the revised attainment demonstration. The District intends to demonstrate that a period of the full 10 years allowed by law is needed to attain the 1-hour ozone standard, and submit the updated 1-hour ozone attainment demonstration as part of the Final 2012 AQMP. This Attachment is a part of Appendix VII - 1-hour Ozone Attainment Demonstration, and the information presented in this Attachment is largely summaries and replications of information presented in the Appendix VI of the Final 2012 AQMP.

The CAA, Section 172(c)(1), sets the overall framework for the Reasonably Available Control Measures (RACM) analysis. The CAA requires the nonattainment air districts to:

> *"provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology)and shall provide for attainment of the national primary ambient air quality standards."*

The U.S. EPA provided further guidance on the RACM in the preamble and the final "Clean Air Fine Particle Implementation Rule" to implement the 1997 PM2.5 NAAQS which were published in the Federal Register in November 1, 2005 and April 25, 2007, respectively, which can be applied to the ozone RACM demonstration. [1, 2] The U.S. EPA's long-standing interpretation of the RACM provision stated in the 1997 PM2.5 Implementation Rule is that the nonattainment air districts should consider all candidate measures that are available and technologically and economically feasible to implement within the nonattainment areas, including any measures that have been suggested; however, the districts are not obligated to adopt all measures, but should demonstrate that there are no additional reasonable measures available that would advance the attainment date by at least one year or contribute to reasonable further progress (RFP) for the area.

Regarding the approach of identifying emission reduction programs, the U.S. EPA recommends the nonattainment air districts to first identify the emission reduction programs that have already been implemented at the federal, other states and local air districts. Next, the U.S. EPA recommends the air districts to examine additional RACM/RACTs adopted for other nonattainment areas to attain the ambient air quality standards as expeditiously as practicable. In addition, the U.S. EPA recognizes that each nonattainment area has its own profile of emitting sources, and thus neither requires specific RACM/RACT to be implemented in every nonattainment area, nor includes a specific source size threshold for the RACM/RACT analysis. The U.S. EPA however recommends severe nonattainment air districts to evaluate controls for smaller sources if needed for attainment.

A RACM/RACT demonstration must be provided within the State Implementation Plan (SIP). For areas projected to attain within five years of designation, a limited RACM/RACT analysis including the review of available reasonable measures, the estimation of potential emission reductions, and the evaluation of the time needed to implement these measures is sufficient. The areas that cannot reach attainment within five years must conduct a thorough RACM/RACT analysis to demonstrate that sufficient control measures could not be adopted and implemented cumulatively in a practical manner in order to reach attainment at least one year earlier.

In regards to economically feasible, the U.S. EPA did not propose a fixed dollar per ton cost threshold and recommended the air districts to include health benefits in the cost analysis. As indicated in the preamble of the 1997 PM2.5 Implementation Rule:

> "*In regard to economic feasibility, U.S. EPA is not proposing a fixed dollar per ton cost threshold for RACM, just as it is not doing so for RACT…Where the severity of the nonattainment problem makes reductions more imperative or where essential reductions are more difficult to achieve, the acceptable cost of achieving those reductions could increase. In addition, we believe that in determining what are economically feasible emission reduction levels, the States should also consider the collective health benefits that can be realized in the area due to projected improvements.*"

The objective of this Appendix is to demonstrate that the District has conducted a thorough RACM/RACT analysis to meet the requirement of the CAA following closely the policy and guidance approach provided by the U.S. EPA.

For the scope of this RACM analysis, District staff will closely study the attainment strategies for stationary and area sources, the rules and regulations of the air districts responsible for the nonattainment areas, namely Ventura, San Francisco, San Joaquin Valley, Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria Texas, and New York Metropolitan while taking into account all available candidate measures proposed by the U.S. EPA, CARB, the Advisory Committee members, the technical experts in air pollution control as well as the public and variety of stakeholders. Staff selected the air districts listed above based on the severity of their nonattainment status and their near-term attainment dates. The RACM analysis for Transportation Control Measures is conducted by SCAG and the RACM analysis for mobile sources conducted by the CARB is shown in applicable Attachments of the Appendix VII.

IDENTIFYING AND EVALUATING REASONABLY AVAILABLE CONTROL MEASURES

To demonstrate that the District has considered all candidate measures that are available and technologically and economically feasible to implement within the Basin, the District staff has conducted 6-steps analysis described below.

Step 1 - Air Quality Technology Symposium

District staff conducted the 2012 Air Quality Technology Symposium in September 2011with participation of technical experts from a variety of areas and the public to solicit new and innovative concepts to assist the Basin in attaining the NAAQS for PM2.5 by 2014-2019 and ozone by 2024-2032. In addition, the District's Planning, Rules Development and Area Sources Division conducted multiple internal meetings with the District's Technology Advancement Office and the Engineering & Compliance Division from September through November of 2011 to brainstorm ideas for feasible control measures. In addition, the District also conducted an on-going extensive outreach to engage a wide range of stakeholders in the process. In general, the following concepts were proposed:

- Promoting zero or near-zero emission measures and providing incentives for on-road and non-road mobile sources as well as goods movement;

- Further reducing VOC emissions from marine coatings, aerospace coatings, solvents and various consumer products, and focusing on reformulations or alternatives to VOC based-solvents;

- Conducting a mandatory technology review for NO_x RECLAIM, and further reducing NOx emissions through the use of low NO_x burners, fuel cells, biogas control, distributed power generation applications, and assessment for all feasible measures, as well as incentives;

- Addressing energy-climate change and co-benefits, the need for electricity storage and smart grid, or new fossil-fueled peaking plants, to compensate for fluctuations in renewable energy supply, and the use of outreach to promote energy efficiency measures; and

- Influencing consumer behavior, expanding carpool programs, incentivizing with outreach, increasing gas tax, and promoting public-private participation and multi-agency collaboration.

Step 2 – U.S. EPA's Suggested List of Control Measures

District staff reviewed for inclusion the control measure concepts suggested by the U.S. EPA for PM2.5 nonattainment areas described in the preamble of the PM2.5 Implementation Rule. Many of these concepts are intended to reduce NOx, a precursor of PM2.5 as well as ozone. As summarized in Table 1, the District either has an existing rule or developed a 2012 control measure for each control measure concept suggested by the U.S. EPA.

TABLE 1

Demonstration of Compliance with Control Measures Recommended by U.S. EPA

U.S. EPA'S CONTROL MEASURE CONCEPTS	2012 CONTROL MEASURES AND EXISTING RULES
STATIONARY SOURCE MEASURES	
Diesel engine retrofit, rebuild, replacement, with catalyzed particle filter	Rule 1470, Rule 1110.2
New or upgraded emission controls for direct PM2.5 (e.g., baghouse or electrostatic precipitator; improved monitoring methods)	Rule 1155, Rule 1156
New/upgraded emission controls for PM2.5 precursors (e.g., scrubbers)	2010 RECLAIM Amendment
Energy efficiency measures to reduce fuel consumption	Rule 1146, Rule 1146.1, Rule 1146.2, Rule 1114, Rule 1111, Control Measure EDU-01, INC-01
MOBILE SOURCE MEASURES	

On-road diesel engine retrofits for school buses and trucks using U.S. EPA-verified technologies	Refer to CARB's Existing Rules and Control Measures
Non-road diesel engine retrofit, rebuild/replace with catalyzed particle filter	Refer to CARB's Existing Rules and Control Measures
Diesel idling programs for trucks, locomotive, and other mobile sources	Refer to CARB's Existing Rules and Control Measures
Transportation control measures (including those listed in section 108(f) of the CAA as well as other TCMs), as well as other transportation demand management and transportation systems management strategies	Refer to SCAG's Control Measures
Programs to reduce emissions and accelerate retirement of high emitting vehicles, boats, lawn and garden equipment	Refer to CARB's Rules and Control Measures
Emissions testing and repair/maintenance programs for on-road vehicles	Refer to CARB's Rules and Control Measures
Emissions testing and repair/maintenance programs for non-road heavy duty vehicles and equipment	Refer to CARB's Rules and Control Measures
Programs to expand use of clean burning fuels	Refer to CARB's Rules and Control Measures
Opacity/emissions standards for gross-emitting diesel equipment or vessels	Refer to CARB's Rules and Control Measures
AREA SOURCE MEASURES	
New open burning regulations and/or measures to minimize emissions from forest and agricultural burning activities	Rule 444
Reduce emissions from woodstoves and fireplaces	Rule 445, Control Measure BCM-01
Regulate charbroiling/other commercial cooking operations	Control Measure BCM-02
Reduce solvent usage or solvent substitution	Control Measure CTS-02
Reduce dust from construction activities/vacant disturbed areas, paved and unpaved roads.	Rule 1157

Step 3 – Reasonably Available Control Technology (RACT)

As required by the CAA, Section 172(c)(1), the nonattainment areas must implement applicable RACTs. While RACM refers to measures which may be applicable to a wide range of sources, stationary as well as area and mobile sources, the U.S. EPA defines RACT as the lowest level of control specifically designed for stationary sources:

> "*lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility*".

The CAA, Section 172(c)(1) and Section 182, require nonattainment areas for ozone that are designated at moderate or above to adopt RACT for major sources. Nonattainment areas classified as serious, severe, or extreme must adopt control measures above and beyond the minimum RACT levels to fulfill attainment.

In addition, the CAA, Section 183, requires the U.S. EPA to provide guidance to the air districts on the “presumptive” RACT levels. As a result, the U.S. EPA developed several Control Techniques Guidelines (CTGs) for VOC sources, and Alternatives Control Techniques (ACT) documents for VOC and NOx sources. Most of the CTGs were issued prior to 1990, and most of the ACT documents were issued in the mid-1990s. The CTGs contain mandated emission standards and work practices whereas the ACTs describe available control techniques and their cost effectiveness, but do not define “presumptive” RACT levels. The U.S. EPA is required to update existing CTG/ACTs, or develop new guidelines, on a frequent basis as new or updated control technologies become available.

The CAA, Section 182(b)(2), further requires the air districts to revise their SIPs to include the mandated RACT levels covered by the CTGs issued after November 15, 1990 and prior to the area’s date of attainment. The U.S. EPA's final rule to implement the 8-hour ozone standard discusses RACT requirements which states that where a RACT SIP is required, the states must assure that RACT is met, either through a certification that previously required RACT controls represent RACT for 8-hour ozone standards, or through a new RACT determination.[3] To satisfy this requirement, the District developed and submitted to CARB and U.S. EPA a demonstration and certification that the District’s rules and regulations fulfill the 8-hour ozone RACT requirements developed between 1990 and the beginning of 2006.[4] The U.S. EPA approved the District’s RACT demonstration in December 2008.[5]

Subsequently, the U.S. EPA developed twelve new CTGs in 2006-2008 to update the requirements for several types of coatings, and staff again conducted an analysis comparing the current requirements in the District’s rules with those requirements in the new CTGs. The 12 new CTGs developed by the U.S. EPA are: [6]

- Flat Wood Paneling Coatings (2006)
- Flexible Packaging Printing Materials (2006)
- Industrial Cleaning Solvents (2006)
- Lithographic Materials and Letterpress Printing Materials (2006)
- Large Appliance Coatings (2007)
- Metal Furniture Coatings (2007)

- Paper, Film, and Foil Coatings (2007)
- Miscellaneous Metal Products Coatings (2008)
- Plastic Parts Coating (2008)
- Auto and Light-Duty Truck Assembly Coatings (2008)
- Fiberglass Boat Manufacturing Materials, and Miscellaneous (2008)
- Industrial Adhesives (2008)

District staff's analysis is summarized in Table 2. As shown in Table 2, three District's VOC rules, Rule 1130 – Graphic Arts, Rule 1115 – Motor Vehicle Assembly Line Coating Operations and Rule 1168 - Adhesives and Sealants have met or exceeded most, but not all, minimum requirements of the CTGs. Consequently, District staff has developed one or more control measures to address these issues. Staff estimates a potential reduction of 0.2 tons per day VOC associated with Rule 1130, and less than 0.01 tons per day VOC associated with Rule 1115, and no emission reduction estimate for Rule 1168 is available at this time. District staff is aware that additional assessments may be required, such as a determination that major VOC sources subject to Rules 1130, 1115, and 1168 met the minimum requirements in the CTGs, or a negative declaration that there are no sources in the area subject to the CTGs. These additional analyses will be provided during the rule development phase, or at the time of developing the 8-hour ozone AQMPs, whichever comes first.

TABLE 2
Evaluation of 2006-2008 U.S. EPA's VOC CTGs

CTG TITLE	DISTRICT RULE	EVALUATION
Flat Wood Paneling Coatings (2006)	Rule 1104 - Wood Flat Stock Coating Operations	Overall equivalency to CTG emission standards. No further action is needed. [1]
Flexible Packaging Printing Materials (2006); Lithographic Printing Materials and Letterpress Printing Materials (2006)	Rule 1130 - Graphic Arts	Regarding flexible packaging printing, the rule is more stringent than CTG, and thus no further action is needed. Regarding lithographic and letterpress printing, the CTG standards for alcohol content in fountain solution and overall control efficiency are more stringent. Staff estimated a potential reduction of 0.2 tpd and may pursue rule update as part of Control Measure MCS-01 – Application of All Feasible Measure Assessment if needed for ozone attainment. [1]
Industrial Cleaning Solvents (2006)	Rule 1171 - Solvent Cleaning Operations	District rule is more stringent than CTG. No further action is needed. [2]
Large Appliance Coatings (2007); Metal Furniture Coatings (2007); and Miscellaneous Metal Products Coatings (2008)	Rule 1107 - Coating of Metal Parts and Products	District rule is equivalent or more stringent than CTGs, thus no further action is needed. [2]
Paper, Film, and Foil Coatings (2007)	Rule 1128 - Paper, Fabric, and Film Coatings	District rule is more stringent than CTG. No further action is needed.[1]
Plastic Parts Coatings (2008)	Rule 1145 - Plastic, Rubber, Glass Coatings	District rule is equivalent or more stringent than CTG. No further action is needed. [1]
Auto and Light-Duty Truck Assembly Coatings (2008)	Rule 1115 - Motor Vehicle Assembly Line Coating Operations	CTG has more stringent limits for electro-deposition primer at 84 g/L (145 g/L in Rule 1115); sprayable primer, primer-surfacer, and topcoat at 144 g/L (180 g/L in Rule 1115); and trunk coatings, interior coatings, sealers, and deadeners at 650 g/L (Rule 1115 provides an exemption for these categories). However, Rule 1115 has a small inventory of about 0.01 tpd, thus no action is needed. [1]
Fiberglass Boat Manufacturing Materials, and Miscellaneous (2008)	Rule 1162 - Polyester Resin Operations	The rule has an overall equivalency to CTG based on more stringent transfer efficiency requirements. No further action is needed. [2]
Industrial Adhesives (2008)	Rule 1168 - Adhesives and Sealants	CTG has more stringent limits for reinforced plastic composite at 200 g/L (250 g/L in Rule 1168); single-ply roof membrane adhesive primer at 250 g/L (450 g/L in Rule 1168); other adhesive primers at 250 g/L (420 g/L in Rule 1168); the control efficiency is 85% (80% in Rule 1168); and the work practices is limited only for stripping cured adhesives or sealants for Rule 1148. Staff may further pursue rule update as part of Control Measure MCS-01 – Application of All Feasible Measures Assessment or CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants if needed for ozone attainment. [3]

Note: 1) Evaluation conducted by Hopps and Ono; 2) Evaluation conducted by Morris and Ono; 3) Evaluation conducted by Calungcagin and De Boer.

Step 4 - Other Districts' Current Rules and Regulations

Because the District is classified as extreme nonattainment, the District staff commits to search for innovative control technologies, make improvements, and update the District's rules and regulations as expeditiously as possible to effectively help the Basin reach attainment. District staff's envisioned that the control technologies available and cost-effective to be implemented in other local areas in California, or any other areas in the nation, would be available and cost-effective for use in the Basin in a timely manner.

To catch all the improvements on innovative control technologies and identify the areas for improvements in its rules and regulations, the District staff re-evaluated all the District's source-specific rules and regulations, and compared the requirements in these rules with more than 100 rules recently adopted or amended by four local air districts in California from 2007 to 2012. The four air districts selected are San Joaquin Valley, Sacramento Metropolitan, Ventura, and San Francisco Bay Area. Staff selected these districts based on the severity of their nonattainment status and their near-term attainment dates.The summary of this analysis is presented in Table 3. In this table, staff *only* listed the areas where the requirements in other local air district's rules are more stringent than those in the District's rules and regulations. The analysis in Table 3 shows that in general the District's current rules and regulations are equivalent to or more stringent than those developed by other air districts. However, where improvements are possible, District staff has developed several control measures to further study the situations. Details of the control measures, emission reductions, cost effectiveness, prioritization and implementation schedule are discussed in Appendix VII. The control measures of which emission reductions cannot be quantified will not be considered RACMs since they cannot be used collectively to estimate the advancement of the attainment date. In addition, staff commits to monitor the rule development in other air districts and conduct further analysis if necessary, and has developed a catch-all Control Measure MCS-01 – Application of All Feasible Measures Assessment to facilitate this activity.

Step 5 - Other Districts' Control Measures

In an effort to ensure that all feasible candidate control measures are considered, District staff evaluated more than 100 control measures adopted within the period of 2007-2012 by the nonattainment air districts as shown below.

Ventura

Ventura is classified as serious nonattainment for the 2008 8-hour ozone standard. In the 2006-2008 Final Triennial Assessment and Plan Update,[7] the Ventura County Air Pollution Control District conducted an analysis of all feasible control measures, and identified 7 new control measures in addition to the 15 control measures in the Ventura's 2007 AQMP. In this list, there is only one new Ventura's control measure described below that is more stringent than the requirements in the existing District's rules:

Ventura adopted a control measure to eliminate the current vapor pressure limit (45 mmHg) of low VOC spray gun cleaning and establish a new limit of 25 g/L VOC content for cleaning solutions used in aerospace assembly and component manufacturing operations, adhesives and sealants, marine coating operations, and pleasure craft coatings and commercial boatyard operations. Currently, the cleaning solutions used in marine coating operations, pleasure craft coatings, and adhesives and sealants in the Basin are subject to District's Rule 1171 limit of 25 g/L, and there is no vapor pressure limit in Rule 1171. However, the limit for cleaning solutions and strippers in District's Rule 1124 – Aerospace Assembly and Component Manufacturing Operations are currently at 200 g/L (or 45 mmHg) and 300 g/L (or 9.5 mmHg), respectively, and there is a potential to reduce these limits. Further assessment will be conducted through the District's Control Measure CTS-02 – Further Emission Reduction from Miscellaneous Coatings, Adhesives, Solvents and Lubricants.

San Francisco Bay Area

San Francisco Bay Area is a nonattainment area for PM2.5 standard and a marginal nonattainment for 8-hour ozone standards. On September 15, 2010, the Bay Area adopted the final Bay Area 2010 Clean Air Plan (CAP)[8] to provide an integrated, multi-pollutant strategy to address ozone, PM, air toxics and greenhouse gases. The plan established 55 feasible control measures to be implemented in the 2010-2012 timeframe in which there are 18 measures for stationary and area sources and 4 energy and climate measures. The following 6 Bay Area's control measures are currently above and beyond the requirements in the existing District's rules:

- Bay Area's Control Measure SSM1 – Metal Melting, and Control Measure SSM6 – PM Limitation proposed to reduce particulate emission limits and encourage the use of high efficiency filtration at foundry operations and metal melting facilities, and other facilities whenever appropriate. The Bay area has developed and proposed amended rule for SSM1 and scheduled for a Public Hearing in 2012. District staff will conduct further analysis study on this concept through the District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

- Bay Area's Control Measure SSM2 – Digital Printing proposed to control VOC emissions from digital printing. The Bay Area is currently collected emissions information from this fairly new category of printing, including solvent-based injet printing and laser printing. It is forecasted to have 21% market share by 2025, and thus there will be a potential to reduce VOC emissions from this category. District staff will conduct further study on this concept through the District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

- Bay Area's Control Measure SSM5 – Vacuum Trucks requires carbon or other control technology on vacuum trucks to reduce emissions of VOCs. District staff will conduct further study on this concept through the District's Control Measure FUG-01 – Further VOC Reductions from Vacuum Trucks.

- Bay Area's Control Measure SSM9 – Cement Kilns, SSM10 – Refinery Boilers and Heaters, SSM11 - Glass Furnaces proposed to further reduce NOx from these source category. District staff will conduct further study through the Control Measure CMB-01 – Further NOx Reductions from RECLAIM.

- Bay Area's Control Measure ECM1 – Energy Efficiency proposed 1) to promote education and training to increase awareness on energy efficiency; 2) to provide technical assistance to local governments and encourage them to adopt and enforce energy efficient building codes; and 3) to provide incentives for improving energy efficiency at schools. These concepts are similar to those described in the District's Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.

- Bay Area's Control Measure ECM2 - Renewable Energy proposed to promote distributed renewable energy generation (solar, micro wind turbines, cogeneration, etc.) on commercial and residential buildings, and at industrial facilities. These concepts are covered under the District's Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.

The District already spearheaded in implementing other concepts in the Bay Area's AQMP that called for reducing SO_2 emissions from coke calciner and cement kilns; further controlling VOC emissions from livestock waste and natural gas production facilities; and

NOx emissions from residential fan type furnaces, space heating, dryers, and ovens. The District also has an on-going program that promotes tree planting. Other Bay Area's control measures addressing New Source Review, Air Toxics "Hot Spots" program, and greenhouse gases in permitting, are either administrative in nature or not related to criteria pollutants.

San Joaquin Valley

San Joaquin Valley is extreme nonattainment with respect to 2008 8-hour ozone standards and nonattainment with respect to PM2.5 standards. Up to date, the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has developed two separate plans to address the 8-hour ozone standards in 2007 and the 1997 PM2.5 standards in 2008. Recently, the SJVUAPCD developed a 2010 mid-course review for the ozone plan, and continued the feasibility study for several other measures such as refinery wastewater separators, refinery turnaround units, refinery vacuum devices and municipal water treatment plans. In addition, the SJVUAPCD is in the process of developing a plan to address the 2006 PM2.5 standards in cooperation with CARB and the District. District staff reviewed the list of control measures completed and listed in the San Joaquin Valley's 2010 mid-course review in comparison with the 2012 control measures recommended by the District. Overall, the District has either already implemented or developed control measures with similar concepts proposed in the SJVUAPCD plans.[9-11]

Dallas-Fort Worth (DFW) Texas

The entire state of Texas is in attainment of the PM2.5 standards, but the state has two nonattainment areas with respect to the 8-hour ozone standards: the Dallas-Fort Worth and the Houston-Galveston-Brazoria. The DFW area was reclassified from a moderate to a serious nonattainment area for the 1997 8-hour ozone standard, and is moderate nonattainment with respect to the 2008 8-hour ozone. The area must attain the 1997 and 2008 8-hour ozone standards by June 2013 and December 2018, respectively. In their previous SIPs, the Texas Commission on Environmental Quality (TCQE) identified 8 new RACMs for area sources and point sources, and 6 of these measures were already implemented at the District. The remaining 2 measures, one for the cement kilns and one for the voluntary energy efficiency and renewable energy will be implemented through the District's Control Measure CMB-01 – Further NOx Reductions from RECLAIM and Control Measure EDU-01 – Further Criteria Pollutant Reductions from Education, Outreach and Incentives.[12]

After being reclassified from a moderate to a serious nonattainment area, TCQE conducted additional RACM analysis in 2011 and made a determination not to adopt any additional measures since modeling demonstrated that the area would be able to meet the attainment date of 2013 for the 1997 ozone standard.

Houston-Galveston-Brazoria (HGB) Texas

The Houston-Galveston-Brazoria area was reclassified from moderate to a severe nonattainment area for the 1997 8-hour ozone standard, and classified as marginal for the 2008 8-hour ozone standard. The HGB area must attain the 1997 8-hour ozone standards by June 2019. The TCQE identified 11 RACMs for area sources and point sources. After being reclassified to severe nonattainment area, the TCQE conducted additional RACM analysis, analyzed additional 100 potential control measures, and determined that there is only one control measure that would help advance the attainment date for the HGB by one year.[13]

This specific control measure calls for a 25% additional reduction of the facility's highly reactive VOC (HRVOC) caps from the facilities which are located in the Harris County and regulated under the HRVOC Emissions Cap and Trade program. The HRVOC cap includes the emissions from cooling towers, process vents, and flares. The District does not have a VOC cap and trade program, nevertheless plans to further control emissions from flares and from process vents at specific facilities through the District's Control Measure CMB-02 – NOx Reductions from Biogas Flares, FUG-01 – Further VOC Reductions from Vacuum Trucks, FUG-02 – Emission Reduction from LPG Transfer and Dispensing , and FUG-03 – Further VOC Reductions from Fugitive VOC Emissions. The District has no plan to further regulate the emissions from cooling towers at this stage.

New York Metropolitan

The New York Metropolitan Area is classified as nonattainment area or the 1997 annual PM2.5 standard of 15 µg/m3. All of the New York State is in compliance with the 1997 24-hour PM2.5 standard of 65 µg/m3. To satisfy the requirement of the CAA, the New York Department of Environmental Conservation (NYDEC) finalized the final annual PM2.5 SIP in July 2008.[14] In this final PM2.5 SIP, it was determined that modeling will be used to demonstrate attainment in 2010 taking into effect the emission reduction programs already in place, the control measures already proposed, and the contingency measures, if needed. The three stationary source control measures that are more stringent than the District's existing rules are:[15]

- Portland Cement Plants. The NYDEC has revised its regulations for cement plants on June 11, 2010 to require case-by-case RACT analysis for cement kilns. The District selects to reduce cement kiln NOx emissions through the District's Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

- Glass Furnaces. The NYDEC has revised its regulation for glass manufacturing facilities on June 11, 2010 to require case-by-case RACT analysis to potentially include control technologies such as oxy-fuel firing, low NOx burners, SCR, SNCR. The District selects to reduce emissions from glass furnaces through Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

- Stationary Combustion Installations. The NYDEC has revised its regulation on June 8, 2010 to include stricter, case-by-case RACT determination for major stationary sources that contain natural gas and/or oil-fired Industrial/Commercial/Institutional boilers, or combined cycle/cogeneration combustion turbines. The Districts will reduce emissions from this category of sources through the District's Control Measure CMB-01 – Further Reductions from NOx RECLAIM.

In addition, many counties in the New York state are nonattainment areas with respect to the 8-hour ozone standards. The NYDEC developed a comprehensive plan to address multi-pollutant attainment for criteria pollutants, greenhouse gases and toxics in June 2010.[16] In addition to the control measures for cement kilns, glass furnaces, boilers and turbines addressed above, the NYDEC includes several measures for VOC Clean Air Interstate Trading of NOx and SO_2. Some of the VOC measures are more stringent than the District's existing rules which will be further analyzed under District's Control Measure MCS-01 – Application of All Feasible Measures Assessment.

New Jersey and Sacramento Metro

District staff also reviewed the control measures developed by Sacramento Metro and New Jersey Department of Environmental Protection for their 8-hour ozone plans. There are no additional new measure concepts that the District has not yet considered for the Final 2012 AQMP. [17-20]

Step 6 - Additional Studies and Analyses

In addition to all of the above analyses, SCAG, CARB, and the District have completed the following analyses to meet the requirements of the CAA:

- RACM analyses and demonstration conducted by SCAG and CARB for transportation and mobile sources control measures are included in Appendix IV-C and in the Addendum to this Attachment.[21]

- Costs and cost effectiveness analyses, planning and scheduling to implement for each District's stationary source and mobile source control measures, if available, are provided in Chapter IV, Appendix IV-A and B.

CONCLUSION

Following are the District staff's findings:

- As required by the CAA and the U.S. EPA's PM2.5 Implementation Rule, District staff evaluated and analyzed all feasible control measure concepts that were currently available for inclusion in the Final 2012 AQMP. These concepts were either provided by the public and experts, or recommended by U.S. EPA, or implemented by other air districts. From these concepts, District staff selected and developed 8 short-term stationary source control measures to address the 24-hour PM2.5 attainment, 15 early-action stationary source control measures and 17 on-road and off-road control measures to address the 8-hour ozone attainment. District staff also developed a catch-all Control Measure MSC-01 – Application of All Feasible Measures Assessment to facilitate the inclusion of any incoming innovative air pollution control technologies or ideas that can help the Basin achieve the NAAQS as expeditiously as possible.

- Following the approach recommended by the U.S. EPA in the PM2.5 Implementation Rule, District staff conducted a study of more than 100 rules and regulations and 100 control measures recently developed in the 2007-2012 timeframe by other nonattainment air districts in the nation. In general, the District's existing rules and regulations are equivalent to, or more stringent than other districts' rules and regulations and their proposed control measures in their respective SIPs. In the few areas where the District's rules can be amended to promote cleaner technologies, add additional best management practices, and improve enforceability, District staff has developed one or more control measures to facilitate these activities.

- The control measures that do not have estimated emission reductions cannot be considered RACMs, and the District commits to further conduct analyses to refine the emission inventory, emission reductions, and cost-effectiveness for these measures. The District's ambient air quality data and modeling analysis in Chapter 3 and Chapter 5 demonstrates that the Basin would be able to meet the 24-hour PM2.5 attainment date by 2014 with the implementation of a few episodic control measures discussed in Chapter 4.

- With regards to the early actions to achieve ozone attainment, District staff has developed an effective menu of controls to meet the attainment dates as expeditiously as possible. The available control measures that District staff did not include would not collectively advance the attainment date or contribute to the RFP because of the uncertain non-quantifiable amount of emission reductions that they may potentially generate.

- In conclusion, the District has conducted the RACM/RACT analysis for identifying and selecting the control measures for the Final 2012 AQMP is in compliance with the requirements of the CAA, the U.S. EPA's PM2.5 Implementation Rule, as well as the U.S. EPA's policy and guidelines.

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TABLE 3

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1109	NOx	Emissions of Oxides of Nitrogen from Boilers and Process Heaters – Petroleum Refineries (Amended 8/5/88)	0.03 lbs/mmBTU of heat input (~25 ppmv). Subsumed by RECLAIM. RECLAIM (Amended 1/2005): • 5 ppmv for >110 mmbtu/hr units • 25 ppmv for units 40-100 mmbtu/hr	San Joaquin Rule 4306 (Amended 10/18/08) has the following limits: NOx limits for refinery gas: • 5 ppmv for units >110 mmbtu/hr; • 25 ppmv for units 65-110 mmbtu/hr; and • 30 ppmv for 5-65 mmbtu/hr units San Joaquin Rule 4320 (Amended 9/5/08) has the following limits for refinery gas: • 5 ppmv for >110 mmbtu/hr units • 5 - 6 ppmv for units between 20 - 110 mmbtu/hr Compliance may be mitigated with annual emissions fee.	Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM
1110.2	NOx, VOC, CO	Emissions from Gaseous and Liquid Fueled Engines (Amended 7/9/2010)	Rule 1110.2 has NOx, VOC, CO limits for all stationary and portable engines over 50 brake horse power (bhp). In general, the limits applicable to 1) stationary, non-emergency engines by 7/1/2011, and 2) biogas (landfill and digester gas) engines by 7/1/2012 are:	San Joaquin Valley Rule 4702 (Amended 8/19/2011) has NOx, VOC, CO and SOx limits for engines rated over 25 bhp. For engines over 50 bhp: - By 1/1/2017, the limits for spark-ignited engines are: • 11 ppmv NOx	Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
			• 11 ppmv NOx • 30 ppmv VOC • 250 ppmv CO Limits for new non-emergency engines driving electrical generators are: • 0.07 lbs NOx per MW-hr • 0.20 lbs CO per MW-hr • 0.10 lbs VOC per MW-hr NOx limits for low usage biogas engines: • 36 ppmv, engines ≥ 500 bhp 45 ppmv, engines < 500 bhp VOC and CO limits for low usage biogas engines: • 40 ppmv VOC, landfill gas • 250 ppmv VOC, digester gas • 2000 ppmv CO. Portable and agricultural engines are not subject to the general limits listed above. Many of Rule 1110.2 engines are in RECLAIM, and RECLAIM will be amended to incorporate feasible BARCT.	• 250 ppmv VOC (rich-burn) and 750 ppmv VOC (lean burn), and • 2000 ppmv CO - Engines used in agricultural operations (AO), or fueled with waste gas, or limited used, or cyclic loaded and field gas fueled are subject to higher limits than the above - In general, all compression ignited engines must meet U.S. EPA Tier 4 standards. Engines between 25 bhp - 50 bhp, non agricultural operations (AO), must meet federal standards 40CFR Part 60 Subpart IIII and JJJJ. The SOx limits are: 1) Natural gas, propane, butane, LPG, or combination, or 2) 5 grains/100 scf for gaseous fuel, or 3) 15 ppmv liquid fuel, or 4) CA reformulated gasoline for spark-ignited engines, or 5) CA reformulated diesel for compression ignited engines, or 6) 95% control.	

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1111	NOx	NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces (Amended 11/6/09)	40 nanograms per joule heat output until 2014. A lower standard of 14 ng/J is required with staggering compliance dates from 2014-2018.		
1112	NOx	Emissions of Oxides of Nitrogen from Cement Kilns (Amended 6/6/86)	Applicable to gray cement only. 11.6 lbs/ton clinker averaged over 24 hours and 6.4 lbs/ton clinker averaged over 30 days. Subsumed by RECLAIM. RECLAIM, amended 1/2005 version, had no recommendation for cement kiln BARCT. However, RECLAIM BARCT analysis is an on-going process and will be evaluated every three years.		Further study the feasibility of lowering the NOx limits through: CMB-01 – Further NOx Reductions from RECLAIM
1117	NOx	Emissions of Oxides of Nitrogen from Glass Melting Furnaces (Amended 1/6/84)	4 lb/NOx per ton of glass pulled. Flat glass and fiberglass melting furnaces are exempt. Many of these R1117 units are in RECLAIM. RECLAIM (Amended 1/2005 version) had no BARCT recommendation for this class. However, BARCT analysis is an on-going process and will be reevaluated every three years.	San Joaquin Rule 4354 – Glass Melting Furnaces (Amended 5/19/2011) have NOx, CO, VOC, SOx limits. There are several options for the NOx limits: • Container Glass: 1.5 lbs/ton (rolling 30-day average) • Fiberglass: 1.3-3 lbs/ton (24-hour average)	Further study the feasibility of lowering NOx limit through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1117 (Cont.)				• Flat Glass: 2.9 lbs/ton (30-day average) – 3.7 lbs/ton (24-hour average) The SOx limits are: • Container Glass: 0.9-1.1lbs/ton (rolling 30-day average) • Fiberglass: 0.9 lbs/ton (rolling 24-hour average) • Flat Glass: 1.2 lbs/ton (30-day average) – 1.7 lbs/ton (24-hour average) The VOC limits are: • Container or Fiberglass: 0.25 lbs/ton or 20 ppmv • Flat Glass: 0.10 lbs/ton or 20 ppmv.	
1121	NOx	Control of Nitrogen Oxides from Residential Type, Natural-Gas-Fired Water Heaters (Amended 9/3/2009)	15 ppmv at 3% O2, dry input (or 10 ng/j output) for all stationary water heaters; and 55 ppmv at 3% O2, dry input (40 ng/j output) for mobile water heaters.	Other Districts' plans propose to accelerate replacements of old water heaters with electric units or new highly-efficient lower-emitting water heaters with the use of incentives.	Further study the possibility of using incentives to promote electric heaters through: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx] In addition, further consider the feasibility of technology transfer through: CMB-03 – Reductions from Commercial Space Heating

TABLE 3

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1134	NOx	Emissions of Oxides of Nitrogen from Stationary Gas Turbines (Amended 8/8/97)	Standard = Reference Limit x (Unit Efficiency/25%), where reference limit depends on size of units, varying from 9 ppmv for units rating at equal to or larger than 10MW to 25 ppmv for units rating from 0.3 MW to less than 2.9 MW. RECLAIM, amended 1/2005 version, indicated that 5 ppmv was achieved in practice but not cost effective, therefore did not propose BARCT. This analysis may need to be revised based on new information. RECLAIM BARCT is an on-going process that is planned to be reviewed every 3 years.	Bay Area, Regulation 9, Rule 9 (Adopted 12/6/06) contains the following limits: • 9 ppmv for units between 250-500 mmBTU/hr and • 5 ppmv for units more than 500 mmBTU/hr San Joaquin Valley Rule 4703, (Amended 8/17/06) requires 3 ppmv for combined cycle >10 MW, and standards from 5 – 50 ppmv for other units. Sacramento Rule 413 (Amended 03/24/05) requires 9 – 25 ppmv depending on size of units, but are independent on equipment efficiency. Ventura Rule 74.9 (Amended 11/08/05) requires 25 – 125 ppmv depending on fuel type but are independent from equipment size and efficiency. Control efficiency 90% - 96%. In addition, all units have to meet 20 ppmv NH3.	Further study the feasibility of lowering the NOx standard and establish ammonia standard through: CMB-01 – Further NOx Reductions from RECLAIM MCS-01 – Application of All Feasible Measures Assessment (for non-RECLAIM facilities)

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1135	NOx	Emissions of Oxides of Nitrogen From Electric Power Generating Systems (Amended 7/19/91)	Mass emission limits and emission reduction goals for utility boilers. Only City of Glendale is subject to Rule 1135, which is allowed to meet 0.2 lb/MW-hr (or a daily mass limit of 390 lb NOx per day, or an annual limit of 35 tons per year). Other utility boilers are in RECLAIM subject to declining NOx allocations which were determined based on a level of 7 ppmv = 0.07 lb/MW-hr = 0.008 lb/mmbtu, assuming a heat rate of 8130 Btu/kw-hr. The utility boilers are operated at various BARCT levels from 5 - 30 ppmv. (Note)	Ventura Rule 59 (amended 7/15/97) requires: • 0.1 lb NOx/MW-Hr for utility boilers and • 0.04 lb/MW-hr for auxiliary boilers. San Joaquin Rule 4306 – Phase 3 (amended 3/17/2005) requires boilers more than 20 mmbtu/hr to comply with the following options: • Standard option of 9 ppmv (or 0.011 lb/mmbtu) complied by 2005-2007, or • Enhanced option of 6 ppmv (or 0.007 lb/mmbtu) complied by 2006-2008. (Assuming a heat rate of 8130 Btu/kw-hr, 6 ppmv is about 0.06 lb/MW-hr.)	Further study the feasibility of lowering the emission targets through: CMB-01 – Further NOx Reductions from RECLAIM facilities MCS-01 – Application of All Feasible Measures Assessment

Note: RECLAIM facilities have flexibility to operate their utility boilers provided that the total facility emissions must be at or below their allocations determined based on a level of 7 ppmv. Regarding BARCT levels, according to Marty Kay and John Yee, the utility boilers at Southern California Edison, Department of Water and Power, and City of Burbank are operated at a level from 5 – 7 ppmv (1-hr to 1-month average time) whereas City of Pasadena boilers are operated at a level of 30 ppmv. In addition, since heat rate (mmbtu per kw-hr) varies with each utility boiler, District staff used 8130 BTU/kw-hr to convert the ppmv to lb/MW-hr for the unit operated by City of Glendale.

TABLE 3 (continued)
Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146	NOx	Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters (Amended 9/5/2008)	Applicable to units rating of more than 5 mmbtu/hr. Current NOx limits: • For digester gas: 15 ppmv • For landfill gas: 25 ppmv • For refinery gas: 30 ppmv (the 2008 amendment did not revise limits for refinery gas) • For other types of fuels: 5 ppmv for ≥75 mmbtu/hr, natural gas; 30 ppmv for ≥75 mmbtu/hr, other fuels; and 5 or 9 ppmv for 20–75 mmbtu/hr units CO limit: 400ppmv Many Rule 1146 units are in RECLAIM. RECLAIM (Amended 1/2005 version) contains the following NOx limits: • For refinery gas: 5 ppmv for units > 110 mmbtu/hr; and 25 ppmv for units < 110 mmbtu/hr units • For other units: 9 ppmv for units > 20 mmbtu/hr; and 12 ppmv for units >2 mmBTU/hr	Sacramento Rule 411 (Amended 10/27/05) limits for gaseous fuel are 9 ppmv for units greater than 20 mmbtu/hr, and 15 ppmv for units from 5 to 20 mmbtu/hr. San Joaquin Rule 4306 (Amended 10/18/08) has the following limits: NOx limits: • 30 ppmv for 5-65 mmbtu/hr units using refinery gas. For units from 40 – 100 mmbtu/hr, refer to the comparison under Rule 1109. • For other types of fuels: 9 ppmv for >20 mmbtu/hr units; 15 ppmv for ≤20 mmbtu/hr units (6 – 9 ppmv for enhanced options) • Other units: 15 – 30 ppmv CO limit: 400 ppmmv. San Joaquin Valley further reduces NOx, CO, SO2 and PM10 emissions by adopting Rule 4320 on 10/16/08. The limits in Rule 4320 are:	Further explore the feasibility of lowering the NOx standards for Rule 1146 (e.g. refinery fuels, digester and landfill gases) and RECLAIM through: CMB-01 – Further NOx Reductions from RECLAIM

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146 (Cont.)	NOx			NOx limits: • For refinery gas: 5 – 6 ppmv for units between 20-110 mmbtu/hr; 6 – 9 ppmv for units between 5 - 20 mmbtu/hr; and 9 ppmv for units firing of less than 50% by vol PUC quality gas. Refer to the comparison under Rule 1109 for 40 mmbtu/hr units and above using refinery gas. • For oil field generators: 5 - 7 ppmv for units greater than 20 mmbtu/hr; 6 – 9 ppmv for units larger than 5 but less than 20 mmtu/hr; and 9 ppmv for units firing of less than 50% by vol PUC quality gas • For low usage units: 9 ppmv • For units at a wastewater treatment facilities firing on less than 50% by vol PUC quality gas: 9 ppmv • For other units: 5 – 7 ppmv for units larger than 20 mmbtu/hr; and 6 – 9 ppmv for units between 5 mmbtu/hr and 20 mmbtu/hr Compliance may be mitigated with annual emission fees.	

TABLE 3 (continued)
Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146.1	NOx	Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters (Amended 9/5/2008)	Applicable to units rating from 2 mmbtu/hr to 5 mmbtu/hr. NOx limits: • Atmospheric Units: 12 ppmv • Digester gas: 15 ppmv • Landfill gas: 25 ppmv • All others: 9 ppmv CO limit: 400 ppmv. Many Rule 1146.1 units are in RECLAIM, and RECLAIM (Amended 1/2005 version) BARCT analysis recommended 12 ppmv for less than 20 mmbtu/hr units based on ultra low NOx technology that is achieved in practice. RECLAIM (Amended in 2005) has a limit of 12 ppmv NOx for boilers in this size range.	Bay Area Rule 9-11 (Amended 5/17/00) has following limits for boilers using gaseous fuel 1) 10 ppmv for boilers with rated input greater than 1.75 mmbtu/hr, 2) 25 ppmv for boilers from 1.5-1.75 mmbtu/hr, 3) 30 ppmv for boilers less than 1.5 million btu/hr. Non-gaseous fuel combustion devices have higher limits than gaseous fuel devices. San Joaquin Rule 4307 (Amended 5/19/2011) has the following limits: NOx limits: - For New or Replacement Units: Atmospheric Units: 12 ppmv, and Non-Atmospheric Units: 9 ppmv -For Retrofit Units: 30 ppmv burning gaseous fuels; and 40 ppmv burning liquid fuels Sulfur limits for SO2: -For natural gas, propane, butane, or LPG: 5 grains of total sulfur per 100 scf, or 9 ppmv SO2, or 95% control -For liquid fuels: 15 ppmv sulfur	Further study the feasibility of promoting the use of cleaner units through incentives through one of the following: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - NOx and SOx Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1146.2	NOx	Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers (Amended 5/5/06)	Applicable to units less than 2 mmbtu/hr. Current limits are: • 20 ppmv for units from 400,000 btu/hr – 2 mmbtu/hr • 55 ppmv for units rating less than 400,000 btu/hr	San Joaquin Valley Rule 4308, (Amended 12/17/09) requires: • 20 ppmv for units used PUC gas from 75,000 btu/hr – 2 mmbtu/hr • 30 ppmv for units from 400,000 btu/hr - 2 mmbtu/hr used other types of fuels • 77 ppmv for units rating from 75,000 btu/hr – 400,000 btu/hr used other types of fuels	Further study the feasibility of promoting the use of cleaner units through: INC-01 – Economic Incentive Programs to Adopt Zero and Near-Zero Technologies [NOx]
2000 - 2015	NOx, SOx	RECLAIM (Amended 5/6/05)	Include facility allocations for NOx and SOx for RECLAIM facilities.	Since other Districts do not have RECLAIM, refer to comparison for individual rules such as Rule 1146, 1146.1, 1110.2 etc.	Further review BARCT through: CMB-01 – Further NOx Reductions from RECLAIM . District has set most stringent BARCT for SOx sources in the 2010 RECLAIM Amendments.

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1106	VOC	Marine Coating Operations (Amended 1/13/95)	Coating-specific emission limits from 275 – 780 g/L. In lieu of complying with specific emission limits, operator can use air pollution control system with at least 85% efficiency. Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.24 (Amended 11/11/03) generally has the same limits as South Coast Rule 1106, except the limit for special marking of items such as flight decks, ship numbers is 420 g/L (490 g/L in Rule 1106) Bay Area Rule 8-43 (Amended 10/16/02) generally has the same limits as South Coast Rule 1106, except it has lower limit for pretreatment wash primer at 420 g/L (780 g/L in Rule 1106)	Further study the potential of lowering the emission standards for this source category through: CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1106.1	VOC	Pleasure Craft Coating Operations (Amended 2/12/99)	Coating-specific emission limits from 340 – 780 g/L. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley's Rule 4603 (Amended 9/17/09) limit for teak primer, wood sealer, and clear wood varnish is 420 g/L, which is more stringent than the limits in Rule 1106.1 (i.e. 775 g/L for teak primer, 550 g/L for clear wood sealers, and 490 g/L for clear wood varnishes.)	Further study the potential of lowering the emission standards for this source category through: CTS-02 – Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1113	VOC	Architectural Coatings (Amended 6/3/2011)	Coating-specific emission limits from 50 g/L – 730 g/L. Allow averaging, scheduled to be phased out on January 1, 2015.		Further study the potential of lowering the emission standards for this source category through: CTS-01 – Further VOC Reductions from Architectural Coatings (R1113)

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1107	VOC	Coating of Metal Parts and Products (Amended 1/6/06)	Coating-specific emission limits from 2.3 lbs/gal – 3.5 lbs/gal. In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 5 ppmv outlet) and 90% capture efficiency. Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.12 (Amended 1/6/06) generally has the same coating-specific limits as South Coast Rule 1107, except in the following categories: • Limit for metallic coating is 3 lbs/gal (3.5 lbs/gal in Rule 1107); • Limit for camouflage is 3 lbs/gal (3.5 lbs/gal in Rule 1107); • Limit of pretreatment coatings is 2.3 lbs/gal (3.5 lbs/gal in Rule 1107) • Overall minimum control efficiency is 90%, higher than Rule 1107 requirement at 85% San Joaquin Valley Rule 4603 (Amended 9/17/09) have more stringent limits than Rule 1107 for baked camouflage and baked metallic coating at 360 g/L (420 g/L in Rule 1107)	Explore the feasibility of lowering the VOC limits considering the diversity of applications, and if feasible, implement through the following control measure: CTS-02 – Further Emission Reduction from Miscellaneous Coatings. Adhesives, Solvents, and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1115	VOC	Motor Vehicle Assembly Line Coating Operations (Amended 5/12/95)	Limits from 1.2 lbs VOC/gal coating for electrophoretic primer to 15 lbs/gal of applied solids for primer, primer surfacer and topcoat. Cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4602, (Amended 9/17/09) has more stringent limits for: 1) Primer at 0.7 lbs/gal and 2) Primer surface and topcoat at 12 lbs/gal	Further lowering the VOC limits
1118	All	Refinery Flares (Amended 11/4/05)	• Minimize flare emissions & require smokeless operations • Specify SO_2 gradually decreasing performance target to less than 0.5 tons per million barrels of crude by 2012. • If the performance target is exceeded, the operator must 1) pay mitigation fee; or 2) submit a Flare Mitigation Plan to reduce emissions. • Require Cause Analysis for event exceeding 100 lbs VOC, 500 lbs of SO2, or 500,000 scfm of vent gas, excluding planned shutdown, startup and turnarounds • Require 160 ppmv H2S, 3 hour average by 1/1/2009, and no limits for NOx, VOC, PM and CO.	U.S. EPA suggested the District to further re-evaluate Rule 1118 (FR Vol 76 No 217, Nov 9, 2011, CBE comments). San Joaquin Valley Rule 4311 (Amended 6/18/09) has VOC/NOx limits for ground-level enclosed flares; SO_2 Targets (1.50 tons/million barrels of crude by 2011, and 0.5 tons/million barrels by 2012); Flare Minimization Plan for refinery flares more than 5 mmbtu/hr; and operational requirements for all flares that have potential to emit more than 10 tons/yr VOC and more than 10 tons/yr of NOx. Bay Area Rule 12-12 (Adopted 4/5/06) does not specify a declining SO2 target and does not contain a mitigation fee option.	Explore the possibility of further minimizing flare related events, through: MSC-03 – Improved Start-Up, Shutdown and Turnaround Procedures In addition, further study the feasibility of reducing emissions of landfill flares through: CMB-02 – NOx Reductions from Biogas Flares

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1122	VOC	Solvent Degreasers (Amended 5/1/09)	Contain various work practice and design requirements.		Further study to assess the feasibility of reducing emissions through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants
1124	VOC	Aerospace Assembly and Component Manufacturing Operations (Amended 9/21/01)	Coating-specific emission limits from 160 – 1000 g/L. Specific high transfer coating applications (e.g. HVLP spray). In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 50 ppmv outlet) and 90% capture efficiency. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4605 (Amended 6/16/2011) has the following limits that are more stringent than those in Rule 1124: • Flight Test Coatings = 600 g/L (840 g/L in Rule 1124) • Fastener Sealant = 600 g/L (675 g/L in Rule 1124) Sacramento Rule 456 (Amended 10/23/08) has the following limits that are more stringent than those in Rule 1124: • Conformal Coating = 600 g/L (Rule 1124 limit is 750 g/L)	Explore the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1124 (Cont.)				• Fire Resistant Coatings = 600 g/L. (Rule 1124 limits are 650 g/L for Commercial; 800 g/L for Military) • High-Temperature Coating = 420 g/L. (Rule 1124 limit is 850 g/L) • Mold Release Coatings = 762 g/L. (Rule 1124 limit is 780 g/L) • Radiation Effect = 600 g/L. (Rule 1124 limit is 800 g/L) • Rain Erosion Resistant Coating = 600 g/L in All Other Category. (Rule 1124 limit is 800 g/L) Ventura 2006-2008 Triennial Assessment and Plan Update has a control measure to require 25 g/L VOC limit for cleaning solutions and remove the 45 mmHg vapor pressure allowance. (Rule 1124 limits for cleaning solutions and strippers are 200 g/L (or 45 mmHg vapor pressure) and 300 g/L (or 9.5 mmHg vapor pressure)	

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1125	VOC	Metal Container, Closure, and Coil Coating Operations (Amended 3/7/2008)	Coating-specific emission limits from 0 g/L (for non food cans) – 660 g/L. Specific high transfer coating applications (e.g. HVLP spray). In lieu of complying with specific emission limits, operator can use air pollution control system with at least 95% control efficiency (or 50 ppmv outlet) and 90% capture efficiency, which is equivalent to an overall control efficiency of 85%. Solvent cleaning operations must comply with Rule 1171.	The following limit in San Joaquin Rule 4604 (Amended 9/20/07) are more stringent than those in Rule 1125: • Two-Piece Interior Body Spray = 420 g/L (440 g/L in Rule 1125) • Three-Piece Interior Body Spray = 360 g/L (510g/L in Rule 1125) In addition, SJV Rule 4604 have many limits that are not listed in Rule 1125 such as 20 g/L for end seal compounds and 225 g/L for two-piece interior sheet base coating and over-vanish. Sacramento Rule 452 (Amended 9/25/2008) has the following more stringent limits than Rule 1125: • Two-Piece Interior Body Spray = 420 g/L (440 g/L in Rule 1125) • Three-Piece Interior Body Spray = 360 g/L (510g/L in Rule 1125)	Explore the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130	VOC	Graphic Arts (Amended 10/8/99)	VOC content limits: 80 g/l – 100 g/l for fountain solution, 150 g/l for adhesives, 225 g/l - 300 g/l for inks and coatings. In lieu of meeting specific emission limits, control device with overall control efficiency from 75% - 85% can be used to achieve equal or better emission reductions. VOC limits for cleaning solutions for printing presses are in Rule 1171 ranging from 25 g/l (0.21 lb/gal) for flexographic printing to 100 g/l (0.83 lb/gal) for lithographic printing (even though 500 g/l is allowed up to end of year 2007.)	The following limits in San Joaquin Valley Rule 4607 (Amended 12/18/08) are more stringent: 1) 95% control efficiency for heat-set web offset lithographic or letterpress printers that emit greater than 25 tons per year VOC; 2) 1.6% VOC content for fountain solution used in heat-set lithographic printers, 5% for fountain solution used in cold-set and sheet-fed lithographic printers, and 8% for fountain solution used in other presses. Sacramento Rule 450 is more stringent in the following: 1) overall control efficiency of 95% for heat-set web offset lithographic and letterpress printing and 80% for flexible package printing (Rule 1130 requires only 75% control efficiency) ; 2) VOC in fountain solution is lower, generally from 1.6% to 5%; 3) electronic circuit limit is 800 g/l (850 g/l in Rule 1130.1)	Further study to assess the feasibility of increasing the overall control efficiency and reducing the alcohol usage in fountain solution through the implementation of: MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130 (Cont.)				Bay Area, Regulation 8, Rule 20 (Amended 11/19/08) requires 8% VOC content in fountain solution. In addition, the rule requires recordkeeping for digital printing, cleaning and stripping of UV or electron beam-cured inks for further study potential emission reductions in a near future. Ventura Rule 74.19 (Amended 6/14/11) requires low VOC content in fountain solution used in lithographic presses. In addition, the U.S. EPA CTG for lithographic and letterpress, September 2006, recommends: • Destruction efficiency of 90% to 95% depending on date of installation (or 20 ppmv outlet concentration) for heat-set web with potential to emit, prior to controls, of at least 25 tpy. • For operations emitting 15 lb/day, fountain solution must be 1) 1.6% alcohol or less, or	

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1130 (Cont.)				2) 3% with refrigerated chiller or 3) 5% alcohol substitute for heat-set web presses; 4) 5% alcohol for sheet-fed presses; 5) 5% alcohol substitute and no alcohol in fountain solution for cold-set web presses. The U.S. EPA CTG for rotogravure and flexographic, adopted in September 2006, recommends control efficiency of 80% for presses installed after March 1995, and 65% - 75% for older presses.	
1130.1	VOC	Screen Printing Operations (Amended 12/13/96)	VOC content limits ranges from 400 g/l – 800 g/l for materials used in screen printing. In lieu of specific emission limits, control device can be used to achieve equal or better reductions, at least 95%.	Bay Area, Regulation 8, Rule 20 (Amended 11/19/08) has more stringent limit for adhesives at 150 g/L (400 g/L in Rule 1130.1). Sacramento Rule 450 (Amended 10/23/08) has more stringent limits than Rule 1130.1 in the following areas: 1) limit for electronic circuit ink is 800 g/L (850 g/L in Rule 1130.1); 2) limit for adhesives is 150 g/L (400 g/L in Rule 1130.1)	Further study to assess the feasibility of reducing the VOC limits for adhesives through: MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1132	VOC	Further Control of VOC from High Emitting Spray Booths (Amended 5/7/04)	Further reduce emissions by 65% from the baseline primarily through the installation of control devices, beyond and above the use of coatings that comply with existing coating rules.		
1136	VOC	Wood Products Coatings (Amended 6/14/96)	VOC content limits range from 2.3 – 6.3 lbs/gal VOC. Averaging provisions and add-on control are allowed. Transfer efficiency is at least 65%, or operator must use certain type of equipment (e.g. HVLP). Solvent cleaning operations must comply with Rule 1171.	Ventura Rule 74.30 (Amended 6/27/06) has more stringent limit for high-solid stains on new wood products at 2 lbs/gal (2.9 lbs/gal in Rule 1136). In lieu of coating specific limits, control equipment achieving 90% efficiency is required. No averaging provisions in Ventura. San Joaquin Valley Rule 4606 (Amended 10/16/08) is more stringent in the following areas: • Rule 1136 allows the use of a stripper with limits higher than 350 g/L if the stripper has low vapor pressure of 2 mmHg. SJV does not have this allowance; • SJV Rule 4606 requires a min overall control efficiency of 85% - 90% for flat wood paneling products, whereas Rule 1136 does not have control efficiency requirement.	Explore the feasibility of lowering the VOC limits for wood products coatings through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1136 (Cont.)				Bay Area, Regulation 8, Rule 32, (Amended 8/5/09) has lower limits for surface preparation and cleanup, including stripping, at 0.21 lbs/gal.	
1144	VOC	Metalworking Fluids and Direct-contact Lubricants (Amended 7/9/2010)	Various limits from 50 g/L – 340 g/L. Add-on control at 90% capture efficiency, 95% control efficiency (or 5 ppmv outlet)		Further study the potential of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1151	VOC	Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations (Amended 12/2/05)	VOC content limits range from 250 – 840 grams VOC per liter. Averaging provisions are allowed. High transfer coating equipment (e.g. HVLP) is required. Solvent cleaning operations must comply with Rule 1171.	San Joaquin Valley Rule 4602 (Amended 9/17/09) is more stringent in the following areas: 1) adhesive at 250 g/L (540 g/L in Rule 1151), 2) gasket/gasket sealing at 200 g/L (400 g/L in Rule 1151), and 3) truck bed liner coating at 200 g/L (310 g/L in Rule 1151) Sacramento Rule 459 (Amended 8/25/11) is more stringent in the following areas: 1) multi-color coating at 520 g/L for mobile equipment driven on rails (680 g/L in Rule 1151), 2) truck bed liner coating at 200 g/L (310 g/L in Rule 1151) Bay Area, Regulation 8, Rule 45 (Amended 12/3/08) is more stringent in the following areas: 1) VOC limit for surface preparation and cleanup, including stripping, of 0.2 lbs/gal or 2) a minimum 85% overall control efficiency.	Further study the feasibility of lowering the VOC limits for coatings through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants, or MSC-01 – Application of All Feasible Measures Assessment
1162	VOC	Polyester Resin Operations (Amended 7/8/05)	VOC limits (monomer content) from 10-48% by weight or alternatively 90% control efficiency for add-on control	Regulation 8, Rule 50 (Amended 12/2/09) is similar to Rule 1162, except the limit for corrosion resistant resin is more stringent at 40% - 46% (48% in Rule 1162). The rule allows some usage of acetone	Further study the feasibility of lowering the VOC limits through: MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1168	VOC	Adhesive and Sealant Applications (Amended 1/7/05)	VOC limits for solvents range from 30 – 775 lbs VOC per gallon. Require the use of high transfer efficiency equipment (e.g. HVLP spray). In lieu of meeting the VOC limits, using add-on control with 80% control efficiency is allowed.	San Joaquin Valley Rule 4653 (Amended 9/16/2010) has more stringent limits in the following areas: • 100 g/L for Cellulosic Plastic Welding Adhesive, 100 g/L for Styrene Acrylonitrile Welding Adhesive, and 200 g/L for Reinforced Plastic Composite Adhesive (Rule 1168 limit is 250 g/L limits for all three categories) • Minimum overall control efficiency is 85% (80% in Rule 1168)	Further study the feasibility of lowering the VOC limits through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations - VOC Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1171	VOC	Solvent Cleaning Operations (Amended 5/1/2009)	VOC limits for solvents are 25 g/l in general, and have a 100-800 g/l VOC for specific cleaning operations. In lieu of meeting the VOC limits, add-on control having 90% collection efficiency and 95% destruction efficiency or meeting 50 ppmv outlet concentration can be used. The rule however only requires (70%)(95%) = 66.5% overall control efficiency for graphic arts and screen printing applications	The U.S. EPA RACT published in September 2006 limit is 50 g/l or an overall control efficiency of 85%. The U.S. EPA is not recommending limits beyond 50 g/l; but also recommends states to adopt higher limits based on individual performance requirements of specific applications. Rule 1171 meets the U.S. EPA RACT.	Further study the feasibility of lowering the VOC limits and increasing the overall control efficiency requirement for control devices located at graphic arts facilities through: CTS-02 - Further Emission Reductions from Miscellaneous Coatings, Adhesives, Solvents and Lubricants,
462	VOC	Organic Liquid Loading (Amended 5/14/99)	Limit in Rule 462 is 0.08 lbs per 1000 gallons of liquid loaded for Class A facility loading of 20,000 gallons or more. This limit is not applicable to small facilities (Class B and C).	Bay Area, Regulation 8, Rule 33 (Amended 4/15/09) has a limit of 0.04 lbs/1000 gallons of liquid loaded and requires stringent monitoring requirements	Further study to assess the feasibility of reducing the VOC limits through: MSC-01 – Application of All Feasible Measures Assessment

TABLE 3 (continued)

Evaluation of SCAQMD Rules and Regulations – VOC, PM Rules

RULE	TYPE	RULE TITLE	CURRENT RULE REQUIREMENTS	OTHER DISTRICTS' 2007-2012 RULES	EVALUATION
1133, 1133.1, 1133.2	PM, VOC, NH3	Composting, Co-Composting, and Related Operations (Rule 1133, Adopted 1/10/2003; Rule 1133.1, Amended 7/8/2011; and Rule 1133.2, Adopted 1/10/2003)	Various performance standards. Air pollution control must have 80% control efficiency or greater. Existing operations must reduce up to 70% baseline VOC and ammonia emissions. Baseline emission factors are 1.78 lbs VOC/ton throughput and 2.93 lbs NH3/ton throughput.	San Joaquin Rule 4565 – Biosolids, Animal Manure, and Poultry Litter Operations (Adopted 3/15/07) and Rule 4566 – Organic Material Composting Operations (Adopted 8/18/11) have various operational requirements for these operations as well as the operators who landfills, composts, or co-composts these materials. The applicability of Rules 4565/4566 is broader than the applicability of Rule 1133.3. In addition, Rules 4565/4566 include additional mitigation measures to control VOC from composting active piles (e.g. maintain minimum oxygen concentration of 5%, moisture content of 40%-70%, carbon to nitrogen ratio of 20-1). San Joaquin's rule does not address chipping & grinding as in Rule 1133.1.	Further study the feasibility of further control through: MCS-02 – Further Emission Reductions from Green Waste Processing
1133.3	VOC NH_3	Emission Reductions from Greenwaste Composting Operations (Adopted 7/8/2011)	Include requirements for composting greenwaste, or greenwaste in combination of manure or foodwaste. Include various performance standards. Require air pollution control with efficiency of 80% or greater for operations greater than 5000 tons/year of foodwaste. For operations less than 5000 tons/year, require the composting piles to be covered, watered, and turned, or operated with measures that reduce at least 40% VOC emission and 20% NH_3 emissions.		

TABLE 3 (continued)

444	All	Open Burning (Amended 11/7/2008)	Contains requirements and prohibitions for open burning to minimize emissions and smoke impacts to the public.	San Joaquin Valley Rule 4103 (Amended 4/15/2010) contains additional best management practices compared to Rule 444 such as best management practices to control open burning of weeds. Bay Area, Reg 5, sets requirements for open burning, and was to forbid recreational burning during curtailment periods.	Further study to include additional good management practices and a possibility of restricting burning during episodic curtailment periods through: BCM-02 – Further Reductions from Open Burning

CALIFORNIA AIR RESOURCES BOARD
Mobile Source RACM Analysis for the South Coast Final 2012 AQMP

Given the significant emission reductions needed for attainment in California, CARB has adopted some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them. These measures target both new and in-use equipment. And while California first focused on cleaning up cars – new car emissions have been reduced by 99 percent – the scope of California's program is vast. The State has implemented regulations and programs to reduce emissions from freight transport equipment, including heavy-duty trucks, ocean going vessels, locomotives, harbor craft, and cargo handling equipment. In addition, the State has standards for lawn and garden equipment, recreational vehicles and boats, and other newly manufactured off-road equipment. California has also adopted many measures that focus on achieving reductions from in-use mobile sources that include accelerated replacement of older equipment with newer, less polluting equipment; more stringent inspection and maintenance requirements; and operational requirements such as truck and bus idling restrictions and speed reduction requirements for ocean going vessels.

California has unique authority under Clean Air Act section 209 to adopt and implement new emission standards for many categories of on-road vehicles and engines, and new and in-use off-road vehicles and engines. Use of this authority is subject to U.S. EPA waiving the applicable federal standard upon their finding that the standards adopted by California are, in the aggregate, at least as stringent as the comparable federal standard.

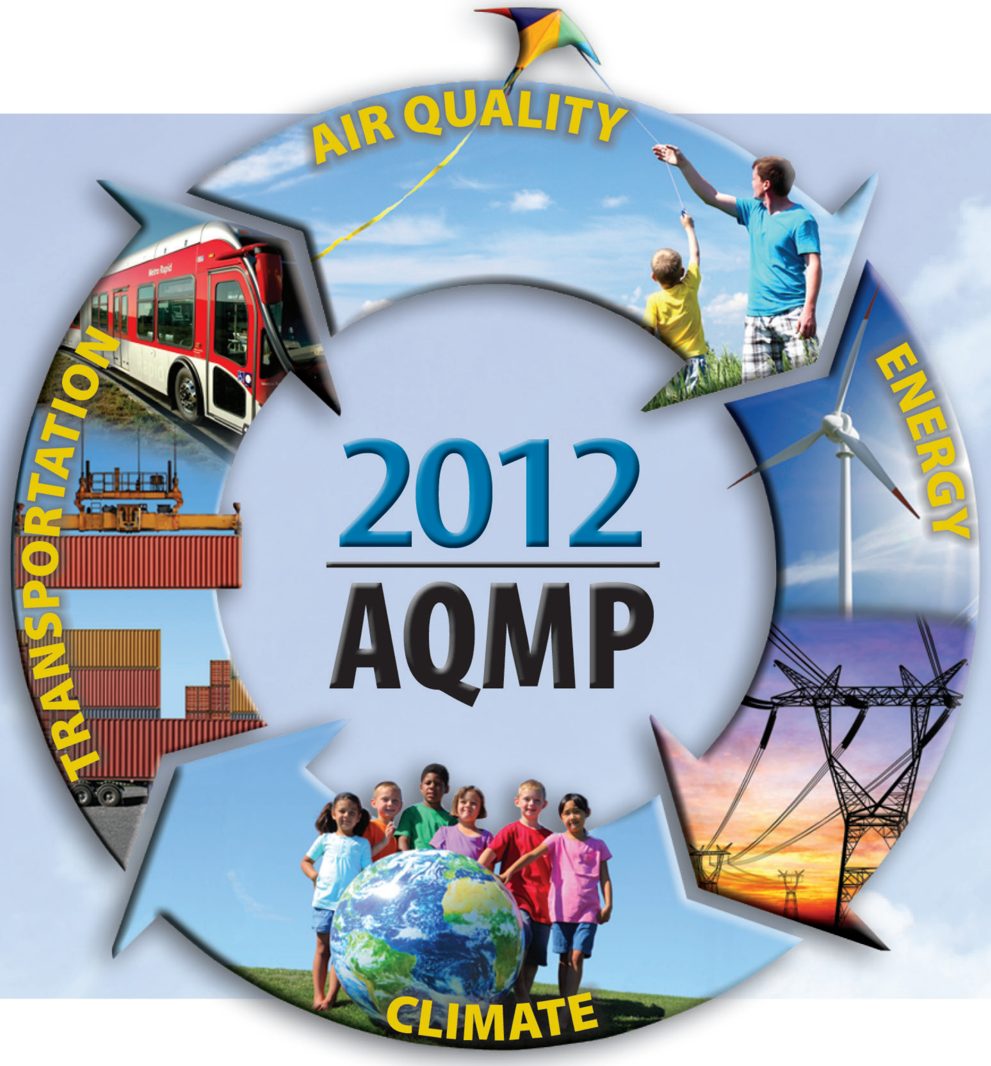
To support the attainment plans submitted to U.S. EPA in 2007 for 8-hour ozone and PM2.5, CARB undertook an extensive public consultation process to identify potential SIP measures. New measures developed by CARB as part of this 2007 State Strategy focused on cleaning up the in-use fleet, and increasing the stringency of emissions standards for a number of engine categories, fuels, and consumer products. These measures build on CARB's already comprehensive program that addresses emissions from all types of mobile sources.

In 2011, U.S. EPA approved the State mobile source control program as being RACM in the context of the 2007 and 2008 South Coast and San Joaquin Valley PM2.5 plans (76 FR 69928 at 69933). In its proposed approval of the 2007 South Coast PM2.5 Attainment Plan, U.S. EPA recognized that the "State of California has been a leader in the development of some of the most stringent control measures nationwide for on-road and off-road mobile sources and the fuels that power them" (76 FR 41562 at 41570). In the 2007 State Strategy, CARB identified and committed to propose new defined measures for the sources under its jurisdiction. Of these new measures, U.S. EPA noted that "many, if not most, of these measures are being proposed for adoption for the first time anywhere in the nation" (76 FR 41562 at 41570).

California's comprehensive mobile source program continues to be RACM as it expands and further reduces emissions. The 2012 PM2.5 SIPs rely on additional regulations adopted since the State's last major SIP revision in 2007. In January 2012, CARB adopted the Advanced Clean Cars program, which combines the control of smog-causing pollutants and greenhouse gas emissions into a single coordinated package of requirements for model years 2017 through 2025. The program was developed in tandem with the federal government over several years, including a joint fact-finding process with shared engineering and technical studies. Benefits from this new program are reflected in emission inventories used in the 2012 PM2.5 attainment plans.

Appendix VIII

Air Quality Management Plan



Vehicle Miles Traveled Emissions Offset Demonstration

February 2013

South Coast Air Quality Management District

Cleaning the air that we breathe...™

South Coast AQMD

FINAL 2012 AQMP
APPENDIX VIII

DEMONSTRATION OF OFFSET OF GROWTH IN EMISSIONS ASSOCIATED WITH GROWTH IN VEHICLE MILES TRAVELED UNDER SECTION 182(d)(1)(A) OF THE FEDERAL CLEAN AIR ACT

FEBRUARY 2013

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT GOVERNING BOARD

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PREFACE

This appendix is prepared as part of the 2012 Air Quality Management Plan to demonstrate that sufficient transportation control strategies and transportation control measures have been identified to offset growth in emissions due to growth in vehicle miles traveled under Section 182(d)(1)(A) of the federal Clean Air Act. Section 182(d)(1)(A) applies to areas classified as severe or extreme nonattainment of the national ambient air quality standard for ozone. As such, the analysis provided in this Appendix applies to air quality management plans and state implementation plans for both the 8-hour ozone (2007 SIP for the South Coast Air Basin) and the previous 1-hour ozone ambient air quality standards (Final 2012 AQMP, Appendix VII).

SECTION 1

INTRODUCTION

INTRODUCTION

The purpose of the vehicle miles travelled (VMT) emissions offset demonstration for the 1-hour and 8-hour ozone standards is to respond to U.S. EPA's proposed action entitled "Disapproval of Implementation Plan Revisions; State of California; South Coast VMT Emissions Offset Demonstrations" published on September 19, 2012 (77 Fed. Reg. 58067). In that proposal, U.S. EPA would withdraw its approval of, and then disapprove, the VMT emissions offset demonstrations in the 2003 1-hour ozone State Implementation Plan (SIP or plan) and the 2007 8-hour ozone plan. In turn, U.S. EPA's proposed action is in response to a decision of the Ninth Circuit Court of Appeals in *Association of Irritated Residents v U.S. EPA,* (9th Cir., reprinted as amended on January 27, 2012, 686 F. 3d 668).

BACKGROUND

In 1979, U.S. EPA established a primary health-based national ambient air quality standard (NAAQS) for ozone at 0.12 parts per million (ppm) averaged over a 1-hour period. See 44 Fed. Reg. 8220 (February 9, 1979). The Clean Air Act (CAA), as amended in 1990, classified areas that had not yet attained that standard, based on the severity of their ozone problem, ranging from Marginal to Extreme. Extreme areas were provided the most time to attain, until November 15, 2010, but were also subject to the most stringent requirements. In particular, Severe and Extreme areas were subject to CAA Section 182(d)(1)(A), which requires state implementation plans to adopt "specific enforceable transportation control strategies and transportation control measures to offset any growth in vehicle miles traveled or numbers of vehicle trips in such area…." U.S. EPA designated the South Coast Air Basin as "Extreme" on November 6, 1991 (56 Fed. Reg. 56694). Thus the South Coast Air Basin was subject to this requirement. The U.S. EPA has historically interpreted this provision of the CAA (now called "VMT emissions offset requirement") to allow areas to meet the requirement by demonstrating that emissions from motor vehicles decline each year through the attainment year. See, e.g., 57 Fed. Reg. 13498, at 13521-13523 (April 16, 1992).

NEW OZONE STANDARD

In 1997, U.S. EPA replaced the 1-hour ozone standard with an 8-hour standard of 0.08 ppm [62 Fed. Reg. 38856 (July 18, 1997)]. The U.S. EPA promulgated rules implementing the new standard. The "Phase 1" rule was issued on April 30, 2004 (69 Fed. Reg. 23951). That rule includes anti-backsliding requirements that meant that many requirements remained applicable even after the revocation of the 1-hour standard, which was effective June 2005. See 40 CFR §51.905(a)(1) and §51.900(f). In particular, an area that was classified as Extreme for the 1-hour standard would remain subject to the VMT emissions offset requirement even if it would not otherwise have been subject to that requirement based on its classification under the new 8-hour ozone standard [40 CFR §51.900(f)(11)]. The U.S. EPA's Phase 2 rule, issued on November 29, 2005 (70 Fed. Reg. 71612) required that areas classified as Severe or Extreme under the new 8-hour standard would also be subject to the VMT offset requirement.

SOUTH COAST SIP SUBMISSIONS FOR VMT OFFSET REQUIREMENT

In 1994, the District, SCAG, and CARB submitted the South Coast 1-hour ozone plan, as required by the 1990 Amendments to the Clean Air Act. The plan included transportation control measures (TCMs). In 1997, U.S. EPA approved this plan [62 Fed. Reg. 1150 (January 8, 1997)]. In 1997 and 1999, the District, SCAG, and CARB submitted revisions to the plan, which were approved as amended in 2000 [65 Fed. Reg.18903 (April 10, 2000)]. In 2004, the state agencies submitted the 2003 South Coast 1-hour ozone SIP. In 2008, the District submitted a VMT offset demonstration to comply with the VMT offset requirement by showing that there would be no increase in motor vehicle emissions between the area's base year for the attainment demonstration and the area's attainment year. The U.S. EPA approved the VMT offset demonstration [74 Fed. Reg. 10176 (March 10, 2009)]. At the same time, U.S. EPA disapproved the overall attainment demonstration which had relied on CARB measures that were subsequently withdrawn. (See 1-hour ozone attainment demonstration Appendix).

The U.S. EPA initially designated the South Coast Air Basin as Severe-17 for the 8-hour ozone standard, but later granted the State's request to reclassify the area as "Extreme" [69 Fed. Reg. 23858 (April 30, 2004)] and [75 Fed. Reg. 24409 (May 5, 2010)]. In 2007, the state submitted a SIP revision to address the 8-hour ozone requirements, including a VMT offset demonstration in accordance with U.S. EPA's prior guidance. In March 2012, U.S. EPA approved the 2007 South Coast 8-hour ozone SIP, including the VMT emission offset demonstration [77 Fed.Reg. 12674 (March 1, 2012)].

LITIGATION OVER VMT OFFSET REQUIREMENT

In approving the 2003 VMT offset demonstration, U.S. EPA used its longstanding interpretation that no additional TCMs are necessary if aggregate motor vehicle emissions are projected to decline each year from the base year of the plan to the attainment year [74 Fed. Reg. 10176, 10179-80 (March 10, 2009)]. Several environmental and community groups challenged this approval. In February 2011, the Ninth Circuit Court of Appeals ruled against U.S. EPA, holding that additional transportation control strategies and transportation control measures are required whenever vehicle emissions are projected to be higher than they would have been had vehicle miles traveled not increased, even where aggregate vehicle emissions are actually decreasing [*Association of Irritated Residents v U.S. EPA*, 632 F. 3d 584, at 596-597, 686 F. 3d. 668 (reprinted as amended on January 27, 2012, and further amended February 13, 2012)]. The U.S. EPA had filed a petition for panel rehearing in May 2011, which was denied on January 27, 2012.

In the meantime, as of December 15, 2011, when the U.S. EPA signed its final approval of the 2007 South Coast 8-hour ozone SIP, the Court had not yet ruled on U.S. EPA's petition for rehearing. Thus U.S. EPA took final action and approved the VMT offset requirement demonstration based on its long-standing interpretation. The final approval was ultimately published on March 1, 2012 (77 Fed. Reg. 12674). Several environmental and community groups filed a lawsuit challenging that approval (*Communities for a Better Environment, et al. v. U.S. EPA*, Ninth Circuit No. 12-71340).

U.S. EPA'S PROPOSED WITHDRAWAL OF APPROVAL AND DISAPPROVAL OF 2003 AND 2007 VMT OFFSET REQUIREMENT DEMONSTRATIONS

In response to the decision in *Association of Irritated Residents*, U.S. EPA has now proposed to withdraw its approval of and to disapprove the VMT offset requirement demonstrations in the 2003 and 2007 South Coast 1-hour and 8-hour ozone SIPs. As U.S. EPA explains, the demonstrations "are not consistent with the court's ruling …because they fail to identify, compared to a baseline assuming no VMT growth, the level of increased emissions resulting solely from VMT growth and to show how such increased emissions have been offset through adoption and implementation of transportation control strategies and transportation control measures."

If U.S. EPA finalizes the proposed disapprovals, the offset sanction in CAA Section 179(b)(2) would apply in the South Coast Air Basin 18 months after the effective date of the final disapproval, and highway funding sanctions six months after that, unless U.S. EPA has taken final approval action on a SIP submission that corrects the deficiency. A federal implementation plan (FIP) would also be triggered 24 months after the final disapproval unless the deficiency has been corrected.

U.S. EPA GUIDANCE ON VMT OFFSET REQUIREMENT

In August 2012, U.S. EPA issued guidance entitled "Implementing Clean Air Act Section 182(d)(1)(A): Transportation Control Measures and Transportation Control Strategies to Offset Growth in Emissions Due to Growth in Vehicle Miles Travelled".

Among other things, U.S. EPA's guidance points out that the Court in *Association of Irritated Residents* omitted any reference to "transportation control strategies" which are not defined in the CAA or U.S. EPA regulation, but which are eligible to offset growth in emissions due to growth in VMT. The U.S. EPA's new guidance indicates that technology improvements such as vehicle technology improvements, motor vehicle fuels, and other control strategies that are transportation-related could be used to offset increases in emissions due to VMT. EPA's revised guidance sets forth a method of calculating what is the actual growth in emissions due to growth in VMT. Essentially, the state would compare projected attainment year emissions assuming no new control measures and no VMT growth with projected actual attainment year emissions (including new control measures and VMT growth). If the latter number is smaller than the former, no additional transportation control measures or strategies would be required. If additional transportation control measures and transportation control strategies are required, they should be clearly identified and distinguished from the measures included in the initial calculations for the base year and the three scenarios identified for the attainment year.

In addition, the guidance recommends that the base year to be used in the demonstration be the base year used in the attainment demonstration for the ozone ambient air quality standard. For the 1-hour ozone attainment demonstration as provided in the Clean Air Act, 1990 was used as the base year. For the 8-hour ozone attainment demonstration, 2002 was used as the base year as provided in the 2007 SIP. The District believes, however, that in all cases the proper "base year" is 1990 since Section 182(d)(1)(A) was part of the 1990 Amendments and clearly contemplated the use of 1990 as a base year.

This Appendix includes a VMT offset demonstration in accordance with U.S. EPA's new guidance for both the 8-hour and 1-hour ozone requirements. To address U.S. EPA's guidance on the base year, two analyses are provided, one using 1990 and a second alternative for 8-hour ozone only, an analysis using 2002 as the base year.

TRANSPORTATION CONTROL STRATEGIES AND TRANSPORTATION CONTROL MEASURES

By listing them separately, the Clean Air Act [CAA §182(d)(1)(A)] differentiates between transportation control strategies (TCS) and transportation control measures (TCM), and thus provides for a wide range of strategies and measures as options to offset growth in emissions from vehicle miles traveled (VMT) growth. In addition, the example TCMs listed in Section 108(f)(1)(A) of the CAA include measures that reduce emissions by reducing VMT, reducing tailpipe emissions, and removing dirtier vehicles from the fleet. California's motor vehicle control program includes a variety of strategies and measures including new engine standards and in-use programs (e.g., smog check, vehicle scrap, fleet rules, idling restrictions). TCMs developed by SCAG provide additional reductions. In addition, SCAG prepares a report every two years that reports on the status of implementation of TCMs.

Based on the provisions in Section 182(d)(1)(A) and the clarifications provided in the U.S. EPA guidance, any combination of transportation control strategies and TCMs may be used to meet the requirement to offset growth in emissions resulting from VMT growth. Since 1990 when this requirement was established, California has adopted more than sufficient enforceable transportation strategies and measures to meet the requirement to offset the growth in emissions from VMT growth. For this demonstration, 1990 level controls serve as the base case since the mandate is to adopt any necessary new strategies and controls needed post-1990.

A list of the state's mobile source control program adopted since 1990 is provided in Attachment 1. In addition, a list of TCMs implemented in the South Coast Air Basin is provided in Attachment 2.

EMISSIONS DUE TO VMT GROWTH

There is no specific guidance in the Clean Air Act, Court Opinion, or the U.S. EPA guidance on how to select the base year for determining the increase in emissions from VMT. Since the Clean Air Act was amended in 1990, the 1990 calendar year is assumed as the base year. As discussed above, the U.S. EPA guidance does provide a recommended calculation methodology that could be done to determine if sufficient transportation control strategies and TCMs have been adopted and implemented to offset the growth in emissions due solely to growth in VMT. As such, any increase in emissions solely from VMT increases in the future attainment year from calendar year 1990 (assuming that there are no further motor vehicle control programs implemented after 1990) would need to be offset. In addition, a calculation is needed to show the emissions levels if VMT had remained constant from 1990 to the future attainment year. As discussed earlier, a comparison of the projected attainment year emissions assuming no new control measures and no VMT growth with projected actual attainment year emissions (including new control measures and VMT growth) would be made. If the latter number is smaller than the former, no additional transportation control measures or strategies would be required.

METHODOLOGY

The following calculations are based on the U.S. EPA guidance recommended calculation methodology. As discussed above, two sets of calculations are provided. The first set uses 1990 as the base year. An alternative analysis is presented using 2002 as the base year. As part of the 1-hour ozone national ambient air quality standard demonstration provided in Appendix VIII, 1990 serves as the base year and 2022 is the projected attainment year. As provided in the 2007 SIP, 2002 is the base year used for the attainment demonstration and 2023 is the attainment year. However, as mentioned above the District believes that for the Section 182(d)(1)(A) demonstration, 1990 serves as the base year for both ozone air quality standards. The analysis using 2002 as the base year is provided as alternative analysis in conjunction with the 8-hour ozone attainment demonstration provided in the 2007 SIP.

Since VMT is projected to increase from the base year to the attainment year and projected VMT for 2023 is higher than the projected VMT for 2022, an analysis using 2022 as the attainment year is not provided and 2023 serves as a more stringent test. Additional discussion is provided in the "Summary Section" below.

Analysis Using 1990 as the Base Year

Step 1. Provide the emissions levels for the base year.

As mentioned above, the base year assumed for the demonstration is 1990. The following table shows the VOC and NOx emissions for calendar year 1990 from the EMFAC2011 model.

Description	VMT (miles/day)	VOC (tons/day)	NOx (tons/day)
1990 Vehicle Miles Travelled and On-Road Emissions	257,490,000	933	854

Step 2. Calculate three emissions levels in the attainment year.

For the attainment year,

(1) calculate emissions levels with the motor vehicle control program frozen at 1990 levels and with projected VMT in the attainment year. This represents what the emissions in the attainment year would have been if transportation control strategies and TCMs had not been implemented after 1990;

(2) calculate emission levels with the motor vehicle control program frozen at 1990 levels and assuming VMT do not increase from 1990 levels; and

(3) calculate an emissions level that represents emissions with full implementation of all transportation control strategies and TCMs since 1990, which represents the projected future year baseline emissions inventory in the attainment year.

Calculation 1. Calculate the emissions in the attainment year assuming no new measures since the base year with growth in VMT

To perform this calculation, the California Air Resources Board (CARB) staff identified the on-road motor vehicle control programs adopted since 1990 and adjusted the EMFAC2011 to reflect the VOC and NOx emissions levels in 2023 without the benefits of the post-1990 control programs. As mentioned earlier, a list of the control programs adopted by CARB since 1990 and TCMs implemented since 1990 are provided in Attachments 1 and 2 to this Appendix. The projected VOC and NOx emissions are 546 and 910 tons/day, respectively.

Calculation 2. Calculate the emissions with no growth in VMT

EMFAC2011 allows the user to input different vehicle miles travelled. As such, for this calculation, the EMFAC 2011 was run for calendar year 2023 with the 1990 VMT level of 257,490,000 miles per day. The VOC and NOx emissions associated with the 1990 VMT level are 484 and 572 tons/day, respectively.

Calculation 3. Calculate emission reductions with full implementation of Transportation Control Strategies & TCMs

The VOC and NOx emission levels for 2023 assuming the benefits of the post-1990 motor vehicle control program and the projected VMT levels in 2023 are calculated using EMFAC2011. The output of the EMFAC2011 model for 2023 is provided in Appendix III of the Final 2012 AQMP. The projected VOC and NOx emissions levels are 70 and 117 tons/day, respectively.

VOC and NOx emissions for the three sets of calculations described above are provided in the following tables.

	Description	VMT* (miles/day)	VOC (tons/day)	NOx (tons/day)
(1)	**Emissions with Motor Vehicle Control Program Frozen at 1990 Levels (VMT at 2023 Projected Levels)**	395,750,000	546	910
(2)	**Emissions with Motor Vehicle Control Program Frozen at 1990 Levels (VMT at 1990 Levels)**	257,490,000	484	572
(3)	**Emissions with Full Motor Vehicle Control Program in Place (VMT at 2023 Projected Levels)**	395,750,000	70	117

* VMT Based on 2012 SCAG Regional Transportation Plan (see 2012 AQMP Appendix III)

As provided in the U.S. EPA guidance, to determine compliance with the provisions of Section 182(d)(1)(A) of the federal Clean Air Act, the emissions levels calculated in Calculation 3 should be less than the emissions levels in Calculation 2:

VOC: 70 < 484 tons/day

NOx: 117 < 572 tons/day

Analysis Using 2002 as the Base Year

As mentioned above, this alternative analysis is for the federal 8-hour ozone ambient air quality standard and the attainment year is 2023.

Step 1. Provide the emissions levels for the base year.

The following table shows the VOC and NOx emissions for calendar year 2002 from the EMFAC2011 model.

Description	VMT (miles/day)	VOC (tons/day)	NOx (tons/day)
2002 Vehicle Miles Travelled and On-Road Emissions	330,267,528	310	602

Step 2. Calculate three emissions levels in the attainment year.

For the attainment year,

(1) calculate emissions levels with the motor vehicle control program frozen at 2002 levels and with projected VMT in the attainment year. This represents what the emissions in the attainment year would have been if transportation control strategies and TCMs had not been implemented after 2002;

(2) calculate emission levels with the motor vehicle control program frozen at 2002 levels and assuming VMT do not increase from 2002 levels; and

(3) calculate an emissions level that represents emissions with full implementation of all transportation control strategies and TCMs since 2002, which represents the projected future year baseline emissions inventory in the attainment year.

Calculation 1. Calculate the emissions in the attainment year assuming no new measures since the base year with growth in VMT

To perform this calculation, the California Air Resources Board (CARB) staff identified the on-road motor vehicle control programs adopted since 2002 and adjusted the EMFAC2011 to reflect the VOC and NOx emissions levels in 2023 without the benefits of the post-2002 control programs. The projected VOC and NOx emissions are 132 and 483 tons/day, respectively.

Calculation 2. Calculate the emissions with no growth in VMT

EMFAC2011 allows the user to input different vehicle miles travelled. As such, for this calculation, the EMFAC 2011 was run for calendar year 2023 with the 2002 VMT level of 330,267,528 miles per day. The VOC and NOx emissions associated with the 2002 VMT level are 124 and 391 tons/day, respectively.

Calculation 3. Calculate emission reductions with full implementation of Transportation Control Strategies & TCMs

The VOC and NOx emission levels for 2023 assuming the benefits of the post-2002 motor vehicle control program and the projected VMT levels in 2023 are calculated using EMFAC2011. The output of the EMFAC2011 model for 2023 is provided in Appendix III of the Final 2012 AQMP. The projected VOC and NOx emissions levels are 70 and 117 tons/day, respectively.

VOC and NOx emissions for the three sets of calculations described above are provided in the following tables.

	Description	VMT* (miles/day)	VOC (tons/day)	NOx (tons/day)
(1)	**Emissions with Motor Vehicle Control Program Frozen at 2002 Levels (VMT at 2023 Projected Levels)**	395,750,000	132	483
(2)	**Emissions with Motor Vehicle Control Program Frozen at 2002 Levels (VMT at 1990 Levels)**	330,267,528	124	391
(3)	**Emissions with Full Motor Vehicle Control Program in Place (VMT at 2023 Projected Levels)**	395,750,000	70	117

* VMT Based on 2012 SCAG Regional Transportation Plan (see 2012 AQMP Appendix III)

As provided in the U.S. EPA guidance, to determine compliance with the provisions of Section 182(d)(1)(A) of the federal Clean Air Act, the emissions levels calculated in Calculation 3 should be less than the emissions levels in Calculation 2:

VOC: 70 < 124 tons/day

NOx: 117 < 391 tons/day

SUMMARY

The previous sections provide an analysis to demonstrate complies with the provisions of Section 182(d)(1)(A) of the federal Clean Air Act. To further illustrate the demonstration, Figures 1 and 2 below show graphically the emissions benefits of the motor vehicle control programs in offsetting VOC and NOx emissions due to VMT increases in the South Coast Air Basin. The left bar (in purple) shows the emissions in the 1990 base year. The three sets of bars on the right in each figure show the emissions levels in 2023 if there were no further motor vehicle controls after 1990 and with projected VMT increases (red bar); the green bar show the emissions if VMT does not increase from 1990 levels and there are no transportation control strategies or TCMs after 1990; and the blue bar shows the emission levels with the post-1990 motor vehicle control program in place. Based on the U.S. EPA guidance, if the blue bar is lower than the green bar, then the identified transportation control strategies and TCMs are sufficient to offset the growth in emissions.

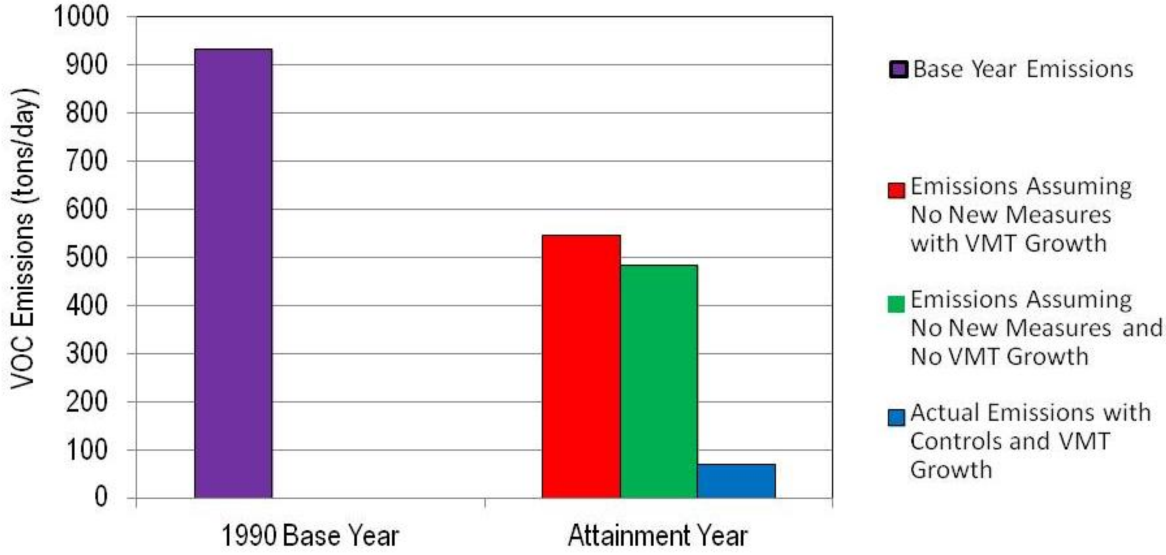

Figure 1. VOC Emissions from On-Road Mobile Sources in the South Coast Air Basin (1990 Base Year)

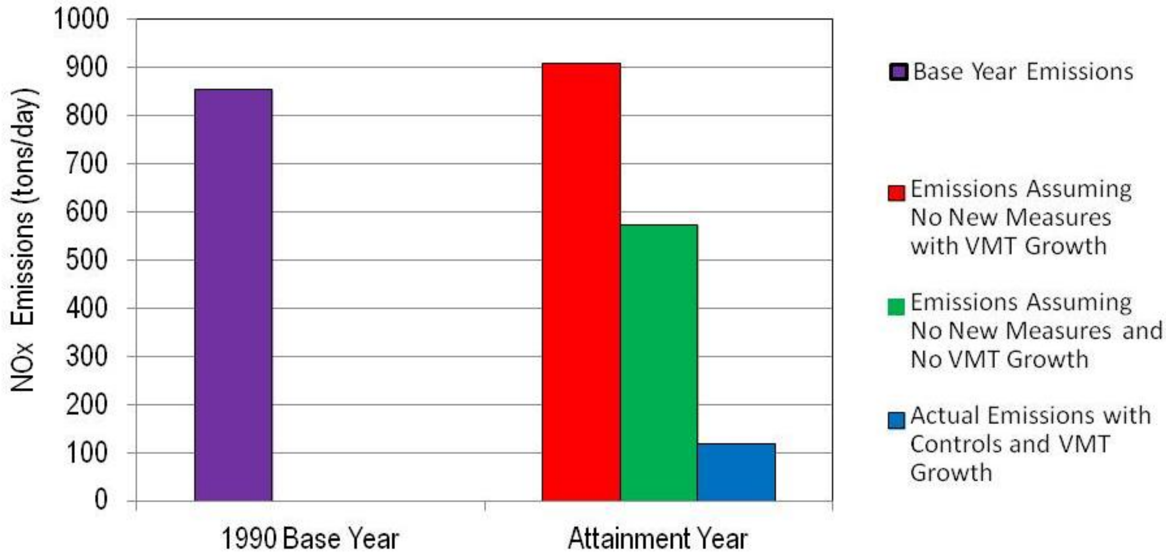

Figure 2. NOx Emissions from On-Road Mobile Sources in the South Coast Air Basin (1990 Base Year)

As discussed above, a similar set of calculations are made using 2002 as the base year. Figures 3 and 4 illustrate the results of the calculation for VOC and NOx, respectively. As with the first analysis, the blue bar is lower than the green bar, the identified transportation control strategies and TCMs are sufficient to offset the growth in emissions.

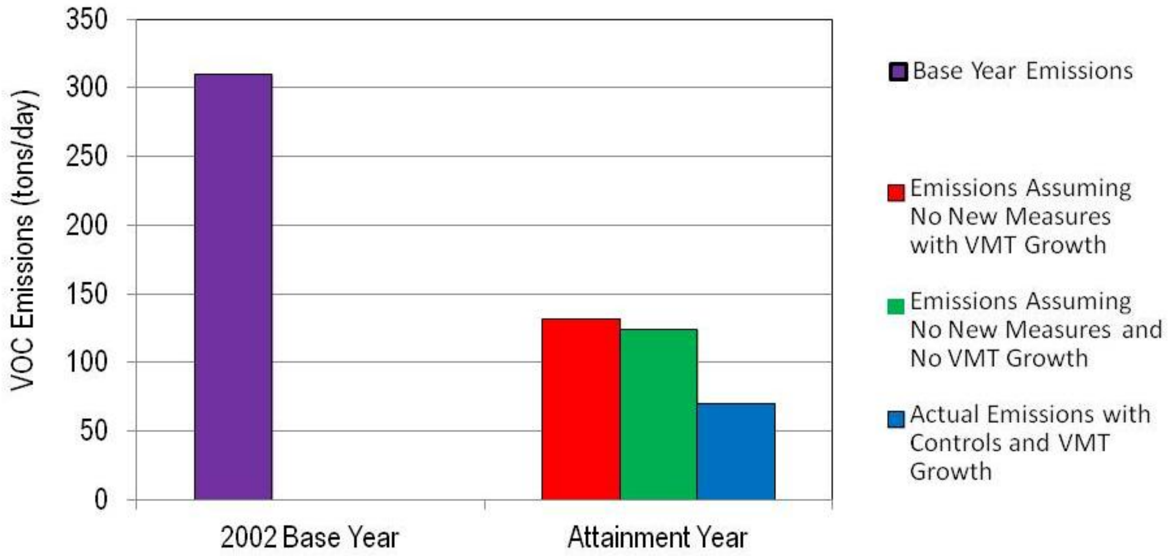

Figure 3. VOC Emissions from On-Road Mobile Sources in the South Coast Air Basin with 2002 as an Alternative Base Year

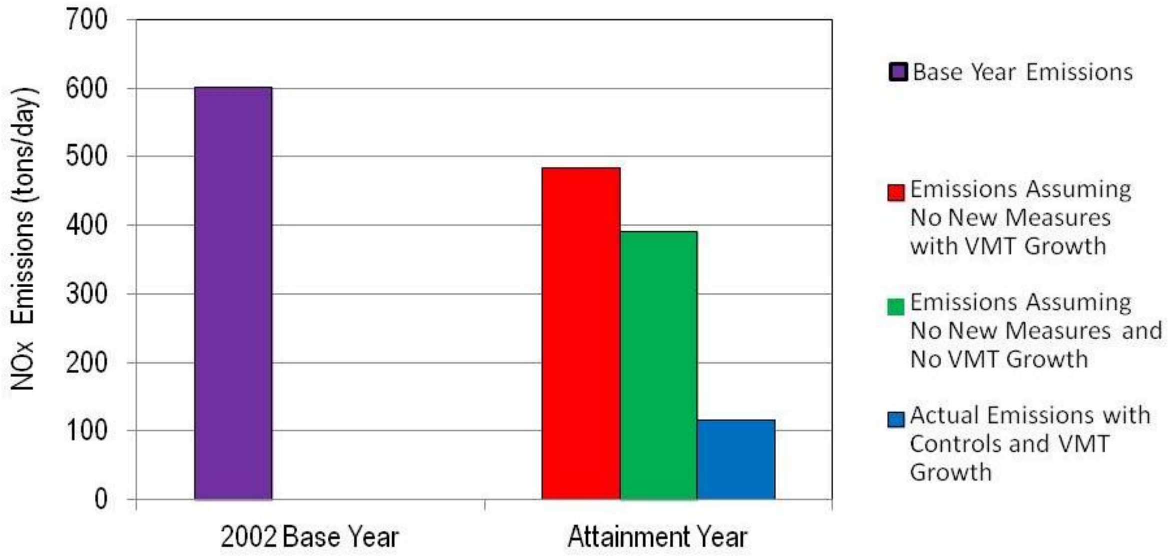

Figure 4. NOx Emissions from On-Road Mobile Sources in the South Coast Air Basin with 2002 as an Alternative Base Year

At this time, based on the 2007 SIP for the 8-hour ozone attainment demonstration, it is projected that the 8-hour ozone ambient air quality standard will be achieved by 2023. It is projected that the previous 1-hour ozone ambient air quality standard will be achieved by 2022.

(See 1-hour ozone attainment demonstration Appendix VII.) As provided in Appendix VII Table VII-3-2, the projected VOC and NOx emissions from on-road vehicles is 73 tons/day and 135 tons/day, respectively and are slightly higher than the on-road VOC and NOx emissions for 2023 (70 and 117 tons/day, respectively). The VMT for 2022 is slightly lower compared to 2023. The demonstration presented for 2023 will be similar for 2022. As such, the above demonstration applies to both the 1-hour ozone and 8-hour ozone national ambient air quality standards. In addition, the District believes that 1990 is the appropriate base year for the demonstration. Regardless, an alternative analysis using 2002 is provided. In both analyses, there are sufficient transportation control strategies and TCMs to offset the emissions increase due to growth in VMT.

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ATTACHMENT 1

CALIFORNIA POST-1990 MOTOR VEHICLE CONTROL PROGRAM

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Emission Control System Warranty. T 13, CCR, 2035-2041, 1977	12/14/89	On-road
Certification Procedure for Aftermarket Parts. VC 27156 & 38391	02/08/90	On-road
Emission Standards for Medium Duty Vehicles. T 13, CCR, 1900, 1956.8, 1960.1, 1968.1, 2061, 2112, 2139	06/14/90	On-road
Wintertime Limits for Sulfur in Diesel Fuel. T 13, CCR, 2255	06/21/90	Fuels
Evaporative Emission Standards. T 13, CCR, 1976	08/09/90	On-road
California Reformulated Gasoline (CaRFG), Phase I. T 13, CCR, 2251.5	09/27/90	Fuels
Low Emission Vehicles and Clean Fuels. T 13, CCR, 1900, 1904, 1956.8, 1960.1, 1960.1.5, 1960.5 and 2111, 2112, 2125, and 2139, 2061.	09/28/90	On-road
Heavy Duty Diesel Smoke Emission Testing. T 13, CCR, 2180-2187	11/08/90	On-road
Limit on Aromatic Content of Diesel Fuel. T 13, CCR, 2256	12/13/90	Fuels
Onboard Diagnostics for Light-Duty Trucks and Light & Medium-Duty Motor Vehicles. T 13, CCR, 1977, 1968.1	09/12/91	On-road
Onboard Diagnostic, Phase II. T 13, CCR, 1968.1, 1977	11/12/91	On-road
Low Emission Vehicles amendments revising reactivity adjustment factor (RAF) provisions and adopting a RAF for M85 transitional low emission vehicles. T 13, CCR, 1960.1	11/14/91	On-road
California Reformulated Gasoline, Phase II. T 13, CCR, 2250, 2255.1, 2252, 2260 - 2272, 2295	11/21/91	Fuels
Wintertime Gasoline Program. T 13, CCR, 2258, 2298, 2251.5, 2296	11/21/91	Fuels

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	**Hearing Date**	**Category**
Specifications for Alternative Motor Vehicle Fuel. T 13, & 26, CCR, 2290, 2291, 2292.1, 2292.2, 2292.3, 2292.5, 2292.6, 2292.7, 1960.1(k), 1956.8(b), 1956.8(d)	12/12/91	Fuels
Specifications for Alternative Motor Vehicle Fuels. T 13, & 26, CCR, 2290-2292.7, 1960.1(k), 1956.8(b), 1956.8(d)	03/12/92	On-road
Standards and Test Procedures for Alternative Fuel Retrofit Systems. T 13, CCR, 2030, 2031	05/14/92	On-road
Phase 2 RFG certification fuel specifications. T 13, CCR, 1960.1, 1956.8(d)	08/13/92	On-road
Substitute Fuel or Clean Fuel Incorporated Test Procedures. T 13, CCR, 1960.1(k), 2317	11/12/92	On-road
Smoke Self Inspection Program for Heavy Duty Diesel & Gasoline Engines. T 13, CCR, 21902194, 2180-2187, 1956.8(b)	12/10/92	On-road
Certification Requirements for Low Emission Passenger Cars, Light-Duty Trucks & Medium Duty Vehicles. T 13, CCR, 1960.1, 1976, 2061, 1900	01/14/93	On-road
Urban Transit Buses. T 13, CCR, 1956.8, 1965, 2112	06/10/93	On-road
Onboard Diagnostic, Phase II. T 13, CCR, 1968.1	07/09/93	On-road
Wintertime Oxygenate Program. T 13, CCR, 2258, 2251.5, 2263(b), 2267, 2298, 2259, 2283, 2293.5	09/09/93	Fuels
Diesel Fuel Regulations -Emergency. T 13, CCR, 2281(h), 2282(1)	10/15/93	Fuels
Evaporative Emission Standards and Test Procedures. T 13, CCR, 1976	02/10/94	On-road

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Predictive Model for Phase II CaRFG. T 13, CCR, 2261, 2262-2270	06/09/94	Fuels
Small Refiner Diesel. T 13, CCR, 2282(e)(1)	07/24/94	Fuels
Diesel Fuel Certification. T 13, CCR, 1956.8(b)&(d), 1960.1(k), 2292.6	09/22/94	Fuels
Self Inspection Program for Heavy Duty Diesel & Gasoline Engines. T 13, CCR, 2190-2194, 21802187, 1956.8(b)	11/09/94	On-road
Onboard Diagnostics, Phase II. T 13, CCR,1963.1, & Certification Procedures	12/08/94	On-road
Periodic Smoke Inspection Program. T 13, CCR, 2190	12/08/94	On-road
Specification for Alternative Motor Vehicle Fuels (M100). T 13 CCR, 2292.1	12/08/94	Fuels
Heavy Duty Vehicle Exhaust Emission Standards. T 13, CCR, 1956.8 and incorporate test procedures.	06/29/95	On-road
Onboard Refueling Vapor Recovery Standards. T 13, CCR, 1976, 1978 and incorporate test procedures	06/29/95	On-road
Test Method for Oxygen in Gasoline. T 13, CCR, 2251.5(c), 2258(c), 2263(b)	06/29/95	Fuels
Retrofit Emission Standards. T 13, CCR, 1956.9, 2030, 2031, and incorporate test procedures	07/27/95	On-road
Low Emission Vehicle Standards 3 (LEV 3). T 13, CCR, 1956.8, 1960.1, 1965, 2101, 2061, 2062, and incorporate test procedures	09/28/95	On-road
Test Methods for CaRFG 13, CCR, 2263(b)	10/26/95	Fuels
Required Additives in Gasoline (Deposit Control Additives). T 13, CCR, 2257 and incorporates testing procedures.	11/16/95	Fuels

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
CaRFG Housekeeping & CARBOB. T 13, CCR, 2263.7, 2266.5, 2260, 2262.5, 2264, 2265, 2272	12/14/95	Fuels
Exemption of Military Tactical Vehicles. T 13, CCR, 1905, 2400, 2420	12/14/95	On Road/Off Road
CaRFG Variance Requirements. T 13, CCR, 2271 (Emergency)	01/25/96	Fuels
Postpone Zero Emission Vehicle Requirements. T 13, CCR, 1900, 1960.1, 1976	03/28/96	On-road
Regulation Improvements and Repeals (fuel additives). T 13, CCR, 2201, 2202	05/30/96	Fuels
Diesel Fuel Certification Test Methods . T 13, CCR, 1956.8(b), 1960.1(k), 2281(c), 2282(b), (c) and (g)	10/24/96	Fuels
Diesel Fuel Test Methods. T 13, CCR, 1956.8(b), 1960.1(k), 2281(c), 2282(b), (c) and (g)	10/24/96	Fuels
Onboard Diagnostics, Phase II, Technical Status. T 13, CCR, 1968.1, 2030, 2031	12/12/96	On-road
Liquefied Petroleum Gas Propane Limit Specification Delay. T 13, CCR, 2292.6	03/27/97	Fuels
Postpone Enhanced Evaporative Emission Requirements for Ultra-Small Volume Vehicle Manufacturers. T 13, CCR, 1976 and incorporate test procedures	05/22/97	On-road
Off-Cycle Emissions Supplemental Federal Test Procedures (SFTPs). T 13, CCR, 1960.1, 2101 and incorporate test procedures	07/24/97	On-road
Heavy Duty Vehicle Smoke Inspection Program/Periodic Smoke Inspection Program. T 13, CCR, 2180-2188 and 2190-2194	12/11/97	On-road

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Heavy Duty Vehicle Regulations: 2004 Standards. T 13, CCR, 1956.8, 1965, 2036, 2112 and test procedures	04/23/98	On-road
Cleaner Burning Gasoline Model Flexibility. T 13, CCR, Sections 2260, 2262.1, 2262.3, 2262.4, 2262.5, 2262.6, 2262.7 and 2265	08/27/98	Fuels
Gasoline Vapor Recovery Systems. T 17, CCR, 94010-94015 and 94150, 94156, 94157, 94158, 94159, 94160, 94162	08/27/98	Vapor Recovery
Gasoline Deposit Control Additive Regulation. T 13, CCR, 2257, and incorporating test procedures	09/24/98	Fuels
Low Emission Vehicles Standards (LEV 2) and Compliance Assurance Program (CAP 2000). T 13, CCR,1961 & 1962 (both new); 1900, 1960.1, 1965, 1968.1, 1976, 1978, 2037, 2038, 2062, 2101, 2106, 2107, 2110, 2112, 2114, 2119, 2130, 2137-2140, 2143-2148	11/05/98	On-road
Exhaust Standards for (On-Road) Motorcycles. T 13, CCR, 1958	12/10/98	On-road
Voluntary Accelerated Light Duty Vehicle Retirement Regulations. T 13, CCR, 2600-2610	12/10/98	On-road
Cleaner Burning Gasoline (Increasing the Oxygen Content). T 13, CCR, sections 2262.5(b) and 2265(a)(2)	12/11/98	Fuels
Specifications for Liquid Petroleum Gas Used as a Motor Vehicle Fuel. T 13, CCR, 2292.6	12/11/98	Fuels
Cleaner Burning Gasoline, Oxygen Requirement for Wintertime In Lake Tahoe Area/Gas Pump Labeling for MTBE. T 13, CCR, 2262.5, and 2273	06/24/99	Fuels

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Clean Fuels Regulation Requirements. T 13, CCR, sections 2300-2317, and 2303.5, 2311.5	07/22/99	On-road
CaRFG Phase 3 Amendments (Phase out of MTBE, standards, predictive model). T 13, CCR, 2260, 2261, 2262.1, 2262.5, 2263, 2264, 2264.2, 2265, 2266 etc…	12/09/99	Fuels
Transit Bus Standards. T 13, CCR, 1956.1, 1956.2, 1956.3, 1956.4, 1956.8, 1965	02/24/00	On-road
CaRFG Phase 3 Follow-up Amendments. T 13, CCR, sections 2260, 2261, 2262.3, 2262.5, 2263, 2264, 2265, 2266, 2266.5, 2270, 2272, 2273, 2282, 2296, 2297, 2262.9 and incorporated test procedures	11/16/00	Fuels
CaRFG Phase 3 Test Methods. T 13, CCR, sections 2263(b)	11/16/00	Fuels
Heavy Duty Diesel Engines "Not-to-Exceed (NTE)" Test Procedures. T 13 CCR, 1956.8, 2065	12/07/00	On-road
Light-and Medium Duty Low Emission Vehicle Alignment with Federal Standards. Exhaust Emission Standards for Heavy Duty Gas Engines. T 13, CCR, 1956.8 &1961	12/07/00	On-road
Zero Emission Vehicle Regulation Update. T 13, CCR, 1900, 1960.1(k), 1961, 1962 & incorporated Test Procedure	01/25/01	On-road
Zero Emission Vehicle Infrastructure and Standardization of Electric Vehicle Charging Equipment. T 13, CCR, 1900(b), 1962(b) 1962.1	06/28/01	On-road
Heavy Duty Diesel Engine Standards for 2007 and Later. T 13, CCR, 1956.8 and incorporated test procedures	10/25/01	On-road

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Low Emission Vehicle Regulations. T 13, CCR, 1960.1,1960.5, 1961, 1962 and incorporate test procedures and guidelines	11/15/01	On-road
California Motor Vehicle Service Information Rule. T 13&17, CCR, 1969 & 60060.1 -60060.7	12/13/01	On-road
Voluntary Accelerated Light Duty Vehicle Retirement Regulations. T 13, CCR, 2601-2605, 2606 & appendices C & D, and 2607-2610	02/21/02	On-road
On-Board Diagnostic II Review Amendments. T 13, CCR, 1968.1, 1968.2, 1968.5	04/25/02	On-road
Diesel Retrofit Verification Procedure, Warranty and In-Use Compliance Requirements. T 13, CCR, 2700-2710	05/16/02	On-road
Revision to Transit Bus Regulations Amendments. T 13, CCR, 1956.1, 1956.2, 1956.4,1956.8, and 2112, & documents incorporated by reference	10/24/02	On-road
Airborne Toxic Control Measure for Diesel Particulate from School Bus Idling. T13, CCR, 2480	12/12/02	On-road
Low Emission Vehicles II. Align Heavy Duty Gas Engine Standards with Federal Standards; minor administrative changes. T 13, CCR, 1961, 1965, 1956.8, 1956.1, 1978, 2065 and documents incorporated by reference	12/12/02	On-road
Zero Emission Vehicle Amendments for 2003. T 13, CCR, 1960.1(k), 1961(a) and (d), 1900, 1962, and documents incorporated by reference	03/25/03	On-road
Solid Waste Collection Vehicles. T 13, CCR, 2020, 2021, 2021.1, 2021.2	09/24/03	On-road

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Airborne Toxic Control Measure for Diesel Particulate for Transport Refrigeration Units. T 13, CCR, 2022 & 2477	12/11/03	On-road
Diesel Retrofit Verification Procedure, Warranty and In-Use Compliance Requirements (Amendments). T 13, CCR, 2701-2707 & 2709	12/11/03	On-road
CA Motor Vehicle Service Information Rule. T 13, CCR, 1969	01/22/04	On-road
Heavy Duty Diesel Engine-Chip Reflash. T 13, CCR, 2011, 2180.1, 2181, 2184, 2185, 2186, 2192, and 2194	03/27/04	On-road
Engine Manufacturer Diagnostic System Requirements for 2007 and Subsequent Model Heavy Duty Engines. T 13, CCR, 1971	05/20/04	On-road
Urban Bus Engines/Fleet Rule for Transit Agencies. T 13, CCR, 1956.1, 1956.2, 1956.3, and 1956.4,	06/24/04	On-road
Airborne Toxic Control Measure for Diesel Particulate from Diesel Fueled Commercial Vehicle Idling. T 13, CCR, 2485	07/22/04	On-road
Greenhouse Gas. T 13, CCR, 1961.1, 1900, 1961 and Incorporated Test Procedures	09/23/04	On-road
California Reformulated Gasoline, Phase 3. T 13, CCR, 2260, 2262, 2262.4, 2262.5, 2262.6, 2262.9, 2263, 2265 (and the incorporated “California Procedures”), and 2266.5	11/18/04	Fuels
Diesel Fuel Standards for Harborcraft & Locomotives. T 13, CCR, 2299, 2281, 2282, and 2284, and T 17, CCR, 93117	11/18/04	Fuels

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
Emergency Regulation for Temporary Delay of Diesel Fuel Lubricity Standard. T 13, CCR, 2284	11/24/04	Fuels
Transit Fleet Rule. T 13, CCR, 2023, 2023.1, 2023.2, 2023.3, 2023.4, 1956.1, 2020, 2021, repeal 1956.2, 1956.3, 1956.4	02/24/05	On-road
On-Board Diagnostic System Requirements for 2010 and Subsequent Model-Year Heavy-Duty Engines (HD OBD). T 13, CCR, 1971.1	07/21/05	On-road
2007-2009 Model-Year Heavy Duty Urban Bus Engines and the Fleet Rule for Transit Agencies. T 13, CCR, 1956.1, 1956.2, and 1956.8	09/15/05	On-road
Requirements to Reduce Idling Emissions from New and In-Use Trucks, Beginning in 2008. T 13, CCR section1956.8 and the incorporated document	10/20/05	On-road
Diesel Particulate Matter Control Measure for On-Road Heavy-Duty Diesel-Fueled Vehicles Owned or Operated by Public Agencies and Utilities. T 13, CCR, 2022 and 2022.1	12/08/05	On-road
AB1009 Heavy-Duty Vehicle Smoke Inspection Program. T 13, CCR, 2180, 2180.1, 2181, 2182, 2183, 2184, 2185, 2186, 2187, and 2188, 2189	01/26/06	On-road
Diesel Verification Procedure, Warranty & In-Use. T 13, CCR, 2702, 2703, 2704, 2706, 2707, and 2709.	03/23/06	On-road
Technical Amendments to Evaporative Exhaust and Evaporative Emissions Test Procedures. T 13, CCR, 1961,1976 and 1978.	05/25/06	On-road

Table A-1 Transportation Control Strategies Adopted by the California Air Resource Board Since 1990

Measure	Hearing Date	Category
California Motor Vehicle Service Information Rule. T 13, CCR, 1969 and incorporated documents	06/22/06	On-road
Heavy-Duty In-Use Compliance Regulation. T 13, CCR, 1956.1, 1956.8, and documents incorporated by reference	09/28/06	On-road
On-Board Diagnostic II. T 13, CCR, 1968.2, 1968.5, 2035, 2037 and 2038	09/28/06	On-road
Zero Emission Bus Regulation. T13, CCR, 2023.1, 2023.3, & 2023.4	10/19/06	On-road
Voluntary Accelerated Retirement Regulation. T 13, CCR, 2601-2610 and appendices A-D	12/07/06	On-road
Phase 3 Reformulated Gasoline (Ethanol Permeation) T 13, CCR, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2270, 2271, and 2273	06/14/07	On-road
Aftermarket Catalytic Converters and Used Catalytic Converters T 13, CCR, 2222	10/25/07	On-road
Port Truck Modernization T 13, CCR, 2027	12/07/07	On-road
Cleaner In-Use Heavy-Duty Trucks T 13, CCR, 2025	12/11/08	On-road
Enhanced Fleet Modernization Program (formerly “Expanded Vehicle Retirement Program”) T 13, CCR, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, and 2630	06/26/09	On-road
Advanced Clean Cars T 13, CCR, 1900, 1956, 1960, 1961, 1962, 1965, 1968, 1976, 1978, 2037, 2038, 2062, 2112, 2139, 2140, 2145, 2147, 2235, 2300, 2302, 2303, 2304, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, and 2318	01/27/12	On-road

ATTACHMENT 2

TRANSPORTATION CONTROL MEASURES IMPLEMENTED SINCE 1990

INTRODUCTION

This Attachment contains a list of transportation control measures implemented in the SCAG region, which includes the South Coast Air Basin, since 1990. The tables are taken from the Federal Transportation Improvement Program [FTIP, formerly Regional Transportation Improvement Program (RTIP)] reports approved by SCAG. Section III of the Technical Appendix to each of the FTIP/RTIP reports contains a list of implemented TCMs. The following section provides a reference list of the FTIP/RTIP reports. The full reports since 2002 can be found on SCAG's website: www.scag.ca.gov/ftip. The specific list of TCMs from each of the referenced reports is provided in the following sections.

REFERENCE

SCAG (2012). 2013 Federal Transportation Improvement Program (Technical Appendix – Section III), September 2012.

SCAG (2011). 2011 Federal Transportation Improvement Program (Technical Appendix – Section III), September 2010.

SCAG (2008). 2008 RTIP Transportation Improvement Program (Technical Appendix – Section III), July 2008.

SCAG (2006). 2006 RTIP Transportation Improvement Program (Technical Appendix – Section III), July 2006.

SCAG (2004). 2004 RTIP Transportation Improvement Program (Technical Appendix – Section III), September 2004.

SCAG (2002). 2002 RTIP Transportation Improvement Program (Technical Appendix – Section III), August 2002.

SCAG (2000). 2000 RTIP Transportation Improvement Program (Technical Appendix – Section III), September 2000.

SCAG (1998). 1998 RTIP Transportation Improvement Program (Technical Appendix – Section III), July 1998.

SCAG (1996). 1996 RTIP Transportation Improvement Program (Technical Appendix – Section III), June 2006.

Table A-1

Committed Transportation Control Measures (TCMs) by Southern California Association of Governments since 1990

2013 FTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

LOS ANGELES COUNTY

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
ARTESIA	LAF1607	SOUTH STREET PEDESTRIAN, BIKEWAY AND TRANSIT IMPROVEMENT. IMPROVE PEDESTRIAN ENVIRONMENT AND TRANSIT STOP LOCATIONS WITH LANDSCAPED MEDIANS, TRANSIT SHELTERS, BENCHES, SIDEWALK ENHANCEMENTS AND LIGHTING. CLOSE EXISTING BIKE LANE GAP.	2014	10/1/2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
AVALON	LAF1501	COUNTY CLUB DRIVE BIKEWAY IMPROVEMENT PROJECT. CONSTRUCTION OF A 4-FOOT WIDE CLASS II BIKE LANE IN BOTH DIRECTIONS ALONG A ONE MILE SECTION OF COUNTRY CLUB DRIVE.	2013	10/1/2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
AZUSA	LAF3434	AZUSA INTERMODAL TRANSIT CENTER. CONSTRUCT REGIONAL AZUSA INTERMODAL TRANSIT CENTER TO ACCOMMODATE EXISTING AND FUTURE PARKING DEMAND AND SUPPORT EFFECTIVE TRANSIT USE.	6/30/2015	6/30/2015	6/30/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
BALDWIN PARK	LAE0076	CONSTRUCT ADD'L VEHICLE PARKING (200 TO 400 SPACES), BICYCLE PARKING LOT AND PEDESTRIAN REST AREA AT THE TRANSIT CENTER	2010	12/31/2014	12/31/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED). BIDS FOR CONSTRUCTION CONTRACTORS BEGAN IN 11-11.
BURBANK	LAF1502	SAN FERNANDO BIKEWAY. IMPLEMENT A CLASS I BIKEWAY ALONG SAN FERNANDO BLVD, VICTORY PLACE AND BURBANK WESTERN CHANNEL TO COMPLETE THE BURBANK LEG OF A 12 MILE BIKEWAY.	2014	6/30/2014	6/30/2015	OBSTACLES ARE BEING OVERCOME. PROJECT SCHEDULE IS CONTINGENT ON ADVANCE OF THE ADJACENT INTERSTATE 5 HOV / EMPIRE INTERCHANGE PROJECT WHICH WILL BE UNDER CONSTRUCTION WITHIN THE SAME RIGHT-OF-WAY. THE I-5 PROJECT IS ADMINISTERED BY CALTRANS AND METRO. DELAY TO THE CALTRANS PROJECT HAS AFFECTED THE SCHEDULE OF THIS PROJECT. THE CITY OF BURBANK IS WORKING WITH CALTRANS TO EXPEDITE THE PROJECT THROUGH THE ENVIRONMENTAL DOCUMENT PROCESSING STAGES TO MINIMIZE ANY FURTHER DELAY. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
CALTRANS	LA000357	ROUTE 5: FROM ROUTE 170 TO ROUTE 118 ONE HOV LANE IN EACH DIRECTION (10 TO 12 LANES) INCLUDING THE RECONSTRUCTION OF THE I-5/SR-170 MIXED FLOW CONNECTOR AND THE CONSTRUCTION OF THE I-5/SR-170 HOV TO HOV CONNECTOR (CFP 345) (2001 CFP 8339; CFP2197).	2008/2010	12/31/2013	12/31/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
CALTRANS	LA000358	ROUTE 5: – FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 12180, 12181,12182,12183,12184, 13350 PPNO 0142F,151E,3985,3986,3987) SAFETEA LU # 570. CONSTRUCT MODIFIED IC @ I-5 EMPIRE AVE, AUX LNS NB & SB BETWEEN BURB	2012/2010	12/31/2014	12/31/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.
CALTRANS	LA000548	ROUTE 10: FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (EA# 117080, PPNO# 0309N)	2030/2015	2/12/2016	2/12/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.
CALTRANS	LA01342	ROUTE 10: RT 10 FROM RT 605 TO PUENTE AVE HOV LANES (8+0 TO 8+2) (EA# 117070, PPNO 0306H) PPNO 3333 3382 AB 3090 REP (TCRP #40)	2008/2010	10/28/2013	10/28/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.
CALTRANS	LA0B875	ROUTE 10: HOV LANES FROM CITRUS TO ROUTE 57/210 – (EA# 11934, PPNO# 0310B)	2015	3/15/2016	3/15/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
CALTRANS	LA0D73	ROUTE 5: LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW (EA 2159A0, PPNO 2808). TCRP#42.2&42.1	2014	12/1/2016	12/1/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.
CALTRANS	LA996134	ROUTE 5: RTE. 5/14 INTERCHANGE & HOV LNS ON RTE 14 – CONSTRUCT 2 ELEVATED LANES – HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO 0168M)	2014/2009	5/24/2013	5/24/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS UNDER CONSTRUCTION.
FOOTHILL TRANSIT ZONE	LA0B311	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM SAFETEA-LU # 341 (E-2006-BUSP-092) (E-2006-BUSP-173)	2003/2005	12/31/2013	12/31/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. AGENCY IS FINALIZING PLANS FOR THE NEW SITE FOR THE PARK AND RIDE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED).
GLENDALE	LA0G406	FAIRMONT AVE. PARK-N-RIDE FACILITY (83 PARKING SPACES) TO SERVE COMMUTERS USING SR-134, I-5. THE LOCATION OF THE PARK-N-RIDE IS FAIRMONT AVENUE AND SAN FERNANDO RD.	12/30/2012	12/30/2013	12/30/2014	OBSTACLES ARE BEING OVERCOME. ONE YEAR DELAY DUE TO COORDINATION AND LAG TIME BETWEEN PROJECT COMPONENTS AS THE PROJECT WAS COMBINED WITH FAIRMONT AVE GRADE SEPARATION. AGENCY HAS AN APPROVED MOU WITH METRO AND THE PROJECT IS UNDERWAY.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
LONG BEACH	LAE1296	LONG BEACH INTELLIGENT TRANSPORTATION SYSTEM	2011	9/30/2012	9/30/2013	OBSTACLES ARE BEING OVERCOME. THE CITY COORDINATED WITH OTHER JURISDICTIONS (SIGNAL HILL, LAKEWOOD AND CALTRANS) TO SELECT AN ADAPTIVE TRAFFIC SIGNAL SYSTEM THAT WAS DEPLOYED IN AN AREA WITH 167 TRAFFIC SIGNALS IN LATE 2010. THE PROJECT WAS DELAYED UNTIL RESEARCH AND TESTING, WHICH WAS PRIVATELY FUNDED, WAS COMPLETED TO ENSURE FEASIBILITY OF THE PROJECT PRIOR TO EXPENDING GRANT FUNDS. IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED).
LONG BEACH	LAF1530	BICYCLE SYSTEM GAP CLOSURES & IMPROVED LA RIVER BIKE PATH. PROJECT WILL CONSTRUCT PRIORITY CLASS I & III BICYCLE SYSTEM GAP CLOSURES IN LONG BEACH AND IMPROVE CONNECTION TO LA RIVER.	2014	10/1/2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
LOS ANGELES COUNTY	LAF1514	EMERALD NECKLACE BIKE TRAIL PROJECT. DESIGN AND CONSTRUCT 1.1 MILES OF CLASS I BIKE PATH TO CONNECT DUARTE ROAD TO THE SAN GABRIEL RIVER BICYCLE TRAIL.	2011	6/30/2013	6/30/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PLANNED OBLIGATION DATE FOR THIS PROJECT IS JUNE 2012 WITH AWARD OF CONTRACT IN SEPTEMBER 2012 AND CONSTRUCTION COMPLETION BY JUNE 2013.
LOS ANGELES COUNTY MTA	LA0C10	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT PHASE I TO VENICE-ROBERTSON STATION	2011/2012	12/31/2012	12/31/2012	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
LOS ANGELES COUNTY MTA	LA0C8114	LA CITY RIDESHARE SERVICES; PROVIDE COMMUTE INFO, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS. PPNO 9003	2009	12/30/2016	12/30/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ONGOING PROJECT.
LOS ANGELES COUNTY MTA	LA0D198	CRENSHAW TRANSIT CORRIDOR	12/31/2018	12/31/2018	12/31/2018	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.
LOS ANGELES COUNTY MTA	LA0F021	EXPOSITION LIGHT RAIL TRANSIT SYSTEM PHASE II – FROM CULVER CITY TO SANTA MONICA		12/31/2017	12/31/2017	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
LOS ANGELES COUNTY MTA	LA0G010	REGIONAL CONNECTOR – LIGHT RAIL IN TUNNEL ALLOWING THROUGH MOVEMENTS OF TRAINS, BLUE, GOLD, EXPO LINES. FROM ALAMEDA / 1ST STREET TO 7TH STREET/METRO CENTER	12/31/2019	12/31/2019	12/31/2019	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
LOS ANGELES COUNTY MTA	LA0G154	LACRD – EL MONTE TRANSIT CENTER IMPROVEMENTS AND EL MONTE BUSWAY IMPROVEMENTS, INCLUDING BIKE LOCKERS, TICKET VENDING MACHINES AT EL MONTE BUSWAY STATIONS AND UP TO 10 BUS BAYS.	12/31/2010	12/31/2012	12/31/2012	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. LACMTA IS WORKING WITH ITS CONTRACTOR TO REMOVE CONTAMINATED SOIL AS QUICKLY AS POSSIBLE AND WORKING WITH SHPO AND FTA TO EXPEDITE APPROVALS.
LOS ANGELES COUNTY MTA	LA0G447	METRO PURPLE LINE WESTSIDE SUBWAY EXTENSION SEGMENT 1 – WILSHIRE/WESTERN TO FAIRFAX	12/31/2019	12/31/2019	2019/2023	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. 2023 IS COMPLETION DATE FOR SEGMENT 2 PROJECT IS IN ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E) PHASE.
LOS ANGELES COUNTY MTA	LA29202W	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. FROM VERMONT TO SANTA MONICA DOWNTOWN- MID-CITY WILSHIRE BRT INCL. DIV. EXPANSION AND BUS ONLY LANE	2009/2010	12/31/2013	12/31/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED). NOTE: 2012-2035 RTP/SCS TCM TIMELY IMPLEMENTATION REPORT PROJECT DESCRIPTION AND COMPLETION DATE ONLY ACCOUNT FOR FIRST PHASE OF PROJECT.
LOS ANGELES COUNTY MTA	LA963542	ACQUISITION REVENUE VEHICLES – 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS); FY05-FY10 TOTAL OF 1000 BUSES.	2005	6/30/2014	6/30/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ONGOING PROJECT.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
LOS ANGELES, CITY OF	LA0B7330	SAN FERNANDO RD ROW BIKE PATH PHSE II – CONSTRUCT 2.75 MILES CLAS I FRM FIRST ST TO BRANFORD ST,ON MTA-OWND ROW PARLEL TO SAN FERNANDO RD. LINK CYCLSTS TO NUMEROUS BUS LNE. PPNO 2868.	2005	1/30/2014	3/30/2014	OBSTACLES ARE BEING OVERCOME. CONSTRUCTION HAD STARTED IN 2010 BUT THERE WAS A BREACH OF A UTILITY LINE WHICH HALTED CONSTRUCTION. THE REPAIR OF THE UTILITY LINE HAD TAKEN APPROXIMATELY 18 MONTHS.
LOS ANGELES, CITY OF	LA0C8164	EXPOSITION BLVD RIGHT-OF-WAY BIKE PATH-WESTSIDE EXTENSION. DESIGN AND CONSTRUCTION OF 2.5 MILES OF CLASS 1 BIKEWAY, LIGHTING, LANDSCAPING & INTERSECTION IMPROVEMENTS. (PPNO# 3184)	2009	2/2/2012	2018	OBSTACLES ARE BEING OVERCOME. IN ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED) DELAYS DUE TO UNANTICIPATED STAGING ISSUES WITH THE CONSTRUCTION OF THE EXPO LINE (PHASE I & II). AGENCY HAD TO WAIT FOR SOME STATION AND ROW CONSTRUCTION ACTIVITIES TO BE COMPLETED BEFORE STARTING CONSTRUCTION ACTIVITIES. THE DESIGN-BUILD OF THE BIKE PATH WILL BEGIN AFTER THE FINAL SIGN-OFF FROM CALTRANS ON THE ENVIRONMENTAL DOCUMENT. THE PROJECT COMPLETION DATE IS JULY 2018, CONSISTENT WITH THE EXPO 2 PHASE.
LOS ANGELES, CITY OF	LAF1450	ENCINO PARK-AND-RIDE FACILITY RENOVATION. RENOVATION OF THE ENCINO PARK-AND-RIDE FACILITY IN ORDER TO ADDRESS PHYSICAL AND STRUCTURAL DEFICIENCIES AND ADD CAPACITY TO THIS HEAVILY UTILIZED FACILITY. INCLUDES 50 NEW PARKING SPACES AND BIKE LOCKERS.	2013	10/1/2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. BID/ADVERTISE PHASE

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LAF1524	SAN FERNANDO RD. BIKE PATH PH. IIIA/IIIB – CONSTRUCTION. RECOMMEND PHASE IIIA-CONSTRUCTION OF A CLASS I BIKE PATH WITHIN METRO OWNED RAIL RIGHT-OF-WAY ALONG SAN FERNANDO RD. BETWEEN BRANFORD ST. AND TUXFORD ST INCL BRIDGE.	10/1/2015	10/1/2015	10/1/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
LOS ANGELES, CITY OF	LAF1708	HOLLYWOOD INTEGRATED MODAL INFORMATION SYSTEM. INSTALLATION OF ELECTRONIC, DIRECTION AND PARKING AVAILABILITY SIGNS WITH INTERNET CONNECTIVITY TO PROVIDE ADVANCE AND REAL-TIME INFORMATION INTENDED TO INCREASE TRANSIT RIDERSHIP	2015	9/21/2015	9/21/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
MONROVIA	LAE0039	TRANSIT VILLAGE – PROVIDE A TRANS. FACILITY FOR SATELLITE PARKING FOR SIERRA MADRE VILLA GOLD LINE STA, P-N-R FOR COMMUTERS, A FOOTHILL TRANSIT STORE.	2010	12/31/2012	12/31/2012	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION
PASADENA	LAE3790	THE PASADENA ITS INTEGRATES 3 COMPONENTS; TRAFFIC SIGNAL COMMUNICATION AND CONTRL, TRANSIT VEHICLE ARRIVAL INFO AND PUBLIC PARKING AVAILABILITY INFO. SAFETEA-LU PRJ #3790 AND #399	2010	6/30/2013	6/30/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. FUNDS HAVE BEEN OBLIGATED. THE PROJECT IS CURRENTLY IN THE DESIGN PHASE.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
PORT OF LOS ANGELES	LAF3170	PORT TRUCK TRAFFIC REDUCTION PROGRAM: WEST BASIN RAILYARD. INTERMODAL RAILYARD CONNECTING PORT OF LA WITH ALAMEDA CORRIDOR TO ACCOMMODATE INCREASED LOADING OF TRAINS AT THE PORT, THEREBY REDUCING TRUCK TRIPS TO OFF-DOCK RAILYARDS.	12/1/2014	12/1/2014	12/1/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENGINEERING/PLANS, SPECIFICATIONS AND ESTIMATES (PS&E)
RANCHO PALOS VERDES	LAF1506	BIKE COMPATIBLE RDWY SAFETY AND LINKAGE ON PALOS VERDES DR. THE PROJECT WILL HAVE A CLASS II BIKE LANE ON BOTH SIDES OF PALOS VERDES DRIVE SOUTH, WITH AN UNPAVED SHOULDER FOR EMERGENCY USE.	2014	10/9/2014	10/9/2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)
RANCHO PALOS VERDES	LAF1605	PEDESTRIAN SAFE BUS STOP LINKAGE. LINKING 11 BUS STOPS CURRENTLY INACCESSIBLE BECAUSE OF LACK OF SIDEWALKS ON BOTH THE EAST AND WEST SIDE OF HAWTHORNE BLVD. FROM CREST RD. TO PALOS VERDES DR. SOUTH (ABOUT 13,000’)	2013	12/9/2013	12/9/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
ROLLING HILLS ESTATE	LAF1529	PALOS VERDES DRIVE NORTH BIKE LANES. CONSTRUCTION OF CLASS II BIKE LANE AND RELATED IMPROVEMENTS ON PALOS VERDES DRIVE NORTH	12/31/2012	12/31/2013	12/31/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT HAS RECEIVED ITS E-76 FOR PE (PS&E). THE CITY WORKED WITH METRO TO UPDATE THE SCHEDULE AND REPROGRAM THE CONSTRUCTION FUNDS; PLANNING TO OBTAIN CONSTRUCTION ALLOCATION BY JUNE 30, 2013 AND COMPLETE CONSTRUCTION BY DECEMBER 31, 2013.
SAN GABRIEL VALLEY COG	LA990359	GRADE SEP XINGS SAFETY IMPR; 35- MI FREIGHT RAIL CORR. THRGH SAN.GAB. VALLEY – EAST. L.A. TO POMONA ALONG UPRR ALHAMBRA &L.A. SUBDIV – ITS 2318 SAFETEA #2178;1436 #1934 PPNO 2318	2003/2009	6/30/2018	6/30/2018	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.
SANTA CLARITA	LAF1424	MCBEAN REGIONAL TRANSIT CENTER PARK AND RIDE. PURCHASE LAND, DESIGN, AND CONSTRUCT A REGIONAL PARK-AND-RIDE LOT ADJACENT TO THE MCBEAN REGIONAL TRANSIT CENTER IN THE CITY OF SANTA CLARITA.	2012	10/1/2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT CURRENTLY IN PRE-CONSTRUCTION PHASE. FUNDING IS IN AN APPROVED FTA GRANT CA-95-X137 AND CA-96-X071
SANTA FE SPRINGS	LA0F096	NORWALK SANTA FE SPRINGS TRANSPORTATION CENTER PARKING EXPANSION AND BIKEWAY IMPROVEMENTS. PROVIDE ADDITIONAL 250 PARKING SPACES FOR TRANSIT CENTER PATRONS AND IMPROVE BICYCLES ACCESS TO THE TRANSIT CENTER	2011	6/30/2012	6/30/2012	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE.

TABLE III-1.1 LOS ANGELES COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
TORRANCE	LA0G358	SOUTH BAY REGIONAL INTERMODAL TRANSIT CENTER PROJECT. THE LAND IS IN THE PROCESS OF BEING PURCHASED AND ESCROW WILL CLOSE ON DECEMBER 17, 2009. PRESENTLY, THE LOT IS VACANT/OPEN LAND WITH NO EXISTING STRUCTURE UPON IT. THE ADDRESS IS 465 N. CRENSHAW BLVD., TORRANCE, CA 90503.	12/31/2015	12/31/2015	12/31/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. RFP IS BEING DEVELOPED. ENVIRONMENTAL DOCUMENT/PRE-DESIGN PHASE (PAED)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
BALDWIN PARK	LAF1654	BALDWIN PARK METROLINK PEDESTRIAN OVERCROSSING. CONSTRUCT A PEDESTRIAN OVERCROSSING OVER BOGART AVE AND THE METROLINK LINE TO LINK THE STATION WITH VITAL BUS TRANSFER POINTS AND TO PROVIDE ACCESS TO PARKING OVERFLOW AREAS.	2015	10/1/2015	10/1/2015	NOT A REPORTABLE TCM (LESS THAN ¼ MILE)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
BALDWIN PARK	LAFA141	BALDWIN PARK METROLINK TRANSPORTATION CENTER. FUNDED THRU STIP AUGMENTATION CONSTRUCTION A TRANSPORTATION CENTER AND PARKING STRUCTURE AT THE BALDWIN PARK METROLINK STATION.	2012	11/1/2014	11/1/2014	DELETE (DUPLICATE OF LAE0076)
CALTRANS	1178A	ROUTE 405: IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) (2206LK CFP) OBLIGATED 6207 (034)	3/10/2011		COMPLETE	COMPLETE
CLAREMONT	LAF1510	CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY. THIS PROJECT PROPOSES THE IMPLEMENTATION OF THE CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY UTILIZING BONITA AVENUE AND FIRST STREET AS PRIMARY CLASS II BIKE ROUTES.	10/1/2012	COMPLETE	COMPLETE	COMPLETE
COMPTON	LA0C8223	COMPTON MLK TRANSIT CENTER EXPANSION AND MULTI-MODAL/WILL ALLOW THE TRANSIT SYSTEM TO REDUCE OPERATING COST.	6/30/2011		COMPLETE	COMPLETE
COMPTON	LA996297	TMOC & RETROFIT OF CITY TRAFFIC SIGNAL SYSTEM (TEA21-#940)	6/1/2012		COMPLETE	COMPLETE

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
CULVER CITY	LA0C8128	FOX HILLS AREA TRAF SIG SYNCH EFFORT & CITY-WIDE AUTO TRAF SIGNAL CONTROL AND MONITORING PROJECT. INCORPORATE 11 SIGNALIZED INTERSECTIONS INTO AN ATSAC / ADAPTIVE TRAF CONTROL SYS.	11/30/2010		COMPLETE	COMPLETE
EL MONTE	LAF1504	EL MONTE: TRANSIT CYCLE FRIENDLY. EL MONTE PROPOSES TO IMPLEMENT THE 1ST PHASE OF THE EL MONTE BIKE-TRANSIT HUB COMPONENT (METRO BICYCLE TRANSPORTATION STRATEGIC PLAN) A COUNTYWIDE EFFORT TO IMPROVE BIKE FACILITIES	2013	10/1/2013	10/1/2013	NOT A REPORTABLE TCM (LESS THAN 1 MILE)
LOS ANGELES COUNTY MTA	LA0G194	ACQUIRE FOUR (4) ALTERNATE FUEL BUSES FOR THE CITY OF ARTESIA TO BE USED FOR NEW FIXED ROUTE SERVICE EARMARK ID #E2008-BUSP-0694	10/31/2011	10/31/2012	10/31/2012	NOT A REPORTABLE TCM (PURCHASE FEWER THAN 5 BUSES)
LOS ANGELES COUNTY MTA	LA0G270	EXPANSION AND IMPROVEMENT TO EXISTING TRANSIT CENTER IN THE CITY OF PALMDALE. E2009-BUSP-137.	9/30/2012	9/30/2013	9/30/2013	NOT A TCM (OUTSIDE SCAB)
LOS ANGELES COUNTY MTA	LA0G431	MULTI-MODAL TRANSIT CENTER AT CSUN TO INCLUDE PASSENGER LOADING AREAS AND BUS SHELTERS	10/1/2012	10/1/2012	10/1/2012	NOT A TCM (NO CAPACITY ENHANCEMENT)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
LOS ANGELES COUNTY MTA	LA29202U1	SAN FERNANDO VALLEY E/W BRT (FROM TERMINUS OF METRO RED LINE IN NO HOLLYWOOD TO WARNER CTR)14-MILE EXCLUSIVE BUS LANES AT FORMER RAIL RD ROW (PPNO 3333 AB3090REP) SAFETEA-LU # 326			COMPLETE	COMPLETE
LOS ANGELES COUNTY MTA	LA974165	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMMODATE PUBLIC ACCESS (PEDESTRIAN ENTRANCES, WALKWAYS, BICYCLE FACILITIES) PPNO# 3417	2002/2007	12/30/2011	12/30/2011	NOT A TCM (NO CAPACITY ENHANCEMENT)
LOS ANGELES COUNTY MTA	LA990305	LIGHT RAIL TRANSIT FLEET- 50 NEW RAIL CAR (26 EXP (10 FOR METRO GOLD LINE EASTSIDE & (16) FOR EXPOSITION LRT) 24 REPLACEMENT CARS - .PPNO 3225.	8/31/2011		COMPLETE	COMPLETE
LOS ANGELES COUNTY MTA	LAE0036	WILSHIRE/ VERMONT PEDESTRIAN PLAZA IMPROVEMENTS AND INTERMODAL PEDESTRIAN LINKAGES	2011	2012	COMPLETE	COMPLETE

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
LOS ANGELES COUNTY MTA	LAE0195	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES PIERCE COLLEGE AND MTA'S RAPID BUS TRANSIT STOPS TO INCLUDE PASSENGER AMENITIES, 2007 CFP # F1658	2010	10/1/2014	10/1/2014	NOT A TCM (NO CAPACITY ENHANCEMENT)
LOS ANGELES COUNTY MTA	LAE0388A	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES MISSION COLLEGE AND PUBLIC TRANSIT SERVICES TO INCLUDE LIGHTING, LANDSCAPIND, AND PASSENGER AMENITIES	12/31/2010		COMPLETE	COMPLETE
LOS ANGELES, CITY OF	LA002738	BIKEWAY/PEDESTRIAN BRIDGE OVER LA RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077) (PPNO# 3156)	2009	7/31/2015	7/31/2015	NOT A REPORTABLE TCM (LESS THAN 1 MILE)
LOS ANGELES, CITY OF	LA0C8126	HARBOR-GATEWAY ATSAC/ATCS PROJECT; IMPROVEMENTS TO 109 SIGNALIZED INTERSECTIONS THROUGH IMPLEMENTATION OF A COMPUTER-BASED REAL TIME TRAFFIC SIGNAL MONITORING & CONTROL SYSTEM.	4/7/2011		COMPLETE	COMPLETE

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LA0C8133	RESEDA ATSAC/ATCS PROJ.PROVIDE ATSAC/ATCS TYPE IMPROVEMENTS TO 107 SIGNALIZED INTERSECTIONS THRU IMPLEMENTATION OF A COMPUTER-BASED REAL TIME TRAFFIC SIGNAL MONITORING & CONTRL SYS	7/1/2012		COMPLETE	COMPLETE
LOS ANGELES, CITY OF	LA0G155	LACRD – TRANSIT SIGNAL PRIORITY IN THE CITY OF LOS ANGELES.	12/31/2011	02/28/2012	12/31/2013	NOT A TCM (DEMO PROJECT)
LOS ANGELES, CITY OF	LAF1342	ATSAC/ATCS - PLATT RANCH PROJECT. PROVIDE ATSAC/ATCS TYPE FACILITIES AND BUS PRIORITY INFRASTRUCTURE TO APPROX. 37 SIGNALIZED INTERSECTIONS THROUGH IMPLEMENTATION OF A COMPUTER-BASED REAL-TIME TRAFFIC MONITORING AND CONTROL SYSTEM.	1/1/2012		COMPLETE	COMPLETE
LOS ANGELES, CITY OF	LAF1520	IMPERIAL HIGHWAY BIKE LANES. THIS PROJECT INVOLVES THE MODIFICATION OF THE MEDIAN ISLAND AND THE WIDENING OF IMPERIAL HIGHWAY ALONG 1000 FT EAST OF PERSHING DRIVE TO ACCOMMODATE BIKE LANES.	6/1/2014	6/1/2014	6/1/2014	NOT A REPORTABLE TCM (LESS THAN 1 MILE)
LOS ANGELES, CITY OF	LAF1615	EASTSIDE LIGHT RAIL PEDESTRIAN LINKAGE. IMPROVE LINKAGES WITHIN 1/4 MILE OF METRO'S GOLD LINE LRT.	2012	6/29/2012	6/29/2012	NOT A TCM (NO CAPACITY ENHANCEMENT)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LAF1657	LOS ANGELES VALLEY COLLEGE (LAVC) BUS STATION EXTENSION. PROJECT WILL EXTEND THE ORANGE LINE STATION AT THE LA VALLEY COLLEGE BY PROVIDING A DIRECT PEDESTRIAN CONNECTION FROM THE STATION TO A NEW PEDESTRIAN ENTRANCE TO LAVC.	2013	10/1/2013	10/1/2013	NOT A TCM (NO CAPACITY ENHANCEMENT)
LOS ANGELES, CITY OF	LAF1704	DOWNTOWN L.A. ALTERNATIVE GREEN TRANSIT MODES TRIAL PROGRAM. OFFER SHARED RIDE-BICYCLE AND NEIGHBORHOOD ELECTRIC VEHICLE TRANSIT SERVICES TO LA CITY HALL AS AN ALTERNATIVE TO OVERCROWDED DASH SERVICE	2014	6/27/2014	6/27/2014	NOT A TCM (DEMONSTRATION PROJECT)
LOS ANGELES, CITY OF	LAF3419	SUNSET JUNCTION PHASE 2. CREATE A MULTI-MODAL TRANSIT PLAZA TO INTEGRATE PUBLIC TRANSPORTATION, PEDESTRIAN & BICYCLE IMPROVEMENTS THAT WOULD RESULT IN REGIONAL & LOCAL BENEFITS (CFP3844). TRIANGLE PROPERTY ON SUNSET BLVD BWT MANZANITA AND SANTA MONICA.	6/30/2017	6/30/2017	6/30/2017	NOT A TCM (NO NEW SERVICE)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
PASADENA	LA0D47	SR 710 MITIGATION PROJECT-TRAFFIC CONTROL AND MONITORING SYSTEM-INTELLIGENT TRANSPORTATION SYSTEMS (ITS). CONSTRUCT AND INSTALL ITS TECHNOLOGY AND VARIOUS DEGREES OF SMART SIGNALS	12/30/2008		COMPLETE	COMPLETE
PICO RIVERA (PREVIOUSLY LEAD AGENCY WAS SGVCOG)	LA0C57	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEP. AT PASSONS BLVD IN PICO RIVERA (& MODIFY PROFILE OF SERAPIS AV,)(PART OF ALAMEDA CORR EAST PROJ.)SAFETEA-LU HPP # 1666 (TCRP #54.3)	2006	12/31/2012	COMPLETE	COMPLETE
SAN DIMAS	LAF1503	BIKEWAY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH. THE BWY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH; WILL CLOSE THE GAP ON A BRIDGE & CONNECT THE EXISTING CLASS II BIKE LANES TO THE EAST & WEST OF SAN DIMAS WASH CROSSING.	12/1/2013	12/1/2013	12/1/2013	NOT A TCM (RECREATIONAL PURPOSE)
SANTA CLARITA	LA0G285	FINAL EXPANSION OF PARKING AT THE NEWHALL METROLINK STATION WHICH WILL ADD 95 PARKING SPOTS FOR PARK AND RIDE.	12/31/2012		COMPLETE	COMPLETE

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
SANTA MON-ICA	LAE0364	CONSTRUCT INTERMODAL PARK AND RIDE FACILITY AT SANTA MONICA COLLEGE CAMPUS ON SOUTH BUNDY DRIVE NEAR AIR-PORT AVENUE	2010	12/31/2013	12/31/2013	NOT A TCM (PARKING FACILITY ON CAMPUS FOR FACULTY AND STUDENTS, NOT PARK AND RIDE. THE PARKING FACILITY ALSO INCLUDES BUS STOP AMENITIES IMPROVEMENTS).
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY	LA0G153	LACRD - PLATFORMS AND PARKING IMPROVEMENTS AT THE METROLINK POMONA STATION. ADDITION OF 100 PARKING SPACES AND EXTENSION OF PLATFORM.(G# CA-37-X052-00)	12/31/2010		COMPLETE	COMPLETE
WESTLAKE VILLAGE	LA960142	LINDERO CANYON ROAD FROM AGOURA TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION	2003/2005	1/30/2013	1/30/2013	NOT A REPORTABLE TCM (SHORTER THAN 1 MILE)

TABLE III-1.2 LOS ANGELES COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
WHITTIER	LA0G257	WHITTIER GREENWAY TRAILHEAD PARK. EXTENSION OF WHITTIER GREENWAY TRAIL FROM MILLS AVENUE TO 300 FEET EAST OF MILLS AVENUE ON CITY OWNED RIGHT-OF-WAY IN CONJUNCTION WITH THE CONSTRUCTION OF NEW TRAILHEAD PARK WITH A PARK AND RIDE PARKING LOT FOR NEARBY PUBLIC TRANSIT STOP. NEW 20 SPACE PARKING LOT WOULD BE CONSTRUCTED OF "GREEN" PERMEABLE PAVEMENT IN COMPLIANCE WITH NPDES REQUIREMENTS. INCLUDES THE INSTALLATION OF PARK AMENITIES, DRINKING FOUNTAIN FOR THE CONVENIENCE OF PEDESTRIAN AND BICYCLE PATRONS OF THE WHITTIER GREENWAY TRAIL. CONSTRUCTION OF NEW SIDEWALKS ALONG MILLS AVENUE TO PROVIDE WHITTIER GREENWAY TRAIL CROSSING CONNECTION AT THE SIGNALIZED INTERSECTION OF MILLS AVENUE AT LAMBERT ROAD.	9/30/2012	9/30/2014	9/30/2014	NOT A TCM (PARK AND RIDE FOR RECREATIONAL PURPOSES)

TABLE III-1.3 LOS ANGELES COUNTY NEW TCMS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2013 FTIP COMPLETION DATE**
BALDWIN PARK	LAF3507	SOUTH BALDWIN PARK COMMUTER BIKEWAY PROJECT. CONSTRUCT 3-MILE COMMUTER CLASS I BIKE PATH ALONG SAN GABRIEL RIVER AND WALNUT CREEK CONNECTING TO MAJOR EMPLOYMENT CENTERS ON BALDWIN PARK BLVD.	9/30/2015
GARDENA	LAF3306	GARDENA MUNICIPAL BUS LINES LINE #1X TSP (TRANSIT SIGNAL SYNCHRONIZATION PROJECT 21-SIGNALS). PROJECT WILL IMPLEMENT TRANSIT SIGNAL PRIORITY ALONG ITS LINE #1X TO REDUCE TRANSIT TRAVEL TIMES AND ENHANCE ON-TIME PERFORMANCE. CITY OF GARDENA: MARINE AVENUE: FROM YUKON AVENUE TO WESTERN AVENUE WESTERN AVENUE: FROM MARINE AVENUE TO 166TH STREET NORMANDIE AVENUE: FROM 166TH STREET TO GARDENA BOULEVARD VERMONT AVENUE: FROM GARDENA BOULEVARD TO 153RD STREET; UP TO 21 LOCATIONS.	6/30/2016
GLENDALE	LA0G202	TRAFFIC LIGHT SYNCHRONIZATION ALONG THREE MAJOR ARTERIIALS , GLENDALE AVE, BRAND BLVD.,SAN FERNANDO RD., AND COLORADO ST.	12/1/2014
INDUSTRY	LAF3303	INDUSTRY-ATMS SIGNAL UPGRADE/CCTV VIDEO SURVEILLANCE SYSTEM. DESIGN & IMPLEMENT 20 ATMS SIGNAL UPGRADE, 6 CCTV VIDEO SURVEILLANCE SYSTEM, WIRELESS COMMUNICATIONS & LOCAL CONTROL CENTER (LCC) VIDEO SCREEN SYSTEM.	3/30/2014
LONG BEACH	LA0C8237	LONG BEACH PARK AND RIDE FACILITY AT 4TH AND PACIFIC, SOUTH OF THE MTA BLUE LINE PACIFIC STATION. 100 DEDICATED, TRANSIT ORIENTED SPACES IN MIXED USE DEVELOPMENT	6/30/2014
LONG BEACH	LA996322	DWNTWN. SHORELINE DR. TRAFFIC MGMT. SYSTEM: DEPLOYMENT OF ITS ELEMENTS IN THE DWNTWN AREA TO RESPOND TO SPECIAL GENERATOR TRAFFIC.	3/31/2013
LONG BEACH	LAF1334	ATLANTIC AVE SIGNAL SYNCHRONIZATION & ENHANCEMENT PROJECT. TRAFFIC SIGNAL UPGRADES AND RECONSTRUCTION, INTERCONNECT, BUS PRIORITY TRAFFIC SIGNAL EQUIPMENT, EMERGENCY VEHICLE PREEMPTION, AND ENHANCEMENTS FOR BUS STOPS AND PEDESTRIAN SAFETY.	12/1/2013
LONG BEACH	LAF1341	OCEAN BL. SIGNAL SYNCHRONIZATION AND ENHANCEMENT PROJECT. INSTALLATION OF NEW SIGNALS, INTERCONNECT, PEDESTRIAN SAFETY ENHANCEMENTS, ADA ACCESS RAMPS, TRANSIT INFORMATION SYSTEMS, AND TRAFFIC SIGNAL UPGRADES AND RECONSTRUCTION. OCEAN BL,ALAMITOS TO LIVINGSTON	10/1/2013
LOS ANGELES COUNTY	LA0C8120	SOUTH BAY FORUM TRAFFIC SIGNAL CORRIDORS PROJECT. DESIGN & CONSTRUCTION OF MULTI JURISDICTIONAL, SIGNAL SYSTEM IMPROVEMENTS ON REGIONAL ARTERIALS & ADVANCED ITS TECHNOLOGY. (APROX. 770 INTERSECTIONS)	12/31/2015
LOS ANGELES COUNTY	LAF1511	EASTSIDE LIGHT RAIL BIKE INTERFACE PROJECT. PROJECT INCLUDES DESIGN AND CONSTRUCTION OF BIKE ROUTES WITH APPROPRIATE SIGNAGE AND STRIPING TO ACCESS METRO GOLD LINE STATIONS.	10/21/2014

TABLE III-1.3 LOS ANGELES COUNTY NEW TCMS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2013 FTIP COMPLETION DATE**
LOS ANGELES COUNTY	LAF3308	SAN GABRIEL VALLEY FORUM TRAFFIC SIGNAL CORRIDORS PROJECT. DESIGN AND CONSTRUCTION OF MULTIJURISDICTIONAL TRAFFIC SIGNAL SYNCH, INTERSECTION OPERATIONAL IMPROVEMENTS, AND INTELLIGENT TRANSPORTATION SYSTEM COMPONENTS ON REGIONAL ARTERIALS. APROX. 183 SIGNALS TOTAL.	6/30/2016
LOS ANGELES COUNTY	LAF3310	SOUTH BAY FORUM TRAFFIC SIGNAL CORRIDORS PROJECT. DESIGN AND CONSTRUCTION OF MULTIJURISDICTIONAL TRAFFIC SIGNAL SYNCHRONIZATION, OPERATIONAL IMPROVEMENTS & ITS COMPONENTS ON ARTERIALS IN THE SOUTH BAY AREA OF LA COUNTY. (APROX 40+ SIGNALS)	6/30/2016
LOS ANGELES COUNTY MTA	LA0D198	CRENSHAW/LAX TRANSIT CORRIDOR	12/31/2018
LOS ANGELES COUNTY MTA	LA0F075	LIGHT RAIL TRANSIT FLEET-UP TO 78 NEW CARS SYSTEMWIDE. THESE EXPANSION RAIL CARS WILL BE ASSIGNED TO EXPO I, EXPO II AND GOLD LINE FOOTHILL.	3/30/2018
LOS ANGELES, CITY OF	LA0G181	ATCS - CENTRAL BUSINESS DISTRICT. DEVELOP A FULLY TRAFFIC RESPONSIVE SIGNAL CONTROL SYSTEM TO APPROXIMATELY 180 INTERSECTIONS CURRENTLY OPERATIONAL WITH ATSAC CAPABILITY.	2/1/2014
LOS ANGELES, CITY OF	LA0G182	THE CENTRAL CITY EAST PROJECT WILL PROVIDE A FULLY TRAFFIC RESPONSIVE SIGNAL CONTROL SYSTEM TO APPROXIMATELY 150 INTERSECTIONS CURRENTLY OPERATIONAL WITH ATSAC CAPABILITY.	5/1/2014
LOS ANGELES, CITY OF	LAF1527	MANCHESTER AVENUE BIKE LANES & ISLAND REDUCTION. THE PROJECT CONSISTS OF THE INSTALLATION OF ONE MILE OF BIKE LANES AND THE REDUCTION OF THE LANDSCAPED MEDIAN ISLAND ON MANCHESTER BL BETWEEN SEPULVEDA BL AND OSAGE AV	10/1/2015
LOS ANGELES, CITY OF	LAF1725	WIFI ON THE GOLD LINE. WIFI INTERNET INSTALLED ON GOLD LINE TRAINS, POLES & STATIONS, EASTSIDE EXTENSION, CHINATOWN & LITTLE TOKYO/ARTS DISTRICTS.	12/31/2014
LOS ANGELES, CITY OF	LAF3171	DE SOTO AVE WIDENING: RONALD REAGAN FWY TO DEVONSHIRE ST.. WIDEN DE SOTO AVE FR SR-118 TO DEVONSHIRE ST TO PROVIDE 3 LANES IN EACH DIRECTION & UNIFORM ROADWAY WIDTH. EXISTING ASPHALT BERMS TO BE REPLACED WITH CURB, GUTTER, & 10' SIDEWALK. SIDEWALK IS 1.42 MILES, 90% OF THE SIDEWALKS ALONG THE PROJECT LIMITS WILL BE NEW.	12/1/2015
LOS ANGELES, CITY OF	LAF3314	INTELLIGENT TRANSPORTATION SYSTEM (ITS) COMMUNICATION SYSTEM. UPGRADE AND REPLACE UNDER CAPACITY COMMUNICATION SYSTEM HARDWARE IN ORDER TO PROVIDE A VIABLE AND COST EFFECTIVE COMMUNICATION LINK BETWEEN TRAFFIC CORRIDORS AND THE LA COUNTY IEN.	12/31/2015

TABLE III-1.3 LOS ANGELES COUNTY NEW TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	2013 FTIP COMPLETION DATE
LOS ANGELES, CITY OF	LAF3513	DESIGN AND CONSTRUCT 3.85 MILE BIKEWAY ALONG FUTURE EXPOSITION LIGHT RAIL CORRIDOR BETWEEN VENICE/ROBERTSON BLVDS. AND SANTA MONICA CITY LIMITS AT CENTINELA. CLASS I AND CLASS II BIKEWAYS.	12/31/2015
LOS ANGELES, CITY OF	LAF3731	DOWNTOWN LA INTER-MODAL TRANSIT INFORMATION AND WAYFINDING. INSTALL TRANSIT INFORMATION MONITORS, VARIABLE MESSAGE SIGNS, INTERACTIVE KIOSKS & PARKING AVAILABILITY SIGNAGE ALONG BROADWAY CORRIDOR TO OLYMPIC.	12/31/2014
PASADENA	LAF3501	DETECTION OF BICYCLES AT SIGNAL CONTROLLED INTERSECTIONS. BICYCLE DETECTION SYSTEMS AT INTERSECTIONS CONTROLLED BY TRAFFIC SIGNALS ALONG BIKE CORRIDORS. PROJECT CORRIDOR LENGTH IS 15.5 MILES.	5/1/2016
SANTA FE SPRINGS	LAF3402	NORWALK/SANTA FE SPRINGS TRANSPORTATION CTR PHASE II PARKING. CONSTRUCT A TOTAL OF APPROX. 160 PARKING SPACES ON A SITE ADJACENT TO THE METROLINK STATION.	6/30/2014
SANTA MONICA	LA0F062	DESIGN AND CONST. OF REAL-TIME PARKING INF./GUIDANCE SYSTEM. PHASE I COVERS SANTA MONICA AREA, BOUNDED BY COLORADO AVE., OCEAN AVE., WILSHIRE BLVD AND LINCOLN BLVD.	6/30/2013
SANTA MONICA	LAF1343	OCEAN PARK BL, MAIN ST, NEILSON WY SIGNAL SYSTEM. INSTALL COMMUNICATION & SIGNAL MODIFICATIONS NEEDED TO BRING INTERSECTIONS ONTO THE SIGNAL CONTROL SYSTEM ALONG THE OCEAN PARK BL, MAIN ST, AND NEILSON WY CORRIDORS. INCLUDES 26 INTERSECTIONS ON 3 CORRIDORS.	6/30/2015
SANTA MONICA	LAF1728	CITY OF SANTA MONICA ITS IMPROVEMENTS. SANTA MONICA REAL TIME BEACH PARKING SIGNS. THIS PROJECT WILL MAKE INFORMATION REGARDING BEACH PARKING AVAILABLE TO MOTORISTS DESTINED FOR SANTA MONICA BEACH PARKING LOTS.	6/30/2013
SANTA MONICA	LAF3703	A 'NO NET NEW TRIPS' RIDESHARE TOOLKIT. DEVELOP A TDM TOOLKIT WITH ONLINE MULTI-MODAL MOBILITY INFORMATION, BIKE ACCOMMODATIONS, 300 WALKING-ROLLING CARTS, 75 BIKE LOCKERS & INCENTIVE PROGRAMS FOR EMPLOYERS, SCHOOLS & NEIGHBORHOODS. WITHIN THE CITY OF SANTA MONICA IN DEMAND MANAGEMENT AREAS AS DEFINED IN THE LAND USE AND CIRCULATION ELEMENT (LUCE) ADOPTED JULY 2010.	6/30/2014
TEMPLE CITY	LA0G668	ROSEMEAD BLVD SAFETY ENHANCEMENTS & BEAUTIFICATION PROJECT: INSTALLATION OF BICYCLE LANES, SIDEWALK IMPROVEMENTS, LANDSCAPING, WAYFINDING SIGNAGE FROM PENTLAND TO CALLITA (1.7 MI).	10/31/2013

ORANGE COUNTY

TABLE III-2.1 ORANGE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
ANAHEIM	ORA000100	GENE AUTRY WAY WEST @ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HASTER (3 LANES IN EA DIR.)	2004	11/16/2012	01/2013	OBSTACLES ARE BEING OVERCOME. PROJECT UNDER CONSTRUCTION. DELAY DUE TO UTILITIES RELOCATION.
CALTRANS	ORA000193	HOV CONNECTORS FROM SR-22 TO I-405, BETWEEN SEAL BEACH BLVD. (I-405 PM 022.558) AND VALLEY VIEW ST. (SR-22 PM R000.917), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTORS.	2010	2/1/2015	2/1/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.
CALTRANS	ORA000194	HOV CONNECTORS FROM I-405 TO I-605, BETWEEN KATELLA AVE. (I-605 PM R001.104) AND SEAL BEACH BLVD. (I-405 PM 022.643), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTIONS.	2010	7/1/2015	7/1/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.
FULLERTON	ORA020113	FULLERTON TRAIN STATION – PARKING STRUCTURE, PHASE I AND II. TOTAL OF 800 SPACES (PPNO 2026)	2004	5/31/2012	6/11/2012	OBSTACLES ARE BEING OVERCOME. CONSTRUCTION STARTED MARCH 2011. SLIGHT DELAY DUE TO INTERNAL SIGNAGE ISSUES.

TABLE III-2.1 ORANGE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA041501	PURCHASE (71) STANDARD 30FT EXPANSION BUSES – ALTERNATIVE FUEL – (31) IN FY08-09, (9) IN FY09-10, (7) IN FY11-12, (6) IN FY12-13 AND (18) IN FY13-14	2012	6/30/2016	6/30/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. DUE TO CUT TO TRANSIT SERVICES, THERE IS NO NEED FOR ADDITIONAL BUSES FOR THE TIME BEING.
OCTA	ORA0826016	PURCHASE (72) PARATRANSIT EXPANSION VANS – (21) IN FY09/10, (51) IN FY10/11.	6/30/2016	6/30/2016	6/30/2016	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. DUE TO CUT TO TRANSIT SERVICES, THERE IS NO NEED FOR ADDITIONAL BUSES FOR THE TIME BEING.
OCTA	ORA082618	PURCHASE PARATRANSIT VEHICLES EXPANSION (MISSION VIEJO) (11) IN FY09/10. ON-GOING PROJECT.	6/30/2030	6/30/2030	6/30/2030	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. DUE TO CUT TO TRANSIT SERVICES, THERE IS NO NEED FOR ADDITIONAL BUSES FOR THE TIME BEING.
OCTA	ORA65002	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING (ORANGE COUNTY PORTION).	2010	6/30/2016	12/30/2020	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. ONGOING INFORMATION FOR RIDESHARE SERVICES
TRANSPOR-TATION CORRIDOR AGENCIES (TCA)	10254	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/5/01	2015/2008	12/31/2020	12/31/2020	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ONGOING IMPLEMENTATION PER SCAG/TCA MOU.

TABLE III-2.1 ORANGE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
TCA	ORA050	ETC (RTE 241/261/133) (RTE 91 TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/05/01.	2015/2010	12/31/2020	12/31/2020	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ONGOING IMPLEMENTATION PER SCAG/TCA MOU.
TCA	ORA051	(FTC-N) (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR, 2 ADDITIONAL M/F LANES, PLS CLMBNG & AUX LANS AS REQ BY 2020 PER SCAG/TCA MOU 4/05/01.	2015/2010	12/31/2020	12/31/2020	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ONGOING IMPLEMENTATION PER SCAG/TCA MOU.
TCA	ORA052	(FTC-S) (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2013; AND 1 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2030 PER SCAG/TCA MOU 4/05/01.	2015/2010	6/15/2030	6/15/2030	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ONGOING IMPLEMENTATION PER SCAG/TCA MOU. TCA IS DEVELOPING ENGINEERING PLANS, ENVIRONMENTAL ASSESSMENTS AND FINANCIAL STRATEGY TO BUILD THE 241 EXTENSION FROM THE EXISTING SOUTHERLY TERMINUS AT OSO PARKWAY TO THE VICINITY OF ORTEGA HIGHWAY WHILE CONTINUING TO PURSUE THE BALANCE OF THE ALIGNMENT THAT CONNECTS TO INTERSTATE 5.

TABLE III-2.2 ORANGE COUNTY COMPLETED/CORRECTED TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
CALTRANS	ORA000195	ON SR-22 (I-405 TO SR55) ADD 2 HOV LANES/1 EA DIR (FRM 0 - 2) & 2 AUX LANES/1 EA DIR (FRM 0-2) (I-5 TO BEACH) & OPERATING IMPROVMENTS (SEE COMMENTS) TCRP PAYBACK WHEN AVAILABLE	6/30/2011		COMPLETE	COMPLETE
OCTA	ORA110633	RIDESHARE VANPOOL PROGRAM – CAPITAL LEASE COSTS	2012	9/30/2012	COMPLETE	COMPLETE
OCTA	ORA120357	TRAFFIC SIGNAL SYNCHRONIZATION SUBSTITUTION TCM (REPLACING BRTS)	6/15/2012	6/15/2012	6/15/2012	COMPLETE
VARIOUS AGENCIES	ORA111225	AGE WELL, INC - 12 MINIVANS FOR EXPANSION SERVICE (UTILIZING $60,562 IN TOLL CREDIT FOR FY10/11)	10/1/2013		COMPLETE	COMPLETE

TABLE III-2.3 ORANGE COUNTY NEW TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	2013 FTIP COMPLETION DATE
ANAHEIM	ORA100508	DEVELOP AND IMPLEMENT AN ITS MASTER PLAN IN ANAHEIM. INCLUDES NEW CCTV CAMERAS (3) AND MODIFICATIONS TO FIBER OPTICS	6/30/2013
OCTA	ORA085001	ORANGE TRANSPORTATION CENTER PARKING EXPANSION - PROJECT WILL PROVIDE APPROXIMATLY 1,100 ADDITIONAL TRANSIT PARKING SPACES AT THE ORANGE STATION PARKING CENTER.	9/1/2015

TABLE III-2.3 ORANGE COUNTY NEW TCMS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2013 FTIP COMPLETION DATE**
OCTA	ORA085004	ANAHEIM CANYON STATION PROJECT WILL ADD DOUBLE TRACK AND ANOTHER PLATFORM AS WELL AS EXTEND THE EXISTING PLATFORM TO BE IN CONFORMANCE WITH THE METROLINK STANDARDS FOR PASSENGER PLATFORM LENGTH. (MAY USE TOLL CREDIT IF CMAQ REQUIRES A MATCH)	6/1/2014
OCTA	ORA111001	INTERSTATE 5 ADD 1 HOV IN EACH DIRECTION FROM SOUTH OF PACIFIC COAST HIGHWAY TO SAN JUAN CREEK ROAD. PPNO:2531F	11/1/2016
OCTA	ORA111002	INTERSTATE 5 ADD 1 HOV IN EACH DIRECTION FROM SOUTH OF AVENIDA VISTA HERMOSA TO SOUTH OF PACIFIC COAST HIGHWAY. PPNO 2531E	10/1/2016
OCTA	ORA990929	INTERSTATE 5 ADD 1 HOV IN EACH DIRECTION FROM SOUTH OF AVENIDA PICO TO SOUTH OF AVENIDA VISTA HERMOSA AND RECONFIGURE AVENIDA PICO INTERCHANGE. PPNO:2531D	7/1/2017
ORANGE COUNTY	ORA112001	MOULTON PARKWAY SMART STREET SEGMENT 3 PHASE II - FROM APPROXIMATELY 400’ NORTH OF EL TORO ROAD TO 500’ NORTH OF SANTA MARIA AVENUE (0.7 MILES) - IMPROVE ROADWAY TRAFFIC CAPACITY AND SMOOTH TRAFFIC FLOW THROUGH TRAFFIC SIGNAL SYNCHRONIZATION (3), BUS TURNOUTS, INTERSECTION IMPROVEMENTS, ADDITIONAL SIDEWALK, ADDITIONAL TURNING LANES AND ON-ROAD BIKE LANES WITHIN THE PROJECT LIMITS.	9/30/2013

RIVERSIDE COUNTY

TABLE III-3.1 RIVERSIDE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
RIVERSIDE COUNTY TRANSPOR-TATION COMMISSION (RCTC)	RIV010212	ON SR91 – ADAMS TO 60/215 IC: ADD ONE HOV LN IN EACH DIRECTION, RESTRIPE TO EXTEND 4TH WB MIXED FLOW LANE FROM 60/215 IC TO CENTRAL OFF-RAMP, RESTRIPE TO EXTEND 5TH WB MIXED FLOW LANE FROM 60/215 IC TO 14TH ST OFF-RAMP, AUX LNS (MADISON-CENTRAL), BRIDGE WIDENING & REPLACEMENTS, EB/WB BRAIDED RAMPS, IC MOD/RECONSTRUCT + SOUND/RETAINING WALLS	2002	8/3/2015	8/3/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION
RCTC	RIV050555	ON I-215 (N/O EUCALYPTUS AVE TO N/O BOX SPRINGS RD) & SR60 (E/O DAY ST TO SR60/I-215 JCT): RECONSTRUCT JCT TO PROVIDE 2 HOV DIRECT CONNECTOR LNS (SR60 PM: 12.21 TO 13.6) AND MINOR WIDENING TO BOX SPRINGS RD FROM 2 TO 4 THROUGH LANES BETWEEN MORTON RD AND BOX SPRINGS RD/FAIR ISLE DR IC (EA: 449311)	2011	4/29/2013	4/29/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. UNDER CONSTRUCTION.

TABLE III-3.1 RIVERSIDE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
RCTC	RIV520109	RECONSTRUCT & UPGRADE SAN JACINTO BRANCH LINE FOR RAIL PASSENGER SERVICE (RIVERSIDE TO PERRIS) (PERRIS VALLEY LINE) (FY 07 5307) (UZA: RIV-SAN)	2012	2014	2014	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. PROJECT CURRENTLY IN LITIGATION OVER DISPUTED EXTENSION OF METROLINK SERVICE TO PERRIS. RCTC IS CLOSELY WORKING WITH FTA TO SECURE THE NEPA APPROVAL BY LATE SUMMER 2012.
RCTC	RIV520111	REGIONAL RIDESHARE – CONTINUING PROGRAM.	2009	ONGOING TCM PROGRAM IN RIVERSIDE COUNTY	6/30/2018	ONGOING PROGRAM.
RIVERSIDE TRANSIT AGENCY	RIV041030	IN THE CITY OF HEMET – CONSTRUCT NEW HEMET TRANSIT CENTER (WITH APPROXIMATELY 4 BUS BAYS) AT 700 SCARAMELLA CR., HEMET, CA (5309C FY 04 + 05 EARMARKS).	6/30/2010	6/30/2013	12/31/2015	OBSTACLES ARE BEING OVER COME. THE CITY OF HEMET HAS IDENTIFIED THE POTENTIAL SITE FOR THE HEMET COURTHOUSE WITH AN ADJACENT TRANSIT CENTER AT STATE AND DEVONSHIRE. ONCE THE HEMET COURTHOUSE FUNDING IS SECURED, THE PROJECT DESIGN AND CONSTRUCTION CAN PROCEED. THE HEMET COURTHOUSE IS CURRENTLY BEING REASSESSED BY THE STATE OF CALIFORNIA. RTA WILL CONTINUE COMMUNICATIONS WITH THE CITY OF HEMET TO MOVE FORWARD WITH THE NEW SELECTED SITE BY THE FUTURE COURTHOUSE AND/OR TO CONSTRUCT AN INTERIM TRANSIT CENTER AT THE RTA OPERATIONS SITE ON SCARAMELLA (PREVIOUS LOCATION).

TABLE III-3.1 RIVERSIDE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
RIVERSIDE TRANSIT AGENCY	RIV050553	IN TEMECULA – CONSTRUCT NEW TEMECULA TRANSIT CENTER AT 27199 JEFFERSON AVE. (SW OF JEFFERSON AVE & SE OF CHERRY ST) (04, 05, 06, 07, E-2006-091, E-2007-0131, & 2008-BUSP-0131, SAFETEA-LU).	12/30/2010	12/30/2014	12/31/2015	OBSTACLES ARE BEING OVERCOME. ORIGINAL SITE AT 27199 JEFFERSON AVE IS NO LONGER FEASIBLE DUE TO ENVIRONMENTAL CONCERNS BY ARMY CORP OF ENGINEERS. TEMECULA & MURRIETA ARE WORKING TO CHOOSE A NEW SITE. A REQUEST FOR PROPOSAL TO CONDUCT A SITE FEASIBILITY STUDY IS SCHEDULED FOR JULY 2012. THE STUDY WILL IDENTIFY THE OPTIMAL LOCATION FOR A TRANSIT CENTER TO SERVE THE COMMUNITIES OF TEMECULA AND MURRIETA, AS WELL AS IDENTIFYING THE SCOPE OF WORK FOR THE PROJECT. THE FEASIBILITY STUDY WILL BE COMPLETED IN SUMMER 2013. ENVIRONMENTAL, RIGHT-OF-WAY, AND CONSTRUCTION WILL FOLLOW – ANTICIPATED COMPLETION YEAR IS 2015
RIVERSIDE TRANSIT AGENCY	RIV090609	IN WESTERN RIVERSIDE COUNTY FOR RTA: INSTALL ADVANCE TRAVELER INFORMATION SYSTEMS (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND INSTALLATION OF ELECTRONIC MESSAGE SIGNS AT APPROX. 60 BUS STOPS (FY 'S 05, 07, 08, 09, AND 10 – 5309).	2011	12/30/2012	12/30/2015	OBSTACLES ARE BEING OVERCOME. RTA HAS INSTALLED A TOTAL OF 40 SIGNS. ADDITIONAL SIGNS ARE PLANNED FOR THE MORENO VALLEY MALL TRANSFER LOCATION – RTA IS CURRENTLY NEGOTIATING PERMISSION FOR THE INSTALLATION OF THE ATIS SIGNS WITH THE MORENO VALLEY MALL OWNERS. THE ATIS ELECTRONIC MESSAGE SIGN SYSTEM ALLOWS RTA CUSTOMERS TO DERIVE BUS SCHEDULES AND ROUTE INFORMATION FROM RTA AND GOOGLE TRANSIT DIRECTLY TO WIRELESS DEVICES.

TABLE III-3.1 RIVERSIDE COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
TEMECULA	RIV62029	AT HWY 79 SO AND LA PAZ ST: ACQUIRE LAND, DESIGN AND CONSTRUCT PARK-AND-RIDE LOT – 250 SPACES (FY 05 HR4818 EARMARK)	2004/2007	12/31/2015	12/31/2015	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. INTERIM 240-SPACE PARK-N-RIDE FACILITY LOCATED IN SPENCER'S CROSSING AT THE CORNER OF BIGGS AND LOS ALAMOS (NE OF THE CITY IN THE VICINITY OF THE FRENCH VALLEY AREA) ARE OPEN. THE ORIGINAL P-N-R FACILITY AT HWY 79 SO AND LA PAZ WILL BE BUILT BY 2015 – MAX NUMBER OF SPACES IS 157. THE REMAINING 93 SPACES WILL BE PROVIDED THROUGH THE INTERIM FACILITY AT SPENCER'S CROSSING AND/OR A COMBINATION OF SPENCER'S CROSSING AND NEW CIVIC CENTER PARKING STRUCTURE.

TABLE III-3.2 RIVERSIDE COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
CORONA	RIV010227	CORONA ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS) - AND REGIONAL ITS INTEGRATION PHASE 2.	12/31/2011		COMPLETE	COMPLETE

TABLE III-3.2 RIVERSIDE COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
RCTC	RIV051201	IN CORONA – CONTINUE THE IMPLEMENTATION OF A 60 SPACE PARK-AND-RIDE LOT (VIA ANNUAL LEASE AGREEMENT) AT LIVING TRUTH CHRISTIAN FELLOWSHIP AT 1114 W. ONTARIO AVE.	9/30/2009	COMPLETE	COMPLETE	COMPLETE
RCTC	RIV070303	ON SR60 IN NW RIV CO: CONTINUE THE IMPLEMENTATION OF THE EXPANDED SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #7 PATROL , 2 TRUCKS) BETWEEN MILIKEN AVE & MAIN ST (SR60 HOV LN CHANGE TCM SUBSTITUTION PROJECT)	2010	ON GOING TCM PROGRAM IN RIVERSIDE COUNTY	COMPLETE	COMPLETE
RCTC	RIV070304	ON I-215 IN SW RIV CO: CONTINUE THE IMPLEMENTATION OF I-215 FREEWAY SERVICE PATROL (FSP) (BEAT #19, 2 TRUCKS) BETWEEN SR74/4TH ST AND ALESSANDRO BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	ON-GOING TCM PROGRAM IN RIVERSIDE COUNTY	COMPLETE	COMPLETE
RCTC	RIV070307	ON SR60 IN MORENO VALLEY: CONTINUE THE IMPLEMENTATION OF SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #8, 2 TRUCKS) BETWEEN DAY ST AND REDLANDS BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	ON-GOING TCM PROGRAM IN RIVERSIDE COUNTY	COMPLETE	COMPLETE

TABLE III-3.2 RIVERSIDE COUNTY COMPLETED/CORRECTED TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV010214	RCTC SHARE OF PURCHASE OF METROLINK CARS & LOCOMOTIVES - UP TO 47 CARS/CABS & 8 LOCOS TO BE ORDERED BY 6/30/06 (FY 03 & 04 5307) (SHARES AMONG LAOC8231, SBD20020801, & ORA090302)	12/31/2011		COMPLETE	COMPLETE
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV011242	PURCHASE EXPANSION ROLLING STOCK (2 CAB CARS AND 3 LOCOMOTIVES) FOR METROLINK IEOC AND RIVERSIDE/FULLERTON/LA LINES (EA: RIVFUL, PPNO: 0079E)	12/30/2011		COMPLETE	COMPLETE

TABLE III-3.3 RIVERSIDE COUNTY NEW TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	2013 FTIP COMPLETION DATE
MORENO VALLEY	RIV071240	IN THE CITY OF MORENO VALLEY - EAST BOUND CACTUS AVE WIDENING BETWEEN VETERANS WAY & HEACOCK: WIDENING OF EAST BOUND CACTUS AVE FROM 2 TO 3 LANES, INCLUDING TRAFFIC SIGNAL MODIFICATIONS WITHIN THE PROJECT REACH, CHANNELIZATION, AND SIGNAL INTERCONNECT SYSTEM (6 SIGNALS).	6/1/2013
RCTC	RIV071250	ON SR-91/I-15: SR91 - CONST 1 MF LN (SR71-I15)/1 AUX LN VAR LOCS(SR241-PIERCE) (OC PM 14.43-18.91), CD SYSTEM (2/3/4 LNS MAIN-I15), 1 TOLL EXPR LN (TEL) & CONVERT HOV TO TEL EA DIR (OC-I15); I15-CONST TEL MED DIR CONNCT NB15 TO WB91 AND EB91 TO SB15, 1 TEL EA DIR SR91 DIR CONNCT-ONTARIO IC (I15 PM 37.56-42.94).	7/31/2017
RCTC	RIV111207	IN WESTERN RIVERSIDE COUNTY - CONTINUE THE IMPLEMENTATION OF PARK-N-RIDE FACILITIES THROUGH PROPERTY LEASES (VARIOUS LOCATIONS THROUGHOUT THE WESTERN COUNTY).	12/30/2018

SAN BERNARDINO COUNTY

TABLE III-4.1 SAN BERNARDINO COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
OMNITRANS	981118	BUS SYSTEM – PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	2005/2008	5/31/2012	9/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO CITY'S EFFORT TO DETERMINE A LOCATION TO HAVE A REAL TRANSIT CENTER. ONTARIO IS PLANNING TO AWARD THE CONSTRUCTION CONTRACT THIS MONTH, WITH COMPLETION OF CONSTRUCTION ESTIMATED IN SEPTEMBER.
RIALTO	200450	RIALTO METROLINK STATION – INCREASE PARKING SPACES FROM 225-775	2006	12/1/2012	12/1/2015	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO DIFFICULTIES GETTING STAKEHOLDERS TO BUY IN ON LEVEL OF EFFECTIVENESS AND LAND VALUE COST ESTIMATES. FTA FUNDS AWARDED FOR JULY 2011 PROJECT IS MOVING FORWARD. RIALTO IS CURRENTLY DRAFTING THE RFP FOR DESIGN OF THE PARKING LOT.
SANBAG	200074	LUMP SUM – TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS (PROJECTS CONSISTENT W/40CFR PART 93.126,127,128, EXEMPT TABLE 2 & 3).	2004	12/1/2015	12/1/2015	ONGOING PROJECT. PAST PROJECTS HAVE BEEN COMPLETED AND NEW PROJECTS HAVE BEEN AWARDED FUNDING.

TABLE III-4.1 SAN BERNARDINO COUNTY TCMS SUBJECT TO TIMELY IMPLEMENTATION

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
VARIOUS AGENCIES	713	I-215 CORRIDOR NORTH – IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 210 – ADD 2 HOV & 2 MIXED FLOW LNS (1 IN EA. DIR.) AND OPERATIONAL IMP INCLUDING AUX LANES AND BRAIDED RAMP	2013	9/1/2013	9/1/2013	NO CHANGE IN COMPLETION DATE FROM 2012-2035 RTP/SCS TCM REPORT. ON SCHEDULE. THIS PROJECT IS OPEN TO TRAFFIC ON THE FREEWAY PORTION. INTERCHANGES ARE NOW BEING CONSTRUCTED ON THE NORTH END OF THE PROJECT. ORANGE SHOW RD. INLAND EMPIRE, MILLS AND 5TH STREET INTERCHANGES AND OFFRAMPS ARE COMPLETED. THE LARGER 215/210 INTERCHANGE IS CURRENTLY UNDER CONSTRUCTION ALL FUNDS HAVE BEEN OBLIGATED FOR THIS PROJECT

TABLE III-4.2 SAN BERNARDINO COUNTY COMPLETED/CORRECTED TCMS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2012-2035 RTP/SCS COMPLETION DATE	2013 FTIP COMPLETION DATE	2013 FTIP PROJECT STATUS
FONTANA	200431	INLAND PACIFIC ELECTRIC TRAIL - ON OLD SP ABANDONED RR BETWEEN I-15 TO MAPLE AVE.- CONSTRUCT CLASS 1 BIKE LANE (APPROX. 7 MILES LONG)	12/1/2011		COMPLETE	COMPLETE
SAN BERNARDINO , CITY OF	20020802	METROLINK ADD'L PARKING STRUCTURE - CONSTRUCT 5 LEVEL PARKING STRUCTURE TO SERVE EXISTING METROLINK STATION AT SANTA FE DEPOT LOCATION	6/30/2009		COMPLETE	COMPLETE

TABLE III-4.2 SAN BERNARDINO COUNTY COMPLETED/CORRECTED TCMS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2012-2035 RTP/SCS COMPLETION DATE**	**2013 FTIP COMPLETION DATE**	**2013 FTIP PROJECT STATUS**
SANBAG	20040827	RIDESHARE PROGRAM FOR SOUTHCOAST AIR DISTRIST	2009	12/1/2015	COMPLETE	COMPLETE

TABLE III-4.3 SAN BERNARDINO COUNTY NEW TCMS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2013 FTIP COMPLETION DATE**
SANBAG	20061012	DOWNTOWN S.B. PASSENGER RAIL – FROM SAN BERNARDINO METROLINK STATION TO APPROX. 1 MILE EAST TO A NEW METROLINK STATION AT RIALTO AVE AND E ST. IN DOWNTOWN SAN BERNARDINO	10/10/2014
UPLAND	20040825	UPLAND METROLINK STATION - ADDITIONAL PARKING FROM 200 TO 500 spaces	12/1/2013

2011 FTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
ARTESIA	LAF1607	SOUTH STREET PEDESTRIAN, BIKEWAY AND TRANSIT IMPROVEMENT. IMPROVE PEDESTRIAN ENVIRONMENT AND TRANSIT STOP LOCATIONS WITH LANDSCAPED MEDIANS, TRANSIT SHELTERS, BENCHES, SIDEWALK ENHANCEMENTS AND LIGHTING. CLOSE EXISTING BIKE LANE GAP.	2014	2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. WAITING FOR METRO APPROVAL FOR DESIGN PHASE OF PROJECT. ON SCHEDULE.
AVALON	LAF1501	COUNTY CLUB DRIVE BIKEWAY IMPROVEMENT PROJECT. CONSTRUCTION OF A 4-FOOT WIDE CLASS II BIKE LANE IN BOTH DIRECTIONS ALONG A ONE MILE SECTION OF COUNTRY CLUB DRIVE.	2013	2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
BALDWIN PARK	LAE0076	CONSTRUCT ADD'L VEHICLE PARKING (200 TO 400 SPACES), BICYCLE PARKING LOT AND PEDESTRIAN REST AREA AT THE TRANSIT CENTER	2010	2010	2014	OBSTACLES ARE BEING OVERCOME. DELAY BECAUSE THE ENVIRONMENTAL DOCUMENT WAS REJECTED BY FTA. THE FTA IS REVIEWING THIS PROJECT TO SEE IF IT SHOULD BE REASSIGNED TO FOOTHILL TRANSIT AUTHORITY.
BALDWIN PARK	LAF1654	BALDWIN PARK METROLINK PEDESTRIAN OVERCROSSING. CONSTRUCT A PEDESTRIAN OVERCROSSING OVER BOGART AVE AND THE METROLINK LINE TO LINK THE STATION WITH VITAL BUS TRANSFER POINTS AND TO PROVIDE ACCESS TO PARKING OVERFLOW AREAS.	2015	2015	10/1/2015	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
BALDWIN PARK	LAFA141	BALDWIN PARK METROLINK TRANSPORTATION CENTER. FUNDED THRU STIP AUGMENTATION CONSTRUCTION A TRANSPORTATION CENTER AND PARKING STRUCTURE AT THE BALDWIN PARK METROLINK STATION.	2012	2012	11/1/2012	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PROJECT FUNDING UPDATED. ON SCHEDULE.
BURBANK	LAF1502	SAN FERNANDO BIKEWAY. IMPLEMENT A CLASS I BIKEWAY ALONG SAN FERNANDO BLVD, VICTORY PLACE AND BURBANK WESTERN CHANNEL TO COMPLETE THE BURBANK LEG OF A 12 MILE BIKEWAY.	2014	2014	6/30/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
CALTRANS	LA000357	ROUTE 5: --- FROM ROUTE 170 TO ROUTE 118 ONE HOV LANE IN EACH DIRECTION (10 TO 12 LANES) INCLUDING THE RECONSTRUCTION OF THE I-5/SR-170 MIXED FLOW CONNECTOR AND THE CONSTRUCTION OF THE I-5/SR-170 HOV TO HOV CONNECTOR (CFP 345) (2001 CFP 8339; CFP2197).	2008/2010	2011	12/31/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
CALTRANS	LA000358	ROUTE 5: --- FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 12180, 12181,12182,12183,12184, 13350 PPNO 0142F,151E,3985,3986,3987) SAFETEA LU # 570. CONSTRUCT MODIFIED IC @ I-5 EMPIRE AVE, AUX LNS NB & SB BETWEEN BURB	2012/2010	2011	12/31/2014	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO RAILROAD WORK AND COMPLEX CONSTRUCTION STAGING AND COORDINATION OF THE RAILROAD AND ROADWAY ELEMENTS.
CALTRANS	LA000548	ROUTE 10: FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (EA# 117080, PPNO# 0309N)	2030/2015	2015	2/12/2016	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO ACCOMMODATING THE COMBINING OF TWO SOUND WALL PROJECTS IN THE SAME POST MILE. THE SOUND WALL ALIGNMENT CAN NOT BE FINALIZED WITHOUT THE I-10 HOV WIDENING PROJECT CENTER LINE REALIGNMENT. THE SCHEDULE OF THE SOUND WALL PROJECT WILL BE MATCHED WITH THE HOV PROJECT TO AVOID SCHEDULE CHANGES.
CALTRANS	LA01342	ROUTE 10: RT 10 FROM RT 605 TO PUENTE AVE HOV LANES (8+0 TO 8+2) (EA# 117070, PPNO 0306H) PPNO 3333 3382 AB 3090 REP (TCRP #40)	2008/2010	2011	10/28/2013	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO RW AND UTILITIES RELOCATION COMPLICATIONS.
CALTRANS	LA0B875	ROUTE 10: HOV LANES FROM CITRUS TO ROUTE 57/210 - (EA# 11934, PPNO# 0310B)	2015	2015	3/15/2016	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO NEW REQUIREMENTS TO SWITCH FROM METRIC TO ENGLISH AND NEW MAPPING AS RESULT.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
CALTRANS	LA0D73	ROUTE 5: LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW (EA 2159A0, PPNO 2808). TCRP#42.2&42.1	2014	2016	12/1/2016	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. CARRYOVER FROM 2008 FTIP WITH SCHEDULE & FUNDING UPDATES. ON SCHEDULE.
CALTRANS	LA996134	ROUTE 5: RTE. 5/14 INTERCHANGE & HOV LNS ON RTE 14 - CONSTRUCT 2 ELEVATED LANES - HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO 0168M)	2014/2009	2013	5/24/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
CALTRANS	LA996137	ROUTE 60: RTE. 60 HOV LNS. FROM RTE. 605 TO BREA CANYON RD. -- CONSTRUCT ONE HOV LANE IN EACH DIRECTION) (CFP: 358, 4262, 6137=67,150+IIP: 5,100) (EA#129410, 129421, PPNO 0482R,0482RA)	2008/2007	2011	5/1/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
CARSON	LAE2932	213TH ST. PEDESTRIAN SIDEWALK BRIGE OVER DOMINGUEZ CHANNEL. CONSTRUCT 213TH ST. PEDESTRIAN BRIDGE TO PROVIDE SAFE PASSAGE FOR PEDESTRIANS & WHEELCHAIRS OVER DOMINGUEZ CHANNEL.	2010	2010	12/31/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO FUNDING ISSUES. CITY HAS SUBMITTED 2009 HSIP APPLICATION FOR ADDITIONAL FUNDS. AWAITING THE RESULT.
CULVER CITY	LAF1717	REAL-TIME MOTORIST PARKING INFORMATION SYSTEM DEMONSTRATION. THIS PROJECT WILL PROVIDE A REAL-TIME INFORMATION SYSTEM TO COMMUNICATE AND GUIDE MOTORISTS TO AVAILABLE PARKING SPACES IN SELECTED PARKING STRUCTURES IN THE CITY OF CULVER CITY.	2011	2011	6/30/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. REVISED PROJECT FUNDING SCHEDULE. ON SCHEDULE.
CULVER CITY MUNI BUS LINES	LA0C8382	SEPULVEDA BLVD BUS STOP IMPROVEMENT PROGRAM. BUS STOP AMENITIES INC LIGHTING SIGNAGE, LANDSCAPING, SHELTERS, SEATING, LANDINGS AND TRASH RECEPTACLES.	2008/2010	2010	6/30/2010	SUBSTITUTED WITH LAF1601-SAN GABRIEL CITY-WIDE BUS SHELTER INSTALLATION IN APRIL 2009.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
EL MONTE	LAF1504	EL MONTE: TRANSIT CYCLE FRIENDLY. EL MONTE PROPOSES TO IMPLEMENT THE 1ST PHASE OF THE EL MONTE BIKE-TRANSIT HUB COMPONENT (METRO BICYCLE TRANSPORTATION STRATEGIC PLAN) A COUNTYWIDE EFFORT TO IMPROVE BIKE FACILITIES	2013	2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. MOU AGREEMENT BETWEEN METRO AND THE CITY APPROVED BY THE CITY. MOU IS IN PROCESS AT METRO. AGENCY IS PREPARING ENVIRONMENTAL DOCUMENTS FOR CALTRANS REVIEW. ON SCHEDULE.
FOOTHILL TRANSIT ZONE	LA0B311	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM SAFETEA-LU # 341 (E-2006-BUSP-092) (E-2006-BUSP-173)	2003/2005	2010	12/31/2013	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO THE ACTION BY THE CITY COUNCIL TO DENY THE ORIGINAL LOCATION OF THE PARK N RIDE LOT. FOOTHILL TRANSIT HAS BEEN AGGRESSIVELY EXPLORING OTHER ALTERNATIVE LOCATIONS AND HAS IDENTIFIED THREE PROSPECT PARKING LOCATIONS.
GLENDALE	LAE0001A	PURCHASE OF CNG BUSES FOR GLENDALE BEELINE TRANSIT SYSTEM	2010	2010	12/1/2011	MANUFACTURING DELAY OBSTACLES ARE BEING OVERCOME.
LA MIRADA	LA0D349	PURCHASE EXPANSION BUSES WITH ALTERNATE FUEL (HYBRID/ELECTRIC)	2008	2008	6/30/2011	MANUFACTURING DELAY OBSTACLES ARE BEING OVERCOME.
LONG BEACH	LAE1296	LONG BEACH INTELLIGENT TRANSPORTATION SYSTEM	2011	2011	9/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO COORDINATION WITH ANOTHER ITS PROJECT UNDER DEVELOPMENT.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
LONG BEACH	LAF1530	BICYCLE SYSTEM GAP CLOSURES & IMPROVED LA RIVER BIKE PATH. PROJECT WILL CONSTRUCT PRIORITY CLASS I & III BICYCLE SYSTEM GAP CLOSURES IN LONG BEACH AND IMPROVE CONNECTION TO LA RIVER.	2014	2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PROJECT START DELAYED BUT PROJECT COMPLETION IS ON SCHEDULE.
LOS ANGELES COUNTY	LAF1514	EMERALD NECKLACE BIKE TRAIL PROJECT. DESIGN AND CONSTRUCT 1.1 MILES OF CLASS I BIKE PATH TO CONNECT DUARTE ROAD TO THE SAN GABRIEL RIVER BICYCLE TRAIL.	2011	2011	12/31/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
LOS ANGELES COUNTY MTA	LA0C10	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT PHASE I TO VENICE-ROBERTSON STATION	2011/2012	2010	12/31/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO PS&E ISSUES.
LOS ANGELES COUNTY MTA	LA0C8114	LA CITY RIDESHARE SERVICES; PROVIDE COMMUTE INFO, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS. PPNO 9003	2009	2010	12/30/2016	NO DELAY. ON-GOING PROJECT.
LOS ANGELES COUNTY MTA	LA29202U3	SAN FERNANDO VALLEY NORTH/SOUTH BRT EXTENSION PHASE I: METRO RAPID SERVICE ALONG RESEDA BLVD. AND SEPULVEDA BLVD. SAFETEA-LU # 183	2005	2009	12/31/2011	OBSTACLES ARE BEING OVERCOME THROUGH ON GOING CONTRACT NEGOTIATION WITH THE CITY OF LOS ANGELES.
LOS ANGELES COUNTY MTA	LA29202U5	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE III: STATION ACCESSIBILITY AND PEDESTRIAN ENHANCEMENTS ON RESEDA BLVD., SEPULVEDA BLVD., AND LANKERSHIM BLVD.	2005/2008	2010	2012	PROJECT IN PROGRESS, ALL FUNDS OBLIGATED. PROJECT OBSTACLES BEING OVERCOME THROUGH ON GOING CONTRACT NEGOTIATION WITH THE CITY OF LOS ANGELES.
LOS ANGELES COUNTY MTA	LA29202U6	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE IV: COMPLETION OF A NORTHBOUND BUS ONLY LANE ON A PORTION OF SEPULVEDA BLVD. AND OTHER IMPROVEMENTS.	2005/2009	2010	2012	PROJECT IN PROGRESS, ALL FUNDS OBLIGATED. PROJECT OBSTACLES BEING OVERCOME THROUGH ON GOING CONTRACT NEGOTIATION WITH THE CITY OF LOS ANGELES.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
LOS ANGELES COUNTY MTA	LA29202W	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. FROM VERMONT TO SANTA MONICA DOWNTOWN- MID-CITY WILSHIRE BRT INCL. DIV. EXPANSION AND BUS ONLY LANE	2009/2010	2011	12/31/2012	OBSTACLES ARE BEING OVERCOME. PROJECT IS GOING THROUGH ENVIRONMENTAL REVIEW PROCESS.
LOS ANGELES COUNTY MTA	LA963542	ACQUISITION REVENUE VEHICLES - 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS); FY05-FY10 TOTAL OF 1000 BUSES.	2005	2012	6/30/2014	ON-GOING BUS PURCHASE PROJECT.
LOS ANGELES COUNTY MTA	LA974165	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMMODATE PUBLIC ACCESS (PEDESTRIAN ENTRANCES, WALKWAYS, BICYCLE FACILITIES) PPNO# 3417	2002/2007	2011	12/30/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. UNDER CONSTRUCTION. ON SCHEDULE.
LOS ANGELES COUNTY MTA	LA990305	LIGHT RAIL TRANSIT FLEET- 50 NEW RAIL CAR (26 EXP (10 FOR METRO GOLD LINE EASTSIDE & (16) FOR EXPOSITION LRT) 24 REPLACEMENT CARS - .PPNO 3225.	7/2/1905	2010	2012	PROJECT ON-GOING. NO DELAY. ALL FUNDS OBLIGATED. ALL VEHICLES WILL BE IN SERVICE IN 2012.
LOS ANGELES COUNTY MTA	LAE0036	WILSHIRE/ VERMONT PEDESTRIAN PLAZA IMPROVEMENTS AND INTERMODAL PEDESTRIAN LINKAGES	2011	2011	2012	PROJECT ON-GOING. NO DELAY. ALL FUNDS OBLIGATED. ALL VEHICLES WILL BE IN SERVICE IN 2012.
LOS ANGELES COUNTY MTA	LAE0195	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES PIERCE COLLEGE AND MTA'S RAPID BUS TRANSIT STOPS TO INCLUDE PASSENGER AMENITIES, 2007 CFP # F1658	2010	2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
LOS ANGELES COUNTY MTA	LAE0388A	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES MISSION COLLEGE AND PUBLIC TRANSIT SERVICES TO INCLUDE LIGHTING, LANDSCAPIND, AND PASSENGER AMENITIES	2010	2010	12/31/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
LOS ANGELES, CITY OF	LA002738	BIKEWAY/PEDESTRIAN BRIDGE OVER LA RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077) (PPNO# 3156)	2009	2012	7/31/2015	OBSTACLES ARE BEING OVERCOME. DESIGN IS ON HOLD, PENDING MTA'S SECURING OF AT-GRADE CROSSING OF SERVICE TRACKS FROM UP/SCRRA.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LA0B7330	SAN FERNANDO RD ROW BIKE PATH PHSE II-CONSTRUCT 2.75 MILES CLAS I FRM FIRST ST TO BRANFORD ST,ON MTA-OWND ROW PARLEL TO SAN FERNANDO RD. LINK CYCLSTS TO NUMEROUS BUS LNE. PPNO 2868.	2005	2010	11/30/2011	OBSTACLES ARE BEING OVERCOME. MINOR DELAY DUE TO ENVIRONMENTAL CLEARANCE DOCUMENTATION. PROJECT CONSTRUCTION HAS STARTED (SIGNAL WORK). CIVIL CONSTRUCTION IS SCHEDULED TO BEGIN IN NOVEMBER, 2009.
LOS ANGELES, CITY OF	LA0C8164	EXPOSITION BLVD RIGHT-OF-WAY BIKE PATH-WESTSIDE EXTENSION. DESIGN AND CONSTRUCTION OF 2.5 MILES OF CLASS 1 BIKEWAY, LIGHTING, LANDSCAPING & INTERSECTION IMPROVEMENTS. (PPNO# 3184)	2009	2010	2/2/2011	OBSTACLES ARE BEING OVERCOME. PROJECT WILL BE COMPLETED BY EXPOSITION CONSTRUCTION AUTHORITY AS A DESIGN-BUILD PROJECT, IN CONJUNCTION WITH EXPOSITION PHASE II LIGHT RAIL PROJECT. PROJECT IS SCHEDULED TO BEGIN IN EARLY 2010.
LOS ANGELES, CITY OF	LA0C8171	GAYLEY AVE BIKE LANES & STREET WIDENING. DESIGN AND CONSTRUCTION OF .25 MILES OF CLASS II BIKE LANES ON GAYLEY AVE FROM EXISTING BIKE LANES AT LEVERING AVENUE TO THE UCLA CAMPUS	2010	2013	5/31/2013	SUBSTITUTED WITH LAF1505 – SAN FERNARDO PACOIMA WASH BIKE PATH IN APRIL 2009.
LOS ANGELES, CITY OF	LA0C8380	CHINATOWN/COLLEGE STREET GOLD LINE STATION - INTERMODEL TRANS. CENTER ENHANCE MENT (PEDESTRIAN WALKWAY BRIDGE, BUS STATION, AND A BIKE STATION)	2004/2008	2008	2012	SEVERE OBSTACLES ARE BEING OVERCOME. DELAY IN CONSTRUCTION DUE TO ISSUES WITH EXISTING DEVELOPMENTS SURROUNDING THE CHINA TOWN GOLD LINE STATION. CITY OF LA HAS HAD DIFFICULTY ACQUIRING PROPERTY TO JOIN THE STATION TO BROADWAY THAT IS NEEDED TO BUILD BIKE STATION AND BRIDGE. CITY IS IN NEGOTIATION WITH THE BANK THAT OWNS THE PROPERTY NEEDED FOR THE PROJECT.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LAF1450	ENCINO PARK-AND-RIDE FACILITY RENOVATION. RENOVATION OF THE ENCINO PARK-AND-RIDE FACILITY IN ORDER TO ADDRESS PHYSICAL AND STRUCTURAL DEFICIENCIES AND ADD CAPACITY TO THIS HEAVILY UTILIZED FACILITY. INCLUDES 50 NEW PARKING SPACES AND BIKE LOCKERS.	2013	2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
LOS ANGELES, CITY OF	LAF1615	EASTSIDE LIGHT RAIL PEDESTRIAN LINKAGE. IMPROVE LINKAGES WITHIN 1/4 MILE OF METRO'S GOLD LINE LRT.	2012	2012	6/29/2012	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PE PHASE IS IN PROGRESS. ON SCHEDULE.
LOS ANGELES, CITY OF	LAF1657	LOS ANGELES VALLEY COLLEGE (LAVC) BUS STATION EXTENSION. PROJECT WILL EXTEND THE ORANGE LINE STATION AT THE LA VALLEY COLLEGE BY PROVIDING A DIRECT PEDESTRIAN CONNECTION FROM THE STATION TO A NEW PEDESTRIAN ENTRANCE TO LAVC.	2013	2013	10/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
LOS ANGELES, CITY OF	LAF1704	DOWNTOWN L.A. ALTERNATIVE GREEN TRANSIT MODES TRIAL PROGRAM. OFFER SHARED RIDE-BICYCLE AND NEIGHBORHOOD ELECTRIC VEHICLE TRANSIT SERVICES TO LA CITY HALL AS AN ALTERNATIVE TO OVERCROWDED DASH SERVICE	2014	2014	6/27/2014	NOT A TCM UNTIL PERMENANT.
LOS ANGELES, CITY OF	LAF1708	HOLLYWOOD INTEGRATED MODAL INFORMATION SYSTEM. INSTALLATION OF ELECTRONIC, DIRECTION AND PARKING AVAILABILITY SIGNS WITH INTERNET CONNECTIVITY TO PROVIDE ADVANCE AND REAL-TIME INFORMATION INTENDED TO INCREASE TRANSIT RIDERSHIP	2015	2015	9/21/2015	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. BEGINNING WORK ON FIELD REVIEW AND PES CALTRANS FORMS. ON SCHEDULE.
LOS ANGELES, CITY OF	LAOB416	ROUTE 101: IN LOS ANGELES - DOWNTOWN OVER FREEWAY 101 - PEDESTRIAN BRIDGE ENHANCEMENT	2010	2010	6/30/2010	NOT A TCM AS JUST AN UPGRADE PROJECT.
MONROVIA	LAE0039	TRANSIT VILLAGE - PROVIDE A TRANS. FACILITY FOR SATELLITE PARKING FOR SIERRA MADRE VILLA GOLD LINE STA, P-N-R FOR COMMUTERS, A FOOTHILL TRANSIT STORE.	2010	2010	12/31/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO ENVIRONMENTAL CLEARANCE ISSUES.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
PALMDALE	LAF1507	AVENUE S BIKEWAY PHASE 2. CLASS I BIKEWAY IMPROVEMENTS ALONG THE GENERAL ALIGNMENT OF AVENUE S IN THE CITY OF PALMDALE. THIS PROJECT WILL INCLUDE CLOSING GAPS IN OUR LOCAL BICYCLE PLAN.	2014	2014	10/1/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PROJECT IN PRE-DESIGN. ON SCHEDULE.
PASADENA	LA0D372	SOUTH ACCESS PEDESTRIAN BRIDGE TO SIERRA MADRE VILLA LIGHT RAIL STATION. THIS PEDESTRIAN BRIDGE OVER THE ROUTE 210 FREEWAY WILL PROVIDE A DIRECT AND SAFE APPROACH FOR PEDESTRIANS	6/29/1905	2010	9/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY AS A RESULT OF THE PROJECT BEING REQUIRED TO BE RE-DESIGNED TO MEET CURRENT AASHTO AND CALTRANS BRIDGE DESIGN STANDARDS.
PASADENA	LA0D47	SR 710 MITIGATION PROJECT-TRAFFIC CONTROL AND MONITORING SYSTEM-INTELLIGENT TRANSPORTATION SYSTEMS (ITS). CONSTRUCT AND INSTALL ITS TECHNOLOGY AND VARIOUS DEGREES OF SMART SIGNALS	2008	2008	12/30/2010	OBSTACLES ARE BEING OVERCOME. SUBSTANTIALLY COMPLETE. DELAY DUE TO OVERALL PROJECT INTEGRATION WITH EXISTING ITS STREET INFRASTRUCTURE. LAST STAGE OF SYSTEM INTEGRATION AND TIMING IS CURRENTLY BEING COMPLETED.
PASADENA	LAE3790	THE PASADENA ITS INTEGRATES 3 COMPONENTS; TRAFFIC SIGNAL COMMUNICATION AND CONTRL, TRANSIT VEHICLE ARRIVAL INFO AND PUBLIC PARKING AVAILABILITY INFO. SAFETEA-LU PRJ #3790 AND #399	2010	2013	6/2011	PROJECT IS AHEAD OF SCHEDULE TO BE COMPLETED BY JUNE 2011.
RANCHO PALOS VERDES	LAF1506	BIKE COMPATIBLE RDWY SAFETY AND LINKAGE ON PALOS VERDES DR. THE PROJECT WILL HAVE A CLASS II BIKE LANE ON BOTH SIDES OF PALOS VERDES DRIVE SOUTH, WITH AN UNPAVED SHOULDER FOR EMERGENCY USE.	2014	2014	10/9/2014	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. CITY STAFF IN THE PROCESS OF COMPLETING THE CULTURAL RESOURCES SERVICES REPORT REQUIRED BY CALTRANS. ON SCHEDULE.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
RANCHO PALOS VERDES	LAF1605	PEDESTRIAN SAFE BUS STOP LINKAGE. LINKING 11 BUS STOPS CURRENTLY INACCESSIBLE BECAUSE OF LACK OF SIDEWALKS ON BOTH THE EAST AND WEST SIDE OF HAWTHORNE BLVD. FROM CREST RD. TO PALOS VERDES DR. SOUTH (ABOUT 13,000')	2013	2013	12/9/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
SAN GABRIEL VALLEY COG	LA0C57	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEP. AT PASSONS BLVD IN PICO RIVERA (& MODIFY PROFILE OF SERAPIS AV,)(PART OF ALAMEDA CORR EAST PROJ.)SAFETEA-LU HPP # 1666 (TCRP #54.3)	2006	2010	12/31/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
SAN GABRIEL VALLEY COG	LA990359	GRADE SEP XINGS SAFETY IMPR; 35- MI FREIGHT RAIL CORR. THRGH SAN.GAB. VALLEY - EAST. L.A. TO POMONA ALONG UPRR ALHAMBRA &L.A. SUBDIV - ITS 2318 SAFETEA #2178;1436 #1934 PPNO 2318	2003/2009	2010	6/30/2018	NO DELAY. ON-GOING PROJECT. ADD NEW PHASE AND MODIFY SCOPE AND COMPLETION DATE.
SANTA CLARITA	LAF1424	MCBEAN REGIONAL TRANSIT CENTER PARK AND RIDE. PURCHASE LAND, DESIGN, AND CONSTRUCT A REGIONAL PARK-AND-RIDE LOT ADJACENT TO THE MCBEAN REGIONAL TRANSIT CENTER IN THE CITY OF SANTA CLARITA.	2012	2012	10/1/2012	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
SANTA FE SPRINGS	LA0F096	NORWALK SANTA FE SPRINGS TRANSPORTATION CENTER PARKING EXPANSION AND BIKEWAY IMPROVEMENTS. PROVIDE ADDITIONAL 250 PARKING SPACES FOR TRANSIT CENTER PATRONS AND IMPROVE BICYCLES ACCESS TO THE TRANSIT CENTER	2011	2011	8/23/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PROJECT DESIGN HAS BEEN COMPLETED AND AGENCY IS READY TO ADVERTISE FOR BIDS. CITY IS WORKING WITH METRO AND CALTRANS TO SWAP ISTEA FUNDS FOR PROP C FUNDS. ON SCHEDULE.
SANTA MONICA	LAE0364	CONSTRUCT INTERMODAL PARK AND RIDE FACILITY AT SANTA MONICA COLLEGE CAMPUS ON SOUTH BUNDY DRIVE NEAR AIRPORT AVENUE	2010	2010	12/31/2012	OBSTACLES ARE BEING OVERCOME. AWAITING A PROJECT TITLE CHANGE IN THE LEGISLATURE AS FUNDS ARE EARMARKS. ONCE APPROVED, PROJECT WILL BE READY TO MOVE FORWARD.

LOS ANGELES COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
SANTA MONICA	LAF1534	BIKE TECHNOLOGY DEMONSTRATION. PROJECT WILL CONSIST OF DESIGN, INSTALLATION AND EVALUATION OF SEVERAL BICYCLE TECHNOLOGIES, INCLUDING BICYCLE ACTIVATED DETECTION AT INTERSECTIONS, BIKE BOXES, AND BIKE PARKING.	2015	2015	6/30/2015	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. REVISED TO MATCH METRO LOASP000F1534. ON SCHEDULE.
TORRANCE	LA0D379	AUTOMATIC VEHICLE LOCATOR (AVL) PROJECT-PHASE 2	2007	2008	12/31/2011	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO FINANCIAL DIFFICULTIES. THE FINAL BID AMOUNT WAS MUCH HIGHER THAN THE ESTIMATE PROJECT COST AND THE AGENCY NEEDED TO FIND ADDITIONAL LOCAL FUNDING TO COMPLETE THE PROJECT. PROJECT IS IN FINAL BAFO STAGE. CONTRACT TO BE AWARDED IN EARLY 2010, WITH WORK TO BEGIN SOON AFTER. ESTIMATED COMPLETION DATE OF AVL PROJECT IS 12/31/11.
WESTLAKE VILLAGE	LA960142	LINDERO CANYON ROAD FROM AGOURA TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION	2003/2005	2013	1/30/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. UNDER CONSTRUCTION. ON SCHEDULE.

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
ALAMEDA CORRIDOR EAST	LA990353	ALAMEDA CORRIDOR EAST – NOGALES ST GRADE SEP	2006	2010	12/29/2010	DELETE PROJECT. PROJECT TRANSFERRED TO ALAMEDA CORRIDOR EAST (ACE).TRANSFERRED TO ACE ON APRIL 2008 AND IS NOW INCLUDED IN OUR TIP (LA990359) WITH TARGET COMPLETION OF JUNE 2012. DELAY DUE TO ISSUES TRANSFERRING THE PROJECT FROM ONE AGENCY TO ANOTHER.
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0D428	PURCHASE PROPERTY/CONSTRUCT PASSENGER TRANSFER STATION	2010	2010	6/30/2010	CORRECTED. NOT A TCM - EXPANSION OF EXISTING FACILITIES.
BELL GARDENS	LA0F099	TRANSIT CENTER AND PARK AND RIDE; CONSIST OF BUS STOP AMENITIES INCLUDING NEW BUS SHELTER, BENCHES, LANDSCAPING ETC.THE TRANSIT CENTER WILL BE SUPPORTED BY A 283 SPACE PARK & RIDE	2009	2010	6/30/2010	CORRECTED. NOT A TCM - UPGRADE OF EXISTING PARKING LOT AND BUS TRANSFER FACILITY.
BELLFLOWER	LA996275	WEST BRANCH GREENWAY MULTI-MODAL TRANS. CORRIDOR DESIGN AND CONSTRUCT 2.5 MILE CLASS I BIKE PATH ALONG MTA-OWNED SANTA ANA BRANCH ROW INCL. PEDESTRIAN AND LANDSCAPING (3145)	2006	2008	12/1/2009	COMPLETED.
BURBANK	LAF1455	CROSS-TOWN TRANSIT CONNECTOR AND SERVICE EXPANSION. FUNDS TO ACQUIRE TWO (2) OF FOUR (4) REQUESTED CNG BUSES TO IMPLEMENT NEW LOCAL TRANSIT SERVICE.	2013	2013	10/1/2013	CORRECTED. NOT REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 55).
CALABASAS	LA974100	U.S. 101 INTERJURISDICTIONAL BIKE LANE GAP CLOSURE CONSTRUCTION 4.5 MILES OF BIKEWAY IMPROVEMENTS TO CLOSE SEVERAL GAPS WITHIN A 12 MILE CORRIDOR(TEA21-#69) (PPNO# 3147)	2003/2006	2008	12/31/2008	COMPLETED.
CALTRANS	1178A	ROUTE 405: IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) (2206LK CFP) OBLIGATED 6207 (034)	2006	2008	3/15/2009	COMPLETED.

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
CALTRANS	LA01344	ROUTE 5: RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES. EA# 122001, PPNO 0162P. GARVEE PROJECT.	2005/2006	2008	5/20/2008	COMPLETED.
CALTRANS	LA0C8344	ROUTE 405: EXTENSION OF N/B I-405 HOV LANE-TO EXTEND THE HOV LANE ON N/B I-405 FROM SOUTH OF VENTURA BL TO SO. BURBANK BLVD WHERE IT WILL JOIN THE EXISTING HOV LANE. (EA# 199620, PPNO# 2788).	2007	2008	10/1/2007	COMPLETED.
CALTRANS	LA195900	ROUTE 405: RTE. 405 - WATERFORD AVE. TO RTE 10 - AUX LANE: LOS ANGELES - WATERFORD AV. TO RTE 10 - CONSTRUCT S/B AUX LANE & S/B HOV LN (2001 CFP 8354) (EA# 195900 ,PPNO 2333). GARV 12/03	2006/2007	2009	4/3/2009	COMPLETED.
CALTRANS	LA963724	ROUTE 210: IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNARDINO COUNTY LINE - CONSTRUCT 8-LANE FREEWAY INCLUDING 2-HOV LANES (12620, 12640, 12630, 10501, 17210) 24270	2003	2010	3/2/2010	COMPLETED.
CALTRANS	LA996138	ROUTE 5: RTE.5 HOV LNS. FROM FLORENCE AVE TO RTE.19 - ADD ONE LANE IN EACH DIRECTION		2016		CORRECTED. DUPLICATE OF LA0D73.
CARSON	LA0C8219	SOUTH BAY PAVILION REGIONAL TRANSIT CTR. CONSTRUCTION OF A TRANSIT CTR AT THE SOUTH BAY PAVILION SHOPPING CTR TO BE SERVED BY ALL 8 CARSON CIRCUIT RTES & MTA LINES #205 & #446-447.	2006	2010	2/28/2010	CORRECTED. NOT A TCM BECAUSE THE FACILITY IS TO SERVE EXISTING BUS ROUTES.
CLAREMONT	LA0D103	PARKING FACILITY EXPANSION FOR TRANSIT PATRONS. THE CITY AND THE REDEVELOPMENT AGENCY WILL EXPAND ON AN EXISTING PARKING FACILITY (500 PARKING SPACE) FOR ADDITIONAL USE BY TRANSIT PATRONS.	2006	2009	12/31/2009	COMPLETED.
COMPTON	LAOB7326	COMPTON CREEK BIKEWAY EXTSN - PHASE III.DSIGN & CNSTRUCT .6 MI OF CLAS 1 BIKE/PED PATH FRM GREENLEAF BL TO ARTESIA FWY.WILL INC BIKE PATH, PED WALKWAY SIGNAGE, STRPNG. (PPNO 2869).	2005/2006	2009	12/30/2010	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
CULVER CITY MUNI BUS LINES	LA0B400	PURCHASE CNG BUSES AND EXPAND NATURAL GAS FUELING FACILITY (SAFETEA-LU TRANSIT PROJECT #207) PROCUREMENT OF SIX (6) 40' CNG EXPANSION BUSES.	2004	2008	7/1/2008	COMPLETED.

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
FOOTHILL TRANSIT ZONE	LA963526	BUS STOP ENHANCEMENT	2005	2008	12/31/2011	CORRECTED. NOT A TCM.
FOOTHILL TRANSIT ZONE	LA9811007	AVL SYSTEM, ARRIVAL SIGNS, (SMART BUS PROJECT) AND LINE 187 SIGNAL PRIORITY	2005	2008	12/31/2008	COMPLETED.
GARDENA	LA0D340	PURCHASE FIVE (5) 40 FT. ALTERNATIVE FUEL BUSES FOR SERVICE EXPANSION. PART OF SAFETEA-LU TRANSIT PROJECT #260 ALONG WITH LA0D308, LA000507, AND LA0D307	2010	2010	6/30/2010	COMPLETED.
GLENDALE	LAFA144	PURCHASE OF 4-40'CNG BUSES FOR THE GLENDALE BEELINE.		2012		COMPLETED.
LA CANADA-FLINTRIDGE	LA0C8159	LA CANADA FLINTRIDGE EAST/WEST BIKEWAY CORRIDOR. DESIGN AND CONSTRUCTION OF 3.42 MILES OF EAST/WEST DIRECTIONAL CLASS II AND CLASS III BIKEWAY IN THE CITY OF LA CANADA FLINTRIDGE.	2008	2008	12/30/2009	COMPLETED.
LONG BEACH	LA0C8163	BIKEWAY AND PEDESTRIAN IMPROVEMENTS. 1.2 MILE CLASS I BIKE/PED PATH FROM WALNUT AVE TO WILLOW ST AT THE BLUE LINE STATION. (PPNO# 3408)	2005	2011	8/1/2010	COMPLETED.
LONG BEACH	LA0C8331	LONG BEACH WAYFINDING/TRANSIT CONNECTION PROGRAM OF SIGNS WILL BE PEDESTRIAN, VEHICULAR, A PARKING AND WILL INCLUDE MAPPING THAT DISPLAYS DESTINATIONS AND TRANSIT OPTIONS.	2004	2009	9/30/2010	COMPLETED.
LONG BEACH	LAF1528	SAN GABRIEL RIVER BIKE PATH GAP CLOSURE AT WILLOW STREET. CREATION OF OFF-STREET BICYCLE PATH TO ACHIEVE BICYCLE ROUTE GAP CLOSURE ON WILLOW STREET FROM THE SAN GABRIEL RIVER BIKE PATH WEST TO STUDEBAKER ROAD	2014	2014	6/30/2014	CORRECTED. NOT A COMMITTED TCM.
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA0C8383	LONG BEACH TRANSIT: BUS STOP IMPROVEMENT PROJ. ENHANCE 9 OF RAIL STATION FEEDER BUS STOPS TO EASE TRANSFERS, MAKE PUBLIC TRANSIT MORE AESTHETICALLY PLEASING & SAFER, INC RIDERSHIP.	2004	2010	12/31/2010	COMPLETED.
LOS ANGELES COUNTY	LA0C8364	NORTH LA COUNTY NON-ADVERTISING BUS STOP SHELTERS. INSTALLATION OF BUS SHELTERS WITH SEATING AT BUS STOPS WITH GREATEST # OF DAILY BOARDING IN NORTH LOS ANGELES COUNTY. PPNO 3229.	2006/2007	2010	6/30/2010	CORRECTED. NOT REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
LOS ANGELES COUNTY	LA996289	SOUTH BAY BIKE TRAIL PED. ACCESS RAMPS/SIDEWALKS - DESIGN OF RAMPS, WALKWAYS TO PROVIDE ACCESS TO THE STH. BAY TRAIL AT DOCKWEILER STATE BEACH (2006 STIP)	2010	2010	12/30/2011	CORRECTED. NOT A TCM SINCE IT IS AN ACCESS IMPROVEMENT TO A RECREATIONAL PEDESTRIAN TRAIL.
LOS ANGELES COUNTY	LAF1414	THIRD STREET & LA VERNE AVENUE PARKING STRUCTURE. CONSTRUCT A PARKING STRUCTURE AT THIRD STREET AND LA VERNE AVENUE TO PROVIDE PARK AND RIDE SPACES FOR AREA TRANSIT USERS.	2016	2016	6/30/2015	CORRECTED. NOT A COMMITTED TCM.
LOS ANGELES COUNTY	LAF1511	EASTSIDE LIGHT RAIL BIKE INTERFACE PROJECT. PROJECT INCLUDES DESIGN AND CONSTRUCTION OF BIKE ROUTES WITH APPROPRIATE SIGNAGE AND STRIPING TO ACCESS METRO GOLD LINE STATIONS.	2014	2014	10/21/2014	CORRECTED. NOT A COMMITTED TCM.
LOS ANGELES COUNTY	LAF1513	FIJI WAY BICYCLE LANE PROJECT. WIDEN THE SOUTH SIDE OF FIJI WAY FROM WEST OF ADMIRALTY WAY FOR BIKE LANES.	2014	2014	10/9/2014	CORRECTED. NOT A COMMITTED TCM
LOS ANGELES COUNTY MTA	LA0C8413	METRO RAPID BUS STATIONS-PHASE II: INCLUDES COMMUNICATIONS & EQUIPMENT	2006/2007	2012	10/1/2016	CORRECTED. NOT A TCM PROJECT SINCE IT IS PROVIDING ONLY EQUIPMENT AND BUS SHELTERS FOR EXISTING RAPID PROGRAM AND SUPPLEMENTAL TO LA29202W - WILSHIRE RAPID PHASE I & II WHICH IS A TCM.
LOS ANGELES COUNTY MTA	LA0F021 NOT IN 2008 REPORT.	EXPOSITION LIGHT RAIL TRANSIT SYSTEM PHASE II - TO SANTA MONICA	6/30/2016	6/30/2016	12/31/2015	CORRECTED. NOT A COMMITTED TCM
LOS ANGELES COUNTY MTA	LA29202U4	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE II: BUS SPEED IMPROVEMENTS ALONG METRO RAPID CORRIDORS AND EXPANSION OF EXISTING PARK & RIDE FACILITY.	2005/2007	2010	12/31/2010	COMPLETED.
LOS ANGELES COUNTY MTA	LA29202V	EASTSIDE TRANSIT CORRIDOR - UNION STATION TO ATLANTIC VIA 1ST ST. TO LORENA, THEN 3RD ST. VIA 3RD/BEVERLY BLVD. TO ATLANTIC (EASTSIDE LRT PPNO 3358)	2009/2010	2010	6/30/2010	COMPLETED.

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
LOS ANGELES COUNTY MTA	LA29202V	EASTSIDE TRANSIT CORRIDOR - UNION STATION TO ATLANTIC VIA 1ST ST. TO LORENA, THEN 3RD ST. VIA 3RD/BEVERLY BLVD. TO ATLANTIC (EASTSIDE LRT PPNO 3358)		6/30/2010	6/30/2010	COMPLETED.
LOS ANGELES, CITY OF	LA0C53	HOLLYWOOD INTERMODAL TRANSPORTATION AND PUBLIC PARKING CENTER ON HAWTHORNE AVE. BETWEEN HIGHLAND AVENUE AND NORTH ORANGE DRIVE (EXIST 500 SP PARK STRUCTURE).TCRP#49.2	2004	2011	10/1/2020	CORRECTED. NOT A TCM BECAUSE THIS IS A REPLACEMENT PROJECT.
LOS ANGELES, CITY OF	LA0C8123	SAN PEDRO ATSAC/ATSC PROJ. PROVIDE ATSAC/ATCS RELATED IMPROVEMENTS TO 57 SIGNALIZED INTERSECTIONS THRU IMPLEMENTATION OF A COMPUTER-BASED REAL TIME TRFFC SIGNAL MONITORING CNTRL SYS.		2011	4/1/2012	COMPLETED.
LOS ANGELES, CITY OF	LA0C8173	NORTHRIDGE METROLINK STN PARKING IMPRVMENT. CONSTRCT ADDT'L 100 PRKING SPCS & RECONFIGURE SOUTHERN PRTION OF EXISTING PRKNG LOT TO YIELD AN ADDT'L 40 NET PRKING SPCES TOTAL 400 SPC.	2007	2009	12/31/2009	COMPLETED.
LOS ANGELES, CITY OF	LA0C8174	LITTLE TOKYO PEDESTRIAN LINKAGES. CONSTRUCTN OF IMPRVEMNTS: SIDEWLK & CROSSWALK ENHANCMNTS, STREET FURNITURE & LANDSCAPING TO PROMOTE PEDESTRIAN TRAVEL W/IN LITTLE TOKYO. PPNO 3116.	2004/2006	2009	6/30/2009	COMPLETED.
LOS ANGELES, CITY OF	LA0C8209	HOLLYWOOD MEDIA DISTRICT-PED IMPRV. STREETSCAPE ELEMNTS: LANDSCAPE MEDIAN ISLANDS, PED LIGHTING,STAMPED XWALK, ON SANTA MONICA BL- VINE ST TO HIGHLAND & HIGHLAND - MELROSE TO FOUNTAIN	2005	2009	6/30/2011	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
LOS ANGELES, CITY OF	LA0C8242	BUS STOP IMPROVEMENTS ON SAN FERNANDO ROAD & TC LIGHTING; ENHANCE PASSENGER FACILITIES AT VARIOUS BUS STOPS WITH GREATEST NUMBER OF DAILY BOARDINGS ON EAST SIDE OF SAN FERNANDO RD.	2008	2010	7/31/2010	COMPLETED.

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
LOS ANGELES, CITY OF	LA0G157	LACRD - CITY OF LOS ANGELES INTELLIGENT PARKING MANAGEMENT PROGRAM.		12/31/2010	12/31/2010	COMPLETED.
LOS ANGELES, CITY OF	LAE0566	PURCHASE OF SIX (6) ALTERNATIVE FUELED VEHICLES TO BE USED IN THE EXPANSION OF THE LAX REMOTE TERMINAL FLYAWAY SHUTTLE BUS SYSTEM. LOS ANGELES WORLD AIRPORTS WILL OPERATE THESE BUSES BETWEEN NEW PARK-N-RIDE LOTS AND LAX AIRPORT.	2011	2011	12/31/2011	COMPLETED.
LOS ANGELES, CITY OF	LAE0567	INTERMODAL TRANSPORTATION CENTER WHICH WOULD ENHANCE PASSENGER SERVICE BETWEEN AREA RAIL AND BUS TRANSIT AND THE LAX AIRPORT.	2010	2013	10/1/2018	CORRECTED. NOT A REPORTABLE TCM PROJECT BASED ON EXISTING PROJECT DESCRIPTION PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
LOS ANGELES, CITY OF	LAF1609	MAIN STREET BUS STOP AND PEDESTRIAN IMPROVEMENTS. DESIGN AND CONSTRUCT BUS STOP AND PEDESTRIAN IMPROVEMENTS THAT WILL INCREASE THE USAGE AND CAPACITY OF PEDESTRIAN FACILITIES ALONG A 0.4 MILE STRETCH OF MAIN STREET.		2015	10/1/2015	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
LOS ANGELES, CITY OF	LAF1611	CESAR CHAVEZ TRANSIT CORRIDOR (110 FWY TO ALAMEDA). INSTALLATION OF PEDESTRIAN/TRANSIT RIDER AMENITIES INC. BUS STOP GARDENS AT THREE INTERSECTIONS, NEW PEDESTRIAN LIGHTING, STREET TREES IN A LANDSCAPED PARKWAY & WAYFINDING SIGNAGE.	2015	2015	10/1/2015	CORRECTED. NOT A TCM PROJECT – INSTALLATION OF AMENITIES.
LOS ANGELES, CITY OF	LAF1612	CENTURY CITY URBAN DESIGN AND PEDESTRIAN CONNECTION PLAN. PROJECT WILL IMPLEMENT SIDEWALK IMPROVEMENTS, DECORATIVE CROSSWALKS, MEDIAN ISLAND, CURB RAMPS, PEDESTRIAN LIGHTING, SHELTERS, BENCHES, TRASH RECEPTACLES & STREET TREES.		2013	12/31/2015	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
LOS ANGELES, CITY OF	LAF1613	EXPO LINE STN STREETSCAPE PROJECT-EAST CRENSHAW TO JEFFERSON. DESIGN & CONSTRUCTION OF PEDESTRIAN RELATED STREETSCAPE IMPROVEMENTS WITHIN 1/4 MILE FROM EACH OF 3 LIGHT RAIL STATIONS ALONG EXPOSITION BLVD BETWEEN CRENSHAW & JEFFERSON.	2013	2013	9/30/2012	CORRECTED. NOT A TCM PROJECT – STREETSCAPE IMPROVEMENTS.
LOS ANGELES, CITY OF	LAF1617	HOLLYWOOD PEDESTRIAN/TRANSIT CROSSROADS PHASE II. DESIGN AND INSTALL PEDESTRIAN AND TRANSIT USER ENHANCEMENTS, EXTENDING THE ORIGINAL HOLLYWOOD PEDESTRIAN/TRANSIT IMPROVEMENT PROJECT TO INCLUDE HIGHLAND AVENUE AND VINE STREET.	2013	2013	12/25/2013	CORRECTED. NOT A TCM PROJECT. PROJECT IS A PEDESTRIAN ENHANCEMENT PROJECT WHICH INCLUDES SIDEWALK RECONSTRUCTION, TREES AND STREET FURNITURE.
LOS ANGELES, CITY OF	LAF1630	WASHINGTON BLVD TRANSIT ENHANCEMENTS. WASHINGTON BL TRANSIT ENHANCEMENT IS A STREETSCAPE DESIGN PROJECT THAT ENCOURAGES INCREASED USE OF PUBLIC TRANSIT WHILE SUPPORTING LAND USES THAT ARE COMPATIBLE W/TOD		2014	12/31/2014	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
LOS ANGELES, CITY OF	LAF1662	SOLANO CANYON-ZANJA MADRE-CHINATOWN-BROADWAY BUS STOP IMPROV. IMPROVE 8 BUS STOPS ALONG BROADWAY-BERNARD ST TO SOLANO AV WITH STREET FURNITURE & LANDSCAPING, INCREASING ACCESSIBILITY, TRANSFERS & TRANSIT USE		2014	6/30/2011	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
LOS ANGELES, CITY OF	LAF1663	SUNSET JUNCTION TRANSIT PLAZA. CONVERT AN UNUSED ROADWAY SECTION INTO A TRANSIT PLAZA WITH NEW CONCRETE PLATFORM, STREET FURNITURE, PED LIGHTS, & LANDSCAPING, INCREASING ACCESSIBILITY, TRANSFERS & TRANSIT USE.		2014	6/30/2013	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
MONTEBELLO	LA55201	CONTINUING PROJECT - BUS STOP IMPROVEMENTS ,AMENITIES ,SHELTERS ,ETC	2010	2010	12/31/2010	COMPLETED.
PALMDALE	LAF1508	6TH STREET EAST BIKEWAY EXTENSION. THIS PROJECT WILL PROVIDE A MISSING LINK IN THE CLASS I BWY TO CONNECT THE EXISTING SIERRA HWY BIKEWAY TO THE TRANSPORTATION CENTER AND AN EXISTING BIKEWAY IN CLOCK TOWER PLAZA	2015	2015	10/1/2015	CORRECTED. NOT A COMMITTED TCM

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
PASADENA	LA0D99	PURCHASE 2 EXPANSION LOW-FLOOR, HANDICAPPED ACCESSIBLE, ALTERNATIVE FUEL TRANSIT BUSES.	2004	2010	12/31/2010	COMPLETED.
PASADENA	LAF1655	EAST COLORADO BOULEVARD PEDESTRIAN ENHANCEMENTS (PHASE I). INSTALLATION OF PEDESTRIAN-SCALE STREET LIGHTING ON REGIONALLY SIGNIFICANT STREET IN A SPECIFIC PLAN AREA OF PASADENA IN ORDER TO INCREASE LIVABILITY/ENHANCE PEDESTRIAN MOVEMENT.		2014	9/30/2014	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
REDONDO BEACH	LA0D299	ACQUISITION OF (6) ALTER FUEL TRANSIT/PARATRANSIT VEHICLES NOT TO EXCEED 35' SAFETEA-LU TRANSIT #251	2010	2010	12/31/2012	CORRECTED. NOT A TCM PROJECT BECAUSE THIS IS A BUS REPLACEMENT PROJECT.
SAN FERNANDO	LAE0127	PROCUREMENT OF (3) CNG TRANSIT VEHICLES AND RELATED INFRASTRCTURE EQUIPMENT FOR FIXED ROUTE PUBLIC TRANSPORTATION.	2010	2010	9/29/2012	CORRECTED. NOT A TCM PROJECT BECAUSE THIS IS A BUS REPLACEMENT PROJECT.
SAN FERNANDO	LAF1640	SAN FERNANDO DOWNTOWN PEDESTRIAN IMPROVEMENT PROJECT. DESIGN AND CONSTRUCTION OF THE DOWNTOWN PORTION OF THE SAN FERNANDO CORRIDORS PLAN. THE PROJECT WILL INCREASE PEDESTRIAN ACTIVITY, PROMOTE PUBLIC TRANSIT AND ENHANCE SAFETY.		2014	9/30/2014	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
SANTA CLARITA	LA0C8130	INCIDENT MANAGEMENT - TRAVELER INFORMATION SUBSYSTEM;INSTALLATION OF SYSTEM DETECTORS, FIBER OPTIC CABLE, CCTV'S, AND TRAVELER INFO SYSTEM VIA WEBSITE, EMAIL OR CELL PHONE.	2006	2008	6/1/2009	COMPLETED.
SANTA CLARITA	LA0C8156	SANTA CLARITA REG'L COMUTR TRAIL - I-5 TO RAILROAD BRIDGE & FROM RAILROAD BRIDGE TO ANZA DRIVE- CONSTRUCT & ACQUISITION OF 1.0 MI OF CLASS I BIKE PATH (PPNO 3127). NON-CAP.	2006	2011	12/31/2011	COMPLETED.
SANTA CLARITA	LA0D363	SANTA CLARITA TRANSIT PHASE 2 - EXPANSION BUSES - 2 OVER THE ROAD COMMUTER BUSES.	2009	2009	10/1/2010	CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 55).

LOS ANGELES COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
SANTA CLARITA	LA0F018	PURCHASE (2) EXPANSION BUSES FOR ROUTE 8 TO THE SAN FERNANDO VALLEY	2009	2009	CANCELED	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 55).
SANTA MONICA	LA57101	BUS FACILITY IMPROVEMENTS	2005	2010	12/30/2010	CORRECTED. NOT A REPORTABLE TCM PROJECT PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 56).
SOUTH PASADENA	LA0B7271	BLUE LINE PEDESTRIAN LINKAGE AND SAFETY IMPROVEMENTS-INCLUDE SIGNAGE, UPGRADES CROSSWALKS, PEDESTRIAN LIGHTING, ENHANCED SIDEWALK AROUND THE STATION IN THE AREA MISSION ST STATION		2008	12/30/2008	COMPLETED.
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY	LA29204	LA-SAN BERNARDINO CR (SF UNION STATION-SAN BERNARDINO) CAPACITY IMPROVEMENTS (3037) (JARC $1982). DEMOT21 = 3037	2003/2005	2009	12/31/2010	COMPLETED.
WHITTIER	LA0B7322	WHITTIER GREENWAY TRAIL-ACQUISITION, DESIGN, AND CONSTRUCTION MANAGEMENT OF 2 MILES CLASS I BIKE/PED PATH ON AN ABANDONED RAIL ROW FROM NORWALK TO FIVE POINTS.PPNO 2872	2004	2011	12/1/2009	COMPLETED.
WHITTIER	LA0C8161	WHITTIER GREENWAY TRAIL: PICKERING BRIDE SEG 1 DEVT& SEG 3 P/E & DEVT. DESIGN, CONST& ACQUIST OF 2.86 MLES CLASS I BIKE/PED FAC ON ABANDONED ROW IN WHITTIER PPNO#3440-EA07-932045	2008	2008	12/7/2009	COMPLETED.

LOS ANGELES COUNTY – NEW COMMITTED TCM PROJECTS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2011 FTIP COMPLETION DATE**
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0G490	THREE (3) EXPANSION HYBRID LOCAL TRANSIT BUSES	1/31/2011
AZUSA	LAF3434	AZUSA INTERMODAL TRANSIT CENTER. CONSTRUCT REGIONAL AZUSA INTERMODAL TRANSIT CENTER TO ACCOMMODATE EXISTING AND FUTURE PARKING DEMAND AND SUPPORT EFFECTIVE TRANSIT USE.	6/30/2015
BALDWIN PARK	LA0D281	DESIGN AND CONSTRUCT PARKING IMPROVEMENTS AT AND ADJACENT TO THE CITY'S EXISTING METROLINK STATION	12/30/2010
CALTRANS	LA0G138	ROUTE 010: LACRD - HOT LANES ON THE I-10 FROM ALAMEDA ST./UNION STATION TO I-605, AND ON I-110 FROM 182 ST./ARTESIA TRANSIT CENTER TO ADAMS BLVD. CONVERSION OF HOV LANES TO HOT LANES.(INFRASTRUCTURE/PAVEMENT)(1HL08D01, 1HL08D03)	12/30/2011
CALTRANS	LA0G139	ROUTE 010: LACRD - EXPAND CAPACITY OF THE I-10 HOT LANE (RESTRIPING AND BUFFER CHANGES). RESTRIPE TO ADD A SECOND LANE (WB - SANTA ANITA TO I-710; EB - I-710 TO BALDWIN AVE) FOR HOT LANES ON THE I-10. (RTP# 1HL08D01)	12/30/2011
CLAREMONT	LAF1510	CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY. THIS PROJECT PROPOSES THE IMPLEMENTATION OF THE CLAREMONT PORTION OF THE CITRUS REGIONAL BIKEWAY UTILIZING BONITA AVENUE AND FIRST STREET AS PRIMARY CLASS II BIKE ROUTES.	10/1/2012
COVINA	LA0D206	METROLINK PEDESTRIAN BRIDGE PROJECT. THIS FACILITY WILL BE CONSTRUCTED ON THE WEST SIDE OF CITRUS AVE. THE METROLINK STATION IS ON THE EAST SIDE OF CITRUS AVE.	12/31/2012
FOOTHILL TRANSIT ZONE	LA0G142	LACRD - 10 BUSES FOR THE I-10 EL MONTE BUSWAY. HOT LANE. (RTP# 1TR08D08 & 1TR08D07A)	12/31/2012
FOOTHILL TRANSIT ZONE	LA0G149	LACRD - I-10 HOT LANE OPERATIONS - NEW TRANSIT SERVICES.(RTP# 1OM08D02).	12/31/2011
GARDENA MUNICIPAL BUS LINES	LA0G147	LACRD - I-110 HOT LANE OPERATIONS - NEW TRANSIT SERVICES.(CITY OF GARDENA)(RTP# 1TR204)	12/31/2011
GLENDALE	LA0G406	FAIRMONT AVE. PARK-N-RIDE FACILITY (83 PARKING SPACES) TO SERVE COMMUTERS USING SR-134, I-5. THE LOCATION OF THE PARK-N-RIDE IS FAIRMONT AVENUE AND SAN FERNANDO RD.	12/30/2012
LOS ANGELES COUNTY	LA990353	ALAMEDA CORRIDOR EAST - NOGALES ST GRADE SEP (T21-491, SGVCG)	12/29/2010
LOS ANGELES COUNTY MTA	LA0D198 *	CRENSHAW TRANSIT CORRIDOR	12/31/2018
LOS ANGELES COUNTY MTA	LA0G010 *	REGIONAL CONNECTOR - LIGHT RAIL IN TUNNEL ALLOWING THROUGH MOVEMENTS OF TRAINS, BLUE, GOLD, EXPO LINES. FROM ALAMEDA / 1ST STREET TO 7TH STREET/METRO CENTER	12/31/2019
LOS ANGELES COUNTY MTA	LA0G150	LACRD - I-10 AND I-110 HOT LANE OPERATIONS (O & M), INCLUDING SECURITY, TVM AND REVENUE COLLECTION SERVICES, MARKETING, NEW TRANSIT (RTP ID 1TR08D7B & 1OM08D01; LA0G150, LA0G151, LA0G152,1OM08D02)	12/31/2011
LOS ANGELES COUNTY MTA	LA0G154	LACRD - EL MONTE TRANSIT CENTER IMPROVEMENTS AND EL MONTE BUSWAY IMPROVEMENTS, INCLUDING BIKE LOCKERS, TICKET VENDING MACHINES AT EL MONTE BUSWAY STATIONS AND UP TO 10 BUS BAYS.	12/31/2010
LOS ANGELES COUNTY MTA	LA0G194	ACQUIRE ALTERNATE FOUR (4) FUEL BUSES FOR THE CITY OF ARTESIA TO BE USED FOR NEW FIXED ROUTE SERVICE EARMARK ID #E2008-BUSP-0694	10/31/2011

LOS ANGELES COUNTY – NEW COMMITTED TCM PROJECTS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2011 FTIP COMPLETION DATE**
LOS ANGELES COUNTY MTA	LA0G196	ACQUIRE ALTERNATE FUEL BUSES FOR RIO HONDO COLLEGE	10/31/2011
LOS ANGELES COUNTY MTA	LA0G270	EXPANSION AND IMPROVEMENT TO EXISTING TRANSIT CENTER IN THE CITY OF PALMDALE. E2009-BUSP-137.	9/30/2012
LOS ANGELES COUNTY MTA	LA0G431	MULTI-MODAL TRANSIT CENTER AT CSUN TO INCLUDE PASSENGER LOADING AREAS AND BUS SHELTERS	10/1/2012
LOS ANGELES COUNTY MTA	LA0G447 *	METRO PURPLE LINE WESTSIDE SUBWAY EXTENSION SEGMENT 1 - WILSHIRE/WESTERN TO FAIRFAX	12/31/2019
LOS ANGELES, CITY OF	LA0G155	LACRD - TRANSIT SIGNAL PRIORITY IN THE CITY OF LOS ANGELES.	12/31/2011
LOS ANGELES, CITY OF	LAF1520 *	IMPERIAL HIGHWAY BIKE LANES. THIS PROJECT INVOLVES THE MODIFICATION OF THE MEDIAN ISLAND AND THE WIDENING OF IMPERIAL HIGHWAY ALONG 1000 FT EAST OF PERSHING DRIVE TO ACCOMMODATE BIKE LANES.	6/1/2014
LOS ANGELES, CITY OF	LAF1524	SAN FERNANDO RD. BIKE PATH PH. IIIA/IIIB - CONSTRUCTION. RECOMMEND PHASE IIIA-CONSTRUCTION OF A CLASS I BIKE PATH WITHIN METRO OWNED RAIL RIGHT-OF-WAY ALONG SAN FERNANDO RD. BETWEEN BRANFORD ST. AND TUXFORD ST INCL BRIDGE.	10/1/2015
LOS ANGELES, CITY OF	LAF3419	SUNSET JUNCTION PHASE 2. CREATE A MULTI-MODAL TRANSIT PLAZA TO INTEGRATE PUBLIC TRANSPORTATION, PEDESTRIAN & BICYCLE IMPROVEMENTS THAT WOULD RESULT IN REGIONAL & LOCAL BENEFITS (CFP3844). TRIANGLE PROPERTY ON SUNSET BLVD BWT MANZANITA AND SANTA MONICA.	6/30/2017
MONTEBELLO	LA0G354	CONSTRUCTION OF TRANSIT CENTER AT THE COMMUNITY REC FACILITY LOCATED AT THE TAYLOR RANCH PARK AND RIDE FACILITY, 737 NORTH MONTEBELLO BOULEVARD, MONTEBELLO.	12/31/2010
PORT OF LOS ANGELES	LAF3170	PORT TRUCK TRAFFIC REDUCTION PROGRAM: WEST BASIN RAILYARD. INTERMODAL RAILYARD CONNECTING PORT OF LA WITH ALAMEDA CORRIDOR TO ACCOMMODATE INCREASED LOADING OF TRAINS AT THE PORT, THEREBY REDUCING TRUCK TRIPS TO OFF-DOCK RAILYARDS.	12/1/2014
ROLLING HILLS ESTATE	LAF1529	PALOS VERDES DRIVE NORTH BIKE LANES. CONSTRUCTION OF CLASS II BIKE LANE AND RELATED IMPROVEMENTS ON PALOS VERDES DRIVE NORTH	12/31/2012
SAN DIMAS	LAF1503	BIKEWAY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH. THE BWY IMPROVEMENTS ON FOOTHILL BLVD. AT SAN DIMAS WASH; WILL CLOSE THE GAP ON A BRIDGE & CONNECT THE EXISTING CLASS II BIKE LANES TO THE EAST & WEST OF SAN DIMAS WASH CROSSING.	12/1/2013
SANTA MONICA	LAF1533	DOWNTOWN SANTA MONICA BIKE TRANSIT STATION. STORE FRONT BIKE CENTER IN DOWNTOWN PARKING STRUCTURE WITH ATTENDED & SELF PARKING FOR 250 BIKES.	6/30/2012
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY	LA0G153	LACRD - PLATFORMS AND PARKING IMPROVEMENTS AT THE METROLINK POMONA STATION. ADDITION OF 100 PARKING SPACES AND EXTENSION OF PLATFORM.(G# CA-37-X052-00)	12/31/2010
TORRANCE	LA0G145	LACRD - 4 BUSES FOR THE I-110 HARBOR TRANSITWAY HOT LANE(TORRANCE TRANSIT). (RTP# 1TR204)	12/31/2010
TORRANCE	LA0G148	LACRD - I-110 HOT LANE OPERATIONS - NEW TRANSIT SERVICES. (RTP# 1TR204)	12/31/2011
TORRANCE	LA0G358	SOUTH BAY REGIONAL INTERMODAL TRANSIT CENTER PROJECT. THE LAND IS IN THE PROCESS OF BEING PURCHASED AND ESCROW WILL CLOSE ON DECEMBER 17, 2009. PRESENTLY, THE LOT IS VACANT/OPEN LAND WITH NO EXISTING STRUCTURE UPON IT. THE ADDRESS IS 465 N. CRENSHAW BLVD., TORRANCE, CA 90503.	12/31/2015

LOS ANGELES COUNTY – NEW COMMITTED TCM PROJECTS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2011 FTIP COMPLETION DATE**
WHITTIER	LA0G257	WHITTIER GREENWAY TRAILHEAD PARK. EXTENSION OF WHITTIER GREENWAY TRAIL FROM MILLS AVENUE TO 300 FEET EAST OF MILLS AVENUE ON CITY OWNED RIGHT-OF-WAY IN CONJUNCTION WITH THE CONSTRUCTION OF NEW TRAILHEAD PARK WITH A PARK AND RIDE PARKING LOT FOR NEARBY PUBLIC TRANSIT STOP. NEW 20 SPACE PARKING LOT WOULD BE CONSTRUCTED OF "GREEN" PERMEABLE PAVEMENT IN COMPLIANCE WITH NPDES REQUIREMENTS. INCLUDES THE INSTALLATION OF PARK AMENITIES, DRINKING FOUNTAIN FOR THE CONVENIENCE OF PEDESTRIAN AND BICYCLE PATRONS OF THE WHITTIER GREENWAY TRAIL. CONSTRUCTION OF NEW SIDEWALKS ALONG MILLS AVENUE TO PROVIDE WHITTIER GREENWAY TRAIL CROSSING CONNECTION AT THE SIGNALIZED INTERSECTION OF MILLS AVENUE AT LAMBERT ROAD.	9/30/2012

* *No right-of-way or construction funding programmed in first two years. Therefore, this is not a committed TCM.*

ORANGE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
ANAHEIM	ORA000100	GENE AUTRY WAY WEST @ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HASTER (3 LANES IN EA DIR.)	2004	2009	2/28/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO RIGHT OF WAY ISSUES. CONSTRUCTION EXPECTED TO START BY DECEMBER 2010.
CALTRANS	ORA000193	HOV CONNECTORS FROM SR-22 TO I-405, BETWEEN SEAL BEACH BLVD. (I-405 PM 022.558) AND VALLEY VIEW ST. (SR-22 PM R000.917), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTORS. LOCAL FUNDS IN THE AMOUNT OF $72,383 ARE PROGRAMMED IN FY 09/10 IN ORDER TO AC FUTURE YEAR CMAQ FUNDS.	2010	2013	9/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. THE LOW BIDDER IS BEING RECOMMENDED TO BE AWARDED WITH THE CONTRACT. ON SCHEDULE.
CALTRANS	ORA000194	HOV CONNECTORS FROM I-405 TO I-605, BETWEEN KATELLA AVE. (I-605 PM R001.104) AND SEAL BEACH BLVD. (I-405 PM 022.643), WITH A SECOND HOV LANE IN EACH DIRECTION ON I-405 BETWEEN THE TWO DIRECT CONNECTIONS.	2010	2013	9/1/2013	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. SPLIT FROM ORA000193. ON SCHEDULE.
FULLERTON	ORA020113	FULLERTON TRAIN STATION - PARKING STRUCTURE, PHASE I AND II. TOTAL OF 800 SPACES (PPNO 2026)	2004	2011	6/30/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA041501	PURCHASE (71) STANDARD 30FT EXPANSION BUSES - ALTERNATIVE FUEL - (31) IN FY08-09, (9) IN FY09-10, (7) IN FY11-12, (6) IN FY12-13 AND (18) IN FY13-14	2012	2012	6/30/2016	ONGOING BUS PURCHASE PROJECT.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA110501	BUS RAPID TRANSIT - 28MI FIXED BRT FRM BREA MALL TO IRVINE TRANS CNTR. INCLUDES STRUCTURES, (32) ROLLING STOCK, AND FEEDER SVC & IBC SHUTTLE- CNG SHUTTLES FROM JWA TO IBC.	2010	2010	6/15/2010	SUBSTITUTED WITH TRAFFIC SIGNALIZATION ALONG THE SAME CORRIDOR. SCAG REGIONAL COUNTIL ADOPTION OF THE SUBSTITUTION WAS FORWARDED TO ARB AND EPA FOR CONCURRENCE.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA110633	RIDESHARE VANPOOL PROGRAM - CAPITAL LEASE COSTS	2012	2012	9/30/2012	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. FUND SWAP. ON SCHEDULE.
ORANGE COUNTY TRANS AUTHORITY	ORA120531	BUS RAPID TRANIST (HARBOR BOULEVARD BRT) - 19MILE FIXED RT BRT	NA	2011	6/30/2011	SUBSTITUTED WITH TRAFFIC SIGNALIZATION ALONG THE SAME

ORANGE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
(OCTA)		BETWEEN FULLERTON AND COSTA MESA; INCLUDES STRUCTURES AND (23) ROLLING STOCK				CORRIDOR. SCAG REGIONAL COUNTIL ADOPTION OF THE SUBSTITUTION WAS FORWARDED TO ARB AND EPA FOR CONCURRENCE.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA120532	BUS RAPID TRANIST (WESTMINSTER/17TH BRT) - 22MILE FIXED RT BRT BETWEEN SANTA ANA AND LONG BEACH; INCLUDES STRUCTURES AND (23) ROLLING STOCK	2011	2011	6/30/2011	SUBSTITUTED WITH TRAFFIC SIGNALIZATION ALONG THE SAME CORRIDOR. SCAG REGIONAL COUNTIL ADOPTION OF THE SUBSTITUTION WAS FORWARDED TO ARB AND EPA FOR CONCURRENCE.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA55241	PURCHASE (87) STANDARD 40 FT EXPAN ALT FUEL BUSES - (14) IN FY08 - 09, (44) IN FY10-11, (14) IN FY11-12, (2) IN FY12 - 13 AND (13) IN FY13 -14	2007/2010	2012	6/30/2016	NO DELAY. ON-GOING PROJECT.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING (ORANGE COUNTY PORTION).	2010	2015	6/30/2016	NO DELAY. ON-GOING PROJECT.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA041502	PURCHASE (48) PARATRANSIT EXPANSION VANS - (22) IN FY10/11, (12) IN FY11/12, AND (14) IN FY13/14	2012	2012	6/30/2012	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
TCA	10254	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/5/01	2015/2008	2015	12/31/2020	NO CHANGE IN TCM STATUS FROM 2008 RTIP TCM REPORT. ON-GOING IMPLEMENTATION PER SCAG/TCA MOU.
TCA	ORA050	ETC (RTE 241/261/133) (RTE 91 TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2020 PER SCAG/TCA MOU 4/05/01.	2015/2010	2015	12/31/2020	NO CHANGE IN TCM STATUS FROM 2008 RTIP TCM REPORT. ON-GOING IMPLEMENTATION PER SCAG/TCA MOU.
TCA	ORA051	(FTC-N) (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR, 2 ADDITIONAL M/F LANES, PLS CLMBNG & AUX LANS AS REQ BY 2020 PER SCAG/TCA MOU 4/05/01.	2015/2010	2015	12/31/2020	NO CHANGE IN TCM STATUS FROM 2008 RTIP TCM REPORT. ON-GOING IMPLEMENTATION PER SCAG/TCA MOU.
TCA	ORA052	(FTC-S) (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2013; AND 1 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2030 PER SCAG/TCA MOU 4/05/01. #1988	2015/2010	2030	6/15/2030	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.

ORANGE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
VARIOUS AGENCIES	ORA990906	LUMP SUM. TEA FUNDS FOR BICYCLE AND PEDESTRIAN FACILITY PROJECTS THROUGHOUT ORANGE COUNTY (PROJECTS ARE CONSISTENT WITH 40 CFR PART 93.126,127,128, EXEMPT TABLES 2 & 3)	2009	2009	12/30/2015	NO DELAY. ON-GOING PROJECT.

ORANGE COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
ANAHEIM	ORA120318	ANAHEIM REGIONAL TRANS INTERMODAL CENTER (ARTIC) PHASE I - INCLUDE EXPAND OF EXIST AMTRAK/METROLINK STATION AT ANA STAD TO PROVIDE ACCESS W/ TRANS SVC	2010	2010	6/30/2018	CORRECTED. NOT A COMMITTED TCM BECAUSE ROW FUNDS THAT HAVE BEEN EXPENDED WERE FOR RELOCATION AND IMPROVEMENTS TO THE EXISTING STATION AND NOT SPECIFICALLY FOR THE ARTIC.
CALTRANS	10167	I-5 FROM SR-91 TO LA COUNTY LINE IN BUENA PARK - ADD 1 MIXED FLOW LN AND 1 HOV LN IN EACH DIRECTION. FROM 6 - 0 TO 8 - 2 LANES.	2008	2008	12/31/2008	COMPLETED.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000104	TRANSITWAY IMPROVEMENTS AT IRVINE TRANSPORTATION CENTER; BUILD 900 SPACE PARKING STRUCTURE, INCLUDING ENVIRONMENTAL, DESIGN AND CONSTRUCTION. PPNO 9511	2007	2007	6/15/2007	COMPLETED
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020119	PURCHASE PARATRANSIT VEHICLES EXPAN (142) - (66) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (13) IN FY07/08, (14) IN FY08/09, (14) IN FY09/10	2007/2010	2010	6/30/2010	COMPLETED.

ORANGE COUNTY – NEW COMMITTED TCM PROJECTS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2011 FTIP COMPLETION DATE**
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA0826016	PURCHASE (72) PARATRANSIT EXPANSION VANS - (21) IN FY09/10, (51) IN FY10/11.	6/30/2016
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA082618	PURCHASE PARATRANSIT VEHICLES EXPANSION (MISSION VIEJO) (11) IN FY09/10. ON-GOING PROJECT.	6/30/2030

RIVERSIDE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
CORONA	RIV010227	CORONA ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS) - AND REGIONAL ITS INTEGRATION PHASE 2.	2005	2010	12/31/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. TOTAL PROJECT COST INCREASED FROM $1,362 TO $6,011 - ADDITIONAL FUNDING COST COVERED BY LOCAL CITY FUNDS AND TLSP FUNDING. ON SCHEDULE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV010212	ON SR91 - ADAMS TO 60/215 IC: ADD ONE HOV LN IN EACH DIRECTION, RESTRIPE TO EXTEND 4TH WB MIXED FLOW LANE FROM 60/215 IC TO CENTRAL OFF-RAMP, RESTRIPE TO EXTEND 5TH WB MIXED FLOW LANE FROM 60/215 IC TO 14TH ST OFF-RAMP, AUX LNS (MADISON-CENTRAL), BRIDGE WIDENING & REPLACEMENTS, EB/WB BRAIDED RAMPS, IC MOD/RECONSTRUCT + SOUND/RETAINING WALLS	2002	2015	8/3/2015	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. R/W PHASE HAS STARTED; ADDITIONAL R/W FUNDING NEEDED TO COVER THE EXTENSIVE UTILITY RELOCATION ASSOCIATED TO THE PROJECT IMPLEMENTATION. ON SCHEDULE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV011211	AT N. MAIN ST/E. GRAND BLVD - CONSTRUCT NEW 1,000 SPACE PARKING STRUCTURE & CCTV/SEC ENHANCE. AT CORONA N. MAIN METROLINK STN (EA: CORSTN, PPNO: 0079D) (FY 07 5307) (UZA: RIV-SAN)	2005	2011	6/30/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. PROJECT WAS COMPLETED IN SUMMER 2009 BUT IT'S PENDING THE APPROVAL OF THE CHANGE ORDERS AND REPORT OF COMPLETION ON THE FEDERAL-AID PROJECT. ON SCHEDULE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV050555	ON I-215 (N/O EUCALYPTUS AVE TO N/O BOX SPRINGS RD) & SR60 (E/O DAY ST TO SR60/I-215 JCT): RECONSTRUCT JCT TO PROVIDE 2 HOV DIRECT CONNECTOR LNS (SR60 PM: 12.21 TO 13.6) AND MINOR WIDENING TO BOX SPRINGS RD FROM 2 TO 4 THROUGH LANES BETWEEN MORTON RD AND BOX SPRINGS RD/FAIR ISLE DR IC (EA: 449311)	2011	2011	4/29/2013	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO RIGHT-OF-WAY ISSUES. PROJECT IS READY TO START CONSTRUCTION IN THE FALL 2010.

RIVERSIDE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT

LEAD AGENCY	PROJECT ID	PROJECT DESCRIPTION	ORIGINAL COMPLETION DATE	2008 RTIP COMPLETION DATE	2011 FTIP COMPLETION DATE	2011 FTIP PROJECT STATUS
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV051201	IN CORONA - CONTINUE THE IMPLEMENTATION OF A 60 SPACE PARK-AND-RIDE LOT (VIA ANNUAL LEASE AGREEMENT) AT LIVING TRUTH CHRISTIAN FELLOWSHIP AT 1114 W. ONTARIO AVE.	9/30/2009	9/30/2009	6/30/2013	OBSTACLES ARE BEING OVERCOME. PARK-N-RIDE FACILITY WILL CONTINUE TO OPERATE IN FY'S 09/10, 10/11, 11/12, AND 12/13, UNDER A LEASE AGREEMENT.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV061162	AT DOWNTOWN RIVERSIDE METROLINK STATION FOR UCR (CE-CERT): IMPLEMENT UCR INTELLISHARE SYSTEM (INTELLIGENT SHARED-USE VEHICLE SYSTEM) AT 2 DESIGNATED PARKING SPACES	2007	2007	12/30/2010	OBSTACLES ARE BEING OVERCOME. COMPLETION DATE CHANGED TO 12/30/2010 TO ALLOW UCR TO PROCESS CLAIM REIMBURSEMENT/FINAL REPORT OF COMPLETION TO CALTRANS LOCAL ASSISTANCE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070303	ON SR60 IN NW RIV CO: CONTINUE THE IMPLEMENTATION OF THE EXPANDED SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #7 PATROL , 2 TRUCKS) BETWEEN MILIKEN AVE & MAIN ST (SR60 HOV LN CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. RCTC WILL CONTINUE THE IMPLEMENTATION OF THE FREEWAY SERVICE PATROL ALONG SR60 (BEAT # 7, 2 TRUCKS), BETWEEN MILLIKEN AVE & MAIN STREET IN FY'S 09/10. ON SCHEDULE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070304	ON I-215 IN SW RIV CO: CONTINUE THE IMPLEMENTATION OF I-215 FREEWAY SERVICE PATROL (FSP) (BEAT #19, 2 TRUCKS) BETWEEN SR74/4TH ST AND ALESSANDRO BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. RCTC WILL CONTINUE THE IMPLEMENTATION OF THE FREEWAY SERVICE PATROL ALONG I-215 (BEAT # 19, 2 TRUCKS), BETWEEN SR74/4TH STREET AND ALESSANDRO BOULEVARD IN FY'S 09/10. ON SCHEDULE.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070307	ON SR60 IN MORENO VALLEY: CONTINUE THE IMPLEMENTATION OF SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #8, 2 TRUCKS) BETWEEN DAY ST AND REDLANDS BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. RCTC WILL CONTINUE THE IMPLEMENTATION OF THE FREEWAY SERVICE PATROL ON SR 60 BETWEEN DAY STREET AND REDLANDS BOULEVARD IN FY'S 09/10. ON SCHEDULE.

RIVERSIDE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520109	RECONSTRUCT & UPGRADE SAN JACINTO BRANCH LINE FOR RAIL PASSENGER SERVICE (RIVERSIDE TO PERRIS) (PERRIS VALLEY LINE) (FY 07 5307) (UZA: RIV-SAN)	2012	2011	12/30/2012	OBSTACLES ARE BEING OVERCOME. ADDITIONAL FUNDING SECURED FOR PERRIS VALLEY LINE - RIVERSIDE TO PERRIS.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	REGIONAL RIDESHARE - CONTINUING PROGRAM.	2009	2009	12/30/2011	NO DELAY. ON-GOING PROJECT.
RIVERSIDE TRANSIT AGENCY	RIV031207	IN WESTERN RIVERSIDE COUNTY IN THE CITY OF CORONA - CONSTRUCT NEW CORONA TRANSIT CENTER AT 31 EAST GRAND BLVD (5309C FY 03+04+06+08 (E-2006-BUSP-080 & E-2008-BUSP-0688) EARMARKS)).	2009	2009	12/31/2010	OBSTACLES ARE BEING OVERCOME. SLIGHT DELAY DUE TO MINOR CHANGES NEEDED TO REFLECT THE 5309(C) ANNUAL APPROPRIATION.
RIVERSIDE TRANSIT AGENCY	RIV041029	IN RIVERSIDE - CONSTRUCT NEW RIVERSIDE TRANSIT CENTER AT 4141 VINE ST., IN THE VICINITY OF DOWNTOWN METROLINK STATION (5309C FY 03+04+06+08, E-2006-BUSP-156 & E-2008-BUSP-0688 EARMARKS) (FY 09 5309) (UZA: RIV-SAN) (TE)	12/30/2010	12/30/2010	12/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO OPTIONS AVAILABLE FOR LOCATIONS. THE LOCATION SELECTION HAS BEEN APPROVED FOR THE VICINITY OF THE DOWNTOWN METROLINK STATION, AND THE CITY OF RIVERSIDE AND RTA ARE WORKING TOGETHER TO MOVE THE PROJECT FORWARD - CURRENTLY WORKING ON A SITE FEASIBILITY STUDY AND A TRAFFIC STUDY.
RIVERSIDE TRANSIT AGENCY	RIV041030	IN THE CITY OF HEMET - CONSTRUCT NEW HEMET TRANSIT CENTER (WITH APPROXIMATELY 4 BUS BAYS) AT 700 SCARAMELLA CR., HEMET, CA (5309C FY 04 + 05 EARMARKS).	6/30/2010	12/30/2010	6/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO THE OPTIONS FOR THE LOCATION OF THE TRANSIT CENTER. RTA DECIDED TO CONSTRUCT THE HEMET TRANSIT CENTER AT THEIR CURRENT HEMET OFFICE ON SCARAMELLA CR.
RIVERSIDE TRANSIT AGENCY	RIV050553	IN TEMECULA - CONSTRUCT NEW TEMECULA TRANSIT CENTER AT 27199 JEFFERSON AVE. (SW OF JEFFERSON AVE & SE OF CHERRY ST) (04, 05, 06, 07, E-2006-091, E-2007-0131, & 2008-BUSP-0131, SAFETEA-LU).	12/30/2010	12/30/2010	6/30/2013	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO FUNDING SHORTFALL - TOTAL PROJECT COST IS $8 MILLION AND ONLY $2 MILLION HAS BEEN SECURED. RTA CONTINUES TO LOBBY FOR FEDERAL, REGIONAL, AND LOCAL FUNDING TO MAKE UP THE PROJECT SHORTFALL AND IMPLEMENT THE PROJECT AS SOON

RIVERSIDE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
						AS POSSIBLE. RTA IS CURRENTLY WORKING ON THE FEASIBILITY STUDY FOR THE PROJECT AND EXPECTS TO COMPLETE THE PROJECT BY 2013.
RIVERSIDE TRANSIT AGENCY	RIV051008	INSTALL MULTI-JURISDICTIONAL ATIS AT TRANSIT CENTERS & HIGH TRAFFIC CORRIDOR BUS STOPS INCLUDING REAL TIME SCHEDULES, IMPROVED SIGNAGE & LIGHTING (MAGNOLIA CORRIDOR PHASE)	2007	2009	12/30/2010	OBSTACLES ARE BEING OVERCOME. COMBINED WITH RIV061121, RIV061135, AND RIV 071234 RIV090609.
RIVERSIDE TRANSIT AGENCY	RIV061121	IN WESTERN RIVERSIDE COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES (APPROX 97) (SAFETEA LU EARMARK - #171, E-2006-BUSP-157)	2008	2009	12/30/2010	OBSTACLES ARE BEING OVERCOME. COMBINED WITH RIV051008, RIV061135, RIV071234 INTO RIV090609.
RIVERSIDE TRANSIT AGENCY	RIV061135	IN WESTERN RIV COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND AT APPROX 60 STOPS (SAFETEA LU #171, E-2007-BUSP-0107)	2009	2009	12/30/2010	OBSTACLES ARE BEING OVERCOME. COMBINED WITH RIV051008, RIV061121, RIV071234 INTO RIV090609.
RIVERSIDE TRANSIT AGENCY	RIV071234	IN WESTERN RIV COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND AT APPROX. 60 STOPS (SAFETEA LU #171, TABLE 4, 5309 PROJECTS).	2010	2010	12/30/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. COMBINED WITH RIV051008, RIV061135, RIV061121 INTO RIV090609. ON SCHEDULE.
RIVERSIDE TRANSIT AGENCY	RIV090609	IN WESTERN RIVERSIDE COUNTY FOR RTA: INSTALL ADVANCE TRAVELER INFORMATION SYSTEMS (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND INSTALLATION OF ELECTRONIC MESSAGE SIGNS AT APPROX. 60 BUS STOPS (FY 'S 05, 07, 08, 09, AND 10 - 5309).	2011	2011	12/30/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. COMBINE PROJECTS RIV051008, RIV061121, RIV061135, AND RIV071234 INTO THIS PROJECT. ON SCHEDULE.
RIVERSIDE TRANSIT AGENCY	RIV990902	IN WESTERN RIVERSIDE COUNTY IN THE CITY OF PERRIS - CONSTRUCT NEW MULTIMODAL TRANSIT FACILITY (BUS & RAIL) AT 4TH AND D STREETS	2006	2008	12/30/2010	OBSTACLES ARE BEING OVERCOME. PROJECT IS COMPLETE AND OPEN FOR USE BUT THE CHANGE ORDERS AND REPORT OF COMPLETION ARE PENDING.

RIVERSIDE COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV010214	RCTC SHARE OF PURCHASE OF METROLINK CARS & LOCOMOTIVES - UP TO 47 CARS/CABS & 8 LOCOS TO BE ORDERED BY 6/30/06 (FY 03 & 04 5307) (SHARES AMONG LAOC8231, SBD20020801, & ORA090302)	2005/2007	2010	12/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO MANUFACTURING.
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV011242	PURCHASE EXPANSION ROLLING STOCK (2 CAB CARS AND 3 LOCOMOTIVES) FOR METROLINK IEOC AND RIVERSIDE/FULLERTON/LA LINES (EA: RIVFUL, PPNO: 0079E)	2004/2009	2009	12/30/2012	OBSTACLES ARE BEING OVERCOME. DELAY DUE TO MANUFACTURING.
TEMECULA	RIV62029	AT HWY 79 SO AND LA PAZ ST: ACQUIRE LAND, DESIGN AND CONSTRUCT PARK-AND-RIDE LOT - 250 SPACES (FY 05 HR4818 EARMARK)	2004/2007	2011	12/31/2012	OBSTACLES ARE BEING OVERCOME. PROJECT DELAYS DUE TO ECONOMIC CONDITIONS.

RIVERSIDE COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
CALTRANS	0121D	ON I-215/SR91/SR60, RIV I215 COR IMPROV PROJ - FROM 60/91/215 JCT TO 60/215 SPLIT - WIDEN 6 TO 8 LNS, INCLUDING MAINLINE/IC IMPROVS, ADD HOV, AUX, & SB TRUCK CLIMB LN (EA: 3348U1)	2006/2007	2009	12/30/2009	COMPLETED.
CALTRANS	354801	JCT RTE 15 TO VALLEY WAY UC - ADD 1 HOV AND 1 M/ F LN IN EA. DIR. INCLUDING OPERATIONAL STRIPING (IN SBD CNTY 9.05 - 9.95 & AT THE EAST END) ALSO WIDEN 5 UC'S & 1 OH (PPNO: 0033)			8/30/2008	COMPLETED.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	46360	IN RIVERSIDE AND MORENO VALLEY ON SR60 FROM RT 215 TO REDLANDS BLVD ADD 2 HOV LANES	12/30/2008	12/30/2008	12/30/2009	COMPLETED.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV051006	IN WESTERN RIVERSIDE COUNTY FOR CARE CONNEXXUS INC.: PURCHASE 1 EXPANSION LARGE BUS (APPROX 16 PASSENGERS, GAS/DIESEL) W/ LIFT AND TIEDOWNS (5310 FY 05/06 CYCLE)	2009	2008		CORRECTED. NOT A REPORTABLE TCM PER 2011 FTIP GUIDELINES TABLE IV-A (PAGE 55).
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV061149	IN WESTERN RIVERSIDE COUNTY FOR PEPPERMINT RIDGE - PURCHASE 2 EXPANSION MODIFIED VANS (APPROX 8 PASS EACH, GAS/DIESEL) (FY 06/07 5310 CYCLE)	2010	2010	6/30/2010	COMPLETED.
RIVERSIDE TRANSIT AGENCY	RIV051005	IN WESTERN RIVERSIDE COUNTY FOR RTA: PURCHASE 7 TYPE II DAR VEHICLES (5310 FY 05/06 CYCLE)	2009	2009		COMPLETED.
RIVERSIDE TRANSIT AGENCY	RIV070705	PURCHASE 5 EXPANSION PARATRANSIT TYPE II VEHICLES (APPROX 12 PASSENGER, GAS/DIESEL) WITH WHEEL CHAIR LIFTS AND ACCESSORIES (FY 08 5307) (UZA: RIV-SAN)	2009	2009		COMPLETED.

RIVERSIDE COUNTY – NEW COMMITTED TCM PROJECTS			
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**2011 FTIP COMPLETION DATE**
RIVERSIDE TRANSIT AGENCY	RIV080929	IN WESTERN RIVERSIDE COUNTY FOR RTA - PURCHASE 9 - 40 FT. CNG EXPANSION BUSES TO IMPLEMENT EXPRESS AND/OR BRT TYPE SERVICES IN WESTERN RIVERSIDE COUNTY, PER RECENTLY COMPLETED COMPREHENSIVE ANALYSIS (COA).	12/30/2010

SAN BERNARDINO COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
FONTANA	200431	INLAND PACIFIC ELECTRIC TRAIL - ON OLD SP ABANDONED RR BETWEEN I-15 TO MAPLE AVE.-CONSTRUCT CLASS 1 BIKE LANE (APPROX. 7 MILES LONG)	2006	2011	12/1/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
OMNITRANS	981118	BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	2005/2008	2009	8/31/2010	OVERCOMING DELAY ASSOCIATED WITH COMPLETION OF CITY REDEVELOPMENT PLAN.
OMNITRANS	20060607	CHAFFEY COLLEGE TRANSCENTER - CONSTRUCT TRANSFER FACILITY AT CHAFFEY COLLEGE	2009	2010	12/1/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
RIALTO	200450	RIALTO METROLINK STATION - INCREASE PARKING SPACES FROM 225-775	2006	2011	12/1/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ENVIRONMENTAL DOCUMENT COMPLETED. ON SCHEDULE.
SAN BERNARDINO, CITY OF	20020802	METROLINK ADD'L PARKING STRUCTURE - CONSTRUCT 5 LEVEL PARKING STRUCTURE TO SERVE EXISTING METROLINK STATION AT SANTA FE DEPOT LOCATION	2008	2009	6/30/2009	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. UNDER CONSTRUCTION. ON SCHEDULE.
SANBAG	SBD031505	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS (PROJECTS ARE CONSISTENT WITH 40 CFR PART 93.126, 127,128, EXEMPT TABLES 2 & 3)	2004	2010	12/1/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
SANBAG	200074	LUMP SUM - TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS (PROJECTS CONSISTENT W/40CFR PART 93.126,127,128, EXEMPT TABLE 2 & 3).	2004	2011	12/1/2011	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
SANBAG	20040827	RIDESHARE PROGRAM FOR SOUTHCOAST AIR DISTRIST	2009	2009	12/1/2009	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. FUNDS ARE OBLIGATED. ON SCHEDULE.

SAN BERNARDINO COUNTY – TCMS REPORTED IN THE 2008 RTIP TIMELY IMPLEMENTATION REPORT						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
VARIOUS AGENCIES	713	I-215 CORRIDOR NORTH - IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 210 - ADD 2 HOV & 2 MIXED FLOW LNS (1 IN EA. DIR.) AND OPERATIONAL IMP INCLUDING AUX LANES AND BRAIDED RAMP	2013	2010	12/1/2010	NO CHANGE IN COMPLETION DATE FROM 2008 RTIP TCM REPORT. ON SCHEDULE.
VARIOUS AGENCIES	20620	UPLAND TO SAN BERNARDINO FROM LA CO LINE TO RTE 215 - 8 LN FREEWAY INCLUDING 2 HOV LNS (6+2)-210 CORR. W/AUX LNS THRUOUT SEGS. 9-11(SEG.11 INCL CONNECTOR BETWEEN 210 & 215 (MORE)	2007/2009	2009	12/1/2010	OBSTACLES ARE BEING OVERCOME. ALL OF THE PROJECT IS COMPLETED EXCEPT FOR THE INTERCHANGE AT 210/215.

SAN BERNARDINO COUNTY – COMPLETED/CORRECTED PROJECTS						
LEAD AGENCY	**PROJECT ID**	**PROJECT DESCRIPTION**	**ORIGINAL COMPLETION DATE**	**2008 RTIP COMPLETION DATE**	**2011 FTIP COMPLETION DATE**	**2011 FTIP PROJECT STATUS**
COLTON	2002164	ON VALLEY BLVD. IN COLTON TO NORTH TO 10TH STREET CONNECTING TO ABANDONED RR CORRIDOR ON WEST SIDE OF COLTON AVE.-CONSTRUCT CLASS I BIKEWAY, LANDSCAPING AND LIGHTING	2003/2006	2008	7/1/2008	COMPLETED.
SANBAG	20020106	MONTCLAIR PEDESTRIAN UNDERCROSSING-CONSTRUCTION OF A 2ND PLATFORM CREATES NEED FOR CONSTRUCTION OF NEW UNDERCROSSING	2003	2008	12/1/2007	COMPLETED.

2008 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
ALAMEDA CORRIDOR EAST	LA990353	ALAMEDA CORRIDOR EAST – NOGALES ST GRADE SEP	2006	2010	The 2008 RTP identified LA990353 as complete. The Nogales-Alhambra (North) part of project is complete. The Nogales-LA Subdivision (South) part of this project was recently transferred by LA County to ACE, and is scheduled for completion in 2010.
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0D428	PURCHASE PROPERTY/CONSTRUCT PASSENGER TRANSFER STATION	2010	2010	No change from the 2008 TCM Report. ROW acquisition; intend to obligate the funds prior to October 2008.
BALDWIN PARK	LAE0076	CONSTRUCT ADD'L VEHICLE PARKING (200 TO 400 SPACES), BICYCLE PARKING LOT AND PEDESTRIAN REST AREA AT THE TRANSIT CENTER	2010	2010	No change from the 2008 RTP TCM Report. Baldwin Park Metrolink Transit Center recently granted $4,200,000 through the STIP process. Metro staff working with Caltrans to obligate a portion of the STIP (LAFA141) funding to complete the Transit Center design. Anticipated completion date December 2009.
BELL GARDENS	LA0F099	TRANSIT CENTER AND PARK AND RIDE; CONSIST OF BUS STOP AMENITIES INCLUDING NEW BUS SHELTER, BENCHES, LANDSCAPING ETC.THE TRANSIT CENTER WILL BE SUPPORTED BY A 283 SPACE PARK & RIDE	2009	2010	No change from the 2008 RTP TCM Report. Environmental Document/Pre-Design Phase (PAED). On schedule.
BELLFLOWER	LA996275	WEST BRANCH GREENWAY MULTI-MODAL TRANS. CORRIDOR DESIGN AND CONSTRUCT 2.5 MILE CLASS I BIKE PATH ALONG MTA-OWNED SANTA ANA BRANCH ROW INCL. PEDESTRIAN AND LANDSCAPING (3145)	2006	2008	No change from the 2008 RTP TCM Report. Project bids due November 14, 2007; award of contract scheduled for November 26, 2007. E-76 for construction in hand. Delays encountered largely related to requested changes from Caltrans in the license agreement between the City and the MTA for use of the property. Anticipated completion date July 2008.
CALABASAS	LA974100	U.S. 101 INTERJURISDICTIONAL BIKE LANE GAP CLOSURE CONSTRUCTION 4.5 MILES OF BIKEWAY IMPROVEMENTS TO CLOSE SEVERAL GAPS WITHIN A 12 MILE CORRIDOR(TEA21-#69) (PPNO# 3147)	2003/2006	2008	No change from the 2008 RTP TCM Report. Under construction. Anticipated completion date December 2008.

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
CALTRANS	1178A	Route 405: IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) (2206LK CFP) OBLIGATED 6207 (034)	2006	2008	No change from the 2008 RTP TCM Report. Construction/Implementation. All funds have been obligated. Anticipated completion date 11/30/2008.
CALTRANS	LA000357	Route 5: --- FROM ROUTE 170 TO ROUTE 118 ONE HOV LANE IN EACH DIRECTION (10 TO 12 LANES) INCLUDING THE RECONSTRUCTION OF THE I-5/SR-170 MIXED FLOW CONNECTOR AND THE CONSTRUCTION OF THE I-5/SR-170 HOV TO HOV CONNECTOR (CFP 345) (2001 CFP 8339; CFP2197). (	2008/2010	2011	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). Anticipated completion date December 2011.
CALTRANS	LA000358	Route 5: --- FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 12180, 12181,12182,12183,12184, 13350 PPNO 0142F,151E,3985,3986,3987) SAFETEA LU # 570. CONSTRUCT MODIFIED IC @ I-5 EMPIRE AVE, AUX LNS NB & SB BETWEEN BURB	2012/2010	2011	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). Anticipated completion date December 2011.
CALTRANS	LA000548	Route 10: FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (EA# 117080, PPNO# 0309N)	2030/2015	2015	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). On schedule.
CALTRANS	LA01342	Route 10: RT 10 FROM RT 605 TO PUENTE AVE HOV LANES (8+0 TO 8+2) (EA# 117070, PPNO 0306H) PPNO 3333 3382 AB 3090 REP (TCRP #40)	2008/2010	2011	No change from the 2008 RTP TCM Report. Bid/Advertise Phase. Anticipated completion date 2012.
CALTRANS	LA01344	Route 5: RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES. EA# 122001, PPNO 0162P. GARVEE project.	2005/2006	2008	No change from the 2008 RTP TCM Report. Construction/Implementation. All funds have been obligated. Anticipated completion date 7/31/08.
CALTRANS	LA0C8344	Route 405: EXTENSION OF N/B I-405 HOV LANE-TO EXTEND THE HOV LANE ON N/B I-405 FROM SOUTH OF VENTURA BL TO SO. BURBANK BLVD WHERE IT WILL JOIN THE EXISTING HOV LANE. (EA# 199620, PPNO# 2788).	2007	2008	No change from the 2008 RTP TCM Report. In construction Implementation Phase. All funds have been obligated. Project on schedule to be completed 7/22/08.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
CALTRANS	LA0D73	Route 5: LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW (EA 2159A0, PPNO 2808). TCRP#42.2&42.1	2014	2016	No change from the 2008 RTP TCM Report. Environmental Document/Pre-design Phase (PAED). Anticipated completion date 2016.
CALTRANS	LA195900	Route 405: RTE. 405 - WATERFORD AVE. TO RTE 10 - AUX LANE: LOS ANGELES - WATERFORD AV. TO RTE 10 - CONSTRUCT S/B AUX LANE & S/B HOV LN (2001 CFP 8354) (EA# 195900 ,PPNO 2333). GARV 12/03	2006/2007	2009	No change from the 2008 RTP TCM Report. Construction Implementation phase. Project Completion scheduled 4/3/2009. All funds have been obligated.
CALTRANS	LA963724	Route 210: IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNARDINO COUNTY LINE - CONSTRUCT 8-LANE FREEWAY INCLUDING 2-HOV LANES (12620, 12640, 12630, 10501, 17210) 24270	2003	2010	No change from the 2008 RTP TCM Report. Construction/Project implementation. Anticipated completion date 2010.
CALTRANS	LA996137	Route 60: RTE. 60 HOV LNS. FROM RTE. 605 TO BREA CANYON RD. -- CONSTRUCT ONE HOV LANE IN EACH DIRECTION) (CFP: 358, 4262, 6137=67,150+IIP: 5,100) (EA#129410, 129421, PPNO 0482R,0482RA)	2008/2007	2011	No change from the 2008 RTP TCM Report. Beginning project implementation. Anticipated completion date 2011.
CALTRANS	LA996134	Route 5: RTE. 5/14 INTERCHANGE & HOV LNS ON RTE 14 - CONSTRUCT 2 ELEVATED LANES - HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO 0168M)	2014/2009	2013	No change from the 2008 RTP TCM Report. Project being awarded. Completion date moved due to contractibility issues. Anticipated completion date 2013.
CARSON, CITY OF	LAE2932	213TH ST. PEDESTRIAN SIDEWALK BRIGE OVER DOMINGUEZ CHANNEL. CONSTRUCT 213TH ST. PEDESTRIAN BRIDGE TO PROVIDE SAFE PASSAGE FOR PEDESTRIANS & WHEELCHAIRS OVER DOMINGUEZ CHANNEL.	2010	2010	No change from the 2008 RTP TCM Report. On schedule.
CARSON, CITY OF	LA0C8219	SOUTH BAY PAVILION REGIONAL TRANSIT CTR. CONSTRUCTION OF A TRANSIT CTR AT THE SOUTH BAY PAVILION SHOPPING CTR TO BE SERVED BY ALL 8 CARSON CIRCUIT RTES & MTA LINES #205 & #446-447.	2006	2010	No change from the 2008 RTP TCM Report. Engineering/Plans , Specifications and Estimates (PS&E)
CLAREMONT	LA0D103	PARKING FACILITY EXPANSION FOR TRANSIT PATRONS. THE CITY AND THE REDEVELOPMENT AGENCY WILL EXPAND ON AN EXISTING PARKING FACILITY (500 PARKING SPACE) FOR ADDITIONAL USE BY TRANSIT PATRONS.	2006	2009	No change from the 2008 RTP TCM Report. Under construction. Anticipated completion date 12/31/09.
COMPTON	LAOB7326	COMPTON CREEK BIKEWAY EXTSN - PHASE III.DSIGN & CNSTRUCT .6 MI OF CLAS 1 BIKE/PED PATH FRM GREENLEAF BL TO ARTESIA FWY.WILL INC BIKE PATH, PED WALKWAY SIGNAGE, STRPNG. (PPNO 2869).	2005/2006	2009	No change from the 2008 RTP TCM Report. On schedule. Anticipated completion date 2009.

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
CULVER CITY MUNI BUS LINES	LA0B400	Purchase CNG buses and expand natural gas fueling facility (SAFETEA-LU Transit Project #207) Procurement of six (6) 40' CNG expansion buses.	2004	2008	No change from the 2008 RTP TCM Report. In the process of planning for the implementation of a BRT and are trying to figure out how many buses needed for this program. Have optional add-on program from last bus procurement. Order for the buses will be placed once planning completed. Anticipated completion date 2008.
CULVER CITY MUNI BUS LINES	LA0C8382	SEPULVEDA BLVD BUS STOP IMPROVEMENT PROGRAM. BUS STOP AMENITIES INC LIGHTING SIGNAGE, LANDSCAPING, SHELTERS, SEATING, LANDINGS AND TRASH RECEPTACLES.	2008/2010	2010	Potential implementation obstacles identified. MTA has identified substitute projects and has requested that SCAG initiate the substitution process pursuant to SAFETEA-LU.
FOOTHILL TRANSIT ZONE	LA0B311	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM SAFETEA-LU # 341 (E-2006-BUSP-092) (E-2006-BUSP-173)	2003/2005	2010	No change from the 2008 RTP TCM Report. Environmental Document/Pre-Design Phase (PAED). Anticipated completion date 2010.
FOOTHILL TRANSIT ZONE	LA963526	BUS STOP ENHANCEMENT	2005	2008	No change from the 2008 RTP TCM Report. Construction/Project implementation. Anticipated completion date June 2008.
FOOTHILL TRANSIT ZONE	LA9811007	AVL SYSTEM, ARRIVAL SIGNS, (SMART BUS PROJECT) AND LINE 187 SIGNAL PRIORITY	2005	2008	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates. Anticipated completion date December 2008.
GARDENA	LA0D340	PURCHASE FIVE (5) 40 FT. ALTERNATIVE FUEL BUSES FOR SERVICE EXPANSION. PART OF SAFETEA-LU TRANSIT PROJECT #260 ALONG WITH LA0D308, LA000507, AND LA0D307	2010	2010	No change from the 2008 RTP TCM Report. PAED Phase. Anticipated completion date June 2010.
GLENDALE	LAE0001A	PURCHASE OF CNG BUSES FOR GLENDALE BEELINE TRANSIT SYSTEM	2010	2010	No change from the 2008 RTP TCM Report. Order additional 17 buses in 08/09. Anticipated completion date 2010.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
LA CANADA-FLINTRIDGE	LA0C8159	LA CANADA FLINTRIDGE EAST/WEST BIKEWAY CORRIDOR. DESIGN AND CONSTRUCTION OF 3.42 MILES OF EAST/WEST DIRECTIONAL CLASS II AND CLASS III BIKEWAY IN THE CITY OF LA CANADA FLINTRIDGE.	2008	2008	No change from the 2008 RTP TCM Report. Anticipated completion date December 2008.
LA MIRADA	LA0D349	PURCHASE EXPANSION BUSES WITH ALTERNATE FUEL (HYBRID/ELECTRIC)	2008	2008	No change from the 2008 RTP TCM Report. Project is in the planning stage. Funds obligated.
LONG BEACH	LA0C8163	BIKEWAY AND PEDESTRIAN IMPROVEMENTS. 1.2 MILE CLASS I BIKE/PED PATH FROM WALNUT AVE TO WILLOW ST AT THE BLUE LINE STATION. (PPNO# 3408)	2005	2011	Delay due to environmental review issues and purchase of site. CEQA review done originally but NEPA review also needed. Negotiatoions on alternate property facilitated by interim funding from City of Long Beach.
LONG BEACH	LA0C8331	LONG BEACH WAYFINDING/TRANSIT CONNECTION PROGRAM OF SIGNS WILL BE PEDESTRIAN, VEHICULAR, A PARKING AND WILL INCLUDE MAPPING THAT DISPLAYS DESTINATIONS AND TRANSIT OPTIONS.	2004	2009	No change from the 2008 RTP TCM Report. Project under construction and implementation. Anticipated completion date December 2009.
LONG BEACH	LAE1296	LONG BEACH INTELLIGENT TRANSPORTATION SYSTEM	2011	2011	No change from the 2008 RTP TCM Report. New Project. On schedule.
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA0C8383	LONG BEACH TRANSIT: BUS STOP IMPROVEMENT PROJ. ENHANCE 9 OF RAIL STATION FEEDER BUS STOPS TO EASE TRANSFERS, MAKE PUBLIC TRANSIT MORE AESTHETICALLY PLEASING & SAFER, INC RIDERSHIP.	2004	2010	No change from the 2008 RTP TCM Report. Construction/Project implementation begins. On schedule.
LOS ANGELES COUNTY	LA0C8364	NORTH LA COUNTY NON-ADVERTISING BUS STOP SHELTERS. INSTALLATION OF BUS SHELTERS WITH SEATING AT BUS STOPS WITH GREATEST # OF DAILY BOARDING IN NORTH LOS ANGELES COUNTY. PPNO 3229.	2006/2007	2010	No change from the 2008 RTP TCM Report. Still coordinating with local transit providers for shelter locations. On schedule.
LOS ANGELES COUNTY	LA996289	SOUTH BAY BIKE TRAIL PED. ACCESS RAMPS/SIDEWALKS - DESIGN OF RAMPS, WALKWAYS TO PROVIDE ACCESS TO THE STH. BAY TRAIL AT DOCKWEILER STATE BEACH (2006 STIP)	2010	2010	No change from the 2008 RTP TCM Report. Preliminary Engineering
LOS ANGELES COUNTY MTA	LA0C10	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT PHASE I TO VENICE-ROBERTSON STATION	2011/2012	2010	No change from the 2008 RTP TCM Report. Under construction. Anticipated completion date 2010.

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
LOS ANGELES COUNTY MTA	LA0C8114	LA CNTY RIDESHARE SERVICES; PROVIDE COMMUTE INFO, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS. PPNO 9003	2009	2010	No change from the 2008 RTP TCM Report. Ongoing. Anticipated completion date December 2010.
LOS ANGELES COUNTY MTA	LA0C8413	METRO RAPID BUS STATIONS-PHASE II: INCLUDES COMMUNICATIONS & EQUIPMENT	2006/2007	2012	No change from 2008 RTP TCM Report. Ongoing installment of bus signal priority system. On schedule.
LOS ANGELES COUNTY MTA	LA29202U3	SAN FERNANDO VALLEY NORTH/SOUTH BRT EXTENSION PHASE I: METRO RAPID SERVICE ALONG RESEDA BLVD. AND SEPULVEDA BLVD. SAFETEA-LU # 183	2005	2009	No change from the 2008 RTP TCM Report. Planning. On schedule.
LOS ANGELES COUNTY MTA	LA29202U4	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE II: BUS SPEED IMPROVEMENTS ALONG METRO RAPID CORRIDORS AND EXPANSION OF EXISTING PARK & RIDE FACILITY.	2005/2007	2010	No change from the 2008 RTP TCM Report. Planning. On schedule.
LOS ANGELES COUNTY MTA	LA29202U5	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE III: STATION ACCESSIBILITY AND PEDESTRIAN ENHANCEMENTS ON RESEDA BLVD., SEPULVEDA BLVD., AND LANKERSHIM BLVD.	2005/2008	2010	No change from the 2008 RTP TCM Report. Planning. On schedule.
LOS ANGELES COUNTY MTA	LA29202U6	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE IV: COMPLETION OF A NORTHBOUND BUS ONLY LANE ON A PORTION OF SEPULVEDA BLVD. AND OTHER IMPROVEMENTS.	2005/2009	2010	No change from the 2008 RTP TCM Report. Planning. On schedule.
LOS ANGELES COUNTY MTA	LA29202V	EASTSIDE TRANSIT CORRIDOR - UNION STATION TO ATLANTIC VIA 1ST ST. TO LORENA, THEN 3RD ST. VIA 3RD/BEVERLY BLVD. TO ATLANTIC (EASTSIDE LRT PPNO 3358)	2009/2010	2010	No change from the 2008 RTP TCM Report. Construction. Anticipated completion date 2010.
LOS ANGELES COUNTY MTA	LA29202W	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. FROM VERMONT TO SANTA MONICA DOWNTOWN- MID-CITY WILSHIRE BRT INCL. DIV. EXPANSION AND BUS ONLY LANE	2009/2010	2011	First phase is complete.
LOS ANGELES COUNTY MTA	LA963542	ACQUISTION REVENUE VEHICLES - 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS); FY05-FY10 TOTAL OF 1000 BUSES.	2005	2012	No change from the 2008 RTP TCM Report. Bids will be advertised soon. 105 45' Comp CNG and 25 45' gas electric hybus, delivery 6/09. 94 ARTICS 6/07 delivered. 95 ARTICS expect to be delivered 6/08. FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS), all delivered. On schedule.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
LOS ANGELES COUNTY MTA	LA974165	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMODATE PUBLIC ACCESS (PEDESTRIAN ENTRABCES, WALKWAYS, BICYCLE FACILITIES) PPNO# 3417	2002/2007	2011	No change from the 2008 RTP TCM Report. Connected to a joint private-public development at the Westlake/MacArthur Park Station. Metro has taken over the project from the City of LA. Anticipated completion date 2011.
LOS ANGELES COUNTY MTA	LA990305	LIGHT RAIL TRANSIT FLEET- 50 NEW RAIL CAR (26 EXP (10 FOR METRO GOLD LINE EASTSIDE & (16) FOR EXPOSITION LRT) 24 REPLACEMENT CARS - .PPNO 3225.	2010	2010	No change from the 2008 RTP TCM Report. All funds have been obligated. Phased project - vehicles will start to be delivered now and will complete all delivery in 2012
LOS ANGELES COUNTY MTA	LAE0036	WILSHIRE/ VERMONT PEDESTRIAN PLAZA IMPROVEMENTS AND INTERMODAL PEDESTRIAN LINKAGES	2011	2011	No change from the 2008 RTP TCM Report. In construction. On schedule
LOS ANGELES COUNTY MTA	LAE0195	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES PIERCE COLLEGE AND MTA'S RAPID BUS TRANSIT STOPS TO INCLUDE PASSENGER AMENITIES, 2007 CFP # F1658	2010	2014	No change from the 2008 RTP TCM Report. Funding to be provided by 2007 Metro Call for Projects process. Anticipated completion date 2014.
LOS ANGELES COUNTY MTA	LAE0388A	DESIGN AND CONSTRUCT IMPROVED PEDESTRIAN LINKAGES BETWEEN LOS ANGELES MISSION COLLEGE AND PUBLIC TRANSIT SERVICES TO INCLUDE LIGHTING, LANDSCAPIND, AND PASSENGER AMENITIES	2010	2010	No change from the 2008 RTP TCM Report. In contract/project award phase. Anticipated completion date December 2010.
LOS ANGELES, CITY OF	LA002738	BIKEWAY/PEDESTRIAN BRIDGE OVER LA RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077) (PPNO# 3156)	2009	2012	Environmental Document/Pre-design Phase (PAED); E76 and CTC Allocation request for 06/07 funds have been completed. Project delay from 2009 to 2012 caused by issues with the LOA between LACMTA and the City of LA are being overcome.
LOS ANGELES, CITY OF	LA0B7330	SAN FERNANDO RD ROW BIKE PATH PHSE II-CONSTRUCT 2.75 MILES CLAS I FRM FIRST ST TO BRANFORD ST,ON MTA-OWND ROW PARLEL TO SAN FERNANDO RD. LINK CYCLSTS TO NUMROUS BUS LNE. PPNO 2868.	2005	2010	No change from the 2008 RTP TCM Report. Project is in Final Design phase. Environmental documents have been completed. Anticipated completion date June 2010.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
LOS ANGELES, CITY OF	LA0C53	HOLLYWOOD INTERMODAL TRANSPORTATION AND PUBLIC PARKING CENTER ON HAWTHORNE AVE. BETWEEN HIGHLAND AVENUE AND NORTH ORANGE DRIVE (EXIST 500 SP PARK STRUCTURE).TCRP#49.2	2004	2011	Agency's acquisition of property was challenged. MTA looking at other site opportunities in the vicinity for the facility.
LOS ANGELES, CITY OF	LA0C8164	EXPOSITION BLVD RIGHT-OF-WAY BIKE PATH-WESTSIDE EXTENSION. DESIGN AND CONSTRUCTION OF 2.5 MILES OF CLASS 1 BIKEWAY, LIGHTING, LANDSCAPING & INTERSECTION IMPROVEMENTS. (PPNO# 3184)	2009	2010	No change from the 2008 RTP TCM Report.
LOS ANGELES, CITY OF	LA0C8171	GAYLEY AVE BIKE LANES & STREET WIDENING. DESIGN AND CONSTRUCTION OF .25 MILES OF CLASS II BIKE LANES ON GAYLEY AVE FROM EXISTING BIKE LANES AT LEVERING AVENUE TO THE UCLA CAMPUS	2010	2013	Potential implementation obstacles identified. MTA has identified substitute projects and has requested that SCAG initiate the substitution process pursuant to SAFETEA-LU.
LOS ANGELES, CITY OF	LA0C8173	NORTHRIDGE METROLINK STN PARKING IMPRVMENT. CONSTRCT ADDT'L 100 PRKING SPCS & RECONFIGURE SOUTHERN PRTION OF EXISTNG PRKNG LOT TO YIELD AN ADDT'L 40 NET PRKING SPCES TOTAL 400 SPC.	2007	2009	No change from the 2008 RTP TCM Report. Project is in the PAED (Preliminary Design) phase. E76 and CTC Allocation Request have been completed for 06/07 funds. Anticipated completion date 2009.
LOS ANGELES, CITY OF	LA0C8174	LITTLE TOKYO PEDSTRIAN LINKAGES. CONSTRUCTN OF IMPRVEMNTS: SIDEWLK & CROSSWALK ENHANCMNTS, STREET FURNITURE & LANDSCAPING TO PROMOTE PEDESTRIAN TRAVEL W/IN LITTLE TOKYO. PPNO 3116.	2004/2006	2009	No change from the 2008 RTP TCM Report. Project funded by local funds only. Project is under construction. Project delay as result of prop 218 assessment process. The community opposed the assessment and additional outreach and community meetings were needed. Assessment is approved and project is under way. Anticipated completion date 2009.
LOS ANGELES, CITY OF	LA0C8209	HOLLYWOOD MEDIA DISTRICT-PED IMPRV. STREETSCAPE ELEMNTS: LANDSCAPE MEDIAN ISLANDS, PED LIGHTING,STAMPED XWALK, ON SANTA MONICA BL- VINE ST TO HIGHLAND & HIGHLAND - MELROSE TO FOUNTAIN	2005	2009	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). Anticipated completion date November 2008.
LOS ANGELES, CITY OF	LA0C8380	CHINATOWN/COLLEGE STREET GOLD LINE STATION - INTERMODEL TRANS. CENTER ENHANCE MENT (PEDESTRIAN WALKWAY BRIDGE, BUS STATION, AND A BIKE STATION)	2004/2008	2008	No change from the 2008 RTP TCM Report. Project in Construction. All funds have been obligated.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
LOS ANGELES, CITY OF	LAE0566	PURCHASE OF SIX (6) ALTERNATIVE FUELED VEHICLES TO BE USED IN THE EXPANSION OF THE LAX REMOTE TERMINAL FLYAWAY SHUTTLE BUS SYSTEM. LOS ANGELES WORLD AIRPORTS WILL OPERATE THESE BUSES BETWEEN NEW PARK-N-RIDE LOTS AND LAX AIRPORT.	2011	2011	No change from the 2008 RTP TCM Report. Bid/Advertise Phase. On schedule.
LOS ANGELES, CITY OF	LAE0567	INTERMODAL TRANSPORTATION CENTER WHICH WOULD ENHANCE PASSENGER SERVICE BETWEEN AREA RAIL AND BUS TRANSIT AND THE LAX AIRPORT.	2010	2013	No change from the 2008 RTP TCM Report. LA City Council has required Los Angeles World Airports to complete additional analysis for LAX master plan projects such that the environmental process is expected to take an additional two years. Anticipated completion date 2013.
LOS ANGELES, CITY OF	LA0C8242	BUS STOP IMPROVEMENTS ON SAN FERNANDO ROAD & TC LIGHTING; ENHANCE PASSENGER FACILITIES AT VARIOUS BUS STOPS WITH GREATEST NUMBER OF DAILY BOARDINGS ON EAST SIDE OF SAN FERNANDO RD.	2008	2010	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E); Funding has changed. MTA and Bureau of St Lighting has entered into an MOU with PC25 funds. Anticipated completion date 2010.
MONROVIA	LAE0039	TRANSIT VILLAGE - PROVIDE A TRANS. FACILITY FOR SATELLITE PARKING FOR SIERRA MADRE VILLA GOLD LINE STA, P-N-R FOR COMMUTERS, A FOOTHILL TRANSIT STORE.	2010	2010	No change from the 2008 RTP TCM Report. With publication of Draft EIR for the Transit Village Development area, projects are being defined with scope of works developing within the 6 months, with design/construction documents to follow. Construction to begin within 6-9 months. Anticipated completion date 2010.
MONTEBELLO	LA55201	CONTINUING PROJECT - BUS STOP IMPROVEMENTS ,AMENITIES ,SHELTERS ,ETC	2010	2010	No change from the 2008 RTP TCM Report. Construction/Project implementation. On schedule.

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
PASADENA	LA0D372	SOUTH ACCESS PEDESTRIAN BRIDGE TO SIERRA MADRE VILLA LIGHT RAIL STATION. THIS PEDESTRIAN BRIDGE OVER THE ROUTE 210 FREEWAY WILL PROVIDE A DIRECT AND SAFE APPROACH FOR PEDESTRIANS	2007	2010	No change from the 2008 RTP TCM Report. Engineering (PS&E) Phase PS&E. ROW completion – Jan. 2009, Construction completion - June 2010. Required revisions to design to comply with new AASHTO standards.
PASADENA	LA0D47	SR 710 MITIGATION PROJECT-TRAFFIC CONTROL AND MONITORING SYSTEM-INTELLIGENT TRANSPORTATION SYSTEMS (ITS). CONSTRUCT AND INSTALL ITS TECHNOLOGY AND VARIOUS DEGREES OF SMART SIGNALS	2008	2008	No change from the 2008 RTP TCM Report. Project in Progress. Anticipated completion date December 2008.
PASADENA	LA0D99	PURCHASE 2 EXPANSION LOW-FLOOR, HANDICAPPED ACCESSIBLE, ALTERNATIVE FUEL TRANSIT BUSES.	2004	2010	No change from the 2008 RTP TCM Report. Vehicles have been purchased and are waiting delivery. All funds have been obligated. Anticipated completion date 2010.
PASADENA	LAE3790	THE PASADENA ITS INTEGRATES 3 COMPONENTS; TRAFFIC SIGNAL COMMUNICATION AND CONTRL, TRANSIT VEHICLE ARRIVAL INFO AND PUBLIC PARKING AVAILABILITY INFO. SAFETEA-LU PRJ #3790 AND #399	2010	2013	Project experienced delays but is now on track. The City is advertising a contract for the Transit Vehicle Arrival Information component to facilitate implementation.
REDONDO BEACH	LA0D299	ACQUISITION OF (6) ALTER FUEL TRANSIT/PARATRANSIT VEHICLES NOT TO EXCEED 35' SAFETEA-LU TRANSIT #251	2010	2010	No change from the 2008 RTP TCM Report. First Vehicle/Equipment Delivered. Anticipated completion date 2010.
SAN FERNANDO	LAE0127	PROCUREMENT OF (3) CNG TRANSIT VEHICLES AND RELATED INFRASTRCTURE EQUIPMENT FOR FIXED ROUTE PUBLIC TRANSPORTATION.	2010	2010	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). On schedule.
SAN GABRIEL VALLEY COG	LA0C57	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEP. AT PASSONS BLVD IN PICO RIVERA (& MODIFY PROFILE OF SERAPIS AV,)(PART OF ALAMEDA CORR EAST PROJ.)SAFETEA-LU HPP # 1666 (TCRP #54.3)	2006	2010	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). On schedule.
SAN GABRIEL VALLEY COG	LA990359	GRADE SEP XINGS SAFETY IMPR; 35- MI FREIGHT RAIL CORR. THRGH SAN.GAB. VALLEY - EAST. L.A. TO POMONA ALONG UPRR ALHAMBRA &L.A. SUBDIV - ITS 2318 SAFETEA #2178;1436 #1934 PPNO 2318	2003/2009	2010	No change from the 2008 RTP TCM Report. Construction/Project implementation begins. On schedule.

Los Angeles County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
SANTA CLARITA	LA0D363	SANTA CLARITA TRANSIT PHASE 2 - EXPANSION BUSES - 2 OVER THE ROAD COMMUTER BUSES.	2009	2009	No change from the 2008 RTP TCM Report. This project will continue for several years while we implement our recently adopted Transportation Development Plan (TDP). Additional federal funds will be added at a later time during a TIP Amendment. Anticipated completion date 2010.
SANTA CLARITA	LA0F018	PURCHASE (2) EXPANSION BUSES FOR ROUTE 8 TO THE SAN FERNANDO VALLEY	2009	2009	No change from the 2008 RTP TCM Report. In procurement stage. Anticipated completion date 2009.
SANTA CLARITA	LA0C8130	INCIDENT MANAGEMENT - TRAVELER INFORMATION SUBSYSTEM;INSTALLATION OF SYSTEM DETECTORS, FIBER OPTIC CABLE, CCTV'S, AND TRAVELER INFO SYSTEM VIA WEBSITE, EMAIL OR CELL PHONE.	2006	2008	No change from the 2008 RTP TCM Report. In implementation stage. Anticipated completion date February 2009.
SANTA CLARITA	LA0C8156	SANTA CLARITA REG'L COMUTR TRAIL - I-5 TO RAILROAD BRIDGE & FROM RAILROAD BRIDGE TO ANZA DRIVE- CONSTRUCT & ACQUISITION OF 1.0 MI OF CLASS I BIKE PATH (PPNO 3127). NON-CAP.	2006	2011	No change from the 2008 RTP TCM Report. In construction. Anticipated completion date January 2011.
SANTA FE SPRINGS	LA0F096	NORWALK SANTA FE SPRINGS TRANSPORTATION CENTER PARKING EXPANSION AND BIKEWAY IMPROVEMENTS. PROVIDE ADDITIONAL 250 PARKING SPACES FOR TRANSIT CENTER PATRONS AND IMPROVE BICYCLES ACCESS TO THE TRANSIT CENTER	2009	2011	No change from the 2008 RTP TCM Report. In ROW acquisition phase. The ISTEA Demonstration Funds have been allocated to this project by the I-5 JPA. FHWA Caltrans approval for this fund reallocation is pending. Additional funds received from 2007 Call for Project. Project authorization and request to proceed with preliminary engineering and construction (relocation) of a groundwater treatment system on the site is being prepared for submittal to Caltrans. Anticipated completion date 2011.
SANTA MONICA	LA57101	BUS FACILITY IMPROVEMENTS	2005	2010	No change from the 2008 RTP TCM Report. Beginning construction/project implementation. On schedule.

Los Angeles County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
SANTA MONICA MUNICIPAL BUS	LAE0364	CONSTRUCT INTERMODAL PARK AND RIDE FACILITY AT SANTA MONICA COLLEGE CAMPUS ON SOUTH BUNDY DRIVE NEAR AIRPORT AVENUE	2010	2010	No change from the 2008 RTP TCM Report. Engineering/Plans, Specifications and Estimates (PS&E). Anticipated completion date 2010.
SCRAA/LACMTA/ SANBAG	LA29204	LA-SAN BERNARDINO CR (SF UNION STATION-SAN BERNARDINO) CAPACITY IMPROVEMENTS (3037) (JARC $1982). DEMOT21 = 3037	2003/2005	2009	Project under construction.
TORRANCE	LA0D379	AUTOMATIC VEHICLE LOCATOR (AVL) PROJECT-PHASE 2	2007	2008	No change from the 2008 RTP TCM Report. Project ongoing. Planned completion date December 2008.
WESTLAKE VILLAGE	LA960142	LINDERO CANYON ROAD FROM AGOURA TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION	2003/2005	2013	Project under construction.
WHITTIER	LA0B7322	WHITTIER GREENWAY TRAIL-ACQUISITION, DESIGN, AND CONSTRUCTION MANAGEMENT OF 2 MILES CLASS I BIKE/PED PATH ON AN ABANDONED RAIL ROW FROM NORWALK TO FIVE POINTS.PPNO 2872	2004	2011	This is a portion of a larger bike trail (see LA0C8161 which is on-schedule). This segment of the bike trail is being delayed due to ROW issues.
WHITTIER	LA0C8161	WHITTIER GREENWAY TRAIL: PICKERING BRIDE SEG 1 DEVT& SEG 3 P/E & DEVT. DESIGN, CONST& ACQUIST OF 2.86 MLES CLASS I BIKE/PED FAC ON ABANDONED ROW IN WHITTIER PPNO#3440-EA07-932045	2008	2008	On schedule.

Los Angeles County Completed/Corrected Projects

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
ACCESS SERVICES, INC.	LA900520	PURCHASE OF ADDITIONAL 386 VEHICLES FROM FY06 TO FY09. 100 VEHICLES IN FY06, 114 VEHICLES IN FY07; 110 IN FY08 AND 62 IN FY09.	2005	2005	Corrected. Not a TCM by definition.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA0D45	ROUTE 47: SR-47 EXPRESSWAY: REPLACEMENT OF SCHUYLER HEIM BRIDGE TO INCLUDE 2 THRU LANES AND 1 AUX LANE NB; AND 3 THRU LANES AND 1 AUX LANE SB; CONSTRUCT EXPRESSWAY AND 2-LANE FLYOVER. SAFETEA-LU # 712 & # 3797	2003/2005	2017	Corrected. Not a TCM - mixed flow project incorrectly labelled as a TCM

Los Angeles County Completed/Corrected Projects					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
ARCADIA	LA990712	NEW & EXPANDED SHUTTLE SERVICE THRU DOWNTOWN ARCADIA CONNECTING HOTELS & BUSINESSES TO SANTA ANITA RACE TRAK & FASHION MALL (HUNTINGTON ST) & PROPOSED METRO GOLD LINE FOOTHILL EXTENSION TRANSIT STATION	2003/2005	2008	Completed
BALDWIN PARK	LA0D281	DESIGN AND CONSTRUCT PARKING IMPROVEMENTS AT AND ADJACENT TO THE CITY'S EXISTING METROLINK STATION	2007	2010	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
BURBANK	LAE0396	UPGRADE EXIST - REG,L TRANSIT & LAYOVER FACILITY ADJACENT TO THE BURBANK-GLENDALE-PASADENA AIRPORT. WILL FACILITATE TRANSFER OF PASSENGERS TO & FROM MANY GROUND TRANS. (PE ONLY)	2011	2011	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
CALABASAS	LA0D322	TRANSIT FACILITY TO INCLUDE BUS MAINTENANCE STRUCTURE, BUS STORAGE, TRANSIT HUB, PARK-N-RIDE, TRAIL HEAD AND A VISITOR SERVING KIOSK.	2007	2008	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
CARSON, CITY OF	LAE0108	PURCHASE TWO TRIPPER BUSES TO RELIEVE OVERCROWDING DURING PEAK PERIODS. ROUTE G AND D, BLUELINE STATION AT DEL AMO BLVD/I-710 TO SOUTH BAY PAVILION MALL, DEL AMO BLVD	2010	2010	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
CARSON, CITY OF	LAE0132	PURCHASE OF ONE BUS.REPLACEMENT OF A 1983 CROWN DIESEL FUEL SCHOOL BUS WITH THE PURCHASE OF A NEW CNG-POWERED SCHOOL BUS. BUS WILL REDUCE EMISSIONS & CONTINUE TO PROVIDE TRANSPORTA	2011	2011	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
CARSON, CITY OF	LAE0407	PURCHASE ONE TROLLEY BUS VEHICLE FOR EXISTING SERVICE ALONG CARSON ST. BETWEEN THE HARBOR TRANSIT WAY STATION AND THE CARSON CIVIC CENTER AT AVALON BLVD	2010	2010	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
COVINA	LA0D206	METROLINK PEDESTRIAN BRIDGE PROJECT. THIS FACILITY WILL BE CONSTRUCTED ON THE WEST SIDE OF CITRUS AVE. THE METROLINK STATION IS ON THE EAST SIDE OF CITRUS AVE.	2006	2012	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
LAC MTA	LA0C8109	COUNTYWIDE TRANSPORTATION SYS. AWARENESS & SATISFACTION. PROJECT WILL USE AND EXPAND UPON IT'S PREDECESSOR'S WORK, THE SERVICE PLANNING MARKET RESEARCH PROGRAM (SPMRP) FOR TRANSIT	2002/2007		Project complete.
LAC MTA	927333	RIDESHARE ACTIVITIES	2005		Project complete.

Los Angeles County Completed/Corrected Projects

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
LOS ANGELES COUNTY	LA002633	THOMPSON CREEK BICYCLE TRAIL (93/97 CFP; BIKE PROGRAM) CLASS I (2 MILES)	2003/2005	2005	Corrected. Not a TCM - Project is recreational and does not meet the definition of a TCM.
LOS ANGELES, CITY OF	LA0C8330	BICYCLE COMMUTER TECHNOLOGY ACCESS, CITY'S WEB PAGE FOR BICYCLE PROGRAM	2006	2009	Not a committed TCM - No funding for ROW or construction in the first two years of the RTIP.
MONTEBELLO	LA0D287	PURCHASE OF 29 REPLACEMENT BUSES. GASOLINE-ELECTRIC HYBRID LOW FLOOR 40' COACH. PURCHASE OF 6 EXPANSION BUSES. GASOLINE-ELECTRIC HYBRID LOW FLOOR 40' COACH	2009	2009	Corrected. Not a TCM – replacement vehicles.
SAN FERNANDO	LA0D284	PROCUREMENT OF TWO EXPANSION CNG TRANSIT VEHICLES AND RELATED INFRASTRUCTURE EQUIPMENT FOR FIXED ROUTE PUBLIC TRANSPORTATION WITHIN THE CITY OF SAN FERNANDO.	2005	2005	Project complete.
SANTA CLARITA	LA0B7335	SANTA CLARA RIVER REGIONAL TRAIL-DESIGNING OF 7 MILES OF CLASS I BIKE/PED PATH ALONG THE NORTH SIDE OF THE RIVER FROM I-5 ON THE WEST TO DISCOVERY PARK ON THE EAST	2005		Corrected. Not a TCM - Project is recreational and does not meet the definition of a TCM.
WEST COVINA	LAE1407	PLAZA DRIVE FROM VINCENT AVE. TO CALIFORNIA AVE. INCLUDING INSTALLATION OF TRAFFIC SIGNAL SYS AT INTERSECTION OF PLAZA DR. & CALIF. THE SYNC. OF TWO TRAFFIC SY, & ADD TURN LANES.	2009	2010	Corrected. Project was incorrectly labeled as a TCM.

Los Angeles County TCMs - New

Lead Agency	Project ID	Project Description	2008 RTIP Completion Date
BALDWIN PARK	LAFA141	BALDWIN PARK METROLINK TRANSPORTATION CENTER. FUNDED THRU STIP AUGMENTATION CONSTRUCTION A TRANSPORTATION CENTER AND PARKING STRUCTURE AT THE BALDWIN PARK METROLINK STATION.	2012
ARTESIA	LAF1607	SOUTH STREET PEDESTRIAN, BIKEWAY AND TRANSIT IMPROVEMENT. IMPROVE PEDESTRIAN ENVIRONMENT AND TRANSIT STOP LOCATIONS WITH LANDSCAPED MEDIANS, TRANSIT SHELTERS, BENCHES, SIDEWALK ENHANCEMENTS AND LIGHTING. CLOSE EXISTING BIKE LANE GAP.	2014

Los Angeles County TCMs - New

Lead Agency	Project ID	Project Description	2008 RTIP Completion Date
AVALON	LAF1501	COUNTY CLUB DRIVE BIKEWAY IMPROVEMENT PROJECT. CONSTRUCTION OF A 4-FOOT WIDE CLASS II BIKE LANE IN BOTH DIRECTIONS ALONG A ONE MILE SECTION OF COUNTRY CLUB DRIVE.	2013
BALDWIN PARK	LAF1654	BALDWIN PARK METROLINK PEDESTRIAN OVERCROSSING. CONSTRUCT A PEDESTRIAN OVERCROSSING OVER BOGART AVE AND THE METROLINK LINE TO LINK THE STATION WITH VITAL BUS TRANSFER POINTS AND TO PROVIDE ACCESS TO PARKING OVERFLOW AREAS.	2015
BURBANK	LAF1455	CROSS-TOWN TRANSIT CONNECTOR AND SERVICE EXPANSION. FUNDS TO ACQUIRE TWO (2) OF FOUR (4) REQUESTED CNG BUSES TO IMPLEMENT NEW LOCAL TRANSIT SERVICE.	2013
BURBANK	LAF1502	SAN FERNANDO BIKEWAY. IMPLEMENT A CLASS I BIKEWAY ALONG SAN FERNANDO BLVD, VICTORY PLACE AND BURBANK WESTERN CHANNEL TO COMPLETE THE BURBANK LEG OF A 12 MILE BIKEWAY.	2014
CALTRANS	LA996138	ROUTE 5: RTE.5 HOV LNS. FROM FLORENCE AVE TO RTE.19 - ADD ONE LANE IN EACH DIRECTION	2016
CALTRANS	LA0B875	ROUTE 10: HOV LANES FROM CITRUS TO ROUTE 57/210 - (EA# 11934, PPNO# 0310B)	2015
CULVER CITY	LAF1717	REAL-TIME MOTORIST PARKING INFORMATION SYSTEM DEMONSTRATION. THIS PROJECT WILL PROVIDE A REAL-TIME INFORMATION SYSTEM TO COMMUNICATE AND GUIDE MOTORISTS TO AVAILABLE PARKING SPACES IN SELECTED PARKING STRUCTURES IN THE CITY OF CULVER CITY.	2011
EL MONTE	LAF1504	EL MONTE: TRANSIT CYCLE FRIENDLY. EL MONTE PROPOSES TO IMPLEMENT THE 1ST PHASE OF THE EL MONTE BIKE-TRANSIT HUB COMPONENT (METRO BICYCLE TRANSPORTATION STRATEGIC PLAN) A COUNTYWIDE EFFORT TO IMPROVE BIKE FACILITIES	2013
GLENDALE	LAFA144	PURCHASE OF 4-40'CNG BUSES FOR THE GLENDALE BEELINE.	2012
LONG BEACH	LAF1528	SAN GABRIEL RIVER BIKE PATH GAP CLOSURE AT WILLOW STREET. CREATION OF OFF-STREET BICYCLE PATH TO ACHIEVE BICYCLE ROUTE GAP CLOSURE ON WILLOW STREET FROM THE SAN GABRIEL RIVER BIKE PATH WEST TO STUDEBAKER ROAD	2014
LONG BEACH	LAF1530	BICYCLE SYSTEM GAP CLOSURES & IMPROVED LA RIVER BIKE PATH. PROJECT WILL CONSTRUCT PRIORITY CLASS I & III BICYCLE SYSTEM GAP CLOSURES IN LONG BEACH AND IMPROVE CONNECTION TO LA RIVER.	2014
LOS ANGELES COUNTY	LAF1414	THIRD STREET & LA VERNE AVENUE PARKING STRUCTURE. CONSTRUCT A PARKING STRUCTURE AT THIRD STREET AND LA VERNE AVENUE TO PROVIDE PARK AND RIDE SPACES FOR AREA TRANSIT USERS.	2016

Los Angeles County TCMs - New			
Lead Agency	**Project ID**	**Project Description**	**2008 RTIP Completion Date**
LOS ANGELES COUNTY	LAF1511	EASTSIDE LIGHT RAIL BIKE INTERFACE PROJECT. PROJECT INCLUDES DESIGN AND CONSTRUCTION OF BIKE ROUTES WITH APPROPRIATE SIGNAGE AND STRIPING TO ACCESS METRO GOLD LINE STATIONS.	2014
LOS ANGELES COUNTY	LAF1513	FIJI WAY BICYCLE LANE PROJECT. WIDEN THE SOUTH SIDE OF FIJI WAY FROM WEST OF ADMIRALTY WAY FOR BIKE LANES.	2014
LOS ANGELES COUNTY	LAF1514	EMERALD NECKLACE BIKE TRAIL PROJECT. DESIGN AND CONSTRUCT 1.1 MILES OF CLASS I BIKE PATH TO CONNECT DUARTE ROAD TO THE SAN GABRIEL RIVER BICYCLE TRAIL.	2011
LOS ANGELES, CITY OF	LA0C8123	SAN PEDRO ATSAC/ATSC PROJ. PROVIDE ATSAC/ATCS RELATED IMPRVMNTS TO 57 SIGNALIZED INTERSECTIONS THRU IMPLEMENTATION OF A COMPUTER-BASED REAL TIME TRFFC SIGNAL MONITORING CNTRL SYS.	2011
LOS ANGELES, CITY OF	LAF1450	ENCINO PARK-AND-RIDE FACILITY RENOVATION. RENOVATION OF THE ENCINO PARK-AND-RIDE FACILITY IN ORDER TO ADDRESS PHYSICAL AND STRUCTURAL DEFICIENCIES AND ADD CAPACITY TO THIS HEAVILY UTILIZED FACILITY. INCLUDES 50 NEW PARKING SPACES AND BIKE LOCKERS.	2013
LOS ANGELES, CITY OF	LAF1609	MAIN STREET BUS STOP AND PEDESTRIAN IMPROVEMENTS. DESIGN AND CONSTRUCT BUS STOP AND PEDESTRIAN IMPROVEMENTS THAT WILL INCREASE THE USAGE AND CAPACITY OF PEDESTRIAN FACILITIES ALONG A 0.4 MILE STRETCH OF MAIN STREET.	2015
LOS ANGELES, CITY OF	LAF1611	CESAR CHAVEZ TRANSIT CORRIDOR (110 FWY TO ALAMEDA). INSTALLATION OF PEDESTRIAN/TRANSIT RIDER AMENITIES INC. BUS STOP GARDENS AT THREE INTERSECTIONS, NEW PEDESTRIAN LIGHTING, STREET TREES IN A LANDSCAPED PARKWAY & WAYFINDING SIGNAGE.	2015
LOS ANGELES, CITY OF	LAF1612	CENTURY CITY URBAN DESIGN AND PEDESTRIAN CONNECTION PLAN. PROJECT WILL IMPLEMENT SIDEWALK IMPROVEMENTS, DECORATIVE CROSSWALKS, MEDIAN ISLAND, CURB RAMPS, PEDESTRIAN LIGHTING, SHELTERS, BENCHES, TRASH RECEPTACLES & STREET TREES.	2013
LOS ANGELES, CITY OF	LAF1613	EXPO LINE STN STREETSCAPE PROJECT-EAST CRENSHAW TO JEFFERSON. DESIGN & CONSTRUCTION OF PEDESTRIAN RELATED STREETSCAPE IMPROVEMENTS WITHIN 1/4 MILE FROM EACH OF 3 LIGHT RAIL STATIONS ALONG EXPOSITION BLVD BETWEEN CRENSHAW & JEFFERSON.	2013
LOS ANGELES, CITY OF	LAF1615	EASTSIDE LIGHT RAIL PEDESTRIAN LINKAGE. IMPROVE LINKAGES WITHIN 1/4 MILE OF METRO'S GOLD LINE LRT.	2012

Los Angeles County TCMs - New

Lead Agency	Project ID	Project Description	2008 RTIP Completion Date
LOS ANGELES, CITY OF	LAF1617	HOLLYWOOD PEDESTRIAN/TRANSIT CROSSROADS PHASE II. DESIGN AND INSTALL PEDESTRIAN AND TRANSIT USER ENHANCEMENTS, EXTENDING THE ORIGINAL HOLLYWOOD PEDESTRIAN/TRANSIT IMPROVEMENT PROJECT TO INCLUDE HIGHLAND AVENUE AND VINE STREET.	2013
LOS ANGELES, CITY OF	LAF1630	WASHINGTON BLVD TRANSIT ENHANCEMENTS. WASHINGTON BL TRANSIT ENHANCEMENT IS A STREETSCAPE DESIGN PROJECT THAT ENCOURAGES INCREASED USE OF PUBLIC TRANSIT WHILE SUPPORTING LAND USES THAT ARE COMPATIBLE W/TOD	2014
LOS ANGELES, CITY OF	LAF1657	LOS ANGELES VALLEY COLLEGE (LAVC) BUS STATION EXTENSION. PROJECT WILL EXTEND THE ORANGE LINE STATION AT THE LA VALLEY COLLEGE BY PROVIDING A DIRECT PEDESTRIAN CONNECTION FROM THE STATION TO A NEW PEDESTRIAN ENTRANCE TO LAVC.	2013
LOS ANGELES, CITY OF	LAF1662	SOLANO CANYON-ZANJA MADRE-CHINATOWN-BROADWAY BUS STOP IMPROV. IMPROVE 8 BUS STOPS ALONG BROADWAY-BERNARD ST TO SOLANO AV WITH STREET FURNITURE & LANDSCAPING, INCREASING ACCESSIBILITY, TRANSFERS & TRANSIT USE	2014
LOS ANGELES, CITY OF	LAF1663	SUNSET JUNCTION TRANSIT PLAZA. CONVERT AN UNUSED ROADWAY SECTION INTO A TRANSIT PLAZA WITH NEW CONCRETE PLATFORM, STREET FURNITURE, PED LIGHTS, & LANDSCAPING, INCREASING ACCESSIBILITY, TRANSFERS & TRANSIT USE.	2014
LOS ANGELES, CITY OF	LAF1704	DOWNTOWN L.A. ALTERNATIVE GREEN TRANSIT MODES TRIAL PROGRAM. OFFER SHARED RIDE-BICYCLE AND NEIGHBORHOOD ELECTRIC VEHICLE TRANSIT SERVICES TO LA CITY HALL AS AN ALTERNATIVE TO OVERCROWDED DASH SERVICE	2014
LOS ANGELES, CITY OF	LAF1708	HOLLYWOOD INTEGRATED MODAL INFORMATION SYSTEM. INSTALLATION OF ELECTRONIC, DIRECTION AND PARKING AVAILABILITY SIGNS WITH INTERNET CONNECTIVITY TO PROVIDE ADVANCE AND REAL-TIME INFORMATION INTENDED TO INCREASE TRANSIT RIDERSHIP	2015
LOS ANGELES, CITY OF	LAOB416	ROUTE 101: IN LOS ANGELES - DOWNTOWN OVER FREEWAY 101 - PEDESTRIAN BRIDGE ENHANCEMENT	2010
PALMDALE	LAF1507	AVENUE S BIKEWAY PHASE 2. CLASS I BIKEWAY IMPROVEMENTS ALONG THE GENERAL ALIGNMENT OF AVENUE S IN THE CITY OF PALMDALE. THIS PROJECT WILL INCLUDE CLOSING GAPS IN OUR LOCAL BICYCLE PLAN.	2014

Los Angeles County TCMs - New			
Lead Agency	**Project ID**	**Project Description**	**2008 RTIP Completion Date**
PALMDALE	LAF1508	6TH STREET EAST BIKEWAY EXTENSION. THIS PROJECT WILL PROVIDE A MISSING LINK IN THE CLASS I BWY TO CONNECT THE EXISTING SIERRA HWY BIKEWAY TO THE TRANSPORTATION CENTER AND AN EXISTING BIKEWAY IN CLOCK TOWER PLAZA	2015
PASADENA	LAF1655	EAST COLORADO BOULEVARD PEDESTRIAN ENHANCEMENTS (PHASE I). INSTALLATION OF PEDESTRIAN-SCALE STREET LIGHTING ON REGIONALLY SIGNIFICANT STREET IN A SPECIFIC PLAN AREA OF PASADENA IN ORDER TO INCREASE LIVABILITY/ENHANCE PEDESTRIAN MOVEMENT.	2014
RANCHO PALOS VERDES	LAF1506	BIKE COMPATIBLE RDWY SAFETY AND LINKAGE ON PALOS VERDES DR. THE PROJECT WILL HAVE A CLASS II BIKE LANE ON BOTH SIDES OF PALOS VERDES DRIVE SOUTH, WITH AN UNPAVED SHOULDER FOR EMERGENCY USE.	2014
RANCHO PALOS VERDES	LAF1605	PEDESTRIAN SAFE BUS STOP LINKAGE. LINKING 11 BUS STOPS CURRENTLY INACCESSIBLE BECAUSE OF LACK OF SIDEWALKS ON BOTH THE EAST AND WEST SIDE OF HAWTHORNE BLVD. FROM CREST RD. TO PALOS VERDES DR. SOUTH (ABOUT 13,000')	2013
SAN FERNANDO	LAF1640	SAN FERNANDO DOWNTOWN PEDESTRIAN IMPROVEMENT PROJECT. DESIGN AND CONSTRUCTION OF THE DOWNTOWN PORTION OF THE SAN FERNANDO CORRIDORS PLAN. THE PROJECT WILL INCREASE PEDESTRIAN ACTIVITY, PROMOTE PUBLIC TRANSIT AND ENHANCE SAFETY.	2014
SANTA CLARITA	LAF1424	MCBEAN REGIONAL TRANSIT CENTER PARK AND RIDE. PURCHASE LAND, DESIGN, AND CONSTRUCT A REGIONAL PARK-AND-RIDE LOT ADJACENT TO THE MCBEAN REGIONAL TRANSIT CENTER IN THE CITY OF SANTA CLARITA.	2012
SANTA MONICA	LAF1534	BIKE TECHNOLOGY DEMONSTRATION. PROJECT WILL CONSIST OF DESIGN, INSTALLATION AND EVALUATION OF SEVERAL BICYCLE TECHNOLOGIES, INCLUDING BICYCLE ACTIVATED DETECTION AT INTERSECTIONS, BIKE BOXES, AND BIKE PARKING.	2015
SOUTH PASADENA	LA0B7271	BLUE LINE PEDESTRIAN LINKAGE AND SAFETY IMPROVEMENTS-INCLUDE SIGNAGE, UPGRADES CROSSWALKS, PEDESTRIAN LIGHTING, ENHANCED SIDEWALK AROUND THE STATION IN THE AREA MISSION ST STATION	2008

Orange County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
ANAHEIM	ORA000100	GENE AUTRY WAY WEST @ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HASTER (3 LANES IN EA DIR.)	2004	2009	No change from the 2008 RTP TCM Report. City is updating environmental documents and beginning ROW.
ANAHEIM	ORA120318	ANAHEIM REGIONAL TRANS INTERMODAL CENTER (ARTIC) - PLANNING AND ENV PHASE - INCLUD EXPAND OF EXIST AMTRAK/METROLINK STATION AT ANA STAD TO PROVIDE ACCESS W/ TRANS SVC	2010	2010	No change from the 2008 RTP TCM Report. Funds programmed for ROW in 06/07 and construction from 06/07 through 08/09.
CALTRANS	10167	I-5 FROM SR-91 TO LA COUNTY LINE IN BUENA PARK - ADD 1 MIXED FLOW LN AND 1 HOV LN IN EACH DIRECTION. FROM 6 - 0 TO 8 - 2 LANES.	2008	2008	No change from the 2008 RTP TCM Report. Project currently underway - in construction
CALTRANS	ORA000193	HOV CONNECTRS ON 22/405 BTWN SEAL BCH BL. & VALLEY VIEW & ON 405/605 BTWN KATELLA AVE & SEAL BCH BL. W/2ND HOV LN IN EA DIR ON 405 BTWN CONNECTRS EA071631 DUAL LD CALTRANS-OCTA	2010	2013	No change from the 2008 RTP TCM Report. Project is currently in design phase. ROW will begin this fiscal year.
FULLERTON	ORA020113	FULLERTON TRAIN STATION - PARKING STRUCTURE, PHASE I AND II. TOTAL OF 500 SPACES (PPNO 2026)	2004	2011	No change from the 2008 RTP TCM Report. Project is in design phase and ROW is scheduled to start this FY. Construction funding was delayed as part of STIP. Anticipated completion date June 2011.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA110501	BUS RAPID TRANIST - 28MI FIXED BRT FRM BREA MALL TO IRVINE TRANS CNTR. INCLUDES STRUCTURES, (32) ROLLING STOCK, AND FEEDER SVC & IBC SHUTTLE- CNG SHUTTLES FROM JWA TO IBC.	2010	2010	No change from the 2008 RTP TCM Report. Project is in design phase. The RFP's for Design - Service Bus Stop Modifications Technology System Design were let in October 2007.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA120531	BUS RAPID TRANSIT (HARBOR BLVD BRT) - 19 MILE FIXED RT BRT BETWEEN FULLERTON AND COSTA MESA; INCLUDES STRUCTURES AND (23) ROLLING STOCK	NA	2011	No change from the 2008 RTP TCM Report. On schedule.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA120532	BUS RAPID TRANIST (WESTMINSTER/17TH BRT) - 22MILE FIXED RT BRT BETWEEN SANTA ANA AND LONG BEACH; INCLUDES STRUCTURES AND (23) ROLLING STOCK	2011	2011	No change from the 2008 RTP TCM Report. The RFP's for Design - Service Bus Stop Modifications Technology System Design were let in October 2007.

Orange County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING (ORANGE COUNTY PORTION).	2010	2015	No change from the 2008 RTP TCM Report. Ongoing
ORANGE COUNTY TRANSIT DISTRICT (OCTD)	ORA041501	PURCHASE (71) STANDARD 30FT EXPANSION BUSES - ALTERNATIVE FUEL - (31) IN FY08-09, (9) IN FY09-10, (7) IN FY11-12, (6) IN FY12-13 AND (18) IN FY13-14	2012	2012	No change from the 2008 RTP TCM Report. Ongoing
OCTD	ORA041502	PURCHASE (48) PARATRANSIT EXPANSION VANS - (22) IN FY10/11, (12) IN FY11/12, AND (14) IN FY13/14	2012	2012	No change from the 2008 RTP TCM Report. Ongoing
OCTD	ORA55241	PURCHASE (87) STANDARD 40 FT EXPAN ALT FUEL BUSES - (14) IN FY08 - 09, (44) IN FY10-11, (14) IN FY11-12, (2) IN FY12 - 13 AND (13) IN FY13 -14	2007/2010	2012	No change from the 2008 RTP TCM Report. Ongoing
OCTD	ORA020119	PURCHASE PARATRANSIT VEHICLES EXPAN (142) - (66) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (13) IN FY07/08, (14) IN FY08/09, (14) IN FY09/10	2007/2010	2010	No change from the 2008 RTP TCM Report. Ongoing project - project is being implemented consistent with programming
TCA	10254	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/5/01	2015/2008	2015	No change from the 2008 RTP TCM Report. Ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
TCA	ORA050	ETC (RTE 241/261/133) (RTE 91 TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/05/01.	2015/2010	2015	No change from the 2008 RTP TCM Report. Ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
TCA	ORA051	(FTC-N) (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR, 2 ADDITIONAL M/F LANES, PLS CLMBNG & AUX LANS AS REQ BY 2015 PER SCAG/TCA MOU 4/05/01.	2015/2010	2015	No change from the 2008 RTP TCM Report. Ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
TCA	ORA052	(FTC-S) (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2013; AND 1 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2030 PER SCAG/TCA MOU 4/05/01. #1988	2015/2010	2030	No change from the 2008 RTP TCM Report. Selection of preferred alternative 2/23/06; proceeding to construction with initial phase opening in 2013, second phase opening in 2030; ROD pending 6/08

Orange County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
VARIOUS AGENCIES	ORA990906	LUMP SUM. TEA FUNDS FOR BICYCLE AND PEDESTRIAN FACILITY PROJECTS THROUGHOUT ORANGE COUNTY (PROJECTS ARE CONSISTENT WITH 40 CFR PART 93.126,127,128, EXEMPT TABLES 2 & 3)	2009	2009	No change from the 2008 RTP TCM Report. All projects are proceeding as scheduled.

Orange County Completed/Corrected Projects

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000104	PARKING EXPANSION AT IRVINE TRANSPORTATION CENTER; BUILD 1500-CAR PARKING STRUCTURE INCLUDING ENVIRONMENTAL, DESIGN, AND CONSTRUCTION. PPNO 9511	2007	2007	Project Complete

Orange County TCMs - New

Lead Agency	Project ID	Project Description	2008 RTIP Completion Date
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA110633	RIDESHARE VANPOOL PROGRAM - CAPITAL LEASE COSTS	2012

Riverside County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
CALTRANS	0121D	ON I-215/SR91/SR60, RIV I215 COR IMPROV PROJ - FROM 60/91/215 JCT TO 60/215 SPLIT - WIDEN 6 TO 8 LNS, INCLUDING MAINLINE/IC IMPROVS, ADD HOV, AUX, & SB TRUCK CLIMB LN (EA: 3348U1)	2006/2007	2009	No change from the 2008 RTP TCM Report. Project under construction. Construction completion scheduled for December 2009.
CORONA	RIV010227	CORONA ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS) - AND REGIONAL ITS INTEGRATION PHASE 2.	2005	2010	No change from the 2008 RTP TCM Report. Phase I completed. 2008 RTIP to reflect Phase 2 portion.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV010212	ON SR91 - ADAMS TO 60/215 IC: ADD HOV LNS, AUX LNS (MADISON-CENTRAL), BRIDGE WIDENING & REPLACEMENTS, EB/WB BRAIDED RAMPS, IC MOD/RECONSTRUCT + SOUND/RETAINING WALLS	2002	2015	No change from the 2008 RTP TCM Report. Environmental document signed on Aug. 31, 2007. Project is in design and right-of-way phase. Estimated completion is 2015.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV011211	AT N. MAIN ST/E. GRAND BLVD - CONSTRUCT NEW 1,000 SPACE PARKING STRUCTURE & CCTV/SEC ENHANCE. AT CORONA N. MAIN METROLINK STN (EA: CORSTN, PPNO: 0079D) (FY 07 5307) (UZA: RIV-SAN)	2005	2011	No change from the 2008 RTP TCM Report. The contract has been awarded. Anticipated completion date 2011.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV050555	ON I-215 (N/O EUCALYPTUS AVE TO S/O BOX SPRINGS RD) & SR60 (DAY ST TO SR60/I-215 JCT): RECONSTRUCT JCT TO PROVIDE 2 HOV DIRECT CONNECTOR LNS (SR60 PM: 12.21 to 13.31) AND MINOR WIDENING TO BOX SPRINGS RD FROM 2 TO 4 THROUGH LANES BETWEEN MORTON RD AND BOX SPRINGS RD/FAIR ISLE DR IC (EA: 449311)	2011	2011	No change from the 2008 RTP TCM Report. Project is in design phase. Anticipated completion date April 2012.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV051006	IN WESTERN RIVERSIDE COUNTY FOR CARE CONNEXXUS INC.: PURCHASE 1 EXPANSION LARGE BUS (APPROX 16 PASSENGERS, GAS/DIESEL) W/ LIFT AND TIEDOWNS (5310 FY 05/06 CYCLE)	2009	2008	No change from the 2008 RTP TCM Report. Vehicles order completed May 11, 2007; target vehicle delivery is March 2008.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV061149	IN WESTERN RIVERSIDE COUNTY FOR PEPPERMINT RIDGE - PURCHASE 2 EXPANSION MODIFIED VANS (APPROX 8 PASS EACH, GAS/DIESEL) (FY 06/07 5310 CYCLE)	2010	2010	No change from the 2008 RTP TCM Report. Vehicle order anticipated to occur May 2008.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV061162	AT DOWNTOWN RIVERSIDE METROLINK STATION FOR UCR (CE-CERT): IMPLEMENT UCR INTELLISHARE SYSTEM (INTELLIGENT SHARED-USE VEHICLE SYSTEM) AT 2 DESIGNATED PARKING SPACES	2007	2007	No change from the 2008 RTP TCM Report. Project is progressing – environmental clearance is underway. Environmental clearance expected by Spring 2008

Riverside County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070303	ON SR60 IN NW RIV CO: IMPLEMENT EXPANDED SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #7 PATROL , 2 TRUCKS) BETWEEN MILIKEN AVE & MAIN ST (SR60 HOV LN CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	No change from the 2008 RTP TCM Report. Ongoing since 2007. Daily service provided Monday - Friday.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070304	ON I-215 IN SW RIV CO: IMPLEMENT NEW I-215 FREEWAY SERVICE PATROL (FSP) (BEAT #19, 2 TRUCKS) BETWEEN SR74/4TH ST AND ALESSANDRO BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	No change from the 2008 RTP TCM Report. Ongoing since 2007. Daily service provided Monday - Friday.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV070307	ON SR60 IN MORENO VALLEY: IMPLEMENT NEW SR60 FREEWAY SERVICE PATROL (FSP) (BEAT #8, 2 TRUCKS) BETWEEN DAY ST AND REDLANDS BLVD (SR60 HOV LANE CHANGE TCM SUBSTITUTION PROJECT)	2010	2010	No change from the 2008 RTP TCM Report. Ongoing since 2007. Daily service provided Monday - Friday.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520109	RECONSTRUCT & UPGRADE SAN JACINTO BRANCH LINE FOR RAIL PASSENGER SERVICE (RIVERSIDE TO PERRIS) (PERRIS VALLEY LINE) (FY 07 5307) (UZA: RIV-SAN)	2012	2011	Draft EA completed in July 2004. Alternative analysis has also been completed. Project is in the PA//ED phase – working on the environmental assessment; waiting to begin preliminary engineering. FTA Small Starts funding approval must be secured prior to start of the PE. Estimated completion date is December 2010.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	REGIONAL RIDESHARE	2009	2009	No change from the 2008 RTP TCM Report. On-going program for implementation of rideshare activities over life of Measure A (through 2039).
RIVERSIDE TRANSIT AGENCY	RIV051005	IN WESTERN RIVERSIDE COUNTY FOR RTA: PURCHASE 7 TYPE II DAR VEHICLES (5310 FY 05/06 CYCLE)	2009	2009	No change from the 2008 RTP TCM Report. 5310 order changed to 7 Type II – DAR vehicles. Vehicles ordered; delivery expected by 2009.
RIVERSIDE TRANSIT AGENCY	RIV051008	INSTALL MULTI-JURISDICTIONAL ATIS AT TRANSIT CENTERS & HIGH TRAFFIC CORRIDOR BUS STOPS INCLUDING REAL TIME SCHEDULES, IMPROVED SIGNAGE & LIGHTING (MAGNOLIA CORRIDOR PHASE)	2007	2009	No change from the 2008 RTP TCM Report. Project progressing forward – revised completion date per lead agency is December 2009.

Riverside County TCMs Reported on in a Previous TIP

Lead Agency	Project ID	Project Description	Original Completion Date	2008 RTIP Completion Date	Project Status
RIVERSIDE TRANSIT AGENCY	RIV061121	IN WESTERN RIVERSIDE COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES (Approx 97) (SAFETEA LU Earmark -#171, E-2006-BUSP-157)	2008	2009	No change from the 2008 RTP TCM Report. Project progressing forward – revised completion date per lead agency is December 2009.
RIVERSIDE TRANSIT AGENCY	RIV061135	IN WESTERN RIV COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND AT APPROX 60 STOPS (SAFETEA LU #171, E-2007-BUSP-0107)	2009	2009	No change from the 2008 RTP TCM Report. On schedule.
RIVERSIDE TRANSIT AGENCY	RIV990902	IN WESTERN RIVERSIDE COUNTY IN THE CITY OF PERRIS - CONSTRUCT NEW MULTIMODAL TRANSIT FACILITY (BUS & RAIL) AT 4TH AND D STREETS	2006	2008	No change from the 2008 RTP TCM Report. Bid Advertisement scheduled for spring 2008.
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV010214	RCTC SHARE OF PURCHASE OF METROLINK CARS & LOCOMOTIVES - UP TO 47 CARS/CABS & 8 LOCOS TO BE ORDERED BY 6/30/06 (FY 03 & 04 5307) (Shares among LAOC8231, SBD20020801, & ORA090302)	2005/2007	2010	No change from the 2008 RTP TCM Report. Cars ordered - delivery of new cars scheduled for 2009.
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV011242	PURCHASE EXPANSION ROLLING STOCK (2 CAB CARS AND 3 LOCOMOTIVES) FOR METROLINK IEOC AND RIVERSIDE/FULLERTON/LA LINES (EA: RIVFUL, PPNO: 0079E)	2004/2009	2009	No change from the 2008 RTP TCM Report. Project is being implemented – the rolling stock contractor was issued a notice to proceed with design & construction of the new cars on 4/13/06. Scheduled completion date is 8/1/2010. The project delay is due to the initial procurement that was protested, causing a significant delay in issuing a second RFP and awarding the contract.
TEMECULA	RIV62029	AT HWY 79 SO AND LA PAZ ST: ACQUIRE LAND, DESIGN AND CONSTRUCT PARK-AND-RIDE LOT - 250 SPACES (FY 05 HR4818 EARMARK)	2004/2007	2011	The project is in design phase (Phase 1). Phase 1 is estimated to be completed by June 2008. Bid advertisement/award and construction to follow (Phase 2), with an estimated completion date of 2011.

Riverside County Completed/Corrected Projects					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
CALTRANS	RIV061163	ON I-15 (R0.0 to R41.8) & I-215 (R8.4 to R38.5): INSTALL APPROX. 75 VEHICLE DETECTION STATIONS FOR IMPROVED INCIDENT RESPONSE, TRAFFIC DATA COLLECTION, & TRAVELER INFO (EA: 0J710G)	2008	2008	Project complete.

Riverside County TCMs - New			
Lead Agency	**Project ID**	**Project Description**	**2008 RTIP Completion Date**
RIVERSIDE TRANSIT AGENCY	RIV031207	IN WESTERN RIVERSIDE COUNTY IN THE CITY OF CORONA - CONSTRUCT NEW CORONA TRANSIT CENTER AT 31 EAST GRAND BLVD (5309c FY 03+04+06 (E-2006-BUSP-080) EARMARKS)	2009
RIVERSIDE TRANSIT AGENCY	RIV070705	PURCHASE 5 EXPANSION PARATRANSIT TYPE II VEHICLES (APPROX 12 PASSENGER, GAS/DIESEL) WITH WHEEL CHAIR LIFTS AND ACCESSORIES (FY 08 5307) (UZA: RIV-SAN)	2009
RIVERSIDE TRANSIT AGENCY	RIV071234	IN WESTERN RIV COUNTY FOR RTA: INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) ON VARIOUS FIXED ROUTE VEHICLES AND AT APPROX. 60 STOPS (SAFETEA LU #171, TABLE 4, 5309 PROJECTS).	2010

San Bernardino County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
COLTON	2002164	ON VALLEY BLVD. IN COLTON TO NORTH TO 10TH STREET CONNECTING TO ABANDONED RR CORRIDOR ON WEST SIDE OF COLTON AVE.-CONSTRUCT CLASS I BIKEWAY, LANDSCAPING AND LIGHTING	2003/2006	2008	No change from the 2008 RTP TCM Report. Under construction. Anticipated completion date August 2008.
FONTANA	200431	INLAND PACIFIC ELECTRIC TRAIL - ON OLD SP ABANDONED RR BETWEEN I-15 TO JUNIPER AVE.-CONSTRUCT CLASS 1 BIKE LANE (APPROX. 7 MILES LONG)	2006	2011	No change from the 2008 RTP TCM Report. Under construction.
OMNITRANS	981118	BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	2005/2008	2009	Project on schedule for 2009 completion. Schedule delayed slightly from summer 2009 to December 2009 to accommodate a major downtown development that includes the construction of a bus zone, and which creates an opportunity to relocate bus stops for a more effective system.
OMNITRANS	20060607	CHAFFEY COLLEGE TRANSCENTER - CONSTRUCT TRANSFER FACILITY AT CHAFFEY COLLEGE	2009	2010	No change from the 2008 RTP TCM Report. Contract with Chaffey College underway. Construction is planned ahead of original schedule. Anticipated completion date April 2009.
RIALTO	200450	RIALTO METROLINK STATION - INCREASE PARKING SPACES FROM 225-775	2006	2011	Project delayed to accommodate completion of the City's Downtown Vision Plan, which influenced the direction of scoping and proper location for the future parking spaces. Downtown Vision Plan is complete and project is moving forward. Land surveys and traffic studies have been conducted and environmental clearance is expected in 2008. Anticipated completion date 2011.
SAN BERNARDINO, CITY OF	20020802	METROLINK ADD'L PARKING STRUCTURE - CONSTRUCT 5 LEVEL PARKING STRUCTURE TO SERVE EXISTING METROLINK STATION AT SANTA FE DEPOT LOCATION	2008	2009	No change from the 2008 RTP TCM Report. Construction to start April/May 2008. Anticipated completion date June 2009.
SANBAG	20040827	RIDESHARE PROGRAM FOR SOUTHCOAST AIR DISTRICT	2009	2009	No change from the 2008 RTP TCM Report. All project dollars obligated to date; project on-going

San Bernardino County TCMs Reported on in a Previous TIP					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
SANBAG	20020106	MONTCLAIR PEDESTRIAN UNDERCROSSING- CONSTRUCTION OF A 2ND PLATFORM CREATES NEED FOR CONSTRUCTION OF NEW UNDERCROSSING	2003	2008	Project delayed due to design considerations of Montclair Gold Line Station. Undercrossing currently under construction, completion scheduled for 2008.
SANBAG	200074	LUMP SUM - TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS (PROJECTS CONSISTENT W/40CFR PART 93.126,127,128, EXEMPT TABLE 2 & 3).	2004	2011	No change from the 2008 RTP TCM Report. Funds have been obligated. Some of these funds are for the Pacific Electric Trail that are included under separate line item detail of the TCM report.
SANBAG	SBD031505	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS (PROJECTS ARE CONSISTENT WITH 40 CFR PART 93.126, 127,128, EXEMPT TABLES 2 & 3)	2004	2010	Projects Completed with original allocations. New allocations awarded to other projects to be completed by 04/09.
VARIOUS AGENCIES	20620	UPLAND TO SAN BERNARDINO FROM LA CO LINE TO RTE 215 - 8 LN FREEWAY INCLUDING 2 HOV LNS (6+2)-210 CORR. W/AUX LNS THRUOUT SEGS. 9-11(SEG.11 INCL CONNECTOR BETWEEN 210 & 215 (MORE)	2007/2009	2009	No change from the 2008 RTP TCM Report. Segments 1-11 complete and freeway open. The 210/215 connector under construction
VARIOUS AGENCIES	713	I-25 CORRIDOR NORTH - IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 210 - ADD 2 HOV & 2 MIXED FLOW LNS (1 IN EA. DIR.) AND OPERATIONAL IMP INCLUDING AUX LANES AND BRAIDED RAMP	2013	2010	The project has been broken into segments for construction. The 5th street bridge is under construction, anticipated completion by 2008. Other segments are in various stages of completion (bidding/design). Bidding for seg. 1, 2 & 5 expected in 2009.

San Bernardino County Completed/Corrected Projects					
Lead Agency	**Project ID**	**Project Description**	**Original Completion Date**	**2008 RTIP Completion Date**	**Project Status**
RANCHO CUCAMONGA	20020201	PACIFIC ELECTRIC INLAND EMPIRE TRAIL - PHASE 1 - HAVEN AVENUE TO 1200' EAST OF ETIWANDA AVE(3.4 MILES) CONSTRUCT CLASS 1 BIKE TRAIL&ROW ACQ.ETIWANDA DEPOT	2004/2006	2007	Project completed.
SANBAG	94163	RIDESHARE ACTIVITIES FOR SOUTH COAST AIR BASIN	NA	NA	Monies expended for all current years. Remains an ongoing project; ID number changed to 20040827.

2006 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

Timely Implementation Report, 2006 RTIP: Transportation Control Measure (TCM) Project Implementation Status- By County

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
ACCESS SERVICES, INC.	LA900520	PURCHASE OF ADDITIONAL 386 VEHICLES FROM FY06 TO FY09. 100 VEHICLES IN FY06, 114 VEHICLES IN FY07; 110 IN FY08 AND 62 IN FY09.	2005	2009	First Delivery Vehicle. This is a multi-year project, with the final purchasing phase to be completed by 2009. As of 2006, the First Vehicle/Equipment has been delivered; the following vehicles will be delivered in phases in 2006, 2007, 2008 with final delivery in 2009.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA0D45	ALAMEDA CORRIDOR TRUCK EXPRESSWAY . ELEVATED 4-LANE EXPRESSWAY BETWEEN COMMODORE HELM BRIDGE AND ALAMEDA STREET (SR-47).	2003/2005	2011	Project is in the Environmental Document/Pre-Design Phase. Project delay was due to required re-evaluation and incorporation as part of the multi-year, multi-phased Alameda Transportation Corridor Project from LA/LB harbors to San Bernardino via Los Angeles County. The Project is scheduled to be completed by 2011.
ARCADIA	LA990712	NEW & EXPANDED SHUTTLE SERVICE THRU DOWNTOWN ARCADIA CONNECTING HOTELS & BUSINESSES TO SANTA ANITA RACE TRAK & FASHION MALL (HUNTINGTON ST) & PROPOSED TRANSIT STATION	2003/2005	2010	No Project Activity. The project has been incorporated as part of the City of Arcadia transportation circulation element incorporating the proposed Metro Gold Line Foothill Extension multi-modal transportation hub. The project will be implemented in phases with the first phase scheduled in 2008 and the second phase by 2010.
BELLFLOWER	LA996275	WEST BRANCH GREENWAY MULTI-MODAL TRANS. CORRIDOR DESIGN AND CONSTRUCT 2.5 MILE CLASS I BIKE PATH ALONG MTA-OWNED SANTA ANA BRANCH ROW INCL. PEDESTRIAN AND LANDSCAPING (3145)	2006	2007	Project In Engineering (PS&E) Phase. Problems in reconciling ROW guidelines arose due to the Orange Line potentially intersecting with this project. Plans had to be reconfigured. Estimated completion date is May 2007.

[7] The dates reflected are the 2004 RTP and RTIP completion dates. If the completion date was identical in both documents only one date is listed.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CALABASAS	LA974100	U.S. 101 INTER-JURISDICTIONAL BIKE LANE GAP CLOSURE CONSTRUCTION 4.5 MILES OF BIKEWAY IMPROVEMENTS TO CLOSE SEVERAL GAPS WITHIN A 12 MILE CORRIDOR(TEA21-#69) (PPNO# 3147)	2003/2006	2006	Project In Engineering (PS&E) Phase. During the Environmental Documentation Phase, issues were raised about streams and wetlands in the area, requiring modifications to the plans. This also resulted in a change in Engineers, adding a slight delay.
CALTRANS	12570	RTE. 57/60 HOV CONNECTOR INDUSTRY FROM OLD BREA CANYON ROAD TO GRAND AVENUE - HOV DIRECT CONNECTORS AND COLLECTOR ROAD (BOTH DIRECTIONS) (EA# 12570, PPNO# 0499Q)	2006/2007	2007	Project In Engineering (PS&E) Phase. Opening July 2007.
CALTRANS	1178A	IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) (2206LK CFP) OBLIGATED 6207 (034)	2006	2008	Construction project implementation has begun. Increase in material, ROW, surety and low response from bidders, plus re-prioritizing by Caltrans headquarters has meant the project has been delayed. Project is under construction and is expected to be completed in 2008.
CALTRANS	LA000357	FROM ROUTE 170 TO ROUTE 118 HOV LANES (10 TO 12 LANES) (CFP 345) (2001 CFP 8339; CFP2197). (EA# 121901, PPNO 0158K)	2008/2010	2010	Project In Environmental Documents/Pre-design Phase. Scheduled for completion July 1 2010. ROW acquisition and certification issues. Scheduled for completion July 1 2010.
CALTRANS	LA000358	FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 121801, PPNO 0142F)	2012/2010	2010	Project In Engineering (PS&E) Phase. Scheduled for completion July 16, 2010. ROW acquisition and certification issues.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	LA000359	IN EL MONTE AND BALDWIN PARK FROM BALDWIN AVE TO ROUTE 605 HOV LANES (8+0 TO 8+2) AND TOS PROJECTS. (EA# 10695, 22350, 22340 PPNO 0295M, PPNO 2969,PPNO 2968)	2004/2005	2006	Project In Engineering (PS&E) Phase. Project under construction and implementation.
CALTRANS	LA000548	FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (PE ONLY) (EA# 117080, PPNO# 0309N)	2030/2015	2015	Project In Environmental Documents/Pre-design Phase. Completed PAED PS&E Scheduled Projected Completion date 12-2015. This project has experienced ROW issues and environmental issues. NEPA has not yet been completed; however the segment before this (I-605 to Puente) is currently underway.
CALTRANS	LA01342	RT 10 FROM RT 605 TO PUENTE AVE HOV LANES (8+0 TO 8+2) (EA# 117070, PPNO 0306H) PPNO 3333 3382 AB 3090 REP	2008/2010	2011	Project In Engineering (PS&E) Phase. Project delay was due to administrative changes in implementation design. For the final phase of this project the MTA will identify the program amount in 2006.
CALTRANS	LA01344	RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES. EA# 122001, PPNO 0162P. GARVEE project	2005/2006	2010	Completed PAED and PS&E and is starting construction. Project delay was due to ROW design issues, increasing material costs that required headquarter approval and re-budgeting. The project is to be completed by 2009.
CALTRANS	LA0B951	ROUTE 10 TO ROUTE 60 - EXPRESSWAY TO FREEWAY CONVERSION - ADD 1 HOV LANE AND 1 MIXED FLOW LANE . (2001 CFP 8349, TCRP #50) (EA# 210600, PPNO 2741)	2030/2010	2012	Project is in right-of-way acquisition phase. Increase in material, ROW, surety and low response from bidders, plus re-prioritizing by Caltrans headquarters has caused the project to be delayed. Project is on schedule to be completed by 2012.
CALTRANS	LA0C8344	EXTENSION OF N/B I-405 HOV LANE- TO EXTEND THE HOV LANE ON N/B I-405 FROM SOUTH OF VENTURA BL TO SO. BURBANK BLVD WHERE IT WILL JOIN THE EXISTING HOV LANE. (EA# 199620, PPNO# 2788).	2007	2008	In construction/implementation phase

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	LA0D73	LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW (EA 2159A0, PPNO 2808).	2014	2016	Project In Environmental Documents/Pre-design Phase. (Project # LA0B7215 will be incorporated into this project in future Timely Implementation Reports.).
CALTRANS	LA195900	RTE. 405 - WATERFORD AVE. TO RTE 10 - AUX LANE: LOS ANGELES - WATERFORD AV. TO RTE 10 - CONSTRUCT S/B AUX LANE & S/B HOV LANE (2001 CFP 8354) (EA# 195900 ,PPNO 2333). GARVEE 12/03	2006/2007	2009	In construction/implementation phase. Caltrans has experienced greater than anticipated increases in materials, security and ROW costs, and a lower than expected number of bidders, requires programming the project further out than initially budgeted. This component of the project is expected to be completed in 2009.
CALTRANS	LA963519	ADD 3 MILES OF TRIPLE TRACK AT BANDINI, MP 148.5 & 151.7 BETWEEN FULLERTON & LAUS (2002 IIP)	2002/2007	2007	Project under engineering plans review/specification and estimates phase.
CALTRANS	LA996134	RTE. 5/14 INTERCHANGE & HOV LNS ON RTE 14 - CONSTRUCT 2 ELEVATED LANES - HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO 0168M)	2014/2009	2010	PAED Phase completed. PS&E completion end of 2006. Project will start construction 10/06 and has a completion date of 10/2010.
CALTRANS	LA996137	RTE. 60 HOV LNS. FROM RTE. 605 TO BREA CANYON RD. -- CONSTRUCT ONE HOV LANE IN EACH DIRECTION) (CFP: 358, 4262, 6137=67,150+IIP: 5,100) (EA#129410, 129421, PPNO 0482R,0482RA)	2008/2007	2008	Initiated construction phase. Project has multi-year funding out to 2010 to accommodate multi-jurisdictional agency funding approval which may cause delays (CTC, for example).

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	LA996138	RTE.5 HOV LNS. FROM FLORENCE AVE TO RTE.19 - ADD ONE LANE IN EACH DIRECTION	2025/2016	2016	Combined with LA0D73B/LA0D73. This project has been integrated with the entire I-5 south corridor project. This project has been integrated with larger I-5 south project; Caltrans is still evaluating this particular segment to determine how it will be completed.
CITY OF CARSON	LA0C8219	SOUTH BAY PAVILION REGIONAL TRANSIT CTR. CONSTRUCTION OF A TRANSIT CTR AT THE SOUTH BAY PAVILION SHOPPING CTR TO BE SERVED BY ALL 8 CARSON CIRCUIT RTES & MTA LINES #205 & #446-447	2006	2010	RFP is ready for public distribution. Delay was caused by having changed the exact location of the transit center due to ROW parcel issues. Construction will commence within next 6 months.
CITY OF LOS ANGELES	LA0B7293	SAN PEDRO PEDESTRIAN WAY-PROVIDE PEDESTRIAN ACCESS WAYS LINKING EXISTING TRANSIT FACILITIES AND PROPOSED PARKING STRUCTURE TO SURROUNDING & OTHER DESTINATIONS IN DOWNTOWN SAN PEDRO	2005/2004	2007	Project is in Bid/Advertise Phase. The reason for delay is that this is part of the CRA redevelopment project area, a multi phase pedestrian/transit/re-development upgrade for downtown San Pedro. The Project's TCM components are being implemented and will be completed as part of the overall project in 2007
CITY OF LOS ANGELES	LA0B7330	SAN FERNANDO RD ROW BIKE PATH PHSE II-CONSTRUCT 2.75 MILES CLASS I FROM FIRST ST TO BRANFORD ST,ON MTA-OWND ROW PARCEL TO SAN FERNANDO RD. LINK CYCLISTS TO NUMEROUS BUS LNE. PPNO 2868	2005	2007	Project In Construction/Implementation Phase. The delay involved various concerns over the use of the right of way with the involved agencies and Metrolink/Freight operators. The issues were resolved and the project will be completed in 2007.
CITY OF LOS ANGELES	LA0C8173	NORTHRIDGE METROLINK STN PARKING IMPRVMENT. CONSTRUCT ADDT'L 100 PRKING SPCS & RECONFIGURE SOUTHERN PRTION OF EXISTING PRKING LOT TO YIELD AN ADDT'L 40 NET PRKING SPCES TOTAL 400 SPC.	2007	2007	Project In Engineering (PS&E) Phase.

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CITY OF LOS ANGELES	LA0C8174	LITTLE TOKYO PEDESTRIAN LINKAGES. CONSTRUCT OF IMPRVMENT: SIDEWALK & CROSSWALK ENHANCEMENTS, STREET FURNITURE & LANDSCAPING TO PROMOTE PEDESTRIAN TRAVEL W/IN LITTLE TOKYO. PPNO 3116.	2004/2006	2007	Project In Engineering (PS&E) Phase. The project was delayed due to changes in project administration. These issues have since been resolved, and the project is now being implemented expeditiously.
CITY OF LOS ANGELES	LA0C8209	HOLLYWOOD MEDIA DISTRICT-PEDESTRIAN IMPROVEMENTS. INCLUDING SMART CROSSWALKS, TRAFFIC SIGNAL, LANDSCAPING ETC. BET. BUS STOPS ALONG SANTA MONICA BLVD, VINE ST AND HIGHLAND AVE.	2005	2008	Project In Bid/Advertise Phase. The reason for the delay is that this is part of the CRA/city of LA Hollywood redevelopment. A multi-phase multi- year program. There had been some delays in getting approvals for specific language in the RFPs. In addition, the City has experienced higher than usual bid prices. This project is expected to be completed by 2008.
CITY OF LOS ANGELES	LA0C8241	PICO UNION/ECHO PARK DASH VEHICLE PROCUREMENT. PURCHASE (3) LOW-FLOOR, PROPANE-POWERED 30' BUSES FOR THE PICO/UNION ECHO PARK SHUTTLE SERVICE.	2004/2010	2010	Project In Bid/Advertise Phase.
CITY OF LOS ANGELES	LA0C8242	BUS STOP IMPROVEMENTS ON SAN FERNANDO ROAD & TC LIGHTING; ENHANCE PASSENGER FACILITIES AT THREE BUS STOPS WITH GREATEST NUMBER OF DAILY BOARDINGS ON EAST SIDE OF SAN FERNANDO ROAD.	2008	2010	Project in Construction/Implementation Phase. The delay was due to the City of Los Angeles outdoor furniture procurement requirement, which obligated Council revisions and approvals to accommodate cost increases. Project will be delivered by 2010.
CITY OF LOS ANGELES	LA0C8318	LA CITY AND SURROUNDING COMMUNITIES BICYCLE MAP-PROJECT WILL UPDATE BIKEWAY MAPPING INFO. FOR THE CITY OF LA AND PLOT BICYCLE LANE AND PATH INFORMATION ON A NEW MAP.	2004	2006	Project In Environmental Documents/Pre-design Phase. The City of Los Angeles has been working with Metro to update the Countywide Bicycle Transportation Strategic Plan. The City of LA maps will form part of the LA County Map which will be used for Bicycle Transportation Account funding. The Countywide Metro maps are now ready, the city will have their maps ready by end of the year.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CITY OF LOS ANGELES	LA0C8319	TAXI/SHUTTLE STANDS AT METRO RED LINE STA AT N HLWD & UNIVERSAL CITY AUTHORIZED TAXI STANDS AT TWO METRO RED LINE STATIONS (UNIVERSAL CITY ON LANKERSHIM AND N. HLWD ON CHANDLER.	2003/2004	2006	Project under construction and implementation.
CITY OF LOS ANGELES	LA0C8330	BICYCLE COMMUTER TECHNOLOGY ACCESS, CITY'S WEB PAGE FOR BICYCLE PROGRAM	2006	2006	Project under construction and implementation.
CITY OF LOS ANGELES	LA0C8380	CHINATOWN/COLLEGE STREET GOLD LINE STATION - INTERMODAL TRANS. CENTER ENHANCE MENT (PEDESTRIAN WALKWAY BRIDGE, BUS STATION, AND A BIKE STATION)	2004/2008	2010	Project In Engineering (PS&E) Phase. The reason for delay was that there were disagreements on design parameters between involved agencies. Negotiations are ongoing. Project will be completed by 2010.
CITY OF LOS ANGELES	LA962148	WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY (95 CALL, CAT 2) [CALL #2446]	2003/2007	2007	Project In Contract Negotiation Phase. The project was delayed due to repeated changes in lead agencies. This issue has now been resolved, with MTA designated as the implementing agency. The project is now being expeditiously implemented. PC25 funds from FY 01/02 are still available and will be used to complete this project.
CITY OF LOS ANGELES	LA974165	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMMODATE PUBLIC ACCESS (PEDESTRIAN ENTRANCES, WALKWAYS, BICYCLE FACILITIES) PPNO# 3417	2002/2007	2008	Project in Project In Engineering (PS&E) Phase. Project Completion date is 2008 and is funded until 2009 for contingency funding approvals by the involved agencies.
COMPTON	LAOB7326	COMPTON CREEK BIKEWAY EXTSN - PHASE III.DSIGN & CNSTRUCT .6 MI OF CLASS 1 BIKE/PED PATH FRM GREENLEAF BL TO ARTESIA FWY.WILL INC BIKE PATH, PED WALKWAY SIGNAGE, STRPNG. (PPNO 2869).	2005/2006	2009	No project activity. The project sponsor has been working with Metro to execute the Memorandum of Understanding. Once executed, project can award contract and be completed by 2009.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
CULVER CITY MUNI BUS LINES	LA0B400	PROCUREMENT OF FIVE (5) 40' CNG EXPANSION BUSES/420K PER BUS	2004	2008	Project Implementation Phase. The project will support the Sepulveda Rapid Bus project. The project delay is due to on-going coordination with various funding agencies needed to ensure that all components are delivered on time. The project will be completed as part of the Metro Rapid Program by 2008.
CULVER CITY MUNI BUS LINES	LA0C8382	SEPULVEDA BLVD BUS STOP IMPROVEMENT PROGRAM. BUS STOP AMENITIES INC LIGHTING SIGNAGE, LANDSCAPING, SHELTERS, SEATING, LANDINGS AND TRASH RECEPTACLES.	2008/2010	2010	Multi-component Project Underway. Project in Environmental Documents/Pre-design phase. Anticipated completion by end of 2009.
FOOTHILL TRANSIT ZONE	LA0B311	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM	2003/2005	2010	Project In Environmental Documents/Pre-design Phase. This is a multi-phased program among Foothill's 21 city service area. Foothill has identified 3 specific sites which are being reviewed by the cities. The reason for delay is that there the coordination/permitting/ROW approvals with the individual cities has taken longer than expected as they each have differing requirements. Once approved, construction is expected to take approximately 6 months. The project is expected to be completed by 2010.
FOOTHILL TRANSIT ZONE	LA0C8362	EL MONTE STATION IMPROVEMENT PROJECT AND TRANSIT STORE EQUIPMENT	2005	2007	Project In Construction/Implementation Phase. The reason for the delay has been some change orders to the original scope of work as various operators are using this facility. Each operator has to agree to the standards and some operators have requested some changes. Operators are working to reach agreement by next six months. Project is expected to be completed by 2008.

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
FOOTHILL TRANSIT ZONE	LA963526	BUS STOP ENHANCEMENT AND SCHEDULE CAROUSELS	2005	2008	Initial Phase. This is a Multi-year program to identify high ridership/low transit amenity bus stops to provide park/ride type improvements including pedestrian and transit amenities to promote ridership. The reason for delay has been the ongoing coordination with the 21 cities and their specific requirements relating to site access and street ROW needs. There are over 3,000 bus stops in the service area with more than 60 identified that qualify for the program. The first phase included 12 sites with transit amenity improvements. The project's budget has been approved and will be completed in 2008.
FOOTHILL TRANSIT ZONE	LA963762	MONROVIA TIMED TRANSFER CENTER	2004	2006	Project in Construction/Implementation phase. The reason for delay was the LA County permitting took longer than anticipated. The land has been purchased and all permits have been approved. Project will be completed by June 2007.
FOOTHILL TRANSIT ZONE	LA9811007	AVL SYSTEM, ARRIVAL SIGNS, FUEL MGMT. SYSTEM (SMART BUS PROJECT)	2005	2007	Project In Construction/Implementation Phase. Project would integrate audio-visual and ADA requirements, interface with the Universal Fare Card, and rider counters. The contract has been signed and the first phases of buses will be online in the next 6-9 months. The project will be completed by end of 2007.
LAC MTA	927333	RIDESHARE ACTIVITIES	2005	2006	Project construction and implementation has commenced.

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA000274	FROM SEPULVEDA TO MORENO CONSTRUCT DIVIDED PKWY WITH TRANSIT PKWAY IMPROVEMENTS, BIKE LANES & RT. 2/405 INTERCHANGE (94CFP; CAT. 2, 210, 98STIP00027) TEA21-#1531	2003/2005	2007	Project In Construction/Implementation Phase. There were delays in the Design Phase, and, subsequently, there was a change in implementing agency. The project is now being implemented by the City of Los Angeles).
LAC MTA	LA002633	THOMPSON CREEK BICYCLE TRAIL (93/97 CFP; BIKE PROGRAM) CLASS I (2 MILES)	2003/2005	2005	At the June 20, 2005 Pomona City Council, council members decided that La County Department of Public Works should not move forward with the project. Severe community opposition resulted in project being removed and is now in the de-obligation process LA450022 is substitute project. This project is primarily recreational and therefore does not meet the definition of a TCM. It will not be reported on subsequently.
LAC MTA	LA01B120	EXPANSION OF DIVISION 1 TO ADD ADDITIONAL CAPACITY OF APPROX 67 BUSES AND ADDITIONAL PARKING SPACE OF EMPLOYEES. ACQUISITION OF A VACANT PARCEL SOUTH OF DIV 1	2003/2005	2007	Project In Environmental Documents/Pre-design Phase. The project was substantially expanded to include an additional 100 buses, resulting in a need to also expand the maintenance facilities, as well, which subsequently changed the environmental documentation requirements.
LAC MTA	LA0B7023	GET ABOUT FLEET IMPROVE (POMONA VAL TRANS. AUTHORITY)-PURCHASE 18, 21 PASSENGER VEHIC TO INCR CAPACITY OF SUBREG PARATRANSIT SYS	2002/2004	2008	First Vehicle Delivered. This is a multi-agency multi-phase project that initiated in 2004. The first delivery of 3 vehicles was completed in 2005 with additional phases in 2006, 2007 and 2008. Anticipated delivery completion date by July 2008.
LAC MTA	LA0C8109	'COUNTYWIDE TRANSPORTATION SYS. AWARENESS & SATISFACTION. PROJECT WILL USE AND EXPAND UPON IT'S PREDECESSOR'S WORK, THE SERVICE PLANNING MARKET RESEARCH PROGRAM (SPMRP) FOR TRANSIT	2002/2007	2007	Project In Environmental Documents/Pre-design Phase

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA0C10	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT – DOWNTOWN LA TO SANTA MONICA	2011/2012	2010	Project in Environmental Document/Pre-Design phase
LAC MTA	LA0C8114	'LA CNTY RIDESHARE SERVICES; PROVIDE COMMUTE INFO, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS. PPNO 9003	2009	2010	Project under construction and implementation.
LAC MTA	LA0C8315	ELECTRIC BIKE AND SCOOTER DEMONSTRATION PROJECT. PURCHASE OF ELECTRIC BIKES AND SCOOTERS AS A TEST FOR FEASIBILITY AS SUBSTITUTES FOR SHORT COMMUTE TRIPS TO PARK AND RIDE LOTS.	2004/2005	2007	Project is in Contract/Project Award Phase. The reason for delay included changes in the scope to accommodate specific agency requirements regarding the program participants. Anticipated completion date is July 2007.
LAC MTA	LA0C8364	NORTH LA COUNTY NON-ADVERTISING BUS STOP SHELTERS. INSTALLATION OF BUS SHELTERS WITH SEATING AT BUS STOPS WITH GREATEST # OF DAILY BOARDING IN NORTH LOS ANGELES COUNTY. PPNO 3229.	2006/2007	2010	No project Activity. The project was part of the 2001 Call for Projects and was determined not to be eligible for TE funds. The project was deferred until eligible funds could be identified. The project has now been programmed with CMAQ funds have been programmed in 2007 and is expected to be completed in by 2010.
LAC MTA	LA0C8413	METRO RAPID BUS STATIONS-PHASE II: INCLUDES COMMUNICATIONS & EQUIPMENT	2005/2009	2009	Construction Implementation Phase. The Project is part of an multi-phase, multi-year implementation of the Los Angeles County Metro Rapid System. Currently 15 lines have been implemented since 2000 and 28 will be implemented by 2008. Currently in negotiations with City of LA on bus shelter contract. County of LA bus shelter contract has been approved. One new line in San Fernando Valley will be opening this December.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA29202U3	SAN FERNANDO VALLEY NORTH/SOUTH BRT EXTENSION PHASE I: METRO RAPID SERVICE ALONG RESEDA BLVD. AND SEPULVEDA BLVD.	2005	2009	Environmental Document/Pre Design Phase. The project lost state TCRP funding due to state deficit. The Major Investment study identified four segments along specific corridors running from the North of the Valley to connect with the Metro Orange Line as a more cost effective Metro Rapid style solution.
LAC MTA	LA29202U4	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE II: BUS SPEED IMPROVEMENTS ALONG METRO RAPID CORRIDORS AND EXPANSION OF EXISTING PARK & RIDE FACILITY.	2005/2007	2010	Environmental Document/Pre Design Phase. MTA has committed over $98 million in TCRP funds from 06/07 through 2009/2010 to ensure the project will be completed by 2010.
LAC MTA	LA29202U5	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE III: STATION ACCESSIBILITY AND PEDESTRIAN ENHANCEMENTS ON RESEDA BLVD., SEPULVEDA BLVD., AND LANKERSHIM BLVD.	2005/2008	2010	Environmental Document/Pre Design Phase. MTA has committed over $98 million in TCRP funds from 06/07 through 2009/2010 to ensure the project will be completed by 2010.
LAC MTA	LA29202U6	SAN FERNANDO VALLEY NORTH/ SOUTH BRT EXTENSION PHASE IV: COMPLETION OF A NORTHBOUND BUS ONLY LANE ON A PORTION OF SEPULVEDA BLVD. AND OTHER IMPROVEMENTS.	2005/2009	2010	Environmental Document/Pre Design Phase. MTA has committed over $98 million in TCRP funds from 06/07 through 2009/2010 to ensure the project will be completed by 2010.
LAC MTA	LA29202V	EASTSIDE TRANSIT CORRIDOR - UNION STATION TO ATLANTIC VIA 1ST ST. TO LORENA, THEN 3RD ST. VIA 3RD/BEVERLY BLVD. TO ATLANTIC (EASTSIDE LRT PPNO 3358)	2009/2010	2010	Project In Environmental Documents/Pre-design Phase.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA29202W	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. FROM VERMONT TO SANTA MONICA DOWNTOWN-MID-CITY WILSHIRE BRT INCL. DIV. 10 EXPANSION	2009/2010	2012	Project under environmental document review and pre-design phase. The reason for delay is due to the community concerns over parking loss and other environmental concerns. In addition, the TCRP funding component was removed due to the state deficit, which required Metro to re-prioritize the project in phases to be completed in 2012. The first phase including procurement of 60' articulated buses has been delivered.
LAC MTA	LA962214	PACIFIC COAST HIGHWAY TRAFFIC MANAGEMENT SYSTEM FROM MCCLURE TUNNEL TO TRANCAS CANYON RD TRAFFIC MAN. & BUS SPEED IMPROVEMNT(TEA21-#707). LACDPW LEAD AGENCY INSTEAD CALTRANS.	2003/2005	2007	Project under construction and implementation. The reason for the delay was that LA County Public Works took over as lead agency instead of Caltrans. The project has experienced greater than anticipated increases in materials, security and ROW costs, and a lower than expected number of bidders, requiring re-programming the project further out than initially budgeted to accommodate these increases. The project is under construction and will complete by June 2007.
LAC MTA	LA963542	ACQUISTION REVENUE VEHICLES - 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370) FY03 (30 HC) + FY04 (70 HC) + (200 ARTICS); FY05-FY10 TOTAL OF 1000 BUSES.	2005	2012	The project is in the Implementation Phase. The first part of the project is completed. This is part of the multi-phased, multi-year implementation of Metro's bus fleet expansion program. This includes an additional procurement of 200 60' articulated buses, which were part of a new design that Metro was the lead agency. The vehicles were required to undergo tests and pass the FTA tests. The first delivery of 40' and 60' buses has been received and the additional vehicles will be delivered in phased in 2007, 2008 and 2009.
LAC MTA	LA974083	CHANDLER/BURBANK BIKE PATH-WHITEOAK TO PIERCE COLLEGE A 3.2 MILE CLASS I BIKEWAY ON MTA'S CHANDLER/BURBANK RAIL RIGHT-OF-WAY WILL IMPROVE NON-MOTORIZED ACCESS (COMBINED W/LA974078)	2003/2007	2008	Project is Construction/Implementation Phase. The project is integrated with a busway project, which was delayed due to the discovery of contaminated soil.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA974124	SANTA MONICA BOULEVARD TRANSIT PARKWAY TRANSIT PEDESTRIAN AND BIKEWAY IMPROVEMENTS ALONG SANTA MONICA BLVD IN WEST LOS ANGELES, SPANS 2.5	2002/2005	2007	Project In Construction/Implementation Phase. There were delays in the Design Phase, and, subsequently, a change in implementing agency. The project is now being implemented by the City of Los Angeles.
LAC MTA	LA974181	LAC+USC MEDICAL CENTER BUS TRANSIT STATION FACILITY WILL HAVE 4 BUS BAYS AND 4 LAYOVER BAYS BUS STOP IMPROVEMENT PRJ	2002/2005	2007	Project In Engineering (PS&E) Phase. The project was delayed due to additional coordination and approvals required by the involved agencies including LA County hospital and fire departments regarding emergency circulation requirements. The project has now incorporated these requirements and is has an anticipated completion date is July 2007.
LAC MTA	LA974294	IN LOS ANGELES - DOWNTOWN OVER FREEWAY 101 - PEDESTRIAN BRIDGE ENHANCEMENT	2004	2007	Project is in Construction/Project Implementation phase. The reason for delay was that the City of Los Angeles has to change the Scope of work for the project due to design changes required to meet the necessary inter agency approvals. The project will be completed late 2007.
LAC MTA	LA990305	LIGHT RAIL TRANSIT FLEET- 50 NEW RAIL CAR.PPNO 3225.	2010	2010	Project In Construction/Implementation Phase. The completion date was erroneously reported as 2003 in previous Timely Implementation Reports. First vehicle and equipment delivered.
LAC MTA	LA996044	VEH ACQ FOR EST L.A. SHUTTLE PURCH 4 VEH'S TO REMEDY EXISTING OVERCROWDED CONDITIONS	2002/2004	2006	First Vehicle Delivered. Remaining acquisitions delayed due to backlog in orders at manufacturer's end.
LAC MTA	LA996285	SOUTH BAY BIKE TRAIL RECONSTRCT AT PLAYA DEL REY - DESIGN AND RECONSTRCT SEGMENT OF THE TRAIL AT DOCKWEILER STATE BEACH.	2005	2008	Project under bid/advertise phase. This project has experienced greater than anticipated increases in materials, security and ROW costs, and a lower than expected number of bidders. The project will require additional funding approvals from the agencies involved. The completion date is 2008.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA996288	SAN GABRIEL RVR. BIKE TRAIL REHAB PHASE I - FROM WHITTIER NARROWS DAM TO FLORENCE AVE.	2005	2006	Project contract awarded.
LONG BEACH	LA0C8163	BIKEWAY AND PEDESTRIAN IMPROVEMENTS. 1.2 MILE CLASS I BIKE/PED PATH FROM WALNUT AVE TO WILLOW ST AT THE BLUE LINE STATION. (PPNO# 3408)	2005	2006	Project under environmental document review and pre-design phase.
LONG BEACH	LA0C8331	LONG BEACH WAYFINDING/TRANSIT CONNECTION PROGRAM-MAJORITY OF SIGNS WILL BE PEDESTRIAN, AND WILL INCLUDE MAPPING THAT DISPLAYS DESTINATIONS AND TRANSIT OPTIONS.	2004	2006	Project under construction and implementation.
LONG BEACH PUBLIC TRANSPORTATION CO.	LA0C8383	LONG BEACH TRANSIT: BUS STOP IMPROVEMENT PROJ. ENHANCE 9 OF RAIL STATION FEEDER BUS STOPS TO EASE TRANSFERS, MAKE PUBLIC TRANSIT MORE AESTHETICALLY PLEASING & SAFER, INC RIDERSHIP.	2004	2010	All of the environmental document/pre-design phase is completed. Project in the construction/implementation phase. Unanticipated staffing shortages caused the delay. Construction is funded for 2007 - waiting for construction approval from MTA.
LONG BEACH PUBLIC TRANSPORTATION CO.	LA973029	BUS STOP AMENITIES	2004	2006	Project is now being implemented after a delay with Caltrans over specifications and project funding requirements. Project is in the process of executing agreement and will go to contract award end of 2006. Project is going to be implemented in phases and is now expected to be completed by 2007.
LOS ANGELES COUNTY	LA0C8316	TRANSPORTATION INFORMATION PROJECT (TIP) EQUIP COUNTY EMPLOYEES AT 41 SITES THROUGHOUT LA COUNTY WITH THE TOOLS NEEDED TO PROVIDE INDIVIDUALIZED TRANSIT ITINERARIES ETC.	2005	2007	First Vehicle Delivered. The reason for delay included technical and ITS compatibility issues with the existing employee databases and program participants. Anticipated completion date by July 2007

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
LOS ANGELES REDEVELOPMENT AGENCY	LA0C53	'HOLLYWOOD INTERMODAL TRANSPORTATION AND PUBLIC PARKING CENTER ON HAWTHORNE AVE. BETWEEN HIGHLAND AVENUE AND NORTH ORANGE DRIVE.	2004	2007	Project In Environmental Documents/Pre-design Phase. This is a TCRP Project that was defunded. *MTA did not get TCRP funds, MTA is programming $2.85 million of CITY funds for construction in FY 07/08.*
MONTEBELLO	LA55201	CONTINUING PROJECT - BUS STOP IMPROVEMENTS ,AMENITIES ,SHELTERS ,ETC	2010	2010	Project In Construction/Implementation Phase.
PASADENA	LA0D47	SR 710 MITIGATION PROJECT-TRAFFIC CONTROL AND MONITORING SYSTEM-INTELLIGENT TRANSPORTATION SYSTEMS (ITS). CONSTRUCT AND INSTALL ITS TECHNOLOGY AND VARIOUS DEGREES OF SMART SIGNALS	2008	2008	Project In Engineering (PS&E) Phase.
PASADENA	LA0D99	PURCHASE 2 EXPANSION LOW-FLOOR, HANDICAPPED ACCESSIBLE, ALTERNATIVE FUEL TRANSIT BUSES.	2004	2006	Project delay due to required revisions and required additional council approval. Project was approved and purchase is now under way.
PASADENA	LA974129	PASADENA GOLD LINE COMMUNITY LINKAGES PEDESTRIAN IMPROVEMENTS TO TWO PLANNED METRO PASADENA GOLD LINE STATIONS WITHIN THE CITY (PPNO# 3422)	2003/2006	2006	Project In Engineering (PS&E) Phase. The project intersects a historic park, and Caltrans had requested significant additional environmental documentation.
SAN GABRIEL VALLEY COG	LA0C56	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEPARATION AT VALLEY VIEW AVENUE IN SANTA FE SPRINGS (PART OF ALAMEDA CORRIDOR EAST PROJECT)	2004/2006	2008	Project In Contract Negotiation Phase. The project is part of the multi-phased, multi-year Alameda Transportation Corridor project from the ports of LA/LB to the San Bernardino County through Los Angeles. Project delay was a result of additional comments from Caltrans requiring the authority to collect additional data and provide un-anticipated analysis. The component of the project is expected to be completed in 2008.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
SAN GABRIEL VALLEY COG	LA0C57	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEPARATION AT PASSONS BLVD IN PICO RIVERA (AND MODIFY PROFILE OF SERAPIS AVENUE)(PART OF ALAMEDA CORRIDOR EAST PROJECT).	2006	2010	Project In Engineering (PS&E) Phase. The project is part of the multi-phased, multi-year Alameda Transportation Corridor project from the ports of LA/LB to the San Bernardino County through Los Angeles. Project has experienced additional comments from Caltrans requiring the authority to collect additional data and provide un-anticipated analysis. The component of the project is expected to be completed in 2008. *The completion date for this project is 2010; the project is funded in 06/07 through 09/10*
SAN GABRIEL VALLEY COG	LA990359	GRADE CROSSINGS/SAFETY IMPRVMT & GRADE SEP. ALONG 35-MILE FREIGHT RAIL CORIDOR THRGH SAN GABRIEL VALLEY - EAST L.A. TO POMONA ALONG UPRR ALHAMBRA &L.A. SUBDIVISIONS - ITS 2318	2003/2009	2010	Project In Engineering (PS&E) Phase
SANTA CLARITA	LA0B7020	ADDITIONAL (150) PARKING AT NEWHALL METROLINK STATION-CONSTRUCT ADEQUATE PARKING AT NEWHALL METROLINK STATION, INCLDE PARK & RIDE, KISS & RIDE & DISBLED -ACCESS SPACES.PPNO 2901	2003/2005	2007	Project in Construction/Implementation Phase. There were unanticipated difficulties with tenant relocation and land procurement.
SANTA CLARITA	LA0B7335	SANTA CLARA RIVER REGIONAL TRAIL-DESIGNING OF 7 MILES OF CLASS I BIKE/PED PATH ALONG THE NORTH SIDE OF THE RIVER FROM I-5 ON THE WEST TO DISCOVERY PARK ON THE EAST	2005	2006	Project In Environmental Documents/Pre-design Phase. Project is going through the environmental process and has received comments form the involved agencies requiring further data collection and analysis. Project will be completed by December 2007.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
SANTA CLARITA	LA0C8130	INCIDENT MANAGEMENT - TRAVELER INFORMATION SUBSYSTEM; INSTALLATION CONSISTS OF 4 STATIONARY ELECTRONIC CHANGEABLE MESSAGE SIGNS & A HIGHWAY ADVISORY RADIO SYSTEM.	2006	2007	Project In Engineering (PS&E) Phase. Preparing Scope of work and MOU amendment. Project is anticipated to begin in September 2006 and be completed by June 2007.
SANTA CLARITA	LA0C8156	SANTA CLARITA REGNL COMUTR TRAIL - I-5 TO FAIRWAYS DRIVE: CNSTRCTN & SOME ACQUISITION OF 1.0 MILES OF CLASS I BIKE PATH & A BRIDGE RESTORATION ADJACENT TO SANTA CLARA.(PPNO 3127).	2006	2007	*This project is finishing design phase. Construction scheduled to begin in spring 07.*
SANTA CLARITA	LA0C8371	SANTA CLARITA TRANSIT EXPANSION BUSES; WILL ALLOW PHASE 1 OF 5 YEAR MASTER PLAN TO BE IMPLEMENTED WITH SEVEN LOCAL BUSES AND FOUR COMMUTER BUSES.	2008	2008	First Vehicle Delivered
SANTA MONICA	LA030001	CALIFORNIA INCLINE SIDEHILL VIADUCT BR 53C0543 ADD, INCLUDED INSTATE IN STATE HBRR PROGRAM (0.3 MILE, 1-S, 1-N) SIDEWALK/BIKEWAY WIDENING & SEISMIC (53C0543)	2006	2008	Project is in Bid Contract Award Phase. Project delay resulted when the first round of bids were denied due to infeasible cost amounts. Subsequently, the project underwent rebidding, which delayed the Environmental Phase. The bid will be approved this year with expected completion end of 2008.
SANTA MONICA	LA57101	BUS FACILITY IMPROVEMENTS	2005	2008	Currently, it is in the Design Phase. This project is part of the Big Blue Bus improvement project, a multi-year, multi-phased project that involves improvements to several different bus facilities components, center facility improvements, and fleet upgrades to the city of Santa Monica. This is an ongoing project.

Los Angeles County

TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
SCRAA/LACMTA/SANBAG	LA29204	LA-SAN BERNARDINO CR (SF UNION STATION-SAN BERNARDINO) CAPACITY IMPROVEMENTS (3037) (JARC $1982). DEMOT21 = 3037	2003/2005	2007	Project In Engineering (PS&E) Phase. Project was delayed due to administrative changes to implementation design
SIERRA MADRE	LA0C8372	EXPANSION OF SIERRA MADRE BUS ROUTE. PURCHASE OF 3 CNG VANS TO EXPAND SIERRA MADRE ROUNDABOUT SYSTEM.	2007	2007	First Vehicle Delivered
SOUTHERN CALIFORNIA REGIONAL RAIL AUTHORITY	LA963758	METROLINK ROLLING STOCK-PHASE II (SCRRA). PURCHASE ADD'L METROLINK ROLLING STOCK TO ALLOW SYST EXPANSION(4 LOCOMOTIVES AND UPTO 31 CARS (JOINTLY FUNDED LA, ORA,RIV,SBD) LA0C8231	2005/2008	2009	Project In Bid/Advertise Phase. The project was delayed due to FTA request for a change in procurement procedures (this project has been merged with LA0C8231, to consolidate all Metrolink rolling stock purchases, and will not be listed under this ID #).
WEST LAKE VILLAGE	LA960142	LINDERO CANYON ROAD FROM AGOURA RD TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION, RAMP WIDENING (TEA21-#65)	20032005	2008	Project In Engineering (PS&E) Phase. The project was delayed due to unexpected difficulties in permitting and certification with Caltrans and the LA County Flood Control District. These issues have since been resolved, and the project is now being implemented.
WHITTIER	LA0B7322	'WHITTIER GREENWAY TRAIL-ACQUISITION, DESIGN, AND CONSTRUCT OF 2 MILES CLASS I BIKE/PED PATH ON AN ABANDONED RAIL ROW FROM NORWALK TO FIVE POINTS.PPNO 2872	2004	2008	This is the first segment in a two-phased project. The reason for the delay included specific siting and ROW issues with CALTRANS delaying the start of the project. The specific requirements have been satisfied and the project is expected to be completed by mid 2008.

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TCMs Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[7] Completion Date	2006 RTIP Completion Date	Project Status
WHITTIER	LA0C8161	WHITTIER GREENWAY TRAIL: SEGMENT 1 DEVT& SEGMENT 3 P/E AND DEVT. DESIGN, CONSTRUCT & SOME ACQUISITION OF 2.86 MILES CLASS I BIKE/PED FACILITIES ON ABANDONED ROW IN WHITTIER (3440)	2008	2008	This is the second segment in a two-phased project. The reason for the delay included specific siting and ROW issues with CALTRANS delaying the start of the project. The specific requirements have been satisfied and the project is expected to be completed by mid 2008.

Los Angeles County

New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
BALDWIN PARK	LA0D281	DESIGN AND CONSTRUCT PARKING IMPROVEMENTS AT AND ADJACENT TO THE CITY'S EXISTING METROLINK STATION	N/A	2006	Project is in the environmental document pre-design phase.
BURBANK	LA0D25	PROCUREMENT OF (3) ALTERNATIVE FUEL TRANSIT VEHICLES	N/A	2005	Project is in the vehicle delivery phase and is an overall expansion of the existing fleet.
CITY OF LOS ANGELES	LA002738	BIKEWAY/PEDESTRIAN BRIDGE OVER LA R RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077)	N/A	2009	Project In Environmental Documents/Pre-design Phase.
CITY OF LOS ANGELES	LA0C8164	EXPOSITION BLVD RIGHT-OF-WAY BIKE PATH-WESTSIDE EXTENSION. DESIGN AND CONSTRUCTION OF 2.5 MILES OF CLASS 1 BIKEWAY, LIGHTING, LANDSCAPING & INTERSECTION IMPROVEMENTS. (PPNO# 3184)	N/A	2009	Project In Construction/Implementation Phase. *The FEIR was completed December 2005. Final design completed May 2006*
CITY OF LOS ANGELES	LA0C8171	GAYLEY AVE BIKE LANES & STREET WIDENING. DESIGN AND CONSTRUCTION OF .25 MILES OF CLASS II BIKE LANES ON GAYLEY AVE FROM EXISTING BIKE LANES AT LEVERING AVENUE TO THE UCLA CAMPUS	N/A	2010	Project under environmental document review and pre-design phase.
CLAREMONT	LA0D103	THE CITY AND THE REDEVELOPMENT AGENCY WILL EXPAND ON AN EXISTING PARKING FACILITY (500 PARKING SPACE) FOR ADDITIONAL USE BY TRANSIT PATRONS.	N/A	2006	Project is in construction implementation Phase. The project is expected to be completed in late 2006
COVINA	LA0D206	METROLINK PEDESTRIAN BRIDGE PROJECT. THIS FACILITY WILL BE CONSTRUCTED ON THE WEST SIDE OF CITRUS AVE. THE METROLINK STATION IS ON THE EAST SIDE OF CITRUS AVE.	N/A	2006	Project is in Environmental Pre-Design Phase. Project is expected to be completed in late 2006.

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New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
LA CANADA-FLINTRIDGE	LA0C8159	LA CANADA FLINTRIDGE EAST/WEST BIKEWAY CORRIDOR. DESIGN AND CONSTRUCTION OF 3.42 MILES OF EAST/WEST DIRECTIONAL CLASS II BIKE LANES IN THE CITY OF LA CANADA FLINTRIDGE.	NA	2007	The project is in the pre-design process and has been scheduled to be completed in late 2007.
LA GARDENA	LA0D340	PURCHASE FIVE (5) 40 FT. ALTERNATIVE FUEL BUSES FOR SERVICE EXPANSION	N/A	2010	Project is in the PAED phase.
LA MIRADA	LA0D349	PURCHASE EXPANSION BUSES WITH ALTERNATE FUEL (HYBRID/ELECTRIC): FY 06=2	N/A	2008	Project is in the PAED phase.
PASADENA	LA0C8155	'8 SEGMENTS OF PASADENA BIKEWAY; INCLUDES IMPROVEMENTS TO SIGNALIZED INTERSECTIONS FOR BICYCLE DETECTION, SIGNAGE, RESTRIPING OF TRAFFIC LANES & STRIPING OF BIKE LANES.	NA	2005	This is a segmented project. The project is scheduled to be completed in late 2007.
SAN FERNANDO	LA0D284	PROCUREMENT OF TWO EXPANSION CNG TRANSIT VEHICLES AND RELATED INFRASTRUCTURE EQUIPMENT FOR FIXED ROUTE PUBLIC TRANSPORTATION WITHIN THE CITY OF SAN FERNANDO.	N/A	2005	Project is in the environmental document pre-design phase

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New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
SAN FERNANDO	LA0D314	PROCURE 2 CNG EXPANSION TRANSIT VEHICLES WHICH WILL PROVIDE FIXED ROUTE PUBLIC TRANSPORTATION IN SAN FERNANDO.	N/A	2005	Project is in the PAED phase.
TORRANCE	LA0D379	AUTOMATIC VEHICLE LOCATOR (AVL) PROJECT-PHASE 2	N/A	2007	Project is in the PAED phase.

Los Angeles County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
AGOURA HILLS	LA990362	US 101 INTERJURISDICTIONAL BIKE LANE GAP CLOSURE PHASE III (TCSP)	2004	N/A	project completed
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963731	ALAMEDA CORRIDOR - NORTH END RAIL ROAD/ARTERIAL GRADE SEPS. & RELATED IMPROVEMENTS EIS/EIR COMPLETE; 8100+1394 P.E. 10517+305 R/W; 29483+5300 CONS.	2004	N/A	Project completed.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963732	ALAMEDA CORRIDOR - MID CORRIDOR SEGMENT 10 MI TRENCH >20 ARTERIAL GRADE SEPS, ENVIRONMENTAL CLEARANCE	2003	N/A	Project completed.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963733	ALAMEDA CORRIDOR - SOUTH END 7 RAILROAD / ARTERIAL GRADE SEPS. + RELATED IMPROVEMENTS ENV. CLEARANCE #NAME?	2002	N/A	Project completed.
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0B7008	3 EXPANSION 40 FT. LOW FLOOR CLEAN DIESEL BUSES; LOCAL FIXED-ROUTE BUSES; TO RELIEVE PEAK PERIOD OVERCROWDING ON CORE ROUTES	2003	N/A	Project completed.
BALDWIN PARK	LA0B7012	LOCAL NTD REPORTERS' BUS FLEET EXPANSION.19 BUSES FOR 5 CITIES.BALDWIN PARK, COMPTON, EL MONTE, MONTEREY PARK & WEST COVINA (CNG,DIESEL & PROPANE FUEL 30-35 FT. VEH). PPNO 2898.	2005	N/A	Project completed.
CALTRANS	11985	NEAR HAWTHORNE AND CULVER CITY FROM ROUTE 105 TO ROUTE 90 - 6 LANE FREEWAY, ADD 2 HOV LANES AND SOUNDWALLS. (EA# 119851, PPNO# 0824B)	2005	NA	Project completed
CALTRANS	16881	IN LA MIRADA TO SANTA FE SPRINGS FROM ORANGE COUNTY LINE TO ROSECRANS AVENUE - INTERIM HOV LANES; I-5 Rail Grade Crossing between RTE. 605/91. (EA 16681 PPNO# 2008)	2005	**Combined with LAOD73**	Project In Environmental Documents/Pre-design Phase. (This project has been combined with LA0D73, and will not be listed under this ID # in subsequent Timely Implementation Reports.) Project canceled. **Combined with LAOD73.**
CALTRANS	9061D	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT PACIFIC COAST HIGHWAY - GRADE SEPARATION	2004	N/A	Project completed

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	LA000543	IN POMONA AND CLAREMONT FROM ROUTE 57 TO SAN BERNARDINO COUNTY LINE HOV LANE IN EACH DIRECTION (C-I: 77719; CFP 350; PPNO 00362) ALSO SOUNDWALL AND REHAB. (EA# 122401,PPNO# 0315P)	2005	N/A	Project completed
CALTRANS	LA092216	TOPANGA CANYON BLVD. BIKE LANE (96 CFP PROJ) CLASS II (RESTRIPE TO ADD LANE_- 7 MILES)	2004	N/A	Project completed.
CALTRANS	LA0B7215	'RTE 5 CORRIDOR WIDENING & RECONSTRUCT IC SEGMENT A - OCL TO RTE 710 WIDEN FROM 6 TO 10 LNS (1 HOV & ONE MF IN EA. DIR). VALLEY VIEW & CARMENITA IC; MODIFY FWY TO FWY IC @ RTE 605	2014	**Combined with LAOD73**	Project In Environmental Documents/Pre-design Phase. (This project has been combined into LA0D73, and will not be listed under this ID # in subsequent reports.)
CALTRANS	LA962201	NEAR SANTA CLARITA, FROM RT 5 TO 126/S.F. RD HOV PROJECT (EA# 119843, PPNO# 0380G)	2003	N/A	Project completed.
CALTRANS	LA963724	IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNAR- DINO COUNTY LINE - CONSTRUCT 8-LANE FREEWAY INCLUDING 2-HOV LANES (12620, 12640, 12630, 10501, 17210)	2003	N/A	Project completed.
CALTRANS	R615TA	METROLINK - RIV/LA VIA FULLERTON AT COMMERCE METROLINK STATION - PLATFORM CONSTRUCTION. TCI 96-97 (06/7-8/99).CTC FINANCIAL VOTE LIST (06/7-8/99)	2002	N/A	Project completed

Los Angeles County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CITIES & COUNTY	LA0B860	KOREAN HEALTH EDUCATION INFORMATION AND RESEARCH CENTER. EXPANSION VEHICLES - THREE 10 PASSENGER SMALL BUSES	2005	N/A	Project completed.
CITIES & COUNTY	LA0B863	'VILLA ESPERANZA. EXPANSION VEHICLE - ONE 17 PASSENGER MEDIUM BUS	2004	N/A	Project completed.
CITIES & COUNTY	LA0C23	HEALTHVIEW - EXPANSION VEHICLE - (1) 17-PASSENGER MEDIUM BUS	2004	N/A	Project completed.
CITIES & COUNTY	LA0C25	'KOREAN HEALTH EDUCATION INFORMATION (KHEIR) - EXPANSION VEHICLES - (3) 10-PASSENGER SMALL BUSES	2005	N/A	Project completed.
CITIES & COUNTY	LA0C30	ULTRALIFE ADULT DAY HEALTH CARE-EXPANSION VEHICLE - (1) 10-PASSENGER SMALL BUS.	2003	N/A	Project completed.
CITIES & COUNTY	LA0C31	ULTRALIFE ADULT DAY HEALTH CARE - EXPANSION VEHICLES - (2) 5-PASSENGER MINIVANS	2003	N/A	Project completed.
CITIES & COUNTY	LA990744	KOREAN HEALTH, EDUCATION, INFO & RESEARCH CENTER (KHEIR)-EXPANSION THREE (3) 17-PASSENGER SMALL BUSES.	2003	N/A	Project completed
CITY OF LOS ANGELES	LA0962071	L.A. RIVER BIKE PATH OVER LOS FELIZ BLVD. CLASS I AND CLASS II [CALL # 2071, MOU P.0002-071 ON 6/30/99]	2003	N/A	Project completed.
CITY OF LOS ANGELES	LA0962129	METROLINK ROW MITIGATION PEDESTRIAN & CROSSING IMPROVEMENTS	2002	N/A	Project completed.
CITY OF LOS ANGELES	LA0B7024	METRO RED LINE MELROSE SHUTTLE-ACQUISITION OF 2 LOW FLOOR, PROPANE-POWERED, 30-FOOT BUSES WILL BE USED IN THE OPERATION OF A NEW HIGH FREQUENCY SHUTTLE	2002	N/A	Project completed.

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CITY OF LOS ANGELES	LA0B7026	METRO RED LINE/WEST HOLLYWOOD/BEVERLY CENTER/CEDER SINAI SHUTTLE-ACQUIRE 7 NEW 30-FOOT, PROPANE-FUELED, DASH STYLE BUSES FOR THE OPERATION OF A HIGH FREQUENCY SHUTTLE	2002	N/A	Project completed.
CITY OF LOS ANGELES	LA0B7034	SUN VALLEY INTERMODAL TRANSIT CENTER; PEDESTRIAN CROSSING/BUS STOP IMPROVEMENT-PROVIDE PED. CROSSINGS AT EACH END OF THE PLATFORM OF SOON TO BE BUILT SUN VALLEY METROLINK STATION	2003	N/A	Project completed.
CITY OF LOS ANGELES	LA0B7278	NORTHEAST COMMUNITY LINKAGES PHASE II-HIGHLIGHT PEDESTRIAN CONNCTNS W/RAIL & BUS LINES ALONG MARMION WAY AND AT PASADENA AVE, FIGUEROA ST, FRENCH AVE, AND AVE 45, 50, 60, 61.	2002	N/A	Project completed
CITY OF LOS ANGELES	LA0C8321	LA CULTURAL TOURISM WEB PAGE DEVELOP & TRANSIT PROMOTION. ENCOURAGES THE USE OF MASS TRANSIT AT TARGETED TRIP GENERATION NODES AND FACILITATE MASS TRANSIT USE TO REG. DESTINATIONS.	2005	N/A	Ongoing Project
CITY OF LOS ANGELES	LA0C8329	BICYCLE RACKS ON COMMUTER EXPRESS BUSES. ADDITION OF FRONT-LOADING BICYCLE RACKS TO A TOTAL OF 93 COMMUTER EXPRESS BUSES AND SPARES THAT SERVE THE CITY AND COUNTY OF LA.	2004	N/A	Project completed.
CITY OF LOS ANGELES	LA0C8385	EL SERENO DASH PROCUREMENT. PURCHASE (2) LOW-FLOOR, PROPANE POWERED, 30' FOOT BUSES FOR THE EL SERENO DASH SERVICE.	2008	N/A	Project completed.
CITY OF LOS ANGELES	LA962245	WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY	2002	N/A	Project completed.

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CITY OF LOS ANGELES	LA996000	DASH PICO UNION/ ECHO PRK VEH ACQ PURCHASE ONE BUS TO RELIEVE OVERCROWDING	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996001	DASH EL SERENO/CTY TERR VEH ACQ PURCHASE2 BUSES TO REDUCE OVERCROWDING	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996002	DASH WILMINGTON VEH ACQUISITION PURCHASE 2 BUSES TO RELIEVE OVERCROWDING	2002	N/A	Project completed
CITY OF LOS ANGELES	LA996003	DASH WATTS VEH ACQUISITION PURCH 2 VEH'S TO REDUCE EXISTING OVERCROWDING	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996004	DASH KING-EAST VEH ACQUISITION FINANCE THE ACQ OF 5 BUSES TO REDUCE OVERCROWDING	2006	N/A	Project completed
CITY OF LOS ANGELES	LA996005	DASH HOLLYWOOD VEH ACQUISITION ACQUIRE TWO BUSES TO REDUCE EXISTING OVERCROWDING	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996006	DASH VERMNT-MAIN VEH ACQUISITION PURCH 5 BUSES TO RELIEVE EXISTING OVERCROWDING	2006	N/A	Project completed

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Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CITY OF LOS ANGELES	LA996007	DASH MANCHSTR-FLORNCE VEH ACQ PURCH 5 BUSES TO RELIEVE EXISTING OVERCROWDING	2006	N/A	Project completed
CITY OF LOS ANGELES	LA996010	COMM EXPRESS 448 VEH ACQUISITION PURCH 3 BUSES TO REDUCE EXISTING OVERCROWDING	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996011	ROWAN SHUTTLE VEH ACQUISITION PURCH 2 BUSES TO REDUCE EXISTING OVERCROWDED CONDITIONS	2003	N/A	Project completed
CITY OF LOS ANGELES	LA996099	METROLINK SHUTTLE (CHATSWORTH)	2003	N/A	Project completed
CITY OF LOS ANGELES	R627TA	METRO RAIL RED LINE AT WESTLAKE COMMUNITY INTERMODAL INTERCEPT FACILITY - DESIGN 1,100 SPACE PARKING STRUCTURE CROSSSTREETS ARE ALVARADO/MACARTHUR. TCI 97-98 (10/29/97).	2002	N/A	Project completed
COMMERCE	927108	ALAMEDA CORRIDOR IN COMMERCE AT ATLANTIC BOULEVARD AND TELEGRAPH ROAD - INTERSECTION IMPROVEMENTS	2002	N/A	Project completed.
COMMERCE	LA963759	TELEGRAPH ROAD TRACK CAPACITY ENHANCEMENT 97-98 TCI	2002	N/A	Project completed
COMPTON	R5046C	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT PACIFIC COAST HIGHWAY, SEPULVEDA BOULEVARD, DEL AMO BLVD, & ALAMEDA ST AT LAUREL PARK ROAD - GRADE SEPARATION	2002	N/A	Project completed

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
COVINA	LA0C8216	MITIGATE PARKING DEFICIENCY: COVINA METROLINK STATION-PROJ PROPOSES TO CONSTR. 330 NEW PARKING SPACES IN A STRUCT. ON EXISTING STA. PARKING LOT. (PPNO 3224 3345 AB3090REP	2006	N/A	Project completed
DOWNEY	LA982251	DEVELOP DOWNEY TRANSPORT/TRANSIT CTR AND TRANSIT YARD- BUS SYSTEMS, METROLINK, AND LIGHT RAIL ACCESS IMPROVEMENTS- LA TO ORANGE CO INTERMODAL FACILITY- 68,000 SQ/FT - NANCE/LORENA	2004	N/A	Project completed
EL MONTE	LA0B7296	CROSSWALK IMPROVEMENT PROJECT.LOCATED AT RAMONA BL/VALLEY BL, PECK RD/VALLEY BL, PECK RD/LOWER AZUSA RD, PECK RD/RAMONA BL, RAMONA BL/SANTA ANITA	2004	N/A	Project completed
EL MONTE	LA0C8323	SAN GABRIEL VALLEY METRO HUB-IMPLEMENT NEW TRANSPORTATION STRATEGIES, INCLUDING AN ELECTRIC BIKE/SHUTTLE SERVICE/PARKING CONTROL PROGRAM.	2003	N/A	Project completed
GLENDALE	LA0C8220	PURCHASE OF (8) 35-FOOT LOW FLOOR CNG HEAVY-DUTY TRANSIT VEHICLES.	2005	N/A	All vehicles and equipment delivered.
GLENDALE	LA963751	METROLINK - SANTA CLARITA LINE GLENDALE TRANSPORTATION CENTER - UPGRADE STATION 96-97 TCI	2006	N/A	Project completed.

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
GLENDALE	LA996065	CNG HVY DUTY TRANSIT VEHICLES PURCH 6 BUSES TO REMEDY EXISTING OVERCROWDING	2004	N/A	Project completed.
INGLEWOOD	LA990701	PASSENGER TRANSFER FACILITY: OFF STREET, NE CRNR OF LA BREA & KELSO. WILL NOT ADD NEW SVC. PROVIDES SAFE OFF STREET TRANSFER FOR PASSENGERS.INGLEWOOD BUS. TRANSIT CENTER PHASE 2.	2005	N/A	Project completed
LAC MTA	7050	METRO RAIL BLUE LINE-LONG BEACH/LA WILMINGTON AVENUE AT IMPERIAL HIGHWAY - OVERCROSSING	2002	N/A	Project completed.
LAC MTA	LA000487	PARK AND RIDE LOT (850 SPACES) LANKERSHIM AND CHANDLER - METRO RED LINE	2002	N/A	Project completed.
LAC MTA	LA000489	PARK AND RIDE LOT (700 SPACES) UNIVERSAL CITY - METRO RED LINE	2003	N/A	Project completed.
LAC MTA	LA0B304	PLAYA VISTA EARNMARK, PURCHASE NEW (5) LOW-EMISSION BUSES, TRACKING EQUIP & BUS AMENITIES INCLUDING PASSENGER SHELTERES, INFO KIOSKS & APPURTENANT EQUIP - TRANSIT SERVICE UPGRADE.	2005	N/A	Project completed
LAC MTA	LA0B7288	GRAND AVE. REALIGNMENT AND PEDESTRIAN ENHANCEMENTS-GRAND AVENUE BETWEEN TEMPLE AND SECOND STREET; CONSTRUCTION OF A TWO BLOCK REALIGNMENT OF GRAND AVENUE IN DOWNTOWN L.A	2003	N/A	project completed

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA0B7337	'CHANDLER BLVD ROW BIKE PATH: 170 FWY TO LA VALLEY COLLEGE-DESIGN OF 2.3 MILES OF BIKEWAY AND OPTIONAL PEDESTRIAN WALKWAY FROM 170 FWY TO LOS ANGELES VALLEY COLLEGE	2005	N/A	Project completed
LAC MTA	LA0C8118	TDM PROGRAM ENHANCEMENT	2004	N/A	Project completed.
LAC MTA	LA0C8179	GRAND AVE RALIGN & PED ENHANCE.- TEMPLE ST TO 300 S/O 2ND ST. STREETSCAPE ENHANCE TO IMPROVE PED. CONNECT. BTWEN CULTURAL & GOV'T FACILITY. PPNO 3332 AB3090REP.	2005	N/A	Construction of project has been completed. MTA is currently waiting for the as-built plans to be completed before final acceptance of the project. Anticipated project acceptance date is May 31, 2006.
LAC MTA	LA210465	SO. CENTRAL LOS ANGELES EXPOSITION PARK INTERMODAL URBAN ACCESS PRJ (STATE OF CAL. DEPT. OF GEN. SERV.) RENEW /RENOVATION PARKING FACILITY IMPROVE PARK/TRAFFIC ACCESS PROGRAM	2003	N/A	Project completed.
LAC MTA	LA29202U2	SAN FERNANDO VALLEY NORTH/SOUTH BRT EXTENSION (PE ONLY)	2010	N/A	Project canceled/completed. Divided into four projects LA29202U3, LA29202U4, LA29202U5, AND LA29202U6 (AMENDMENT 6) was listed as key TCM in 2004 RTIP.
LAC MTA	LA29212X	METRO RAIL GOLD LINE - PASADENA EXT UNION STA TO SIERRA MADRE VILLASTA 13.5 MILES, 12 STATIONS; AND 2.9 M TCSP FUNDS FOR EXTENSION TO CLAREMONT PE WORK	2003	N/A	Project completed.
LAC MTA	LA963755	CHINATOWN INTERMODAL IMPROVEMENT TO DEVELOP A CONNECTION FROM BLUE LINE - PASADENA (CHINATOWN STATION TO BROADWAY STREET) TCI 97-98 (06/14-15/00), TCI 97-98 (03/28-29/01)	2002	N/A	Project completed.

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA974235	SIGNAL SYSTEM TECHNICIAN TRAINING PROGRAM CURRICULUM DEVELOPMENT PROGRAM AT COMMUNITY COLLEGE	2002	N/A	Project completed
LAC MTA	LA990306	RAPID BUS PROGRAM - 4 - FORTY FT BUSES. ALSO FACILITY: BUS STOP DESIGN AND CONSTRUCTION, TECHNOLOGY UPGRADING, OPERATING SUPPORT.	2007	N/A	Project completed.
LAC MTA	LA991305	RIDESHARE 2000/CLUB METRO-EXTEND AND EXPAND IMPLEMENT. INCENTIVE PRGM. TO ENCOURAGE USE OF ALT. MODES OF TRAVEL OTHER THAN DRIVING ALONE.	2005	N/A	Project In Construction/Implementation Phase. This project has been combined with LA0C8114 & 92733, and will not be listed under this ID # in subsequent reports.
LAC MTA	R616TA	METROLINK - SANTA CLARITA LINE AT VINCENT HILL/ACTON GRADE METROLING ST. INSTL TRFIC SGNALS, CANOPY,PVING,LIHTNG.TCI 96-97 (10/29/97),TCI 97-98 (09/21-22/98),TCI 97-98 (07/08/97).	2002	N/A	Project completed
LONG BEACH PUBLIC TRANSPORTATION CO.	LA0C8320	SOUTHEAST REGIONAL TRANSIT INFORMATION NETWORK-WILL MAKE USERS IDENTIFY THE TRANSIT OPTION THAT BEST MEETS THEIR INDIVIDUAL NEEDS BY SERVING AS A ONE STOP SOURCE.	2005	N/A	Project completed.
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA01B110	BIKE RACKS ON BUSES	2003	N/A	Project completed.
LOS ANGELES COUNTY	LA0B7004	VEHICLE ACQUISITION FOR EAST LOS ANGELES FIXED ROUTE SHUTTLE SERVICE PHASE II-PURCHASE OF 3 VEHICLES WILL INCREASE FREQUENCY OF THE EXISTING 3 SHUTTLES SERVICE ROUTES	2004	N/A	Project Complete

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
MANHATTAN BEACH	LAOB418	IN MANHATTAN BEACH - MARINE AVENUE BETWEEN SEPULVEDA BLVD (STATE ROUTE 1) AND VALLEY/ARDOMOR PEDESTRIAN AND AESTHETIC IMPROVEMENTS. (EA# 220201, PPNO #2841). STATE TEA.	2003	N/A	Project completed
MONTEBELLO	LA000504	PURCHASE AND INSTALLATION OF ON BOARD BIKE RACKS	2004	N/A	Project completed.
MONTEBELLO	LA55012	REPLACE BUSES- 2000 (5) 40' BUSES AND (10) 40' EXPANSION BUSES	2003	N/A	Project completed.
NORWALK	LA0C71	PURCHASE OF (4) FOUR ALTERNATIVELY FUELED EXPANSION BUSES	2004	N/A	Project completed.
NORWALK	LA0D01	NORWALK ON BEHALF OF SANTA FE SPRINGS - ALTERNATIVE FUEL VEHICLES AND TRANSIT RELATED FACILITIES.	2004	N/A	project completed
NORWALK	LA0D02	PURCHASE (2) EXPANSION PARATRANSIT VEHICLES	2003	N/A	Project completed.
NORWALK	LA0D04	NORWALK/SANTA FE SPRINGS TRANSPORTATION CENTER EXPANSION - PARKING & RELATED IMPROVEMENTS	2004	2008	project completed

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
PALOS VERDES ESTATES	LA0C8226	PV TRANSIT CAPITAL IMPROVEMENT PROGRAM II. PURCHASE 3 EXPANSION CLEAN-FUEL VEHICLES.	2005	N/A	First Vehicle Delivered. Project Complete.
PASADENA	LA0B215	PURCHASE OF (5) 30-FOOT ALTERNATIVE FUEL EXTENSION VEHICLES (GTIP)	2004	N/A	Project completed.
REDONDO BEACH	LA0C8072	'PCH TRAFFIC AND INTERSECTION IMPROVEMENT, FROM HERONDO ST TO CATALINA AVE. (PPNO 3126)	2005	2006	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. Not a TCM
SAN GABRIEL VALLEY COG	LA974367	ALAMEDA CORRIDOR EAST - GATEWAY TO AMERICA; RAIL ROAD OVERCROSS SAFETY REALIGNMENT ALONG SO. PACIFIC & UNION PACIFIC RR (SGVCOG)	2006	N/A	Project completed
SAN GABRIEL VALLEY COG	LA990354	ALAMEDA CORRIDOR EAST (SGCG) (T21-1017) RAILROAD CROSSING IMPROVEMENT	2006	N/A	Project completed
SANTA CLARITA	LA0C09	'TRANSIT CENTER PASSENGER AMENITIES	2003	N/A	Project completed.
SANTA CLARITA	LA973024	IMPROVE PEDESTRIAN ACCESS TO TRNSIT STOPS, INSTALLING CROSSWALKS, SIDE- WALKS, AND PEDESTRIAN-ACTUATED TRAFFIC SIGNALS.@ 17 TRANSIT STOPS VARIOUS LOCATIONS, PROJECT EXEMPT	2003	N/A	Project completed

Los Angeles County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
SANTA MONICA	LA0B7267	CROSSWALK ENHANCEMENTS ALONG TRANSIT CORRIDOR-ENHANCEMENTS DESIGNED TO IMPROVE PEDESTRIAN ACCESS TO EXISTING AND PLANNED TRANSIT FACILITIES ALONG SANTA	2004	N/A	Project completed.
SANTA MONICA	LA960192	THROUGHOUT THE CITY OF SANTA MONICA VARIOUS BIKE RACKS AND LOCKERS	2002	N/A	Project completed.
SCAG	LA996082	WEB ACCESS VANPOOL INFO SYS DEV & IMPLMENT DATABSE FOR VANPOOLS, VACANCIES	2002	N/A	Ongoing Project
SCAG	LA996083	COMMUTER CHANNEL NON-MONETARY SUBSCRIPTION SRVCE	2002	N/A	Ongoing Project
SCRAA/LACMTA/SANBAG	LA0B7107	CHATSWORTH INTERMODAL PARK AND RIDE-INCLUDE DESIGN AND CONS. OF ADDITIONAL 150 SPACES-CONSTRUCTION WILL INCL GRADING, ASPHALT PAVING, INSTALLATION OF CONCRETE BUMPERS ETC (PE ONLY)	2004	N/A	Project completed.
LAC MTA	LA29202U1	SAN FERNANDO VALLEY EAST/WEST BRT (FROM THE TERMINUS OF METRO RED LINE RAIL IN NO HOLLYWOOD TO WARNER CTR)14-MILE EXCLUSIVE BUS LANES AT FORMER RAIL RD ROW (PPNO 3333 AB3090REP)	2005	2010	Contract/Project Complete.
LAC MTA	LA990353	ALAMEDA CORRIDOR EAST - NOGALES ST GRADE SEP (T21-491, SGVCG)	2006	2008	Project completed.

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
LAC MTA	LA29202X	METRO RED LINE MOS-3: N. HOLLYWOOD 5.9-MILE W/ 3 STATIONS, HIGHLAND TO N.HOLLYWOOD STA. 15,370+ 746= 16,117 118,630+5,754=124,384	N/A	2005	Project completed
NORWALK	LA0B0841	PURCHASE TWO (2) 40-FT GILLIG + SHORTFALL	N/A	2005	Project completed
CALTRANS	LA0D174	ROUTE 138 WIDENING FROM 2 LANES TO 4 LANES-WIDENING AT TWIN BRIDGES (SEG.11B) EA# 127261, PPNO 3330			NOT A TCM – widening project; does not meet the definition of a TCM in the SCAB
CALTRANS	LA0D76	IN DOWNTOWN LA-ON ROUTE 110-TEMPLE STREET. ACCESS IMPROVEMENTS.	2005	2008	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. NOT A TCM -
CITY OF LOS ANGELES	LA0C8303	ANGELS FLIGHT RAILWAY PLAZA. ENHNCMENT OF SYSTM & DEVT OF LOWER PLAZA INCL KIOSKS, INCLDS INSTALLING, WAITING & SEATING AREAS, LIGHTING, CNNCTIONS BET HILL ST & ADJCENT RED LINE ST	2005	N/A	Recreational project; not for use as a mode of transportation. NOT A TCM
CITY OF LOS ANGELES	LA996241	CHANDLER BIKEWAY EXTENSION-DESIGN & CONSTRUCT .5 MILE EXT, CYCLIST SHOWER AND LOCKER FACILITY AT HISTORIC TRAIN STATION ACROSS FROM CHANDLER BLVD. FROM THE METRO RED LINE STATION.	2004	2006	Recreational project; not for use as a mode of transportation. NOT A TCM
CITY OF LOS ANGELES	LA996290	SEPULVEDA BLVD. FROM CENTINELA AVE. TO LINCOLN BLVD - WIDEN SEPUL BLVD. BET. LINCOLN AND CENTINELA	2005	2006	–widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB NOT A TCM
LAC MTA	LA996390	SEPULVEDA BLVD. FROM CENTINELA AVE. TO LINCOLN BLVD - WIDEN SEPUL BLVD. BET. LINCOLN AND CENTINELA	2005	2007	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. NOT A TCM
MONROVIA	LA0C8250	MONROVIA RAILROAD DEPOT MULTI-MODAL TRANSIT CENTER: STABILIZING STRUCTURE AND THEN OVERALL STRUCTURAL ELEMENTS WILL BE REPAIRED FOLLOWED BY RESTORING KEY ARCHITECTURAL. PPNO# 3415	2005	2007	Safety/maintenance project. Does not meet the definition of a TCM in the SCAB. NOT A TCM
MONTEBELLO	LA0D28	PURCHASE OF 2 EXPANSION BUSES AND 3 REPLACEMENT BUSES, ALL HYBRID (GASOLINE-ELECTRIC) LOW FLOOR 40' COACH.	2005	2007	Replacement bus purchase is not a TCM. NOT A TCM

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
MONTEBELLO	LA0D287	PURCHASE OF 29 REPLACEMENT BUSES. GASOLINE-ELECTRIC HYBRID LOW FLOOR 40' COACH. PURCHASE OF 6 EXPANSION BUSES. GASOLINE-ELECTRIC HYBRID LOW FLOOR 40' COACH			Replacement bus purchase is not a TCM. NOT A TCM
MONTEREY PARK	LA0D190	NORTH ATLANTIC BLVD WIDEN AND CHANNELIZATION BETWEEN NEWMARK AVE. HILLMAN AVE WIDEN TO SIX LANES OF OPERATION TO INCLUDE ACCELERATION & DECELARATION LANE OPRTN MDIFCTION.	2006	2008	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. NOT A TCM
PALMDALE	LA0C8326	PALMDALE TRANSPORTATION CENTER COMMUTER SERVICE CENTER-A REGIONAL MULTI-MODAL TRANSIT FACILITY IS CURRENTLY IN DESIGN.			Not in SCAB
PALMDALE	LA0C8361	PALMDALE TRANSIT AMENITIES PROGRAM. PROVIDE BUS SHELTERS ALONG VARIOUS REGIONAL AND LOCAL STOPS WITHIN THE CITY OF PALMDALE.			Not in SCAB
PASADENA	LA0D46	SR 710 MITIGATION PROJ-LAKE AVE/WALNUT ST & HILL AVE/WALNUT ST INTERSECTION MOBILITY IMPRVMENTS. PROJ INCLUDES WIDENING OF THE EAST SIDE OF LAKE AVE. FROM WALNUT FOR TURN LANES.	2005	2006	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. NOT A TCM
PASADENA	LA0D48	SR 710 MITIGATION PROJECT-110 FWY TO 210 FWY CONNECTOR.MARENGO INTERCHANGE EMPHASIS. THIS PROJECT INCLUDES THE INSTALLATION OF DIRECTIONAL SIGNS, CHANGEABLE MESSAGE SIGNS	2006	N/A	Widening/capacity enhancing project; does not meet the definition of a TCM in the SCAB. NOT A TCM
SCRAA/LACMTA/SANBAG	LA0B7009	ANTELOPE VALLEY LINE IMPROVEMENTS- INCREASE CAPACITY AND REDUCE TRAVEL TIME ON THIS COMMUTER RAIL AND FREIGHT SERVICE LINE BETWEEN LANCASTER AND LOS ANGELES	2005	N/A	NOT IN SCAB

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Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	20090	NEAR SOUTH PASADENA FROM ROUTE 10 TO ROUTE 210 - PARTIAL RIGHT OF WAY FOR NEW 6 LANE FREEWAY WITH 2 HOV LANES (EA# 020090, PPNO 0219M)	2006	2008	PROPERTY MANAGEMENT - NOT A TCM

Orange County

Projects Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[8] Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	10167	I-5 FROM SR-91 TO LA COUNTY LINE IN BUENA PARK - ADD 1 MIXED FLOW LN AND 1 HOV LN IN EACH DIRECTION. FROM 6 - 0 TO 8 - 2 LANES.	2008	2008	In contract award phase
TCA	10254	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/5/01	2015/2008	2008	ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
ANAHEIM	ORA000100	GENE AUTRY WAY WEST@ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HARBOR.	2004	2009	There were difficulties in completing the environmental document. The project is now cleared and in the final design early ROW stage.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000104	TRANSITWAY IMPROVEMENTS AT IRVINE TRANSPORTATION CENTER; BUILD 900 SPACE PARKING STRUCTURE, INCLUDING ENVIRONMENTAL, DESIGN AND CONSTRUCTION.	2004/2005	2007	Delay due to funding and availability of a viable site. The site has been identified and construction will start 2007.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000193	SR-22/I-405 AND I-405/I-605 INTERCHANGES. DESIGN HOV TO HOV LANE CONNECTORS	2010	2015	*Not a TCM for timely implementation. This project should not have been listed as a TCM in 2004; it was not a committed TCM at that time. It became a committed TCM in 2006 (funds for CON in 05/06). Prior years included funding only for design. This project will be reported on as a TCM in the next Timely Implementation report.*
CALTRANS	ORA000195	ON SR-22 (I-405 TO SR55) ADD 2 HOV LANES/1 EA DIR (FRM 0 - 2); & 2 AUX LANES/1 EA DIR (FRM 0- 2) (I-5 TO BEACH) & OPERATING IMPROVMENTS	2007	2007	construction underway

[8] The dates reflected are the 2004 RTP and RTIP completion dates. If the completion date was identical in both documents only one date is listed.

Orange County

Projects Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[8] Completion Date	2006 RTIP Completion Date	Project Status
FULLERTON	ORA020113	FULLERTON TRAIN STATION - PARKING STRUCTURE, PHASE I AND II. TOTAL OF 670 SPACES.	2004	2008	Project is in environmental phase. Due to the unavailability of previously identified sites, the city is now is the process of procuring a different site. **STIP funds have been programmed to this project as part of the adopted 2006 STIP approved 4/27/06**
ORANGE COUNTY TRANSIT DISTRICT (OCTD)	ORA020119	PURCHASE PARATRANSIT VEHICLES EXPAN (142) - (66) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (13) IN FY07/08, (14) IN FY08/09, (14) IN FY09/10	2007/2010	2010	ongoing
VARIOUS AGENCIES	ORA030302	(9) EXPANSION MEDIUM BUSES (TYPE II) AND (11) MOBILE RADIOS - ORANGE COUNTY ARC - PROVIDE SERVICES TO SENIORS AND DISABLED PERSONS.	2004	2006	contract award
TCA	ORA050	ETC (RTE 241/261/133) TOLL RD (RTE 91TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/05/01.	2015/2010	2010	ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
TCA	ORA051	(FTC-N) TOLL RD (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR; 3 MF EA. DIR BY 2010; 4 MF EA. DIR BY 2015, PLS CLMBNG & AUX LANS PER SCAG/TCA MOU 4/05/01.	2015/2010	2010	ongoing implementation of AVO monitoring requirements of SCAG/TCA MOU
TCA	ORA052	(FTC-S) TOLL RD (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2006; AND 2 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2015 PER SCAG/TCA MOU 4/05/01.	2015/2010	2010	proceeding toward construction; selection of a preferred alternative 2/23/06; ROD pending 6/06
ORANGE COUNTY TRANSIT DISTRICT (OCTD)	ORA55241	PURCHASE (79) STANDARD 40 FT EXPAN ALT FUEL BUSSES - (28) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (9) IN FY08/09, (7) IN FY09/10	2007/2010	2010	ongoing

Orange County

Projects Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[8] Completion Date	2006 RTIP Completion Date	Project Status
BUENA PARK	ORA55286	COMMUTER RAIL STATION (DALE STREET AND MALVERN) IN BUENA PARK. CONSTRUCT NEW RAIL STATION. 308 PARKING SPACES.	2006	2006	construction underway
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING. (ORANGE COUNTY PORTION).	N/A	N/A	ongoing
GARDEN GROVE	ORA981104	RECONSTRUCT HARBOR BLVD INTERCHANGE. 4 LANES EACH DIRECTION. (1/4 MILE BEFORE AND AFTER SR-22 RAMPS) 2 HOV LNES(1 E/B & 1 W/B) AND PROPOSED SR-22 HOV LANES.	2007/2004	2007	Construction underway. Project being completed as part of the overall SR-22 widening project. This project is on the same schedule as that project.
ORANGE, CITY OF	ORA990443	SR-22 AND CITY DRIVE INTERCHANGE IMPROVEMENTS. RECONFIGURE FREEWAY INTERCHANGE AT SR-22 FROM SR-57 TO LEWIS STREET -- FROM 6/0 TO 6/2 LANES (ADDING 2 HOV LANES)	2007/2004	2007	Construction underway. Project being completed as part of the overall SR-22 widening project. This project is on the same schedule as that project.
ORANGE, CITY OF	ORA990452	TUSTIN BRANCH RAIL TRAIL (SANTA ANA RIVER TO FAIRHAVEN ST) CONVERT RAILS TO BIKE TRAIL THROUGH VILLA PARK AND ORANGE. CONNECTS 9 MILE TRAIL.	2003/2005	2006	ROW phase
VARIOUS AGENCIES	ORA990906	LUMP SUM. TEA FUNDS FOR BICYCLE AND PEDESTRIAN FACILITY PROJECTS THROUGHOUT ORANGE COUNTY.	2009	2009	ongoing
VARIOUS AGENCIES	ORA030301	(1) EXPANSION MINIVAN - A.S. FOUNDATION - PROVIDE SERVICES TO SENIORS AND DISABLED PERSONS.	2004	2005	minivans purchased, awaiting delivery

Orange County

Projects Reported on in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[8] Completion Date	2006 RTIP Completion Date	Project Status
MISSION VIEJO	ORA990902	MISSION VIEJO (CITYWIDE) REMOTE TMC AND TRAVLER/PUBLIC INFO ACCESS CENTER. PROVIDES TRAFFIC INFO TO PUBLIC LIBRARIES. EST COMM INTERTIE BETWEEN CITY AND CALTRANS	2003/2004	2006	contract issues caused delay; project is now under construction

Orange County

New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA1100501	BUS RAPID TRANSIT - 28MI FIXED BRT FRM BREA MALL TO IRVINE TRANS CNTR. INCLUDES STRUCTURES, ROLLING STOCK, AND FEEDER SVC & IBC SHUTTLE- CNG SHUTTLES FROM JWA TO IBC.	N/A	2010	New Project. This project is being implemented to replace ORA194.

Orange County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	1332	(RTE SR-22 TO RTE SR-91) IN CITY OF ORANGE WIDEN EXIST 8-LN FWY INCL. 2 STND HOV LNS ADD 2 MIXED FLOW LANES AND_AUX LNS; OC @ LAVETA, MEATS & KATELLA (98 STIP PROJECT)	2002	2005	complete
CALTRANS	5242	I-405 TO LA CO LINE -- ADD ONE HOV LANE IN EACH DIRECTION. THIS PROJECT WILL COMPLETE THE I-605 INTERCOUNTY GAP IN THE HOV SYSTEM IN SO. CALIF. (ITIP PROJECT)	2002	2005	complete
CALTRANS	6951	405/55 INTERCHANGE SOUTH TRANSITWAY MOS1_EXISTING 4 MIXED 1 HOV_ON SR55 AND I-405 EXIST IS 5 MF AND 1 HOV ADD HOV DIRECT TRANSITWAY FROM SR55 TO I-405	2005	2005	complete
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA194	CENTRAL ORANGE COUNTY FIXED GUIDEWY (CENTERLINE) FOR CONSTRUCTION FROM JOHN WAYNE AIRPORT TO SANTA ANA TRANSPORTATION CENTER PLUS LINK TO SANTA ANA COLLEGE	2010	2010	*TCM substitution* this project was modified and will be reported as three separate projects: ORA109, ORA194B and ORA194C. TCM substitution approved by EPA July 27, 2006.
CALTRANS	ORA55073	BIRCH TO I-405 WIDENING; ADD (1) MIXED FLOW LANE IN NB DIR; NB AUX LANE; SOUNDWALLS; AND (1) HOV LANE (2010) IN EACH DIR. NEAR SR55 INTERCHANGE (98 STIP)	2005	2004	complete
LAGUNA NIGUEL	ORA9530	MISSION VIEJO/LAGUNA NIGUEL STATION LOS ANGELES/SAN DIEGO CORRIDOR	2003	2005	complete

Orange County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
YORBA LINDA	ORA981103	IN YORBA LINDA, CONSTRUCT COMMUTER RAIL STATION AND PARK AND RIDE (347 SPACES) NEAR ESPERANZA RD AND NEW RIVER ST	2009	2005	*TCM substitution* this project was modified and will be reported as three separate projects: ORA109, ORA194B and ORA194C
IRVINE	ORA990802	IRVINE AMTRAK STATION BUILD PEDESTRIAN OVERCROSSING AND LANDSCAPING	2003	2005	complete
CALTRANS	6951	405/55 INTERCHANGE SOUTH TRANSITWAY MOS1 EXISTING 4 MIXED 1 HOV ON SR55 AND I-405 EXIST IS 5 MF AND 1 HOV ADD HOV DIRECT TRANSITWAY FROM SR55 TO I-405	2005	2006	complete
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020105	HYBRID ELECTRIC URBAN 40 FT BUSES (10) EXPANSION	2004	2006	complete
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020114	WEST ORANGE COUNTY TRANSIT GUIDEWAY - BUS RAPID TRANSIT		2007	Only the eng phase is programmed, by definition this does not by definition qualify as a TCM
ANAHEIM	ORA120318	ANAHEIM REGIONAL TRANSPORTATION INTERMODAL CENTER (ARTIC) - NEAR/INCLUDING EXPANSION OF EXISTING AMTRAK/METROLINK STATION AT EDISON FIELD TO PROVIDE ACCESS W/ OTHER TRANSIT SERVICE	N/A	2010	Not a TCM – not fully funded (i.e. not a *committed* TCM with funds for ROW or construction in first two years of 2004 RTIP)
YORBA LINDA	ORA120322	YORBA LINDA - CONSTRUCT PEDESTRIAN BRIDGE OVER IMPERIAL HWY NEAR MAIN ST	2009	2009	Safety/maintenance project. Not a TCM

Orange County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA120325	OCTA - INTER COUNTY EXPRESS BUS SERVICE - VEHICLE CAPITAL LEASE	2010	2010	complete

Riverside County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[9] Completion Date	2006 RTIP Completion Date	Project Status
CALTRANS	354801	JCT RTE 15 TO VALLEY WAY - ADD 1 HOV LN AND 1 M/ F LN IN EA. DIR. INCLUDING OPERATIONAL STRIPING (IN SBD CNTY 9.05 - 9.95 & AT THE EAST END) ALSO WIDEN 5 UC'S & 1 OH	2006/2008	2008	STIP funds allocated and CMAQ funds obligated. Construction to begin during FY 05/06.
CALTRANS	0121D	ON I-215/SR91/SR60, RIV I215 COR IMPROV PROJ - FROM 60/91/215 JCT TO 60/215 SPLIT - WIDEN 6 TO 8 LNS, INCLUDING MAINLINE/IC IMPROVS, ADD HOV, AUX, & SB TRUCK CLIMB LN (EA: 3348U1)	2006/2007	2009	Under construction
CORONA	RIV010227	CORONA ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS)	2005	2010	This is an ongoing project. Funds for Part 1 were obligated and project is under construction. Part 2 with 5207 funds will be obligated during FY 06/07.
HEMET	RIV990708	CONSTRUCT TRANSPORTATION/ TRANSIT CENTER/PARK-N-RIDE LOT ON CORNER OF HARVARD AND LATHAM AVE, APP 100 SPACES	2003/2004	2006	CMAQ now obligated. Construction to be during 1/06 with the estimated completion by 5/06.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV020902	IN WEST RIV CO FOR EXCEED, A DIVISION OF VALLEY RESOURCE CENTER - PURCHASE 1 EXPANSION 20' MODIFIED VAN, 1 EXPANSION 22' MEDIUM BUS, AND 2 RADIOS - SECTION 5310 FY 02/03 CYCLE	2004	2008	PS&E phase - Local match funding issues now resolved through coordinated effort between Caltrans and RCTC. Final vehicle configuration and order in progress. Project is now moving for expeditiously.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	REGIONAL RIDESHARE	N/A	N/A	Ongoing program for implementation of rideshare activities.

[9] The dates reflected are the 2004 RTP and RTIP completion dates. If the completion date was identical in both documents only one date is listed.

Riverside County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[9] Completion Date	2006 RTIP Completion Date	Project Status
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV010214	PURCHASE/REHAB ROLLING STOCK - RIVERSIDE COUNTY SHARE (13 CARS IN FY02/03 AND 18 CARS IN FY 03/04)	2005/2007	2008	First order phase completed with follow-on order to occur by mid FY 05/06. Estimated delivery to be completed by 6/30/08. The first cab order will be completed in 2008, with follow on order completion in 2010
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV011242	PURCHASE EXPANSION ROLLING STOCK (2 CAB CARS AND 3 LOCOMOTIVES) FOR METROLINK IEOC AND RIVERSIDE/FULLERTON/LA LINES (EA: RIVFUL, PPNO: 0079E)	2004/2009	2009	*Received STIP funding April 2006. This project is on schedule.*
MORENO VALLEY	32300	AT SR60/NASON ST IC - MODIFY/RECONSTRUCT IC & NASON ST FROM ELDER TO FIR: REALIGN EB, WB EXIT PLUS EB & WB ENTRY RAMPS, ADD EB & WB RAMP HOV LNS, & ADD AUX LANES (EA: 32300)	2007	2007	PS&E - environmental cleared and final design progressing. ROW anticipated soon.
TEMECULA	RIV62029	AT HWY 79 SO AND LA PAZ, ACQUIRE LAND, DESIGN AND CONSTRUCT PARK AND RIDE - 250 SPACES (FY 05 HR4818 EARMARK)	2004/2007	2009	PAED - project is a joint effort between Temecula and RTA. Delay results from delay in implementing new Temecula transit center due to past location safety issues. Programmed in RIV050553 for RTA. Temecula and RTA are moving forward to complete the project. The 2006 RTIP reflects the revised timing

Riverside County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[9] Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE TRANSIT AGENCY	RIV990902	IN WESTERN RIVERSIDE COUNTY IN THE CITY OF PERRIS - CONSTRUCT NEW MULTIMODAL TRANSIT FACILITY (BUS & RAIL) AT 4TH AND D STREETS	2006	2007	Transit bus portion moving forward with implementation estimated during 2007. Metrolink station portion will be completed as part of Perris Valley Line project programmed in RIV520109 (not a committed TCM).

Riverside County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
TEMECULA	RIV030301	ITS DEMO - SIGNAL INTERCONNECT ON SR79 NORTH (DESIGN/INSTALL CONDUIT/ INTERCONNECT CABLE) FROM MARGARITA TO MURRIETA HOT SPRINGS & CCTV AT VARIOUS SIGNALIZED LOCATIONS	2005	NA	Completed.
RIVERSIDE TRANSIT AGENCY	RIV030614	IN WESTERN RIVERSIDE COUNTY - PURCHASE 5 EXPANSION 14 PASSENGER DIAL-A-RIDE VANS (FY 04 5307)	2006	NA	completed
RIVERSIDE TRANSIT AGENCY	RIV030610	RTA BUS STOP AMENITIES - INSTALL APPROX. 45 NEW SHELTERS & REHAB APPROX 159 SHELTERS (PARTS, PAINT, SIGNS, POLES, BENCHES, TRASH RECEPTACLES & ANCILLARY HARDWARE) (FY 04 5307)	2005	NA	completed
RIVERSIDE TRANSIT AGENCY	RIV030613	IN WESTERN RIVERSIDE COUNTY - INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) AT APPROXIMATELY 48 BUS STOPS (INCLUDES UPGRADED SIGNAGE AND LIGHTING) (FY 04 5307)	2006	NA	completed
RIVERSIDE CITY	RIV020605	IN WESTERN RIVERSIDE COUNTY FOR THE CITY OF RIVERSIDE SPECIAL SERVICES - PURCHASE 2 EXPANSION 25' TWELVE PASSENGER DIAL-A-RIDE VEHICLES	2004	NA	completed
RIVERSIDE CITY	RIV030606	CITY OF RIVERSIDE SPECIAL SERVICES - PURCHASE 1 EXPANSION 20 PASSENGER ALT-FUEL DIAL-A-RIDE VEHICLE WITH LIFT, TIEDOWNS, RADIO, AND FAREBOX (FY 04 5307)	2005	NA	completed

Riverside County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	46360	IN RIVERSIDE AND MORENO VALLEY ON SR60 FROM RT 215 TO REDLANDS BLVD ADD 2 HOV LANES	2006	NA	completed
CORONA	RIV030602	IN THE CITY OF CORONA - PURCHASE/INSTALL MOBILE DATA TERMINAL (MDT) & AUTOMATIC VEHICLE LOCATOR (AVL) IN 14 TRANSIT VEHICLES & INTEGRATE W/ DISPATCHING SOFTWARE (FY 04 5307)	2005	NA	completed
SCAG	RIV62103	ITS TRANSIT PROJECT; INCLUDES AUTOMATED VEHICLE LOCATOR, GLOBAL POSTION SAT; MOBILE DATA TERMINALS;		NA	completed
CORONA	RIV010511	CITY OF CORONA -- PURCHASE 3 EXPANSION VEHICLES -- RED LINE FIXED ROUTE	2006	NA	Deleted - TCM Substitution. . New Park and Ride lot to be constructed and submitted as replacement TCM project: 60 spaces, located at 1114 W. Ontario Ave, Corona CA. Estimated date for implementation - April 2006. Expansion bus purchase will be deleted from RTIP. Estimated date for implementation - April 2006. The TCM substitution was approved by EPA July 27, 2006
RIVERSIDE TRANSIT AGENCY	RIV030626	IN WESTERN RIVERSIDE COUNTY - DEBT FINANCING (FY 03/04 PORTION) FOR 57 TRANSIT COACHES, 25 REPLACEMENT, 32 EXPANSION (FY 04 5307)	2005	NA	Construction/Implementation Complete, Project Open for Use
TEMECULA	990914	I-15 TRAFFIC SURVEILLANCE AND SIGNAL SYSTEM INTEGRATION (I-215/ County Line) TEA 21 Demonstration Project	2004	NA	Construction/Implementation Complete, Project Open for Use

Riverside County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE TRANSIT AGENCY	RIV041024	IN WESTERN RIVERSIDE COUNTY FOR RTA - PURCHASE 5 PARATRANSIT 12 PASSENGER DIAL-A-RIDE VEHICLES (FY 05 5307)	2006	N/A	Completed Project: Funds obligated in TEAM and expended. Vehicle delivery expected to be completed by 5/12/06.

Riverside County

New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV030902	IN WESTERN RIVERSIDE COUNTY FOR EXCEED, A DIVISION OF VALLEY RESOURCE CENTER - PURCHASE 2 EXPANSION SMALL BUSES AND 1 EXPANSION MINIVAN (5310 FY 03/04 CYCLE)	N/A	2008	Match issues appear to be resolved and project is progressing forward. Funds anticipated to be obligated and vehicles on order by October 2006.
RIVERSIDE TRANSIT AGENCY	RIV041009	IN WESTERN RIVERSIDE COUNTY FOR RTA - DEBT FINANCING (FY 04/05 PORTION) FOR 57 TRANSIT COACHES, 25 REPLACEMENT, 32 EXPANSION (FY 05 5307)	N/A	2006	Construction/project implementation phase - debt financing project -
RIVERSIDE TRANSIT AGENCY	RIV050538	IN WESTERN RIVERSIDE COUNTY FOR RTA - DEBT FINANCING (FY 05/06 PORTION) FOR 57 TRANIST COACHES, 25 REPLACEMENT, 32 EXPANSION (FY 06 5307, UZA: RIV-SAN)	N/A	2007	In PS&E
RIVERSIDE TRANSIT AGENCY	RIV051005	IN WESTERN RIVERSIDE COUNTY FOR RTA: PURCHASE 10 EXPANSION MINIVANS (APPROX 5 PASSENGERS EACH, GAS/DIESEL) (5310 FY 05/06 CYCLE)	N/A	2009	In PS&E

Riverside County

New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV051006	IN WESTERN RIVERSIDE COUNTY FOR CARE CONNEXXUS INC.: PURCHASE 1 EXPANSION LARGE BUS (APPROX 16 PASSENGERS, GAS/DIESEL) W/ LIFT AND TIEDOWNS (5310 FY 05/06 CYCLE)	N/A	2009	In PS&E
RIVERSIDE TRANSIT AGENCY	RIV051008	INSTALL MULTI-JURISDICTIONAL ATIS AT TRANSIT CENTERS & HIGH TRAFFIC CORRIDOR BUS STOPS INCLUDING REAL TIME SCHEDULES, IMPROVED SIGNAGE & LIGHTING (MAGNOLIA CORRIDOR PHASE)	N/A	2007	Project implementation now in progress and should be completed by 6/30/07. 5309c funds obligated. Maintain project in prior obligated section. project split also (RIV041028)
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV011243	METROLINK-SAN BERNARDINO SUBDIVISION TIER 11 CONSTRUCT NEW STATION AT 3360 VAN BUREN BLVD IN RIVERSIDE (PARKING 550 SPACES)	2003	Replaced 2004	*This project went through the substitution process in 2004; therefore does not need to be included in the 2006 RTIP* Downtown Riverside and La Sierra stations were expanded to provide additional parking spaces.

San Bernardino County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[10] Completion Date	2006 RTIP Completion Date	Project Status
VARIOUS	713	I-215 CORRIDOR NORTH - IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 30- ADD 2 HOV LANES 1 LANE IN EA. DIR. AND OPERATIONAL IMPROVEMENTS	2005/2010	2010	Project in Engineering (PS&E) Phase. The project was delayed because of conflicting findings between the environmental and engineering analysis with regard to the preferred alternative, necessitating substantial revisions to the environmental analysis and to the traffic studies. Project is still having design issues with FHWA
VARIOUS	20620	UPLAND TO SAN BERNARDINO FROM LOS ANGELES COUNTY LINE TO ROUTE 215 - 8 LANE FREEWAY INCLUDING 2 HOV LANES (6+2) - 210 CORRIDOR PROJECT W/AUX LANES THROUGOUT SEGMENT 9-11	2007/2009	2009	segments 1-9 complete; finishing up last 2 segments-environmental reevaluation is taking place o the last two segments
SANBAG	94163	RIDESHARE ACTIVITIES FOR SOUTH COAST AIR BASIN	N/A	N/A	On Going Operational Project-monies expended for all current years - still an on-going project new number 20040827
SANBAG	200074	LUMP SUM - TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS	2004	2006	Project in Construction/Implementation Phase-funds have been obligated and projects underway
RIALTO	200450	RIALTO METROLINK STATION - INCREASE PARKING SPACES FROM 225-775	2006	2007	starting feasibility study

[10] The dates reflected are the 2004 RTP and RTIP completion dates. If the completion date was identical in both documents only one date is listed.

San Bernardino County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[10] Completion Date	2006 RTIP Completion Date	Project Status
OMNITRANS	981118	BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	2005/2008	2008	starting design
COLTON	2002164	ON VALLEY BLVD. IN COLTON TO NORTH TO 10TH STREET CONNECTING TO ABANDONED RR CORRIDOR ON WEST SIDE OF COLTON AVE.-CONSTRUCT CLASS I BIKEWAY, LANDSCAPING AND LIGHTING	2003/2006	2007	Project in ROW Clearance Phase. Project was delayed due to protracted negotiations with BNSF Railroad on ROW. Environmental completed in 2004. The $659,000 of TEA 3. Environmental issues and delayed 1 year and doing historical site. Looking for construction being underway by June 06.
OMNITRANS	2002171	(1) EXPANSION PARATRANSIT VAN	2003	2003	Combined in 2004 with ID 20020110
SANBAG	20020106	MONTCLAIR PEDESTRIAN UNDERCROSSING-CONSTRUCTION OF A 2ND PLATFORM CREATES NEED FOR CONSTRUCTION OF NEW UNDERCROSSING	2003	2006	*The platform is complete and in use with an at-grade crossing. The undercrossing is currently in the design phase; however, the lead agency had to reconsider the design to accommodate the Gold Line which is currently planned to terminate in Montclair. SCRRA is the lead agency for the design and construction*
RANCHO CUCAMONGA	20020201	PACIFIC ELECTRIC INLAND EMPIRE TRAIL – PHASE 1 – HAVEN AVENUE TO 1200' EAST OF ETIWANDA AVE (3.4) MILES) CONSTRUCT CLASS 1 BIKE TRAIL & ROW ACQ, ETIWANDA DEPOT	2004/2006	2007	finishing PS&E

San Bernardino County

Projects Reported in a Previous RTIP

Lead Agency	Project ID	Description	2004 RTP/RTIP[10] Completion Date	2006 RTIP Completion Date	Project Status
SANBAG	SBD031505	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS (PROJECTS ARE CONSISTENT WITH 40 CFR PART 93.126, 127,128, EXEMPT TABLES 2 & 3)	2004	2008	3 million obligated - 3.9 left to obligate; ongoing allocations

San Bernardino County

New TCMs Subject to Timely Implementation (not in the 2004 RTIP)

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
FONTANA	200431	INLAND PACIFIC ELECTRIC TRAIL - ON OLD SP ABANDONED RR BETWEEN I-15 TO JUNIPER AVE.-CONSTRUCT CLASS 1 BIKE LANE (APPROX. 7 MILES LONG)	N/A	2007	working with caltrans to get federal funds obligated - obligation of funds expected by 9/06

San Bernardino County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
SANBAG	SBD031505	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS	2004	N/A	Project in Construction/Implementation Phase - projects awarded funds and projects completed for the 2004 FY
CHINO	SBD41220	CHINO AVENUE/CENTRAL TO 6TH STS. MULTI-MODAL TRANSPORTATION CENTER INCLUDES PARK-N-RIDE LOT WITH 125 SPACES(PHASE 1 FUNDED-PHASE 2 AWAITING FUNDING)	2004	N/A	Project In Construction/Implementation Phase-project should be completed by 6/06-monies obligated and underway
OMNITRANS	SBD31088	BUS FLEET EXPANSION-PURCHASE 40' EXPANSION HEAVY DUTY COACHES & AUX. EQUIPMT, CNG 01-9, 03-1 (Note: The 'OTHER' FUNDS ARE CARL MAYER FUNDS)		N/A	completed
SANBAG	SBD0194	NEAR FONTANA FROM 0.5 MI E OF HEMLOCK TO 0.2 MI E OF SIERRA AVE CONSTRUCT 6-LANE FWY & 2 HOV LANES	2002	N/A	completed
OMNITRANS	981119	TRANSIT INTERMODAL FACILITIES - FONTANA TRANSCENTER - EXPAND BUS BAYS, IMPROVE LANDSCAPING, SIGNALS AND PEDESTRIAN AND PASSENGER FACILITIES	2002	N/A	completed
PERRIS	RIV990709	IN THE CITY OF PERRIS - RECONSTRUCT INTERSECTION AT 4TH ST AND REDLANDS AVE INCLUDING ROUND ABOUT, MINOR LANDSCAPING AND MINOR R/W ACQUISITION	2004	2012	Per the request for Caltrans and the City of Perris, RIV990709 has been re-scoped to be a standard intersection signal installation which is now stated in the 2006 RTIP. This project does not meet the definition of a TCM **per EPA/TCWG 5/2/06.**

San Bernardino County

Completed and Corrected Projects

Lead Agency	Project ID	Description	2004 RTIP Completion Date	2006 RTIP Completion Date	Project Status
RIVERSIDE CITY	RIV0084	AT VAN BUREN ST IC RECONSTRUCT RAMPS (INCLDS HOV RAMPS), WIDEN OC ON VAN BUREN FROM 4 TO 6 LN & ADD AUX LANES; ADD NEW EB ONRAMP W/ENTRANCE @ INDIANA	2005	2009	HOV does not include a bypass. Not a TCM - should be labeled as EXEMPT per EPA 5/2/06

2004 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

Timely Implementation Report, 2004 RTIP: Transportation Control Measure (TCM) Project Implementation Status- By County

Los Angeles County

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	2004 RTP PROJECT COMPLETION DATE	2004 RTIP PROJECT COMPLETION DATE	Project Status
ACCESS SERVICES INC.	LA900520	SCAB	0	PURCHASE OF ADD'L 591 VEHICLES FROM FY01 TO FY05. 110 VEHICLES IN FY01, 161 VEHICLES IN FY02, 125 VEHICLES IN FY03, 149 VEHICLES IN FY04, AND 92 VEHICLES IN FY05.	2005	2005	Project Implementation Phase
AGOURA HILLS	LA990362	SCAB	0	CITYWIDE STREET AND BIKE PATH PROJ (T21-939). US 101 REGIONAL BIKE LANE GAP CLOSURE. TCSP	2003	2004	Project In Engineering (PS&E) Phase. This project has been delayed somewhat due to unforeseen design difficulties. The issues are now being resolved and the project is expected to be expeditiously implemented.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963731	SCAB	0	ALAMEDA CORRIDOR - NORTH END RAIL ROAD/ARTERIAL GRADE SEPS. & RELATED IMPROVEMENTS EIS/EIR COMPLETE; 8100+1394 P.E. 10517+305 R/W; 29483+5300 CONS.	2004	2004	**Project Completed**
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963732	SCAB	0	ALAMEDA CORRIDOR - MID CORRIDOR SEGMENT 10 MI TRENCH >20 ARTERIAL GRADE SEPS, ENVIRONMENTAL CLEARANCE	2003	2003	**Project Completed**
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963733	SCAB	0	ALAMEDA CORRIDOR - SOUTH END 7 RAILROAD / ARTERIAL GRADE SEPS. + RELATED IMPROVEMENTS ENV. CLEARANCE #NAME?	2002	2002	**Project Completed**
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0B7008	VAR	0	3 EXPANSION 40 FT. LOW FLOOR CLEAN DIESEL BUSES; LOCAL FIXED-ROUTE BUSES; TO RELIEVE PEAK PERIOD OVERCROWDING ON CORE ROUTES.	2003	2003	**Project Completed**
BALDWIN PARK	LA0B7012	SCAB	0	LOCAL NTD REPORTERS' BUS FLEET EXPANSION.19 BUSES FOR 5 CITIES.BALDWIN PARK, COMPTON, EL MONTE, MONTEREY PARK & WEST COVINA (CNG,DIESEL & PROPANE FUEL 30-35 FT. VEH).	2005	2005	Project In Engineering (PS&E) Phase
BELLFLOWER	LA996275	SCAB	0	WEST BRANCH GREENWAY MULTI-MODAL TRANS. CORRIDOR DESIGN AND CONSTRUCT 2.5 MILE CLASS I BIKE PATH ALONG MTA-OWNED SANTA ANA BRANCH ROW INCL. PEDESTRIAN AND LANDSCAPING	2003	2006	Project In Engineering (PS&E) Phase. There were problems in reconciling ROW guidelines; there was the potential that the Orange Line might intersect with this project, so the plans had to be reconfigured. These issues have since been resolved and the project is now being expeditiously implemented.
BURBANK	LA0D25	SCAB	0	PROCUREMENT OF (3) ALTERNATIVE FUEL TRANSIT VEHICLES	2004	2004	**Project Completed**
BURBANK	LA8STIP13	SCAB	0	BURBANK LOCAL TRANSIT PURCHASE OF THREE ALT. FUEL BUSES FOR ONGOING TDM PROGRAM	2004	2004	**Project Completed**

CALABASAS	LA974100	SCAB	0	U.S. 101 INTERJURISDICTIONAL BIKELANE GAP CLOSURE CONSTRUCTION 4.5 MILES OF BIKEWAY IMPROVEMENTS TO CLOSE SEVERAL GAPS WITHIN A 12 MILE CORRIDOR(TEA21-#69)	2003	2006	Project In Engineering (PS&E) Phase. During the Environmental Documentation Phase, issues were raised about streams and wetlands in the area, requiring modifications to the plans. This also resulted in a change in Engineers, adding a slight delay. These issues have since been resolved and the project is now being expeditiously implemented.
CALTRANS	1178A	SCAB	405	IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) 98CTIP $ FUND NB LN, ALSO PAYS FOR SB $ DELETED FROM 96STIP	2006	2007	Project In Engineering (PS&E) Phase
CALTRANS	11985	SCAB	405	NEAR HAWTHORNE AND CULVER CITY FROM ROUTE 105 TO ROUTE 90 - 6 LANE FREEWAY, ADD 2 HOV LANES AND SOUNDWALLS. (EA# 119851, PPNO# 0824B)	2005	2005	Project In Construction/Implementation Phase
CALTRANS	12570	SCAB	60	RTE. 57/60 HOV CONNECTOR INDUSTRY FROM OLD BREA CANYON ROAD TO GRAND AVENUE - HOV DIRECT CONNECTORS AND COLLECTOR ROAD (BOTH DIRECTIONS)	2006	2007	Project In Engineering (PS&E) Phase
CALTRANS	16881	SCAB	5	IN LA MIRADA TO SANTA FE SPRINGS FROM ORANGE COUNTY LINE TO ROSECRANS AVENUE - INTERIM HOV LANES; I-5 Rail Grade Crossing between RTE. 605/91.	2014	2014	This project has been combined with LA0D73, and will not be listed under this ID # in subsequent Timely Implementation Reports.
CALTRANS	9061D	SCAB	0	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT PACIFIC COAST HIGHWAY - GRADE SEPARATION	2002	2002	**Project Completed**
CALTRANS	LA000357	SCAB	5	--- FROM ROUTE 170 TO ROUTE 118 HOV LANES (10 TO 12 LANES) (CFP 345) (2001 CFP 8339; CFP2197). (EA# 121901, PPNO# 0158K)	2008	2010	Project In Environmental Documents/Pre-design Phase. Project was delayed due to administrative difficulties. MTA is working with Caltrans and other agencies to resolve these issues so as to meet the current completion date.
CALTRANS	LA000358	SCAB	5	--- FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346)(2001 CFP 8355). (EA# 121801, PPNO# 0142F)	2012	2010	Project In Engineering (PS&E) Phase. MTA is working with Caltrans to further expedite the construction schedule.
CALTRANS	LA000359	SCAB	10	IN EL MONTE AND BALDWIN PARK FROM BALDWIN AVE TO ROUTE 605 HOV LANES (8+0 TO 8+2) AND TOS PROJECTS. (EA#10691. PPN0# 0295M)	2004	2005	Project In Engineering (PS&E) Phase
CALTRANS	LA000543	SCAB	10	IN POMONA AND CLAREMONT FROM ROUTE 57 TO SAN BERNARDINO COUNTY LINE HOV LANE IN EACH DIRECTION (C-I: 77719; CFP 350; PPNO 00362) ALSO SOUNDWALL AND REHAB. (EA# 122401,PPNO# 0315P).	2005	2004	**Project Completed**
CALTRANS	LA01342	SCAB	10	RT 10 FROM RT 605 TO PUENTE AVE HOV LANES(8+0 TO 8+2). (EA# 117070, PPNO# 0306N)	2008	2010	Project In Engineering (PS&E) Phase. Project was delayed due to administrative changes in implementation design. These issues are now being resolved and the project is expected to be expeditiously implemented.
CALTRANS	LA01344	SCAB	5	RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES. EA# 122001, PPNO# 0162P	2005	2006	Project In Bid/Advertise Phase.
CALTRANS	LA01348	SCAB	14	--- RT 14 FROM ESCONDIDO CYN RD. TO PEARBLOSSOM HWY HOV LANES (4 TO 6 LANES) ONE LANE IN EACH DIRECTION. (EA-117101, PPNO# 0389N)	2002	2003	**Project Completed**
CALTRANS	LA0B420	SCAB	0	IN VAN NUYS - MULTIMODAL TRANSPORTATION CENTER - PEDESTRIAN IMPROVEMENTS AND LANDSCAPING	2002	2004	**Project Completed**

CALTRANS	LA0B7215	SCAB	5	RTE 5 CORRIDOR WIDENING & RECONSTRUCT IC SEGMENT A - OCL TO RTE 605 WIDEN FROM 6 TO 10 LNS (1 HOV & ONE MF IN EA. DIR). VALLEY VIEW & CARMENITA IC; MODIFY FWY TO FWY IC @ RTE 605	2014	2014	This project has been combined into LA0D73, and will not be listed under this ID # in subsequent reports.
CALTRANS	LA0B875	SCAB	10	HOV LANES FROM CITRUS TO ROUTE 57/210	2030	2015	Project In Engineering (PS&E) Phase. The project completion date was erroneously reported as 2030 in the 2004 RTP.
CALTRANS	LA0B951	SCAB	71	ROUTE 10 TO ROUTE 60 -- EXPRESSWAY TO FREEWAY CONVERSION -- ADD 1 HOV LANE AND 1 MIXED FLOW LANE . (2001 CFP 8349, TCRP #50) (EA# 210600, PPNO# 2741)	2030	2010	Project In Right-of-way Acquisition Phase. The project completion date was erroneously reported as 2030 in the 2004 RTP.
CALTRANS	LA0C8344	SCAB	405	EXTENSION OF N/B I-405 HOV LANE-TO EXTEND THE HOV LANE ON N/B I-405 FROM SOUTH OF VENTURA BL TO SO. BURBANK BLVD WHERE IT WILL JOIN THE EXISTING HOV LANE. (EA# 199620, PPNO# 2788).	2007	2007	Project In Engineering (PS&E) Phase
CALTRANS	LA0D73	SCAB	5	LA MIRADA, NORWALK & SANTA FE SPRINGS-ORANGE CO LINE TO RTE 605 JUNCTION. WIDEN FOR HOV & MIXED FLOW LNS, RECONSTRUCT VALLEY VIEW & CARMENITA RD I/C. MODEL #1404	2014	2014	Project In Environmental Documents/Pre-design Phase. (Project # LA0B7215 will be incorporated into this project in future Timely Implementation Reports.)
CALTRANS	LA195900	SCAB	405	RTE. 405 - WATERFORD AVE. TO RTE 10 - AUX LANE: LOS ANGELES - WATERFORD AV. TO RTE 10 - CONSTRUCT S/B AUX LANE & S/B HOV LANE (2001 CFP 8354) (EA# 195900,PPNO# 2333)	2006	2007	Project In Engineering (PS&E) Phase
CALTRANS	LA962201	SCAB	14	NEAR SANTA CLARITA, FROM RT 5 TO 126/S.F. RD HOV PROJECT (EA# 119843, PPNO# 0380G)	2003	2003	**Project Completed**
CALTRANS	LA962216	SCAB	0	TOPANGA CANYON BLVD. BIKE LANE (96 CFP PROJ) CLASS II (RESTRIPE TO ADD LANE_- 7 MILES)	2003	2004	**Project Completed**
CALTRANS	LA963519	SCAB	0	ADD 3 MILES OF TRIPLE TRACK AT BANDINI, MP 148.5 & 151.7 BETWEEN FULLERTON & LAUS	2002	2007	Project in Bid/Advertise Phase. The project has been delayed due to unforeseen jurisdictional issues, ROW acquisition issues, and MOU execution. The MOU is now in process, and the other issues have been resolved. The project is expected to be implemented expeditiously, once the MOU is executed.
CALTRANS	LA963724	SCAB	30	IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNAR- DINO COUNTY LINE - CONSTRUCT 8-LANE FREEWAY INCLUDING 2-HOV LANES (12620, 12640, 12630, 10501, 17210)	2003	2003	**Project Completed**
CALTRANS	LA996134	SCAB	5	RTE. 5/14 INTERCHANGE & HOV LNS ON RTE. 14 -- CONSTRUCT 2 ELEVATED LANES -- HOV CONNECTOR (DIRECT CONNECTORS) (EA# 16800)(2001 CFP 8343) (PPNO# 0168M)	2014	2009	Project In Engineering (PS&E) Phase
CALTRANS	LA996137	SCAB	60	RTE. 60 HOV LNS. FROM RTE. 605 TO BREA CANYON RD. -- HOV LANE (FROM 8 TO 10 LANES TO 10 TO 12 LANES) (CFP: 358, 4262, 6137=67,150+IIP: 5,100)	2008	2007	Project In Engineering (PS&E) Phase
CALTRANS	LA996138	SCAB	5	RTE.5 HOV LNS. FROM FLORENCE AVE TO RTE.19 -- ADD ONE LANE IN EACH DIRECTION	2025	2016	Project In Environmental Documents/Pre-design Phase
CALTRANS	R5046C	SCAB	0	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT PACIFIC COAST HIGHWAY, SEPULVEDA BOULEVARD, DEL AMO BLVD, & ALAMEDA ST AT LAUREL PARK ROAD - GRADE SEPARATION	2002	2002	**Project Completed**

CARSON, CITY OF	LA0C8219	SCAB	0	SOUTH BAY PAVILION REGIONAL TRANSIT CTR. CONSTRUCTION OF A TRANSIT CTR AT THE SOUTH BAY PAVILION SHOPPING CTR TO BE SERVED BY ALL 8 CARSON CIRCUIT RTES & MTA LINES #205 & #446-447.	2006	2006	Project In Environmental Documents/Pre-design Phase.
COMMERCE	927108	SCAB	0	ALAMEDA CORRIDOR IN COMMERCE AT ATLANTIC BOULEVARD AND TELEGRAPH ROAD - INTERSECTION IMPROVEMENTS	2002	2002	**Project Completed**
COMMERCE	LA0C37	SCAB	0	BUS STOP IMPROVEMENTS, CONSTRUCTION OF PASSENGER SHELTERS AND INFORMATION KIOSKS	2002	2002	**Project Completed**
COMMERCE	LA963759	SCAB	0	TELEGRAPH ROAD TRACK CAPACITY ENHANCEMENT 97-98 TCI	2002	2002	**Project Completed**
COMMERCE	R615TA	SCAB	0	METROLINK - RIV/LA VIA FULLERTON AT COMMERCE METROLINK STATION - PLATFORM CONSTRUCTION	2002	2002	**Project Completed**
COMPTON	LAOB7326	SCAB	0	COMPTON CREEK BIKEWAY EXTENSION - PHASE III.DESIGN & CONSTRUCT .6 MI OF CLASS 1 BIKE/PED PATH FROM GREENLEAF BLVD TO ARTESIA FWY.WILL INC BIKE PATH, PED WALKWAY SIGNAGE, STRIPING	2005	2005	Project In Engineering (PS&E) Phase
COVINA	LA0C8216	SCAB	0	MITIGATE PARKING DEFICIENCY FOR COVINA METROLINK STATION-PROJECT PROPOSES TO CONSTRUCT 330 NEW PARKING SPACES IN A STRUCTURE OVER AN EXISTING STATION PARKING LOT. (PPNO# 3224)	2006	2006	Project In Engineering (PS&E) Phase
COVINA	LA9811080	SCAB	0	EASTLAND SATELLITE PARK n RIDE LOT (REPLACEMENT PARKING FOR EASTLAND SHOPPING CENTER -- 429 SPACES) (CROSS STREETS ARE BARRANCA/WORKMAN)	2002	2002	**Project Completed**
CULVER CITY MUNI BUS LINES	LA026	SCAB	0	PROCUREMENT OF TWO (2) 30' CNG EXPANSION BUSES FOR SERVICE	2003	2003	**Project completed**
CULVER CITY MUNI BUS LINES	LA0B400	SCAB	0	PROCUREMENT OF FOUR (4) 40' CNG EXPANSION BUSES/400K PER BUS	2004	2004	Project Implementation Phase
CULVER CITY MUNI BUS LINES	LA0C8382	SCAB	0	SEPULVEDA BLVD BUS STOP IMPROVEMENT PROGRAM. BUS STOP AMENITIES INC LIGHTING SIGNAGE, LANDSCAPING, SHELTERS, SEATING, LANDINGS AND TRASH RECEPTACLES.	2008	2010	Multi-component Project Underway. The project was delayed due to administrative issues, which have since been resolved, and the project is expected to be expeditiously implemented.
DOWNEY	LA982251	SCAB	0	DEVELOP DOWNEY TRANSPO/TRANSIT CTR AND TRANSIT YARD- BUS SYSTEMS, METROLINK, AND LIGHT RAIL ACCESS IMPROVEMENTS- LA TO ORANGE CO INTERMODAL FACILITY- 68,000 SQ/FT - NANCE/LORENA	2002	2004	**Project Completed**
FOOTHILL TRANSIT ZONE	LA0B311	SCAB	0	PARK AND RIDE FACILITY TRANSIT ORIENTED NEIGHBORHOOD PROGRAM	2003	2005	Project In Environmental Documents/Pre-design Phase. The project was delayed due to site environmental factors, requiring the identification of additional mitigation measures These issues have since been resolved and the project is now being expeditiously implemented.
FOOTHILL TRANSIT ZONE	LA0C8362	SCAB	0	EL MONTE STATION IMPROVEMENT PROJECT-FUNDING WILL PROVIDE FOR NEW LIGHTING, INFORMATION SIGNAGE, AND OTHER PASSENGER AMENITIES.	2004	2005	Project In Construction/Implementation Phase
FOOTHILL TRANSIT ZONE	LA963526	SCAB	0	BUS STOP ENHANCEMENT	2005	2005	Project In Construction/Implementation Phase
FOOTHILL TRANSIT ZONE	LA963762	SCAB	0	MONROVIA TIMED TRANSFER CENTER	2004	2004	Project In Environmental Documents/Pre-design Phase

FOOTHILL TRANSIT ZONE	LA9811007	SCAB	0	AVL SYSTEM, ARRIVAL SIGNS, FUEL MGMT. SYSTEM AND CAROUSEL	2005	2005	Project In Construction/Implementation Phase
GLENDALE	LA0C8220	SCAB	0	PURCHASE OF (8) 35-FOOT LOW FLOOR CNG HEAVY-DUTY TRANSIT VEHICLES.	2005	2005	Project Implementation Phase
GLENDALE	LA963751	SCAB	0	METROLINK - SANTA CLARITA LINE GLENDALE TRANSPORTATION CENTER - UPGRADE STATION 96-97 TCI	2006	2003	**Project Completed**
GLENDALE	LA996065	SCAB	0	CNG HVY DUTY TRANSIT VEHICLES PURCH 6 BUSES TO REMEDY EXISTING OVERCROWDING	2004	2004	**Project Completed**
INGLEWOOD	LA990701	SCAB	0	PASSENGER TRANSFER FACILITY: OFF STREET, NE CRNR OF LA BREA & KELSO. WILL NOT ADD NEW SVC. PROVIDES SAFE OFF STREET TRANSFER FOR PASSENGERS.INGLEWOOD BUS. TRANSIT CENTER PHASE 2.	2002	2005	Project In Construction/Implementation Phase. There were difficulties with contractor to whom the work was originally awarded. A new contractor has since been designated, and the project is now being expeditiously implemented.
LONG BEACH	LA0C8163	SCAB	0	BIKEWAY AND PEDESTRIAN IMPROVEMENTS. 1.2 MILE CLASS I BIKE/PED PATH FROM WALNUT AVE TO WILLOW ST AT THE BLUE LINE STATION.	2005	2005	Project In Construction/Implementation Phase
LONG BEACH	LA0C8331	SCAB	0	LONG BEACH WAYFINDING/TRANSIT CONNECTION PROGRAM-MAJORITY OF SIGNS WILL BE PEDESTRIAN, AND WILL INCLUDE MAPPING THAT DISPLAYS DESTINATIONS AND TRANSIT OPTIONS.	2004	2004	Project In Engineering (PS&E) Phase
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA01B110	SCAB	0	BIKE RACKS ON BUSES	2003	2003	**Project Completed**
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA0B7006	SCAB	0	LONG BEACH TRANSIT EXPANSION BUSES - THE PURCHASE OF UP TO 11 40-FOOT, LOW-FLOOR LNG ALTERNATIVE FUEL BUSES WHICH SERVE THE MOST CROWDED ROUTES, INCLUDING 190,7,100 & 171.	2003	2003	**Project completed**
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA0C8320	SCAB	0	SOUTHEAST REGIONAL TRANSIT INFORMATION NETWORK-WILL MAKE USERS IDENTIFY THE TRANSIT OPTION THAT BEST MEETS THEIR INDIVIDUAL NEEDS BY SERVING AS A ONE STOP SOURCE.	2003	2005	Pre-design Phase. Project was delayed due to administrative changes in implementation design These issues have since been resolved and the project is now being expeditiously implemented.
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA0C8383	SCAB	0	LONG BEACH TRANSIT: BUS STOP IMPROVEMENT PROJ. ENHANCE 9 OF RAIL STATION FEEDER BUS STOPS TO EASE TRANSFERS, MAKE PUBLIC TRANSIT MORE AESTHETICALLY PLEASING & SAFER, INC RIDERSHIP.	2004	2004	Project In Construction/Implementation Phase
LONG BEACH PUBLIC TRANSPORTATION COMPANY	LA973029	SCAB	0	BUS STOP AMENITIES	2004	2004	Project In Construction/Implementation Phase
LOS ANGELES COUNTY	LA002633	SCAB	0	THOMPSON CREEK BICYCLE TRAIL (93/97 CFP; BIKE PROGRAM) CLASS I (2 MILES)	2003	2005	Project In Construction/Implementation Phase. Project was delayed due to changes in implementation program These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES COUNTY	LA0B416	SCAB	0	IN LOS ANGELES - DOWNTOWN OVER FREEWAY 101 - PEDESTRIAN BRIDGE ENHANCEMENT	2004	2004	Project In Construction/Implementation Phase
LOS ANGELES COUNTY	LA0B7004	SCAB	0	VEHICLE ACQUISITION FOR EAST LOS ANGELES FIXED ROUTE SHUTTLE SERVICE PHASE II-PURCHASE OF 3 VEHICLES WILL INCREASE FREQUENCY OF THE EXISTING 3 SHUTTLES SERVICE ROUTES	2002	2004	Project In Construction/Implementation Phase. Vehicle delivery was delayed due to a backlog at the manufacturer's end. The vehicles are now expected to be delivered by September, 2004.

LOS ANGELES COUNTY	LA0B7288	SCAB	0	GRAND AVE. REALIGNMENT AND PEDESTRIAN ENHANCEMENTS-GRAND AVENUE BETWEEN TEMPLE AND SECOND STREET; CONSTRUCTION OF A TWO BLOCK REALIGNMENT OF GRAND AVENUE IN DOWNTOWN L.A	2003	2003	**Project Completed**
LOS ANGELES COUNTY	LA0C8179	SCAB	0	GRAND AVE RALIGN & PED ENHANCEMENTS-TEMPLE ST TO 300 S/O 2ND ST. STREETSCAPE ENHANCEMENTS TO IMPROVE PED. CONNECTIONS BETWEEN MAJOR CULTURAL & GOVERNMENT FACILITY.	2005	2005	Project In Engineering (PS&E) Phase
LOS ANGELES COUNTY	LA0C8315	SCAB	0	ELECTRIC BIKE AND SCOOTER DEMONSTRATION PROJECT. PURCHASE OF ELECTRIC BIKES AND SCOOTERS AS A TEST FOR FEASIBILITY AS SUBSTITUTES FOR SHORT COMMUTE TRIPS TO PARK AND RIDE LOTS.	2005	2005	Project In Engineering (PS&E) Phase
LOS ANGELES COUNTY	LA0C8316	SCAB	0	TRANSPORTATION INFORMATION PROJECT (TIP). EQUIP COUNTY EMPLOYEES AT 41 SITES THROUGHOUT LA COUNTY WITH THE TOOLS NEEDED TO PROVIDE INDIVIDUALIZED TRANSIT ITINERARIES ETC.	2005	2005	First Vehicle Delivered
LOS ANGELES COUNTY	LA0C8364	SCAB	0	NORTH LA COUNTY NON-ADVERTISING BUS STOP SHELTERS. INSTALLATION OF BUS SHELTERS WITH SEATING AT BUS STOPS WITH GREATEST # OF DAILY BOARDING IN NORTH LOS ANGELES COUNTY.	2007	2007	Multi-component Project
LOS ANGELES COUNTY	LA962214	SCAB	1	PACIFIC COAST HIGHWAY TRAFFIC MANAGEMENT SYSTEM FROM MCCLURE TUNNEL TO TRANCAS CANYON RD TRAFFIC MAN. & BUS SPEED IMPROVEMNT(TEA21-#707)	2003	2005	Project In Construction/Implementation Phase. The project was delayed due to unexpected difficulties in inter-agency coordination between Caltrans, County of Los Angeles, and City of Malibu These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES COUNTY	LA974181	SCAB	0	LAC+USC MEDICAL CENTER BUS TRANSIT STATION FACILITY WILL HAVE 4 BUS BAYS AND 4 LAYOVER BAYS BUS STOP IMPROVEMENT PRJ	2002	2005	Project In Engineering (PS&E) Phase. The project is facing unanticipated ROW acquisition difficulties, which MTA is currently working to resolve.
LOS ANGELES COUNTY	LA990353	SCAB	0	ALAMEDA CORRIDOR EAST - NOGALES ST GRADE SEP (T21-491, SGVCG)	2006	2006	Project In Engineering (PS&E) Phase. The project was delayed due to unanticipated difficulties in design and engineering documentation These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES COUNTY	LA996044	SCAB	0	VEH ACQ FOR EST L.A. SHUTTLE PURCH 4 VEH'S TO REMEDY EXISTING OVERCROWDED CONDITIONS	2002	2004	First Vehicle Delivered. Remaining acquisitions delayed due to backlog in orders at manufacturer's end. The remaining vehicles are expected to be delivered within 2004.
LOS ANGELES COUNTY	LA996285	SCAB	0	SOUTH BAY BIKE TRAIL RECONSTRCT AT PLAYA DEL REY - DESIGN AND RECONSTRCT SEGMENT OF THE TRAIL AT DOCKWEILER STATE BEACH.	2005	2005	Project In Construction/Implementation Phase.
LOS ANGELES COUNTY	LA996288	SCAB	0	SAN GABRIEL RVR. BIKE TRAIL REHAB PHASE I - FROM WHITTIER NARROWS DAM TO FLORENCE AVE.	2005	2005	Project In Engineering (PS&E) Phase
LOS ANGELES COUNTY	R616TA	SCAB	0	METROLINK - SANTA CLARITA LINE AT VINCENT HILL/ACTON GRADE METROLING STATION - INSTALL TRAFFIC SIGNALS, CANOPY, PAVING, LIGHTING	2002	2002	**Project Completed**
LOS ANGELES COUNTY MTA	7050	SCAB	0	METRO RAIL BLUE LINE-LONG BEACH/LA WILMINGTON AVENUE AT IMPERIAL HIGHWAY - OVERCROSSING	2002	2002	**Project Completed**

LOS ANGELES COUNTY MTA	927333	SCAB	0	RIDESHARE ACTIVITIES	2005	2005	Project Implementation Phase
LOS ANGELES COUNTY MTA	LA000274	SCAB	2	FROM SEPULVEDA TO MORENO CONTRUCT DIVIDED PKWAY WITH TRANSIT PKWAY IMPROVEMENTS, BIKE LANES & RT. 2/405 INTERCHANGE (94CFP; CAT. 2, 210, 98STIP00027) TEA21-#1531	2003	2005	Project In Construction/Implementation Phase. There were delays in the Design Phase, and, subsequently, there was a change in implementing agency. The City of Los Angeles has since been designated as the implementing agency, and the project is now being expeditiously implemented.
LOS ANGELES COUNTY MTA	LA000487	SCAB	0	PARK AND RIDE LOT (850 SPACES) LANKERSHIM AND CHANDLER - METRO RED LINE	2002	2004	**Project Completed**
LOS ANGELES COUNTY MTA	LA000489	SCAB	0	PARK AND RIDE LOT (700 SPACES) UNIVERSAL CITY - METRO RED LINE	2003	2004	**Project Completed**
LOS ANGELES COUNTY MTA	LA01B101	SCAB	0	COOPERATIVE PURCHASE OF HYBRID ELECTRIC COACHES BY MTA AND INTERESTED MUNICIPAL OPERATORS AS A TEST PROGRAM (2001 CFP 8116)	2006	2006	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA01B120	SCAB	0	EXPANSION OF DIVISION 1 TO ADD ADDITIONAL CAPACITY OF APPROX 67 BUSES AND ADDITIONAL PARKING SPACE OF EMPLOYEES. ACQUISITION OF A VACANT PARCEL SOUTH OF DIV 1	2003	2005	Project In Environmental Documents/Pre-design Phase. The project was substantially expanded to include an additional 100 buses, resulting in a need to also expand the maintenance facilities as well, which in turn changed the environmental documentation requirements. These issues have now been resolved and the project is now being expeditiously implemented.
LOS ANGELES COUNTY MTA	LA0B303	SCAB	0	ACQUISITION OF TROLLEY BUSES (2) AND CHARGING STATIONS FOR THE CITY OF MONROVIA'S DOWNTOWN TROLLEY SERVICE	2004	2004	**Project Completed**
LOS ANGELES COUNTY MTA	LA0B304	SCAB	0	PLAYA VISTA EARNMARK, PURCHASE NEW (5) LOW-EMISSION BUSES, TRACKING EQUIP & BUS AMENITIES INCLUDING PASSENGER SHELTERES, INFO KIOSKS & APPURTENANT EQUIP - TRANSIT SERVICE UPGRADE.	2004	2005	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA0B7023	SCAB	0	GET-ABOUT FLEET IMPROVE (POMONA VAL TRANS. AUTHORITY)-PURCHASE 18, 21 PASSENGER VEHIC TO INCR CAPACITY OF SUBREG PARATRANSIT SYS	2002	2004	**Project Completed**
LOS ANGELES COUNTY MTA	LA0C10	SCAB	0	MID-CITY/EXPOSITION CORRIDOR LIGHT RAIL TRANSIT PROJECT - DOWNTOWN LA TO SANTA MONICA	2011	2012	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA0C8109	SCAB	0	COUNTYWIDE TRANSPORTATION SYS. AWARENESS & SATISFACTION. PROJECT WILL USE AND EXPAND UPON IT'S PREDECESSOR'S WORK, THE SERVICE PLANNING MARKET RESEARCH PROGRAM (SPMRP) FOR TRANSIT	2007	2007	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA0C8114	SCAB	0	LOS ANGELES COUNTY RIDESHARE SERVICES; PROVIDE COMMUTE INFORMATION, EMPLOYER ASSISTANCE AND INCENTIVE PROGRAMS THROUGH CORE & EMPLOYER RIDESHARE SERVICES & MTA INCENTIVE PROGRAMS.	2009	2009	Project In Engineering (PS&E) Phase
LOS ANGELES COUNTY MTA	LA0C8118	SCAB	0	TDM PROGRAM ENHANCEMENT	2004	2004	Project In Engineering (PS&E) Phase
LOS ANGELES COUNTY MTA	LA0C8413	SCAB	0	METRO RAPID BUS STATIONS-PHASE II; INCLUDES COMMUNICATIONS & EQUIPMENT	2005	2009	Project in Contract Negotiation Phase. The project was delayed due to changes in design. These issues have since been resolved and the project is now being expeditiously implemented.

LOS ANGELES COUNTY MTA	LA0D38	SCAB	0	PURCHASE A MINIMUM OF 200 CLEAN AIR LIGHT-DUTY VEHICLES (UP TO 225, DEPENDING ON ULTIMATE PURCHASE ORDER) ALL VEHICLES WILL BE OPERATIONAL WITHIN 6 TO 12 MONTHS.	2003	2009	Project Implementation Phase. This is an AQMD project, and the apparent change in completion date is due to the addition of vehicles over and above the original purchase order. As such, the change in completion date is due to a rescoping of the project and not due to an actual delay.
LOS ANGELES COUNTY MTA	LA210465	SCAB	0	SO. CENTRAL LOS ANGELES EXPOSITION PARK INTERMODAL URBAN ACCESS PRJ (STATE OF CAL. DEPT. OF GEN. SERV.) RENEW /RENOVATION PARKING FACILITY IMPROVE PARK/TRAFFIC ACCESS PROGRAM	2003	2003	**Project Completed**
LOS ANGELES COUNTY MTA	LA29202U1	SCAB	0	SAN FERNANDO VALLEY EAST/WEST BRT (FROM THE TERMINUS OF THE METRO RED LINE HEAVY RAIL IN NO HOLLYWOOD TO WARNER CENTER)14-MILE EXCLUSIVE BUS LANES LOCATED IN FORMER RAIL ROAD ROW	2005	2005	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA29202U2	SCAB	0	SAN FERNANDO VALLEY NORTH/SOUTH BRT EXTENSION	2009	2010	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA29202V	SCAB	0	EASTSIDE TRANSIT CORRIDOR - UNION STATION TO ATLANTIC VIA 1ST ST. TO LORENA, THEN 3RD ST. VIA 3RD/BEVERLY BLVD. TO ATLANTIC (EASTSIDE LRT)	2009	2010	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA29202W	SCAB	0	MID -CITY TRANSIT CORRIDOR: WILSHIRE BLVD. METRO RAPID TRANSITWAY FROM VERMONT TO SANTA MONICA DOWNTOWN	2009	2010	Project In Environmental Documents/Pre-design Phase
LOS ANGELES COUNTY MTA	LA29202X	SCAB	0	METRO RED LINE MOS-3: N. HOLLYWOOD 5.9-MILE W/ 3 STATIONS, HIGHLAND TO N.HOLLYWOOD STA. 15,370+ 746= 16,117 118,630+5,754=124,384	2002	2002	**Project Completed**
LOS ANGELES COUNTY MTA	LA29212X	SCAB	0	METRO RAIL BLUE LINE - PASADENA EXT UNION STA TO SIERRA MADRE VILLASTA 13.5 MILES, 12 STATIONS	2003	2003	**Project Completed**
LOS ANGELES COUNTY MTA	LA963542	SCAB	0	ACQUISTION REVENUE VEHICLES - 2,513 CLEAN FUEL BUSES: LEASED VEH, FY02 (370); +30 HC; FY03 -FY06 TOTAL OF 516	2005	2005	Project Implementation Phase
LOS ANGELES COUNTY MTA	LA963755	SCAB	0	CHINATOWN INTERMODAL IMPROVEMENT TO DEVELOP A CONNECTION FROM BLUE LINE - PASADENA (CHINATOWN STATION TO BROADWAY STREET) 97-98 TCI	2002	2002	**Project completed**
LOS ANGELES COUNTY MTA	LA974083	SCAB	0	CHANDLER/BURBANK BIKE PATH-WHITEOAK TO PIERCE COLLEGE A 3.2 MILE CLASS I BIKEWAY ON MTA'S CHANDLER/BURBANK RAIL RIGHT-OF-WAY WILL IMPROVE NON-MOTORIZED ACCESS (COMBINED W/LA974078)	2003	2007	Project In Construction/Implementation Phase. The project is integrated with a busway project, which was delayed due to the discovery of contaminated soil. This project cannot be completed independent of the busway. These issues are now being resolved and the project is expected to be expeditiously implemented.
LOS ANGELES COUNTY MTA	LA974124	SCAB	0	SANTA MONICA BOULEVARD TRANSIT PARKWAY TRANSIT PEDESTRIAN AND BIKEWAY IMPROVEMENTS ALONG SANTA MONICA BLVD IN WEST LOS ANGELES, SPANS 2.5	2002	2005	Project In Construction/Implementation Phase. There were delays in the Design Phase, and, subsequently, a change in implementing agency. The project is now being administered by the City of Los Angeles, and is expected to be expeditiously implemented.
LOS ANGELES COUNTY MTA	LA974235	SCAB	0	SIGNAL SYSTEM TECHNICIAN TRAINING PROGRAM CURRICULUM DEVELOPMENT PROGRAM AT COMMUNITY COLLEGE	2002	2002	**Project Completed**
LOS ANGELES COUNTY MTA	LA990305	SCAB	0	LIGHT RAIL TRANSIT FLEET- 50 NEW RAIL CAR	2010	2010	Project In Construction/Implementation Phase. (The completion date was erroneously reported as 2003 in previous Timely Implementation Reports.)

LOS ANGELES COUNTY MTA	LA990306	SCAB	0	RAPID BUS PROGRAM - 4 - FORTY FOOT BUSES. ALSO FACILITY: BUS STOP DESIGN AND CONSTRUCTION, TECHNOLOGY UPGRADING, OPERATING SUPPORT.	2007	2004	**Project Completed**
LOS ANGELES COUNTY MTA	LA991305	SCAB	0	RIDESHARE 2000/CLUB METRO- EXTEND AND EXPAND IMPLEMNT. INCNTIVE PRGM. TO ENCOURAGE USE OF ALT. MODES OF TRAVEL OTHER THAN DRIVING ALONE.	2005	2005	Project In Construction/Implementation Phase. (This project has been combined with LA0C8114 & 92733, and will not be listed under this ID # in subsequent reports.)
LOS ANGELES REDEVELOPMENT AGENCY	LA0C53	SCAB	0	HOLLYWOOD INTERMODAL TRANSPORTATION AND PUBLIC PARKING CENTER ON HAWTHORNE AVE. BETWEEN HIGHLAND AVENUE AND NORTH ORANGE DRIVE.	2004	2004	Project In Environmental Documents/Pre-design Phase
LOS ANGELES, CITY OF	LA002738	SCAB	0	BIKEWAY/PEDESTRIAN BRIDGE OVER LA R RIVER AT TAYLOR YARD CLASS I (CFP 738, 2077)	2002	2007	Project In Environmental Documents/Pre-design Phase. There were significant delays in the ROW Acquisition Phase. These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES, CITY OF	LA0B7002	SCAB	0	ATHENS/LENNOX/WILLOWBROOK/FLORENCE ET AL BUS SHELTER INSTALLATION-ENHANCE PASSENGER FACILITIES AT BUS STOPS, IMPROVE PASSENGER COVENIENCE	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA0B7024	SCAB	0	METRO RED LINE MELROSE SHUTTLE-ACQUISITION OF 2 LOW FLOOR, PROPANE-POWERED, 30-FOOT BUSES WILL BE USED IN THE OPERATION OF A NEW HIGH FREQUENCY SHUTTLE	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA0B7026	SCAB	0	METRO RED LINE/WEST HOLLYWOOD/BEVERLY CENTER/CEDER SINAI SHUTTLE-ACQUIRE 7 NEW 30-FOOT, PROPANE-FUELED, DASH STYLE BUSES FOR THE OPERATION OF A HIGH FREQUENCY SHUTTLE	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA0B7034	SCAB	0	SUN VALLEY INTERMODAL TRANSIT CENTER; PEDESTRIAN CROSSING/BUS STOP IMPROVEMENT-PROVIDE PED. CROSSINGS AT EACH END OF THE PLATFORM OF SOON TO BE BUILT SUN VALLEY METROLINK STATION	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA0B7274	SCAB	0	CITYWIDE ST PEDESTRIAN IMPROVEMENT-CONSISTS OF A SERIES OF STREETSCAPE ENHANCEMENTS WITHIN DOWNTOWN LA DESIGNED TO STRENGTHEN THE PEDESTRIAN LINKAGE BETWEEN DOWNTOWN DESTINATIONS.	2002	2004	**Project Completed**
LOS ANGELES, CITY OF	LA0B7276	SCAB	0	GRAND AVE RELIGNMENT AND PEDESTRIAN ENHANCEMENTS-REALIGNING GRAND AVE BETWEEN TEMPLE AVE AND FIRST ST WILL INCREASE PEDESTRIAN CAPACITY. SPECIFIC IMPROVEMENTS INCLUDE SIDEWALKS ETC	2003	2003	**Project completed**
LOS ANGELES, CITY OF	LA0B7278	SCAB	0	NORTHEAST COMMUNITY LINKAGES PHASE II-HIGHLIGHT PEDESTRIAN CONNCTNS W/RAIL & BUS LINES ALONG MARMION WAY AND AT PASADENA AVE, FIGUEROA ST, FRENCH AVE, AND AVE 45, 50, 60, 61.	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA0B7285	SCAB	0	ALISO VILLAGE PEDESTRIAN LINKAGE PROJECT-LINK THE NEW RECONSTRUCTED ALISO VILLAGE PUBLIC HOUSING DEVELOPMENT TO THE 2ND ST TRANSIT WAY & METRO RAIL STATION AT FIRST AND BOYLE ST.	2002	2004	**Project Completed**

LOS ANGELES, CITY OF	LA0B7290	SCAB	0	VERMONT SIDEWALK WIDENING/TRANSIT AVENIDA: EXPOSITION BLVD TO I-10-ENHANCE THE PEDESTRIAN ENVIRONMENT/INCREASE SAFETY ON VERMONT AVE	2003	2004	**Project Completed**
LOS ANGELES, CITY OF	LA0B7293	SCAB	0	SAN PEDRO PEDESTRIAN WAY-PROVIDE PEDESTRIAN ACCESS WAYS LINKING EXISTING TRANSIT FACILITIES AND PROPOSED PARKING STRUCTURE TO SURROUNDING & OTHER DESTINATIONS IN DOWNTOWN SAN PEDRO	2003	2004	**Project Completed**
LOS ANGELES, CITY OF	LA0B7330	SCAB	0	SAN FERNANDO ROAD ROW BIKE PATH PHASE II-CONSTRUCT 2.75 MILES CLASS I FROM FIRST ST TO BRANFORD ST, ON MTA-OWNED ROW PARALLEL TO SAN FERNANDO RD. LINK CYCLISTS TO NUMEROUS BUS LINE	2005	2005	Project In Construction/Implementation Phase
LOS ANGELES, CITY OF	LA0C8173	SCAB	0	NORTHRIDGE M ETROLINK STN PARKING IMPRVMENT. CONSTRCT ADDT'L 100 PRKING SPCS & RECONFIGURE SOUTHERN PRTION OF EXISTNG PRKNG LOT TO YIELD AN ADDT'L 40 NET PRKING SPCES TOTAL 400 SPC.	2007	2007	Project In Engineering (PS&E) Phase
LOS ANGELES, CITY OF	LA0C8174	SCAB	0	LITTLE TOKYO PEDESTRIAN LINKAGES. CONSTRUCTION OF IMPROVEMENTS: SIDEWALK AND CROSSWALK ENHANCEMENTS, STREET FURNITURE & LANDSCAPING TO PROMOTE PEDESTRIAN TRAVEL W/IN LITTLE TOKYO.	2004	2006	Project In Engineering (PS&E) Phase. The project was delayed due to changes in project administration. These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES, CITY OF	LA0C8209	SCAB	0	HOLLYWOOD MEDIA DISTRICT-PEDESTRIAN IMPROVEMENTS. INCLUDING SMART CROSSWALKS, TRAFFIC SIGNAL, LANDSCAPING ETC. BET. BUS STOPS ALONG SANTA MONICA BLVD, VINE ST AND HIGHLAND AVE.	2005	2005	Project In Bid/Advertise Phase
LOS ANGELES, CITY OF	LA0C8241	SCAB	0	PICO UNION/ECHO PARK DASH VEHICLE PROCUREMENT. PURCHASE (3) LOW-FLOOR, PROPANE-POWERED 30' BUSES FOR THE PICO/UNION ECHO PARK SHUTTLE SERVICE.	2004	2010	Project In Bid/Advertise Phase. There were significant delays in negotiating an MOU between MTA and the City of Los Angeles. These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES, CITY OF	LA0C8242	SCAB	0	BUS STOP IMPROVEMENTS ON SAN FERNANDO ROAD & TC LIGHTING; ENHANCE PASSENGER FACILITIES AT THREE BUS STOPS WITH GREATEST NUMBER OF DAILY BOARDINGSON EAST SIDE OF SAN FERNANDO ROAD.	2008	2008	Project in Construction/Implementation Phase.
LOS ANGELES, CITY OF	LA0C8303	SCAB	0	ANGELS FLIGHT RAILWAY PLAZA. ENHNCMENT OF SYSTM & DEVT OF LOWER PLAZA INCL KIOSKS, INCLDS INSTALLING, WAITING & SEATING AREAS, LIGHTING, CNNCTIONS BET HILL ST & ADJCENT RED LINE ST	2005	2005	Project In Engineering (PS&E) Phase
LOS ANGELES, CITY OF	LA0C8318	SCAB	0	LA CITY AND SURROUNDING COMMUNITIES BICYCLE MAP-PROJECT WILL UPDATE BIKEWAY MAPPING INFO. FOR THE CITY OF LA AND PLOT BYCYCLE LANE AND PATH INFORMATION ON A NEW MAP.	2004	2004	Project In Environmental Documents/Pre-design Phase
LOS ANGELES, CITY OF	LA0C8319	SCAB	0	TAXI/SHUTTLE STANDS AT METRO RED LINE STA AT N HLWD & UNIVERSAL. CITY AUTHORIZED TAXI STANDS AT TWO METRO RED LINE STATIONS (UNIVERSAL CITY ON LANKERSHIM AND N. HLWD ON CHANDLER.	2003	2004	Project In Construction/Implementation Phase

LOS ANGELES, CITY OF	LA0C8321	SCAB	0	LA CULTURAL TOURISM WEB PAGE DEVELOP & TRANSIT PROMOTION. ENCOURAGES THE USE OF MASS TRANSIT AT TARGETED TRIP GENERATION NODES AND FACILITATE MASS TRANSIT USE TO REG. DESTINATIONS.	2005	2005	Project In Construction/Implementation Phase
LOS ANGELES, CITY OF	LA0C8324	SCAB	0	BICYCLE PARKING AT FIVE GOLD LINE STATIONS-PROJECT WILL INSTALL BICYCLE PARKING AND LOCKERS AT FIVE OF THE SIX PASADENA BLUE LINE STATIONS LOCATED WITHIN THE CITY OF LA.	2003	2005	Project In Engineering (PS&E) Phase. **This project is programmed for PE only, and thus is not a TCM.** It will not be listed in subsequent Timely Implementation Reports.
LOS ANGELES, CITY OF	LA0C8329	SCAB	0	BICYCLE RACKS ON COMMUTER EXPRESS BUSES. ADDITION OF FRONT-LOADING BICYCLE RACKS TO A TOTAL OF 93 COMMUTER EXPRESS BUSES AND SPARES THAT SERVE THE CITY AND COUNTY OF LA.	2003	2004	Project In Construction/Implementation Phase
LOS ANGELES, CITY OF	LA0C8330	SCAB	0	BICYCLE COMMUTER TECHNOLOGY ACCESS, CITY'S WEB PAGE FOR BICYCLE PROGRAM	2006	2006	Project Underway
LOS ANGELES, CITY OF	LA0C8380	SCAB	0	CHINATOWN/COLLEGE STREET BLUE LINE STATION ENHANCEMENT-FEATURES CONSIST OF A PEDESTRIAN WALKWAY BRIDGE; A BUS STATION AND A BIKE STATION.	2004	2008	Project In Engineering (PS&E) Phase. There were disagreements on design parameters between involved agencies. Negotiations are ongoing, and once these are resolved, the project is expected to be expeditiously implemented.
LOS ANGELES, CITY OF	LA0C8385	SCAB	0	EL SERENO DASH PROCUREMENT. PURCHASE (2) LOW-FLOOR, PROPANE POWERED, 30' FOOT BUSES FOR THE EL SERENO DASH SERVICE.	2008	2008	Project In Bid/Advertise Phase.
LOS ANGELES, CITY OF	LA962071	SCAB	0	L.A. RIVER BIKE PATH OVER LOS FELIZ BLVD. CLASS I AND CLASS II [CALL # 2071, MOU P.0002-071 ON 6/30/99]	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA962129	SCAB	0	METROLINK ROW MITIGATION PEDESTRIAN & CROSSING IMPROVEMENTS	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA962148	SCAB	0	WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY (96 CALL, CAT 2) [CALL #2445]	2003	2007	Project In Contract Negotiation Phase. The project was delayed due to repeated changes in lead agencies. This issue has since been resolved, with MTA designated as the implementing agency. The project is now being expeditiously implemented.
LOS ANGELES, CITY OF	LA962445	SCAB	0	WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY	2002	2002	**Project Completed**
LOS ANGELES, CITY OF	LA974165	SCAB	0	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMODATE PUBLIC ACCESS (PEDESTRIAN ENTRABCES, WALKWAYS, BICYCLE FACILITIES)	2002	2007	Project In Contract Negotiation Phase. Project was delayed due to unanticipated environmental issues in the design phase. These issues have since been resolved and the project is now being expeditiously implemented.
LOS ANGELES, CITY OF	LA996000	SCAB	0	DASH PICO UNION/ ECHO PRK VEH ACQ PURCHASE ONE BUS TO RELIEVE OVERCROWDING	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996001	SCAB	0	DASH EL SERENO/CTY TERR VEH ACQ PURCHASE2 BUSES TO REDUCE OVERCROWDING	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996002	SCAB	0	DASH WILMINTON VEH ACQUISITION PURCHASE 2 BUSES TO RELIEVE OVERCROWDING	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996003	SCAB	0	DASH WATTS VEH ACQUISITION PURCH 2 VEH'S TO REDUCE EXISTING OVERCROWDING	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996004	SCAB	0	DASH KING-EAST VEH ACQUISITION FINANCE THE ACQ OF 5 BUSES TO REDUCE OVERCROWDING	2006	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996005	SCAB	0	DASH HLLYWOOD VEH ACQUISITION ACQUIRE TWO BUSES TO REDUCE EXISTING OVERCROWDING	2003	2003	**Project Completed**

LOS ANGELES, CITY OF	LA996006	SCAB	0	DASH VERMNT-MAIN VEH ACQUISITION PURCH 5 BUSESTO RELIEVE EXISTING OVERCROWDING	2006	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996007	SCAB	0	DASH MANCHSTR-FLORNCE VEH ACQ PURCH 5 BUSES TO RELIEVE EXISTING OVERCROWDING	2006	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996010	SCAB	0	COMM EXPRESS 448 VEH ACQUISITION PURCH 3 BUSES TO REDUCE EXISTING OVERCROWDING	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996011	SCAB	0	ROWAN SHUTTLE VEH ACQUISITION PURCH 2 BUSES TO REDUCE EXISTING OVERCROWDED CONDITIONS	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996099	SCAB	0	METROLINK SHUTTLE (CHATSWORTH)	2003	2003	**Project Completed**
LOS ANGELES, CITY OF	LA996106	SCAB	0	DOWNTOWN PRKING MGMT ORDINANCE PRKNG ORD. TO MANAGE PRKNG SUPPLY	2003	2004	**Project Completed**
LOS ANGELES, CITY OF	LA996241	SCAB	0	CHANDLER BIKEWAY EXTENSION-DESIGN & CONSTRUCT .5 MILE EXT, CYCLIST SHOWER AND LOCKER FACILITY AT HISTORIC TRAIN STATION ACROSS FROM CHANDLER BLVD. FROM THE METRO RED LINE STATION.	2004	2004	Proj ect In Engineering (PS&E) Phase
LOS ANGELES, CITY OF	LA996390	SCAB	0	SEPULVEDA BLVD. FROM CENTINELA AVE. TO LINCOLN BLVD - WIDEN SEPUL BLVD. BET. LINCOLN AND CENTINELA TO PROVIDE BUS/CARPOOL PRIORITY LANE.	2004	2005	Project In Environmental Documents/Pre-design Phase
LOS ANGELES, CITY OF	LA996439	SCAB	0	BICYCLE RACK AND PARKING PHASE II INSTALL ESTIMATED 833 INVERTED BIKE RACKS,	2002	2004	**Project Completed**
LOS ANGELES, CITY OF	R627TA	SCAB	0	METRO RAIL RED LINE AT WESTLAKE COMMUNITY INTERMODAL INTERCEPT FACILITY - DESIGN 1,100 SPACE PARKING STRUCTURE CROSSSTREETS ARE ALVARADO/MACARTHUR	2002	2002	**Project Completed**
MANHATTAN BEACH	LAOB418	SCAB	1	IN MANHATTAN BEACH - MARINE AVENUE BETWEEN SEPULVEDA BLVD (STATE ROUTE 1) AND VALLEY/ARDOMOR PEDESTRIAN AND AESTHETIC IMPROVEMENTS. (EA# 220201, PPNO #2841). STATE TEA.	2003	2003	**Project Completed**
MONROVIA	LA0C8250	SCAB	0	MONROVIA RAILROAD DEPOT MULTI-MODAL TRANSIT CENTER; STABILIZING STRUCTURE AND THEN OVERALL STRUCTURAL ELEMENTS WILL BE REPAIRED FOLLOWED BY RESTORING KEY ARCHITECTURAL FEATURES.	2005	2005	Project In Environmental Documents/Pre-design Phase
MONTEBELLO	LA000504	SCAB	0	PURCHASE AND INSTALLATION OF ON BOARD BIKE RACKS.	2003	2003	**Project Completed**
MONTEBELLO	LA0D28	SCAB	0	PURCHASE OF (1) EXPANSION BUS. ONE HYBRID (DIESEL-ELECTRIC) LOW FLOOR 40' COACH FOR INSERVICE TESTING.	2005	2005	Project In Bid/Advertise Phase
MONTEBELLO	LA55012	SCAB	0	REPLACE BUSES- 2000 (5) 40' BUSES AND (10) 40' EXPANSION BUSES	2003	2003	**Project Completed**
MONTEBELLO	LA55201	SCAB	0	CONTINUING PROJECT - BUS STOP IMPROVEMENTS ,AMENITIES ,SHELTERS ,ETC	2010	2010	Project In Construction/Implementation Phase
MONTEREY PARK	LA0D189	SCAB	0	PARAMOUNT BLVD AND GREENWOOD AVE IMPROVEMENT: PROVIDE ADDTIONAL TURNING LANES AT SR 60 ON/OFF RAMP AT PARAMOUNT BLVD INTERSECTION, FREEWAY ACCESS IMPROVEMENT	2006	2006	Project In Engineering (PS&E) Phase
MONTEREY PARK	LA0D190	SCAB	0	NORTH ATLANTIC BLVD WIDEN AND CHANNELIZATION BTWN NEWMARK AVE HILLMAN AVE WIDEN TO SIX LANES OF OPERATION TO INCLUDE ACCELERATION & DECELARATION LANE OPRTN MDIFCTION	2006	2006	Project In Engineering (PS&E) Phase

NORWALK	LA01B103	SCAB	0	PURCHASE 4 - 40' LOW FLOOR BUSES	2003	2003	**Project completed**
NORWALK	LA0B0841	SCAB	0	PURCHASE TWO (2) 40-FT GILLIG + SHORTFALL	2003	2004	**Project Completed**
NORWALK	LA0C71	SCAB	0	PURCHASE OF (4) FOUR ALTERNATIVELY FUELED EXPANSION BUSES.	2004	2004	**Project Completed**
NORWALK	LA0D01	SCAB	0	NORWALK ON BEHALF OF SANTA FE SPRINGS - ALTERNATIVE FUEL VEHICLES AND TRANSIT RELATED FACILITIES.	2004	2004	Project In Construction/Implementation Phase
NORWALK	LA0D02	SCAB	0	PURCHASE (2) EXPANSION PARATRANSIT VEHICLES	2003	2003	Project in Environmental Doucment/Pre-design Phase
NORWALK	LA0D04	SCAB	0	NORWALK/SANTA FE SPRINGS TRANSPORTATION CENTER EXPANSION - PARKING & RELATED IMPROVEMENTS	2004	2004	Contract Award Phase. Anticipated completion March 2005.
NORWALK	LA973500	SCAB	0	BUS STOP AMENITIES AT VARIOUS BUS STOP LOCATIONS	2003	2005	Multi-component Project; Partially Complete, Partially Ongoing. There were changes in the Scope of Work, resulting in a change in architects for the projects. These issues have since been resolved and the project is now being expeditiously implemented.
NORWALK	LA990302	SCAB	0	PROCUREMENT OF (2) PARATRANSIT VEHICLES	2003	2003	**Project completed**
PALOS VERDES ESTATES	LA0C8226	SCAB	0	PV TRANSIT CAPITAL IMPROVEMENT PROGRAM II. PURCHASE 3 EXPANSION CLEAN-FUEL VEHICLES.	2005	2005	First Vehicle Delivered
PASADENA	LA0B215	SCAB	0	PURCHASE OF (5) 30-FOOT ALTERNATIVE FUEL EXTENSION VEHICLES (GTIP)	2003	2003	**Project Completed**
PASADENA	LA0B7270	SCAB	0	BLUE LINE PEDESTRIAN ENHANCEMENTS-IMPROVE PEDESTRIAN ACCESS TO PLANNED BLUE LINE STATIONS IN THE CITY OF PASADENA, LOCATED ALONG THE PASADENA BLUE LINE ALIGNMENT	2003	2004	Project In Construction/Implementation Phase
PASADENA	LA0D47	SCAB	0	SR 710 MITIGATION PROJECT-TRAFFIC CONTROL AND MONITORING SYSTEM-INTELLIGENT TRANSPORTATION SYSTEMS (ITS). CONSTRUCT AND INSTALL ITS TECHNOLOGY AND VARIOUS DEGREES OF SMART SIGNALS	2008	2008	Project In Engineering (PS&E) Phase
PASADENA	LA0D48	SCAB	0	SR 710 MITIGATION PROJECT-110 FWY TO 210 FWY CONNECTOR.MARENGO INTERCHANGE EMPHASIS. THIS PROJECT INCLUDES THE INSTALLATION OF DIRECTIONAL SIGNS, CHANGEABLE MESSAGE SIGNS	2006	2006	Project In Engineering (PS&E) Phase
PASADENA	LA0D99	SCAB	0	PURCHASE 2 EXPANSION LOW-FLOOR, HANDICAPPED ACCESSIBLE, ALTERNATIVE FUEL TRANSIT BUSES.	2004	2004	Contract Award Phase
PASADENA	LA974129	SCAB	0	PASADENA GOLD LINE COMMUNITY LINKAGES PEDESTRIAN IMPROVEMENTS TO TWO PLANNED METRO PASADENA GOLD LINE STATIONS WITHIN THE CITY	2003	2006	Project In Engineering (PS&E) Phase. The project intersects a historic park, and Caltrans had requested significant additional environmental documentation. These issues have since been resolved and the project is now being expeditiously implemented.
REDONDO BEACH	LA0C8072	SCAB	1	PCH TRAFFIC AND INTERSECTION IMPROVEMENT, FROM HERONDO ST TO CATALINA AVE. (PPNO 3126)	2005	2005	Project In Engineering (PS&E) Phase
SAN GABRIEL VALLEY COG	LA974367	SCAB	0	ALAMEDA CORRIDOR EAST - GATEWAY TO AMERICA; RAIL ROAD OVERCROSS SAFETY REALIGNMENT ALONG SO. PACIFIC & UNION PACIFIC RR (SGVCOG)	2006	2004	**Project Completed**

SAN GABRIEL VALLEY COG	LA974423	SCAB	0	ALAMEDA CORRIDOR EAST - GATEWAY TO AMERICA (SGVCOG) IMPLEMENTATION OF TRAFFIC CONTROL MEASURES TO MODIFY OPERATION OF TRAFFIC SIGNALS AT GRADE CROSSINGS (TEA21-#198)	2003	2004	**Project Completed**
SAN GABRIEL VALLEY COG	LA990354	SCAB	0	ALAMEDA CORRIDOR EAST (SGCG) (T21-1017) RAILROAD CROSSING IMPROVEMENT	2006	2004	**Project Completed**
SAN GABRIEL VALLEY COG	LA990355	SCAB	0	ALMEDA CORRIDOR EAST - SYNCHRONIZE & TRAFFIC LIGHTS UPGRADE (T21-1138)	2006	2004	**Project Completed**
SAN GABRIEL VALLEY COG	LA990359	SCAB	0	ALAMEDA CORRIDOR-EAST GRADE SEP (T21-1533)	2003	2009	Project In Engineering (PS&E) Phase. Project was delayed due to unanticipated administrative changes in implementation design. These issues are now being resolved and the project is expected to be expeditiously implemented.
SANTA CLARITA	LA0B7020	SCAB	0	ADDITIONAL (150) PARKING AT NEWHALL METROLINK STATION-CONSTRUCT ADEQUATE PARKING AT THE NEWHALL METROLINK STATION, INCLUDE PARK & RIDE, KISS & RIDE AND DISABLED-ACCESS SPACES	2003	2005	Project in Construction/Implementation Phase. There were unanticipated difficulties with tenant relocation and land procurement. These issues have since been resolved and the project is now being expeditiously implemented.
SANTA CLARITA	LA0C09	SCAB	0	TRANSIT CENTER PASSENGER AMENITIES	2003	2003	**Project Completed**
SANTA CLARITA	LA0C8130	SCAB	0	INCIDENT MANAGEMENT - TRAVELER INFORMATION SUBSYSTEM; INSTALLATION CONSISTS OF 4 STATIONARY ELECTRONIC CHANGEABLE MESSAGE SIGNS & A HIGHWAY ADVISORY RADIO SYSTEM.	2006	2006	Project In Engineering (PS&E) Phase
SANTA CLARITA	LA0C8156	SCAB	0	SANTA CLARITA REGIONAL COMMUTER TRAIL - I-5 TO FAIRWAYS DRIVE; CONSTRUCTION AND SOME ACQUISITION OF 1.0 MILES OF CLASS I BIKE PATH AND A BRIDGE RESTORATION ADJACENT TO SANTA CLARA.	2006	2006	Project In Engineering (PS&E) Phase
SANTA CLARITA	LA0C8371	SCAB	0	SANTA CLARITA TRANSIT EXPANSION BUSES; WILL ALLOW PHASE 1 OF 5 YEAR MASTER PLAN TO BE IMPLEMENTED WITH SEVEN LOCAL BUSES AND FOUR COMMUTER BUSES.	2008	2008	First Vehicle Delivered
SANTA CLARITA	LA973024	SCAB	0	IMPROVE PEDESTRIAN ACCESS TO TRNSIT STOPS, INSTALLING CROSSWALKS, SIDE- WALKS, AND PEDESTRIAN-ACTUATED TRAFFIC SIGNALS.@ 17 TRANSIT STOPS VARIOUS LOCATIONS, PROJECT EXEMPT	2003	2003	**Project Completed**
SANTA FE SPRINGS	LA0C56	SCAB	0	ACE/GATEWAY CITIES-CONSTRUCT GRADE SEPARATION AT VALLEY VIEW AVENUE IN SANTA FE SPRINGS (PART OF ALAMEDA CORRIDOR EAST PROJECT)	2007	2006	Project In Contract Negotiation Phase. The project was delayed due to programming error that designated the wrong implementing agency. These issues are now being resolved and the project is expected to be expeditiously implemented.
SANTA MONICA	LA030001	SCAB	0	CALIFORNIA INCLINE SIDEHILL VIADUCT BR 53C0543 ADD, INCLUDED INSTATE IN STATE HBRR PROGRAM (0.3 MILE, 1-S, 1-N) SIDEWALK/BIKEWAY WIDENING & SEISMIC	2006	2006	Project In Environmental Documents/Pre-design Phase
SANTA MONICA	LA0B7267	SCAB	0	CROSSWAY ENHANCEMENTS ALONG TRANSIT CORRIDOR-ENHANCEMENTS DESIGNED TO IMPROVE PEDESTRIAN ACCESS TO EXISTING AND PLANNED TRANSIT FACILITIES ALONG SANTA	2002	2004	**Project Completed**
SANTA MONICA	LA57101	SCAB	0	BUS FACILITY IMPROVEMENTS	2005	2005	Contract Award Phase
SANTA MONICA	LA57108	SCAB	0	BUS STOP AMENITIES	2003	2003	**Project Completed**

SANTA MONICA	LA960192	SCAB	0	THROUGHOUT THE CITY OF SANTA MONICA VARIOUS BIKE RACKS AND LOCKERS	2002	2002	**Project Completed**
SANTA MONICA	LA990726	SCAB	0	BIKE RACKS (CFP/6089)	2003	2004	**Project Completed**
SCAG	LA996082	SCAB	0	WEB ACCESS VANPOOL INFO SYS DEV & IMPLMENT DATABSE FOR VANPOOLS, VACANCIES	NA	NA	**Ongoing Project**
SCAG	LA996083	SCAB	0	COMMUTER CHANNEL NON-MONETARY SUBSCRIPTION SRVCE	NA	NA	**Ongoing Project**
SCRAA/LACMTA/ SANBAG	LA0B7107	SCAB	0	CHATSWORTH INTERMODAL PARK AND RIDE-INCLUDE DESIGN AND CONS. OF ADDITIONAL 150 SPACES- CONSTRUCTION WILL INCL GRADING, ASPHALT PAVING, INSTALLATION OF CONCRETE BUMPERS ETC (PE ONLY)	2003	2004	**Project Completed**
SCRRA/LACMTA/ SANBAG	LA29204	SCAB	0	LA-SAN BERNARDINO CR (SF UNION STATION-SAN BERNARDINO) CAPACITY IMPROVEMENTS (DEMO TEA21) (JARC $991).	2003	2006	Project In Engineering (PS&E) Phase. Project was delayed due to unanticipated administrative changes in implementation design. These issues are now being resolved and the project is expected to be expeditiously implemented.
SIERRA MADRE	LA0C8372	SCAB	0	EXPANSION OF SIERRA MADRE BUS ROUTE. PURCHASE OF 3 CNG VANS TO EXPAND SIERRA MADRE ROUNDABOUT SYSTEM.	2007	2007	First Vehicle Delivered
SOUTH PASADENA	LA0B7271	SCAB	0	BLUE LINE PEDESTRIAN LINKAGE AND SAFETY IMPROVEMENTS-INCLUDE SIGNAGE, UPGRADES CROSSWALKS, PEDESTRIAN LIGHTING, ENHANCED SIDEWALK AROUND THE STATION IN THE AREA MISSION ST STATION	2003	2003	**Project Completed**
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	LA0B7009	VAR	0	ANTELOPE VALLEY LINE IMPROVEMENTS- INCREASE CAPACITY AND REDUCE TRAVEL TIME ON THIS COMMUTER RAIL AND FREIGHT SERVICE LINE BETWEEN LANCASTER AND LOS ANGELES	2003	2005	Project In Construction/Implementation Phase
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	LA963758	SCAB	0	PURCHASE METROLINK CARS & LOCOMOTIVES	2005	2008	Project In Bid/Advertise Phase. The project was delayed due to FTA request for a change in procurement procedures. These issues have since been resolved and the project is now being expeditiously implemented.
VARIOUS AGENCIES	LA0B853	SCAB	0	WORK TRAINING PROGRAMS, INC. VEHICLE EXPANSION - TWO 5 PASSENGER VEHICLES.	2003	2003	**Project Completed**
VARIOUS AGENCIES	LA0B854	SCAB	0	WHITTIER TRANSIT. EXPANSION VEHICLE - ONE 17 PASSENGER MEDIUM BUS.	2003	2003	**Project Completed**
VARIOUS AGENCIES	LA0B860	SCAB	0	KOREAN HEALTH EDUCATION INFORMATION AND RESEARCH CENTER. EXPANSION VEHICLES - THREE 10 PASSENGER SMALL BUSES.	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA0B863	SCAB	0	VILLA ESPERANZA. EXPANSION VEHICLE - ONE 17 PASSENGER MEDIUM BUS.	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA0C23	SCAB	0	HEALTHVIEW - EXPANSION VEHICLE - (1) 17-PASSENGER MEDIUM BUS	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA0C25	SCAB	0	KOREAN HEALTH EDUCATION INFORMATION (KHEIR) - EXPANSION VEHICLES - (3) 10-PASSENGER SMALL BUSES.	2003	2004	**Project Completed**

VARIOUS AGENCIES	LA0C30	SCAB	0	ULTRALIFE ADULT DAY HEALTH CARE- EXPANSION VEHICLE - (1) 10-PASSENGER SMALL BUS.	2003	2003	**Project Completed**
VARIOUS AGENCIES	LA0C31	SCAB	0	ULTRALIFE ADULT DAY HEALTH CARE - EXPANSION VEHICLES - (2) 5-PASSENGER MINIVANS.	2003	2003	**Project Completed**
VARIOUS AGENCIES	LA0C33	SCAB	0	WHITE MEMORIAL MEDICAL CENTER - EXPANSION VEHICLES - (5) 10-PASSENGER SMALL BUSES.	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA0C34	SCAB	0	WHITE MEMORIAL MEDICAL CENTER - EXPANSION VEHICLE - (1) 5-PASSENGER MINIVAN.	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA0C35	SCAB	0	WHITE MEMORIAL MEDICAL CENTER - EXPANSION VEHICLE - (1) 17-PASSENGER MEDIUM BUS.	2003	2004	**Project Completed**
VARIOUS AGENCIES	LA973039	SCAB	0	ACCESS SERVICES INC. FLEET EXPANSION VEHICLES 46 MINI -- VANS	2002	2002	**Project Completed**
VARIOUS AGENCIES	LA990744	SCAB	0	KOREAN HEALTH, EDUCATION, INFO & RESEARCH CENTER (KHEIR)- EXPANSION THREE (3) 17-PASSENGER SMALL BUSES.	2003	2003	**Project Completed**
WESTLAKE VILLAGE	LA960142	SCAB	0	LINDERO CANYON ROAD FROM AGOURA RD TO JANLOR DR CONSTRUCT BIKE PATH, RESTRIPE STREET, INTERSECTION WIDENING, SIGNAL COORDINATION, RAMP WIDENING (TEA21-#65)	2003	2005	Project In Engineering (PS&E) Phase. The project was delayed due to unexpected difficulties in permitting and certification with Caltrans and the LA County Flood Control District. These issues have since been resolved and the project is now being expeditiously implemented.
WHITTIER	LA0B7322	SCAB	0	WHITTIER GREENWAY TRAIL-ACQUISITION, DESIGN, AND CONSTRUCT OF 2 MILES CLASS I BIKE/PED PATH ON AN ABANDONED RAIL ROW FROM NORWALK TO FIVE POINTS	2004	2004	Project In Engineering (PS&E) Phase
WHITTIER	LA0C8161	SCAB	0	WHITTIER GREENWAY TRAIL: SEGMENT 1 DEVT& SEGMENT 3 P/E AND DEVT. DESIGN, CONSTRCT & SOME ACQUISITION OF 2.86 MLES CLASS I BIKE/PED FACILITIES ON ABANDONED R.O.W IN WHITTIER	2008	2008	Project In Engineering (PS&E) Phase

Orange County

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	2004 RTP PROJECT COMPLETION DATE	2004 RTIP PROJECT COMPLETION DATE	Project Status
ANAHEIM	ORA000100	SCAB	5	GENE AUTRY WAY WEST@ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5 (S)/MANCHESTER AND EXTEND GENE AUTRY WAY WEST FROM I-5 TO HARBOR.	2004	2004	Project In Design Phase - ROW To Begin Jan-04
ANAHEIM	ORA010202	SCAB	0	PURCHASE (10) 22 FOOT ELECTRIC BUSES FOR ANAHEIM RESORT AREA AND MISC. SUPPORT EQUIPMENT.	2003	2003	**Project Completed**
BUENA PARK	ORA55286	SCAB	0	COMMUTER RAIL STATION (DALE STREET AND MALVERN) IN BUENA PARK. CONSTRUCT NEW RAIL STATION. 308 PARKING SPACES.	2006	2006	Project In Design Phase; Construction To Begin March-04
CALTRANS	10167	SCAB	5	I-5 FROM SR-91 TO LA COUNTY LINE IN BUENA PARK - ADD 1 MIXED FLOW LN AND 1 HOV LN IN EACH DIRECTION. FROM 6 - 0 TO 8 - 2 LANES.	2008	2008	Project In Bid/Advertise Phase. Construction Will Start Aug-04; Estimated Completion Date Is Dec-08
CALTRANS	1332	SCAB	55	(RTE SR-2 2 TO RTE SR-91) IN CITY OF ORANGE_WIDEN EXIST 8-LN FWY INCL. 2 STND HOV LNS ADD 2 MIXED FLOW LANES AND_AUX LNS; OC @ LAVETA, MEATS & KATELLA (98 STIP PROJECT)	2002	2003	**Project Completed**
CALTRANS	5242	SCAB	605	I-405 TO LA CO LINE -- ADD ONE HOV LANE IN EACH DIRECTION. THIS PROJECT WILL COMPLETE THE I-605 INTERCOUNTY GAP IN THE HOV SYSTEM IN SO. CALIF. (ITIP PROJECT)	2002	2005	Project In Construction Phase. The project was delayed due to design issues. These issues have since been resolved and the project is now being expeditiously implemented.
CALTRANS	6951	SCAB	405	405/55 INTERCHANGE SOUTH TRANSITWAY MOS1_EXISTING 4 MIXED 1 HOV_ON SR55 AND I-405 EXIST IS 5 MF AND 1 HOV ADD HOV DIRECT TRANSITWAY FROM SR55 TO I-405	2002	2005	Project In Construction Phase. The project was delayed due to design issues. These issues have since been resolved and the project is now being expeditiously implemented.
CALTRANS	ORA000195	SCAB	22	ON SR-22 (I-405 TO SR55) ADD 2 HOV LANES/1 EA DIR (FRM 0 - 2); & 2 AUX LANES/1 EA DIR (FRM 0- 2) (I-5 TO BEACH) & OPERATING IMPROVMENTS	2007	2007	Project In Design And Construction (Design - Build)
CALTRANS	ORA55073	SCAB	73	BIRCH TO I-405 WIDENING; ADD (1) MIXED FLOW LANE IN NB DIR; NB AUX LANE; SOUNDWALLS; AND (1) HOV LANE (2010) IN EACH DIR. NEAR SR55 INTERCHANGE (98 STIP)	2005	2005	Project In Construction
FULLERTON	ORA020113	SCAB	0	FULLERTON TRAIN STATION - PARKING STRUCTURE, PHASE I AND II. TOTAL OF 670 SPACES.	2004	2004	Project In Design Phase. The project was delayed due to changes in project configuration. These issues are now being resolved and the project is expected to be expeditiously implemented.
GARDEN GROVE	ORA981104	SCAB	22	RECONSTRUCT HARBOR BLVD INTERCHANGE. 4 LANES EACH DIRECTION. (1/4 MILE BEFORE AND AFTER SR-22 RAMPS) 2 HOV LNES(1 E/B & 1 W/B) AND PROPOSED SR-22 HOV LANES.	2007	2004	Eng Complete; ROW/Construction To Commence FY03/04 (Design Build)
MISSION VIEJO	ORA990902	SCAB	0	MISSION VIEJO (CITYWIDE) REMOTE TMC AND TRAVLER/PUBLIC INFO ACCESS CENTER. PROVIDES TRAFFIC INFO TO PUBLIC LIBRARIES. EST COMM INTERTIE BETWEEN CITY AND CALTRANS	2003	2004	Project In Contract Award Phase

ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000104	SCAB	0	TRANSITWAY IMPROVEMENTS AT IRVINE TRANSPORTATION CENTER; BUILD 900 SPACE PARKING STRUCTURE, INCLUDING ENVIRONMENTAL, DESIGN AND CONSTRUCTION.	2004	2005	Project In Construction Phase
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020105	SCAB	0	HYBRID ELECTRIC URBAN 40 FT BUSES (10) EXPANSION	2004	2004	Prototype buses being tested for technology performance
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA194	SCAB	0	CENTRAL ORANGE COUNTY FIXED GUIDEWY (CENTERLINE) FOR CONSTRUCTION FROM JOHN WAYNE AIRPORT TO SANTA ANA TRANSPORTATION CENTER PLUS LINK TO SANTA ANA COLLEGE	2010	2010	Project In Design Phase. This project has been modified (see discussion on page 5, above), and now has three components, which will be reported as three projects in subsequent reporting—ORA194, ORA 194B, and ORA194C. The completion date for the replacement projects remains the same.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	SCAB	0	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING. (ORANGE COUNTY PORTION).	N/A	N/A	Ongoing Project
ORANGE COUNTY TRANSIT DISTRICT (OCTD)	ORA020119	SCAB	0	PURCHASE PARATRANSIT VEHICLES EXPAN (142) - (66) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (13) IN FY07/08, (14) IN FY08/09, (14) IN FY09/10	2007	2010	Acquisition is ongoing. The change in project completion date is due to the fact that the project was substantially expanded from 30 Paratransit vehicles to 142 Paratransit vehicles, and so extended through FY09/10. The project is being expeditiously implemented.
ORANGE COUNTY TRANSIT DISTRICT (OCTD)	ORA55241	SCAB	0	PURCHASE (79) STANDARD 40 FT EXPAN ALT FUEL BUSSES - (28) IN FY04/05, (21) IN FY05/06, (14) IN FY06/07, (9) IN FY08/09, (7) IN FY09/10	2009	2010	Project is ongoing. The project was substantially expanded from 17 alternative fuel vehicles to 79 alternative fuel vehicles, and extended through FY 09/10. The project is being expeditiously implemented.
ORANGE, CITY OF	ORA990443	SCAB	22	SR-22 AND CITY DRIVE INTERCHANGE IMPROVEMENTS. RECONFIGURE FREEWAY INTERCHANGE AT SR-22 FROM SR-57 TO LEWIS STREET -- FROM 6/0 TO 6/2 LANES (ADDING 2 HOV LANES)	2007	2004	Project In Engineering Phase; ROW/Construction To Begin FY03/04 (DESIGN BUILD)
ORANGE, CITY OF	ORA990452	SCAB	0	TUSTIN BRANCH RAIL TRAIL (SANTA ANA RIVER TO FAIRHAVEN ST) CONVERT RAILS TO BIKE TRAIL THROUGH VILLA PARK AND ORANGE. CONNECTS 9 MILE TRAIL.	2003	2005	Project In Engineering and ROW Phase - Construction delayed by difficulties with site access for environmental soil sampling on railroad portion of project site. The City is in discussions with Caltrans to resolve the issue, and the project is expected to be expeditiously implemented.
TCA	10254	SCAB	73	SJHC, 15 MI TOLL RD BETWEEN I-5 IN SAN JUAN CAPISTRANO & RTE 73 IN IRVINE, EXISTING 3/M/F EA.DIR.1 ADD'L M/F EA DIR, PLUS CLIMBING & AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/5/01	2015	2015	Project In Environmental Documentation/Pre-design Phase
TCA	ORA050	SCAB	241	ETC (RTE 241/261/133) TOLL RD (RTE 91TO I-5/JAMBOREE) EXISTING 2 M/F EA.DIR, 2 ADD'L M/F IN EA. DIR, PLUS CLIMB AND AUX LNS AS REQ, BY 2015 PER SCAG/TCA MOU 4/05/01.	2015	2015	Project In Environmental Documentation/Pre-design Phase
TCA	ORA051	SCAB	241	(FTC-N) TOLL RD (OSO PKWY TO ETC) (13MI) EXISTING 2 MF IN EA. DIR; 2 add'l MF EA. DIR BY 2015, PLS CLMBNG & AUX LANS PER SCAG/TCA MOU 4/05/01.	2015	2015	Project In Environmental Documentation/Pre-design Phase

TCA	ORA052	SCAB	241	(FTC-S) TOLL RD (I-5 TO OSO PKWY) (15MI) 2 MF EA. DIR BY 2006; AND 2 ADDITIONAL M/F EA. DIR. PLS CLMBNG & AUX LANES AS REQ BY 2015 PER SCAG/TCA MOU 4/05/01.	2006/2015	2015	Project Engineering (PS&E) Phase
VARIOUS AGENCIES	ORA030301	SCAB	0	(1) EXPANSION MINIVAN - A.S. FOUNDATION - PROVIDE SERVICES TO SENIORS AND DISABLED PERSONS.	2004	2004	Agency progressing with projects based on CT guidelines.
VARIOUS AGENCIES	ORA030302	SCAB	0	(9) EXPANSION MEDIUM BUSES (TYPE II) AND (11) MOBILE RADIOS - ORANGE COUNTY ARC - PROVIDE SERVICES TO SENIORS AND DISABLED PERSONS.	2004	2004	Agency progressing with projects based on CT guidelines
VARIOUS AGENCIES	ORA990906	SCAB	0	LUMP SUM. TEA FUNDS FOR BICYCLE AND PEDESTRIAN FACILITY PROJECTS THROUGHOUT ORANGE COUNTY.	2009	2009	Multipart project – some components underway
YORBA LINDA	ORA981103	SCAB	0	IN YORBA LINDA, CONSTRUCT COMMUTER RAIL STATION AND PARK AND RIDE (347 SPACES) NEAR ESPERANZA RD AND NEW RIVER ST	2005	2009	Project In Environmental Document/Pre-design Phase. Project was delayed due to unanticipated administrative changes in implementation design. These issues have since been resolved and the project is now being expeditiously implemented.

Riverside County

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	2004 RTP PROJECT COMPLETION DATE	2004 RTIP PROJECT COMPLETION DATE	Project Status
CALTRANS	0121D	SCAB	215	ON I-215/SR91/SR60, RIV I215 COR IMPROV PROJ - FROM 60/91/215 JCT TO 60/215 SPLIT - WIDEN 6 TO 8 LNS, INCLUDING MAINLINE/IC IMPROVS, ADD HOV, AUX, & SB TRUCK CLIMB LN (EA: 3348U1)	2006	2007	Project in Construction/Implementation Phase
CALTRANS	354801	SCAB	60	JCT RTE 15 TO VALLEY WAY - ADD 1 HOV LN AND 1 M/ F LN IN EA. DIR. INCLUDING OPERATIONAL STRIPING (IN SBD CNTY 9.05 - 9.95 & AT THE EAST END) ALSO WIDEN 5 UC'S & 1 OH	2006	2008	Project ready to list; will be obligated in August 2004.
CORONA	RIV010227	SCAB	0	CORONA ADVANCED TRAFFIC MANAGEMENT SYSTEM (ATMS)	2005	2005	Pending obligation, on schedule
CORONA	RIV010511	SCAB	0	CITY OF CORONA -- PURCHASE 3 EXPANSION VEHICLES -- RED LINE FIXED ROUTE	2003	2006	Project in design evaluation phase. Changes in projected ridership levels required a redesign of the project implementation. These issues are now being resolved and the project is expected to be expeditiously implemented.
CORONA	RIV030602	SCAB	0	IN THE CITY OF CORONA - PURCHASE/INSTALL MOBILE DATA TERMINAL (MDT) & AUTOMATIC VEHICLE LOCATOR (AVL) IN 14 TRANSIT VEHICLES & INTEGRATE W/ DISPATCHING SOFTWARE (FY 04 5307)	2005	2005	Under construction; Expected completion 12/31/04
HEMET	RIV990708	SCAB	0	CONSTRUCT TRANSPORTATION/ TRANSIT CENTER/PARK-N-RIDE LOT ON CORNER OF HARVARD AND LATHAM AVE, APP 100 SPACES	2003	2004	Acquiring right of way, construction to begin Sept 04.
PERRIS	RIV990709	SCAB	0	IN THE CITY OF PERRIS - RECONSTRUCT INTERSECTION AT 4TH ST AND REDLANDS AVE INCLUDING ROUND ABOUT, MINOR LANDSCAPING AND MINOR R/W ACQUISITION	2004	2004	Pending obligation, on schedule
RIVERSIDE CITY	RIV0084	SCAB	91	AT VAN BUREN ST IC RECONSTRUCT RAMPS (INCLDS HOV RAMPS), WIDEN OC ON VAN BUREN FROM 4 TO 6 LN & ADD AUX LANES; ADD NEW EB ONRAMP W/ENTRANCE @ INDIANA	2007	2005	In final design (PS&E) stage.
RIVERSIDE CITY	RIV020605	SCAB	0	IN WESTERN RIVERSIDE COUNTY FOR THE CITY OF RIVERSIDE SPECIAL SERVICES - PURCHASE 2 EXPANSION 25' TWELVE PASSENGER DIAL-A-RIDE VEHICLES	2004	2004	Sec 5307 funds scheduled for release on 6-01-04.
RIVERSIDE CITY	RIV030606	SCAB	0	CITY OF RIVERSIDE SPECIAL SERVICES - PURCHASE 1 EXPANSION 20 PASSENGER ALT-FUEL DIAL-A-RIDE VEHICLE WITH LIFT, TIEDOWNS, RADIO, AND FAREBOX (FY 04 5307)	2005	2005	Sec 5307 funds scheduled for release on 6-01-04.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	0006S	SCAB	0	METROLINK - SAN BERNARDINO SUBDIVISION TIER II NEW STATIONS AT MAIN ST IN CORONA	2003	2003	**Project completed**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	46360	SCAB	60	IN RIVERSIDE AND MORENO VALLEY ON SR60 FROM RT 215 TO REDLANDS BLVD ADD 2 HOV LANES	2005	2006	Project in Construction/Implementation Phase.

RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV010908	SCAB	0	IN WESTERN RIVERSIDE COUNTY FOR EXCEED, A DIVISION OF VALLEY RESOURCE CENTER - PURCHASE 6 EXPANSION MINIVANS AND 6 RADIOS - SECTION 5310 FY 2001/02 CYCLE	2003	2004	**Project completed**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV011243	SCAB	0	METROLINK-SAN BERNARDINO SUBDIVISION TIER 11 CONSTRUCT NEW STATION AT 3360 VAN BUREN BLVD IN RIVERSIDE (PARKING 550 SPACES)	2003	2003	**Project completed.** The project was rescoped to substantially expand parking facilities at two adjacent Metrolink stations--the La Sierra Metrolink station (1,025 new parking spaces), and the Riverside Metrolink station (125 new parking spaces), creating 625 new parking spaces over and above those originally proposed at the Van Buren station--in response to a reevaluation of the operational implications of locating a new station only two miles from the existing La Sierra station, and due to substantial increases in ridership demand observed at the La Sierra and Riverside stations on the Metrolink system.
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV020902	SCAB	0	IN WEST RIV CO FOR EXCEED, A DIVISION OF VALLEY RESOURCE CENTER - PURCHASE 1 EXPANSION 20' MODIFIED VAN, 1 EXPANSION 22' MEDIUM BUS, AND 2 RADIOS - SECTION 5310 FY 02/03 CYCLE	2004	2004	Vehicles on order, awaiting delivery by 12/30/04
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV52008	SCAB	0	IN RIVERSIDE COUNTY CONSTRUCT PASSENGER OVERCROSSINGS AND SECURITY ENHANCEMENTS @ WEST CORONA, LA SIERRA, AND PEDLEY METROLINK/ PARK-N-RIDE STATIONS	2003	2003	**Project completed**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	SCAB	0	REGIONAL RIDESHARE	N/A	N/A	**Ongoing program for implementation of rideshare activities.**
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV62044	SCAB	0	PEDLEY PLATFORM EXTENSION	2002	2003	**Project completed**
RIVERSIDE TRANSIT AGENCY	RIV000605	SCAB	0	DEBT FINANCING FOR 57 TRANSIT COACHES, 25 REPLACEMENT, 32 EXPANSION (FY 02/03 PORTION) (FY 03 5307)	2004	2003	**Project completed**
RIVERSIDE TRANSIT AGENCY	RIV020601	SCAB	0	IN WESTERN RIVERSIDE COUNTY PURCHASE TEN 30' EXPANSION ALT FUEL BUSES IN FY 02/03.	2004	2003	**Project completed**
RIVERSIDE TRANSIT AGENCY	RIV030610	SCAB	0	RTA BUS STOP AMENITIES - INSTALL APPROX. 45 NEW SHELTERS & REHAB APPROX 159 SHELTERS (PARTS, PAINT, SIGNS, POLES, BENCHES, TRASH RECEPTACLES & ANCILLARY HARDWARE) (FY 04 5307)	2005	2005	Project in Engineering (PS&E) Phase
RIVERSIDE TRANSIT AGENCY	RIV030613	SCAB	0	IN WESTERN RIVERSIDE COUNTY - INSTALL AUTOMATED TRAVELER INFORMATION SYSTEM (ATIS) AT APPROXIMATELY 48 BUS STOPS (INCLUDES UPGRADED SIGNAGE AND LIGHTING) (FY 04 5307)	2006	2006	Project in Engineering (PS&E) Phase
RIVERSIDE TRANSIT AGENCY	RIV030614	SCAB	0	IN WESTERN RIVERSIDE COUNTY - PURCHASE 5 EXPANSION 14 PASSENGER DIAL-A-RIDE VANS (FY 04 5307)	2006	2006	Project in Engineering (PS&E) Phase
RIVERSIDE TRANSIT AGENCY	RIV030626	SCAB	0	IN WESTERN RIVERSIDE COUNTY - DEBT FINANCING (FY 03/04 PORTION) FOR 57 TRANSIT COACHES, 25 REPLACEMENT, 32 EXPANSION (FY 04 5307)	2005	2005	Project in Engineering (PS&E) Phase

RIVERSIDE TRANSIT AGENCY	RIV32666	SCAB	0	IN WESTERN RIVERSIDE COUNTY PURCHASE 10 EXPANSION 14 PASSENGER DAR VANS IN FY 02/03	2004	2004	**Project completed**
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV010214	SCAB	0	PURCHASE/REHAB ROLLING STOCK - RIVERSIDE COUNTY SHARE (13 CARS IN FY02/03 AND 18 CARS IN FY 03/04)	2005	2007	Project in Contract Award Phase. The project was delayed due to revisions in the contracted delivery date to take account of backlog with the manufacturer. These issues have since been resolved and the project is now being expeditiously implemented.
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	RIV011242	SCAB	0	PURCHASE EXPANSION ROLLING STOCK (2 CAB CARS AND 3 LOCOMOTIVES) FOR METROLINK IEOC AND RIVERSIDE/FULLERTON/LA LINES (EA: RIVFUL, PPNO: 0079E)	2004	2009	Project in Contract Award Phase. This project has been included in the current RFP for RIV010214, which was delayed due to revisions in the contracted delivery date to take account of backlog with the manufacturer. These issues have since been resolved and the project is now being expeditiously implemented.
TEMECULA	RIV030301	SCAB	79	ITS DEMO - SIGNAL INTERCONNECT ON SR79 NORTH (DESIGN/INSTALL CONDUIT/ INTERCONNECT CABLE) FROM MARGARITA TO MURRIETA HOT SPRINGS & CCTV AT VARIOUS SIGNALIZED LOCATIONS	2004	2005	Project in Construction/Implementation Phase

San Bernardino County

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	2004 RTP PROJECT COMPLETION DATE	2004 RTIP PROJECT COMPLETION DATE	Project Status
CALTRANS	44301	SCAB	30	IN UPLAND, LA/SBD CO LINE TO MOUNTAIN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 1)	2002	2002	**Project Completed**
CALTRANS	44311	SCAB	30	IN UPLAND, MOUNTAIN AVE. TO 0.1 MILE W/O CUCAMONGA CANNYON WASH CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES & CAMPUS AVE. UC (SEGMENT 2)	2002	2002	**Project Completed**
CALTRANS	44321	SCAB	30	IN RANCHO CUCAMONGA, 0.1 MILE W/O CUCAMONGA CANYON WASH TO HERMOSA AV CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 3)	2002	2002	**Project Completed**
CALTRANS	44331	SCAB	30	IN RANCHO CUCAMONGA, HERMOSA AVE TO 0.6 KM E/O MILLIKEN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT4)	2002	2002	**Project Completed**
VARIOUS	713	SCAB	215	I-215 CORRIDOR NORTH - IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 30- ADD 2 HOV LANES 1 LANE IN EA. DIR. AND OPERATIONAL IMPROVEMENTS	2005	2010	Project in Engineering (PS&E) Phase. The project was delayed because of conflicting findings between the environmental and engineering analysis with regard to the preferred alternative, necessitating substantial revisions to the environmental analysis and to the traffic studies. These issues have since been resolved and the project is now being expeditiously implemented.
CHINO	SBD41220	SCAB	0	CHINO AVENUE/CENTRAL TO 6TH STS. MULTI-MODAL TRANSPORTATION CENTER INCLUDES PARK-N-RIDE LOT WITH 125 SPACES(PHASE 1 FUNDED-PHASE 2 AWAITING FUNDING)	2003	2004	Project In Construction/Implementation Phase
COLTON	2002164	SCAB	0	ON VALLEY BLVD. IN COLTON TO NORTH TO 10TH STREET CONNECTING TO ABANDONED RR CORRIDOR ON WEST SIDE OF COLTON AVE.-CONSTRUCT CLASS I BIKEWAY, LANDSCAPING AND LIGHTING	2003	2005	Project in ROW Clearance Phase. Project was delayed due to protracted negotiations with BNSF Railroad on ROW.
MOUNTAIN REGIONAL TRANSIT AUTHORITY	20010283	SCAB	0	BUS SYSTEM - EXPANSION ALT. FUEL NEW TROLLEY VEHICLE SERVICE TO OPERATE BIG BEAR VISITORS TROLLEY	2003	2003	**Project Completed**
OMNITRANS	200077	SCAB	0	BUS SYSTEM - PURCHASE EXPANSION ALT FUEL BUSES (01-13), (02-14)	2002	2002	**Project Completed**
OMNITRANS	2002171	SCAB	0	(1) EXPANSION PARATRANSIT VAN	2003	2003	**Project Completed**
OMNITRANS	981118	SCAB	0	BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER	2005	2005	Project in Construction/Implementation Phase
OMNITRANS	981119	SCAB	0	TRANSIT INTERMODAL FACILITIES - FONTANA TRANSCENTER - EXPAND BUS BAYS, IMPROVE LANDSCAPING, SIGNALS AND PEDESTRIAN AND PASSENGER FACILITIES	2002	2002	**Project Completed**

OMNITRANS	SBD31088	SCAB	0	BUS FLEET EXPANSION-PURCHASE 40' EXPANSION HEAVY DUTY COACHES & AUX. EQUIPMT, CNG 01-9, 03-1 (Note: The 'OTHER' FUNDS ARE CARL MOYER FUNDS)	2003	2003	**Project Completed**
RANCHO CUCAMONGA	20020201	SCAB	0	PACIFIC ELECTRIC INLAND EMPIRE TRAIL – PHASE 1 – HAVEN AVENUE TO 1200' EAST OF ETIWANDA AVE (3.4) MILES) CONSTRUCT CLASS 1 BIKE TRAIL & ROW ACQ, ETIWANDA DEPOT	2004	2004	**Project in Engineering (PS&E) Phase**
RIALTO	SBD59203	SCAB	0	PEDESTRIAN FACILITY IMPROVEMENTS AT RIALTO METROLINK STATION IN BETWEEN ORANGE AND RIVERSIDE AVENUES (IN ALLEY WAY IN BETWEEN METROLINK AND DOWNTOWN BUSINESS DISTRICT	2003	2003	**Project Completed**
SANBAG	200074	SCAB	0	LUMP SUM - TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS	2004	2004	Project in Construction/Implementation Phase
SANBAG	20020106	SCAB	0	MONTCLAIR PEDESTRIAN UNDERCROSSING-CONSTRUCTION OF A 2ND PLATFORM CREATES NEED FOR CONSTRUCTION OF NEW UNDERCROSSING	2003	2003	**Project Completed**
SANBAG	44340	SCAB	30	IN SAN BERNARDINO COUNTY FROM MILLIKEN AVE TO 0.4 MI WEST OF EAST AVE CONSTRUCT 8-LN FWY WITH 2 HOV LANES **SEE STIP PPNO #193B, C & S FOR	2002	2002	**Project Completed**
SANBAG	94163	SCAB	0	RIDESHARE ACTIVITIES FOR SOUTH COAST AIR BASIN	N/A	N/A	**Project is fully operational and ongoing**
SANBAG	SBD0194	SCAB	30	NEAR FONTANA FROM 0.5 MI E OF HEMLOCK TO 0.2 MI E OF SIERRA AVE CONSTRUCT 6-LANE FWY & 2 HOV LANES	2002	2002	**Project Completed**
SANBAG	SBD031505	SCAB	0	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS	2004	2004	Project in Construction/Implementation Phase
SCRAA/LACMTA/SANBAG	991213	SCAB	0	SAN BERNARDINO LINE CAPACITY IMPROVEMENTS (TRACK IMPROVEMENTS)-FREMONT & MARENGO SIDINGS	2003	2003	**Project Completed**
VICTOR VALLEY TRANSIT AUTHORITY	20010281	SCAB	0	BUS SYSTEM - BUS EXPANSION - ALT. FUEL - 5 COMMUTER BUSES FOR COMMUTER DOWN THE HILL BUS SERVICE (IN MDAB & SCAB AIR BASIN)	2004	2004	**Project Completed**

2002 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

2002 REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM (RTIP) (FY2002/2003-2007/2008) – TCM PROJECTS

Update of TCM projects in 2001 RTIP TCM Implementation Status report:
(Same basic report format as 2001 RTIP)

LOS ANGELES COUNTY - TCMs

PROJECT ID: LA974170
PROJECT DESCRIPTION: AGOURA HILLS P&R LOT INCREASE CAPACITY IN AGOURA HILLS AREA FROM 93 TO 193 SPACES LOCATED ON THE 101 FWY
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: 16113
PROJECT DESCRIPTION: ON CATALINA ISLAND FROM AVALON TO NORTH END OF ISLAND - 2 MILE BIKEWAY WITH SCENIC OVERLOOK
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA000777 **ROUTE:** 405
PROJECT DESCRIPTION: FROM ROUTE 10 TO ROUTE 101 TO EXISTING 8-10 LANE FWY ADD TWO HOV LANES (SB:4+0; 5+0 TO 5+1 HOV)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA973005
PROJECT DESCRIPTION: BUS EXPANSION: ALTERNATIVE FUEL (TROLLEY BUS)
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA962315
PROJECT DESCRIPTION: POMONA VALLEY TRAFFIC SIGNAL FORUM IMPROVEMENT PROJECT REGIONALLY SIGNIFICANT IMPROVEMENT SIGNAL COORDIN./MONITOR.
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: 4U004
PROJECT DESCRIPTION: IN LOS ANGELES FROM PICO STATION LOS ANGELES CONVENTION CENTER - SIDEWALKS AND PEDESTRIAN CONNECTIONS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA79203
PROJECT DESCRIPTION: LA STANDARD LIGHT RAIL CAR PROCUREMENT FOR GREEN AND BLUE LINES (52) POSSIBLE DEFENSE CONVERSION FUNDS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA962356
PROJECT DESCRIPTION: SOUTH BAY JPA SYNCHRONIZATION & BUS SPEED IMPROVEMENTS (TRANSIT PRIORITY SYSTEM)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Project was completed.

PROJECT ID: LA9703001
PROJECT DESCRIPTION: RIDESHARE EMPLOYER SERVICE INCLUDING RIDEGUIDE/SURVEY REGISTRATION, TDM ASSISTANCE, SPECIAL MARKETING & MONITORING
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Project was completed.

LOS ANGELES COUNTY - TCMs

PROJECT ID:	LA974006
PROJECT DESCRIPTION:	UNION STA. GATEWAY BIKE STA. (BIKE RACKS/LOCKERS, BICYCLE REPAIR/ ACCESSORY SALES, SHOWERS/CHANGING FACILITIES, LIMITED FOOD SVC.)
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	4U005
PROJECT DESCRIPTION:	METROLINK VAN NUYS STATION BETWEEN WILLIS AVENUE AND RAYNER STREET - PEDESTRIAN OVERCROSSING
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA962098
PROJECT DESCRIPTION:	BOYLE HEIGHTS ATSAC PROJECT COMPUTER BASED REAL TIME TRAFFIC SIGNAL MONITORING SYSTEM
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA962102
PROJECT DESCRIPTION:	MID-CITIES BUS SPEED IMPROVEMENTS (PEAK-HOUR ONLY)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA962107
PROJECT DESCRIPTION:	SMART CORRIDOR OPERATION ENHANCEMENT
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA962113
PROJECT DESCRIPTION:	CENTRAL/EAST LA BUS SPEED IMPROVEMENT PROJECT (INCREASES SPEED FOR FIXED-ROUTE TRANSIT BY SIGNAL PRIORITY)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA962121
PROJECT DESCRIPTION:	VICTORY/VANOWEN BUS PRIORITY TREATMENTS (SIGNAL COORDIN.)
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA55201
PROJECT DESCRIPTION:	CONTINUING PROJECT - BUS STOP IMPROVEMENTS (AMENITIES, SHELTERS)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA55206
PROJECT DESCRIPTION:	DAR REPLACEMENT VANS; ONE NEW VAN AND ONE REPLACEMENT VAN
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

PROJECT ID:	LA973506
PROJECT DESCRIPTION:	ROLLING STOCK ACQUISITION UP TO 5 LOCOMOTIVES & 30 CARS
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Project was completed.

LOS ANGELES COUNTY - TCMs

PROJECT ID:	LA974096
PROJECT DESCRIPTION:	SANTA CLARITA COMMUTE CONNECT OPERATION - PROPANE-FUELED EXP. BUSES TO LINK EMPLOYMENT CTRS W/ SANTA CLARITA METROLINK STA.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Project complete
PROJECT ID:	LA974419
PROJECT DESCRIPTION:	BLUE LINE MISSION STREET STATION PARK-AND-RIDE LOT WILL CONSIST OF 130 SPACES AND 300 SQUARE FEET FOR BICYCLES
FUNDING YEARS:	1999/2000
IMPLEMENTATION STATUS:	Project is now LA996090

TCMs project status using new reporting format for 2002 RTIP:

LOS ANGELES COUNTY - TCMs – LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
AGOURA HILLS	LA990362	SCAB	0	CITYWIDE STREET AND BIKE PATH PROJ (T21-939)	00/01 01/02	This project is in the design phase. Project to be completed in December 2003.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963731	SCAB	0	ALAMEDA CORRIDOR - NORTH END RAIL ROAD/ARTERIAL GRADE SEPS. & RELATED IMPROVEMENTS EIS/EIR COMPLETE; 8100+1394 P.E. 10517+305 R/W; 29483+5300 CONS.	00/01 01/02	Project is under construction. Completion of project is estimated for June 2002.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963732	SCAB	0	ALAMEDA CORRIDOR - MID CORRIDOR SEGMENT 10 MI TRENCH >20 ARTERIAL GRADE SEPS, ENVIRONMENTAL CLEARANCE	00/01 01/02	Project is under construction. Completion of project is estimated for June 2002.
ALAMEDA TRANSPORTATION CORRIDOR AGENCY	LA963733	SCAB	0	ALAMEDA CORRIDOR - SOUTH END 7 RAILROAD / ARTERIAL GRADE SEPS. + RELATED IMPROVEMENTS ENV. CLEARANCE	00/01	Project is under construction. Completion of project is estimated for June 2002.
BELLFLOWER	LA996275	SCAB	0	WEST BRANCH GREENWAY MULTI-MODAL TRANS. CORRIDOR DESIGN AND CONSTRUCT 2.5 MILE CLASS I BIKE PATH ALONG MTA-OWNED SANTA ANA BRANCH ROW INCL. PEDESTRIAN AND LANDSCAPING	01/02	Project has not commenced yet. Waiting for MTA to abandon Rail Road Right of Way.
CALABASAS	LA974100	SCAB	0	U.S. 101 INTERJURISDICTIONAL BIKELANE GAP CLOSURE CONSTRUCTION 4.5 MILES OF BIKEWAY IMPROVEMENTS TO CLOSE SEVERAL GAPS WITHIN A 12 MILE CORRIDOR(TEA21-#69)	00/01 01/02	Project has not commenced yet. Waiting for MOU to be signed by MTA. Estimated completion date August or October of 2002.
CALTRANS	9061D	SCAB	0	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT PACIFIC COAST HIGHWAY - GRADE SEPARATION	00/01	In the design phase.
CARSON, CITY OF	LA974042	SCAB	0	HARBOR TRANSITWAY SHUTTLE WEEKDAY AND SATURDAY SERVICE BETWEEN HARBOR TRANSITWAY STATIONS AT CARSON AND	00/01	Completed Project in FY 2000.

LOS ANGELES COUNTY - TCMs – LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
				REGIONAL DESTINATIONS AND EMPLOYMENT CENTERS		
COMMERCE	927108	SCAB	0	ALAMEDA CORRIDOR IN COMMERCE AT ATLANTIC BOULEVARD AND TELEGRAPH ROAD - INTERSECTION IMPROVEMENTS	00/01	Completed December 2000.
COMPTON	LAOB7326	SCAB	0	COMPTON CREEK BIKEWAY EXTENSION - PHASE III. DESIGN & CONSTRUCT .6 MI OF CLASS 1 BIKE/PED PATH FROM GREENLEAF BLVD TO ARTESIA FWY. WILL INC BIKE PATH, PED WALKWAY SIGNAGE, STRIPING	01/02	Ongoing. Project will be completed by December 2002.
HERMOSA BEACH	LA974080	SCAB	0	RE-ROUTE HERMOSA BIKEWAY TO STRAND AND RECONSTRUCT BIKEWAY PROJECT WILL RELOCATE THE BIKEWAY FROM HERMOSA AVE TO STRAND AND THEREBY ALLEVIATE CONGESTION	00/01	Completed May 21, 2001.
LONG BEACH	LA003551	SCAB	0	CARSON ST/BIXBY RD. BIKE TRE (93/94 CFP, CAT. 8, 551) COMBINATION CLASS I AND CLASS II	00/01	Replaced by #8157 (2001 Call for Projects); 9.2 Class II bike lane in City of Long Beach; part of LA County TEA lump sum projects; funding years – 05, 06, 07
LOS ANGELES COUNTY	9061F	SCAB	0	ALAMEDA CORRIDOR IN LOS ANGELES COUNTY AT DEL AMO BOULEVARD - ACQUISITION OF RIGHT OF WAY FOR GRADE SEPARATION	00/01	Completed
LOS ANGELES COUNTY	LA002633	SCAB	0	THOMPSON CREEK BICYCLE TRAIL (93/97 CFP; BIKE PROGRAM) CLASS I (2 MILES)	00/01	Project is in PE phase.
LOS ANGELES COUNTY	LA996289	SCAB	0	SOUTH BAY BIKE TRAIL PED. ACCESS RAMPS/SIDEWALKS - DESIGN OF RAMPS, WALKWAYS TO PROVIDE ACCESS TO THE STH. BAY TRAIL AT DOCKWEILER STATE BEACH	01/02	LOA fully executed on 04/17/02. Project was programmed FY02/03.
LOS ANGELES COUNTY MTA	927333	SCAB	0	RIDESHARE ACTIVITIES	00/01 01/02	Work in Progress. Completion in FY 2004.
LOS ANGELES COUNTY MTA	LA0B100	SCAB	0	LUMP SUM TRANSPORTATION ENHANCEMENT ACTIVITIES (EXCLUDING CATEGORY 7). INCLUDES BIKEWAY/PEDESTRIAN PROJECTS THAT WILL BE IDENTIFIED SEPARATELY IN AMENDMENT #1 TO THE 2002 RTIP.	00/01 01/02	Projects are on schedule for a timely delivery. Projects will be completed in FY06.
LOS ANGELES COUNTY MTA	LA210465	SCAB	0	SO. CENTRAL LOS ANGELES EXPOSITION PARK INTERMODAL URBAN ACCESS PRJ (STATE OF CAL. DEPT. OF GEN. SERV.) RENEW /RENOVATION PARKING FACILITY IMPROVE PARK/TRAFFIC ACCESS PROGRAM	00/01 01/02	Work in progress. Completion in FY03.
LOS ANGELES COUNTY MTA	LA29202U1	SCAB	0	SAN FERNANDO TRANSIT CORRIDOR - FROM NORTH HOLLYWOOD REDLINE STATION TO WARNER CENTER	00/01 01/02	P/E stage waiting for Environmental clearance. Completion expected FY06.

LOS ANGELES COUNTY - TCMs – LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
LOS ANGELES COUNTY MTA	LA974124	SCAB	0	SANTA MONICA BOULEVARD TRANSIT PARKWAY TRANSIT PEDESTRIAN AND BIKEWAY IMPROVEMENTS ALONG SANTA MONICA BLVD IN WEST LOS ANGELES, SPANS 2.5 MI	00/01	Project currently is in design FY03.
LOS ANGELES COUNTY MTA	LA991305	SCAB	0	RIDESHARE 2000/CLUB METRO- EXTEND AND EXPAND IMPLEMNT. INCENTIVE PRGM. TO ENCOURAGE USE OF ALT. MODES OF TRAVEL OTHER THAN DRIVING ALONE.	00/01 01/02	Preliminary stage completion by FY05.
LOS ANGELES, CITY OF	LA0B7330	SCAB	0	SAN FERNANDO ROAD ROW BIKE PATH PHASE II-CONSTRUCT 2.75 MILES CLASS I FROM FIRST ST TO BRANFORD ST, ON MTA-OWNED ROW PARALLEL TO SAN FERNANDO RD. LINK CYCLISTS TO NUMEROUS BUS LINE	00/01	Project under construction, to be completed on 6/30/05.
LOS ANGELES COUNTY MTA	LA0B7337	SCAB	0	CHANDLER BLVD ROW BIKE PATH: 170 FWY TO LA VALLEY COLLEGE-DESIGN OF 2.3 MILES OF BIKEWAY AND OPTIONAL PEDESTRIAN WALKWAY FROM 170 FWY TO LOS ANGELES VALLEY COLLEGE	00/01	In the PE phase to be completed on 6/30/05.
LOS ANGELES COUNTY MTA	LA974083	SCAB	0	CHANDLER/BURBANK BIKE PATH-WHITEOAK TO PIERCE COLLEGE A 3.2 MILE CLASS I BIKEWAY ON MTA'S CHANDLER/BURBANK RAIL RIGHT-OF-WAY WILL IMPROVE NON-MOTORIZED ACCESS (COMBINED W/LA974078)	00/01 01/02	In construction phase, to be completed on 6/30/03
LOS ANGELES, CITY OF	LA996097	SCAB	0	BUSINESS BICYCLE PARKING PROGRAM	00/01	In construction phase to be completed on 12/31/02.
LOS ANGELES, CITY OF	LA996106	SCAB	0	DOWNTOWN PRKING MGMT ORDINANCE PRKNG ORD. TO MANAGE PRKNG SUPPLY, CREATE IN-LIEU FEES FOR TRANSIT SERVICE ENHANCEMENTS	00/01	In construction phase, to be completed on 12/31/02.
LOS ANGELES, CITY OF	LA996390	SCAB	0	SEPULVEDA BLVD. FROM CENTINELA AVE. TO LINCOLN BLVD - WIDEN SEPUL BLVD. BET. LINCOLN AND CENTINELA TO PROVIDE BUS/CARPOOL PRIORITY LANE.	01/02	In construction phase, to be completed on 6/30/04.
PASADENA	LA0B7055	SCAB	110	ARROYO PKWAY CORR TRANS IMP(UPGRADE 6 SIGNALS) -BETWEEN GREEN & HOLLY ST COMPLIMENT & AUGMENT PLANNED CALTRANS RELINQUISHMENT OF ARROYO PKW, BETWEEN COLORADO BLVD & GLENARM ST	00/01 01/02	Ongoing project to be completed in FY03, in the PE phase.
SANTA CLARITA	LA0B7335	SCAB	0	SANTA CLARA RIVER REGIONAL TRAIL-DESIGNING OF 7 MILES OF CLASS I BIKE/PED PATH ALONG THE NORTH SIDE OF THE RIVER FROM I-5 ON THE WEST TO DISCOVERY PARK ON THE EAST	00/01 01/02	In the PE phase to be completed on 6/30/05.
SCAG	927331	SCAB	0	RIDESHARE ACTIVITIES	00/01	Completed

LOS ANGELES COUNTY - TCMs – LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
SCAG	LA996082	SCAB	0	WEB ACCESS VANPOOL INFO SYS DEV & IMPLEMENT DATABASE FOR VANPOOLS, VACANCIES	00/01	Development Phase delayed due to unavoidable staff changes. Completion expected in FY03.
SCAG	LA996083	SCAB	0	COMMUTER CHANNEL NON-MONETARY SUBSCRIPTION SERVICE	00/01	Operational Phase will be complete in December FY02.

LOS ANGELES COUNTY - TCMs - STATE HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CALTRANS	1178A	SCAB	405	IN LOS ANGELES AND CULVER CITY FROM ROUTE 90 TO ROUTE 10 - HOV LANES (SB 5+0 TO 5+1; NB 5+0 TO 5+1 HOV) 98CTIP $ FUND NB LN, ALSO PAYS FOR SB $ DELETED FROM 96STIP	00/01 01/02	Project in the PE phase, will be completed on 1/13/09.
CALTRANS	11985	SCAB	405	NEAR HAWTHORNE AND CULVER CITY FROM ROUTE 105 TO ROUTE 90 - 6 LANE FREEWAY ADD 2 HOV LANES AND SOUNDWALLS	00/01	In the PE phase to be completed on 9/18/06.
CALTRANS	12570	SCAB	60	RTE. 57/60 HOV CONNECTOR INDUSTRY FROM OLD BREA CANYON ROAD TO GRAND AVENUE - HOV DIRECT CONNECTORS AND COLLECTOR ROAD (BOTH DIRECTIONS)	00/01 01/02	In the PE phase, project to be completed by 5/24/06.
CALTRANS	16881	SCAB	5	IN LA MIRADA TO SANTA FE SPRINGS FROM ORANGE COUNTY LINE TO ROSECRANS AVENUE - INTERIM HOV LANES; I-5 Rail Grade Crossing between RTE. 605/91.	00/01 01/02	In the PE phase, project to be completed by 12/7/12.
CALTRANS	2009	SCAB	710	NEAR SOUTH PASADENA FROM ROUTE 10 TO ROUTE 210 - PARTIAL RIGHT OF WAY FOR NEW 6 LANE FREEWAY WITH 2 HOV LANES	00/01	In ROW phase, project to be completed on 7/13/04.
CALTRANS	LA000357	SCAB	5	--- FROM ROUTE 170 TO ROUTE 118 HOV LANES (10 TO 12 LANES) (CFP 345) (2001 CFP 8339)	05/06	In the design phase.
CALTRANS	LA000358	SCAB	5	--- FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES) (CFP 346) (2001 CFP 8355)	01/02	In the design phase.
CALTRANS	LA000359	SCAB	10	IN EL MONTE AND BALDWIN PARK FROM BALDWIN AVE TO ROUTE 605 HOV LANES (8+0 TO 8+2)	01/02	In the design phase.
CALTRANS	LA000543	SCAB	10	IN POMONA AND CLAREMONT FROM ROUTE 57 TO SAN BERNARDINO COUNTY LINE HOV LANE IN EACH DIRECTION (C-I: 77719; CFP 350; PPNO 00362) ALSO SOUNDWALL AND REHAB	00/01	In the design phase.
CALTRANS	LA000548	SCAB	10	FROM PUENTE TO CITRUS HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (PE ONLY)	00/01	In the preliminary engineering phase.

LOS ANGELES COUNTY - TCMs - STATE HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CALTRANS	LA000549	SCAB	605	FROM ORANGE COUNTY LINE TO NORTH OF SOUTH ST HOV LANES (CFP 363) (FROM 8 TO 10 LANES)	01/02	Project completed.
CALTRANS	LA01342	SCAB	10	RT 10 FROM RT 605 TO PUENTE AVE HOV LANES(8+0 TO 8+2)	00/01	The project is in environmental process. Design process will be executed by next year.
CALTRANS	LA01344	SCAB	5	RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES	00/01	In the design phase.
CALTRANS	LA01348	SCAB	14	RT 14 FROM ESCONDIDO CYN RD. TO PEARBLOSSOM HWY HOV LANES (4 TO 6 LANES) ONE LANE IN EACH DIRECTION. (EA-117101)	00/01	Project is in the construction phase.
CALTRANS	LA962201	SCAB	14	NEAR SANTA CLARITA, FROM RT 5 TO 126/S.F. RD HOV PROJECT (EA# 119843)	00/01	In the construction phase.
CALTRANS	LA963724	SCAB	30	IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNARDINO COUNTY LINE - CONSTRUCT 8-LANE FREEWAY INCLUDING 2-HOV LANES (12620, 12640, 12630, 10501, 17210)	00/01 01/02	In construction phase.
CALTRANS	LA98STIP	SCAB	5	IN LOS ANGELES ON ROUTE 5 INTERIM HOV LANE FROM ROSECRANS TO FLORENCE - EXISTING 3 MIXED FLOW IN EA. DIRECTION, PROJECT IS TO ADD 1 HOV & 1 MIXED FLOW EA DIRECTION	00/01	In the PE phase, project to be completed by 3/25/13.
CALTRANS	LA996137	SCAB	60	RTE. 60 HOV LNS. FROM RTE. 605 TO BREA CANYON RD. -- HOV LANE (FROM 8 TO 10 LANES TO 10 TO 12 LANES)	00/01 01/02	In the design phase.
CALTRANS	LA996138	SCAB	5	RTE.5 HOV LNS. FROM FLORENCE AVE TO RTE.19 - - ADD ONE LANE IN EACH DIRECTION	00/01 01/02	In the environmental phase.
LOS ANGELES COUNTY	LAOB416	SCAB	101	IN LOS ANGELES - DOWNTOWN OVER FREEWAY 101 - PEDESTRIAN BRIDGE ENHANCEMENT	02/03	In the construction phase to be completed on 12/31/04.
LOS ANGELES COUNTY MTA	LA000274	SCAB	2	FROM SEPULVEDA TO MORENO CONSTRUCT DIVIDED PKWAY WITH TRANSIT PKWAY IMPROVEMENTS, BIKE LANES & RT. 2/405 INTERCHANGE (94CFP; CAT. 2, 210, 98STIP00027) TEA21-#1531	00/01 01/02	Project is in the PE phase. There is no definite date on completion.
LOS ANGELES COUNTY MTA	LA98STIP4	SCAB	101	RT. 101 SOUTHBOUND IMPROVEMENTS FROM LOS ANGELES ST TO CENTER ST ELIMINATE HEWITT ST ON/OFF RAMPS & ADD NEW OFF RAMP @ VIGNES & RESTRIPE EXISTING NON-STDRD LANE WIDTHS	02/03	Currently in design. Completion expected in 09/05.
MANHATTAN BEACH	LAOB418	SCAB	0	IN MANHATTAN BEACH - MARINE AVENUE BETWEEN SEPULVEDA BLVD (STATE ROUTE 1) AND VALLEY/ARDOMOR PEDESTRIAN AND AESTHETIC IMPROVEMENTS	01/02	Project completed 12/01. Paperwork has been turned into Caltrans for reimbursement.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
ACCESS SERVICES INC.	LA900520	SCAB	0	PURCHASE OF ADD'L 591 VEHICLES FROM FY01 TO FYO5. 110 VEHICLES IN FY01, 115 VEHICLES IN FY02, 125 VEHICLES IN FY03, 149 VEHICLES IN FY04, AND 92 VEHICLES IN FY05.	00/01 01/02	This project is in the construction phase. Project to be completed in FY06.
ANTELOPE VALLEY TRANSIT AUTHORITY	LA0B7008	VAR	0	3 EXPANSION 40 FT. LOW FLOOR CLEAN DIESEL BUSES; LOCAL FIXED-ROUTE BUSES; TO RELIEVE PK PERIOD OVERCROWDING ON CORE ROUTES.	01/02	Preliminary stages. Completion of project is expected in FY03.
ARCADIA	LA990712	SCAB	0	NEW AND EXPANDED SERVICE THROUGH DOWNTOWN ARCADIA CONNECTING HOTELS AND BUSINESSES TO SANTA ANITA RACE TRACK AND FASHION MALL (HUNTINGTON STREET)	00/01 01/02	This project is in the design phase. Still planning on implementation of the project. Completion expected in FY02/03.
BALDWIN PARK	LA0B7012	SCAB	0	LOCAL NTD REPORTERS' BUS FLEET EXPANSION.19 BUSES FOR 5 CITIES. BALDWIN PARK, COMPTON, EL MONTE, MONTEREY PARK & WEST COVINA (CNG, DIESEL & PROPANE FUEL 30-35 FT. VEH).	00/01 01/02	Need federal approval. Paperwork to be finalized and project to be completed in FY04.
BELL	LA962379	SCAB	0	NEW SCDC PEAK HOUR INTER-CITY VAN SHUTTLE SUBSCRIPTION SERVICE NO SHUTTLE NUMBER	00/01	Completed
BURBANK	LA8STIP13	SCAB	0	BURBANK LOCAL TRANSIT PURCHASE OF TWO ELECTRIC BUSES FOR ONGOING TDM PROGRAM	00/01	Ongoing. Project near completion.
CALABASAS	LA0B305	SCAB	0	PURCHASE OF 4 CNG BUSES FOR EXPANDED SERVICE. THE BUSES WILL BE A COMBINATION OF 15, 20, AND 25 PASSENGER TYPES, WITH THE EXACT CONFIGURATION TO BE DETERMINED.	00/01	Project is ongoing. To be completed in latter part of 2002.
CALTRANS	LA963519	SCAB	0	ADD 3 MILES OF TRIPLE TRACK AT BANDINI, MP 148.5 & 151.7 BETWEEN FULLERTON & LAUS	00/01	In the construction phase to be completed on 12/31/02.
CLAREMONT	LA990716	SCAB	0	EXPANSION OF BUS FLEET BY 1 VEHICLE (CNG). THE VEHICLE WILL HOLD 21 PASSENGERS AND COST $65K	00/01 01/02	Project is in the construction phase, to be completed on 12/31/03.
COMMERCE	LA963759	SCAB	0	TELEGRAPH ROAD TRACK CAPACITY ENHANCEMENT 97-98 TCI	00/01	Final phase completed latter part of Feb. FY02
COMPTON	LA974406	SCAB	0	MARTIN LUTHER KING JR PARK AND RIDE EXPANSION PROJECT PURCHASE LAND AND CONSTRUCTING 100 NEW PARKING SPACES AS WELL AS PROVIDING SECURITY SURVEILLANCE	00/01	Completed
COVINA	LA9811080	SCAB	0	EASTLAND SATELLITE PARK n RIDE LOT (REPLACEMENT PARKING FOR EASTLAND SHOPPING CENTER -- 429 SPACES) (CROSS STREETS ARE BARRANCA/WORKMAN)	00/01	Work in progress. Complete in FY03.
CULVER CITY MUNI BUS LINES	LA0B404	SCAB	0	PROCUREMENT OF SIX (6) 30' CNG BUSES. FOUR BUSES TO REPLACE EXISTING 1983 BUSES AND TWO BUSES ARE FOR SERVICE EXPANSION OF LINE 6.	02/03	Grant has not been executed yet. The project is estimated to be complete on FY03.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CULVER CITY MUNI BUS LINES	LA0B405	SCAB	0	CMAQ FUNDS USED TO FUND SERVICE EXPANSION ON LINE 6	01/02	Grant has not been executed yet. The project is estimated to be complete on FY03.
CULVER CITY MUNI BUS LINES	LA0B406	SCAB	0	MARKET EXPANSION OF LINE 6.	01/02	Grant has not being executed yet. The project is estimated to be complete on FY03.
EL MONTE	LA0B7296	SCAB	0	CROSSWALK IMPROVEMENT PROJECT. LOCATED AT RAMONA BL/VALLEY BL, PECK RD/VALLEY BL, PECK RD/LOWER AZUSA RD, PECK RD/RAMONA BL, RAMONA BL/SANTA ANITA	00/01	In construction, to be completed by 6/30/04.
FOOTHILL TRANSIT ZONE	LA0B307	SCAB	0	EASTLAND SATELLITE PARK AND RIDE LOT - 429 PARKING SPACES, LOCATED AT BARRANCA & CITRUS ON BERKMAN	00/01	Project completed (Duplicate of LA9811080)
FOOTHILL TRANSIT ZONE	LA0B311	SCAB	0	PARK AND RIDE FACILITY ON OAK STREET BETWEEN VINCENT & GLENDORA. 160 PARKING SPACES SERVING BUS LINES #699 AND #272.	00/01	Project in the construction phase. Completion date is on 2004.
GARDENA	LA01B104	SCAB	0	PURCHASE FIVE (5) FIXED-ROUTE EXPANSION BUSES	01/02	Completed.
GLENDALE	LA963751	SCAB	0	METROLINK - SANTA CLARITA LINE GLENDALE TRANSPORTATION CENTER - UPGRADE STATION 96-97 TCI	00/01	Project under construction to be completed on 12/31/06.
GLENDALE	LA996065	SCAB	0	CNG HVY DUTY TRANSIT VEHICLES PURCH 6 BUSES TO REMEDY EXISTING OVERCROWDING	00/01	Project under construction to be completed by 12/31/02.
LONG BEACH PUBLIC TRANSPORTATION CO	LA0B7006	SCAB	0	LONG BEACH TRANSIT EXPANSION BUSES - THE PURCHASE OF UP TO 11 40-FOOT, LOW-FLOOR ALTERNATIVE FUEL BUSES WHICH SERVE THE MOST CROWDED ROUTES, INCLUDING 190, 7, 100 & 171.	00/01 01/02	Pilot stage. Completion FY02.
LONG BEACH PUBLIC TRANSPORTATION CO	LA990719	SCAB	0	(14) EXPANSION 40' BUSES (CLEAN DIESEL)	00/01	Completed.
LOS ANGELES COUNTY	LA0B7004	SCAB	0	VEHICLE ACQUISITION FOR EAST LOS ANGELES FIXED ROUTE SHUTTLE SERVICE PHASE II-PURCHASE OF 3 VEHICLES WILL INCREASE FREQUENCY OF THE EXISTING 3 SHUTTLES SERVICE ROUTES	00/01	Project in the construction phase, to be completed by 12/31/02.
LOS ANGELES COUNTY	LA974005	SCAB	0	LAC+USC MEDICAL CTR AREA EXISTING FLEXIBLE SHUTTLE ALT. FUEL FLEXIBLE FEEDER SHUTTLE-EXPANSION (CONNECTS MEDICAL CTR W/TRANSIT FACILITY)	00/01	Completed
LOS ANGELES COUNTY	LA996044	SCAB	0	VEH ACQ FOR EST L.A. SHUTTLE PURCH 4 VEH'S TO REMEDY EXISTING OVERCROWDED CONDITIONS	00/01	Project under construction to be completed by 12/31/02.
LOS ANGELES COUNTY MTA	7050	SCAB	0	METRO RAIL BLUE LINE-LONG BEACH/LA WILMINGTON AVENUE AT IMPERIAL HIGHWAY – OVERCROSSING	00/01	Under construction. Will be completed in FY02.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
LOS ANGELES COUNTY MTA	LA01B101	SCAB	0	COOPERATIVE PURCHASE OF HYBRID ELECTRIC COACHES BY MTA AND INTERESTED MUNICIPAL OPERATORS AS A TEST PROGRAM	01/02	Project will occur in late Spring 2002. Completion is expected 12/05.
LOS ANGELES COUNTY MTA	LA0B303	SCAB	0	ACQUISITION OF TROLLEY BUSES (2) AND CHARGING STATIONS FOR THE CITY OF MONROVIA'S DOWNTOWN TROLLEY SERVICE	00/01	Pending Grant Approval. Completion 12/05.
LOS ANGELES COUNTY MTA	LA0B304	SCAB	0	PLAYA VISTA EARNMARK, PURCHASE NEW (5) LOW-EMISSION BUSES, TRACKING EQUIP & BUS AMENITIES INCLUDING PASSENGER SHELTERS, INFO KIOSKS & APPURTENANT EQUIP - TRANSIT SERVICE UPGRADE.	00/01	Pending grant approval. Completion 12/05.
LOS ANGELES COUNTY MTA	LA0B7023	SCAB	0	GET ABOUT FLEET IMPROVE (POMONA VAL TRANS. AUTHORITY)-PURCHASE 18, 21 PASSENGER VEHIC TO INCR CAPACITY OF SUBREG PARATRANSIT SYS	00/01	Completion in FY02 in December. Process of allocation request specification development.
LOS ANGELES COUNTY MTA	LA0B7107	SCAB	0	CHATSWORTH INTERMODAL PARK AND RIDE-INCLUDE DESIGN AND CONS. OF ADDITIONAL 150 SPACES-CONSTRUCTION WILL INCL GRADING, ASPHALT PAVING, INSTALLATION OF CONCRETE BUMPERS ETC (PE ONLY)	01/02	Development stages. Discussing project management and funding with a partner agency. Project is delayed. Completion expected in June FY03.
LOS ANGELES COUNTY MTA	LA29202X	SCAB	0	METRO RED LINE MOS-3: N. HOLLYWOOD 5.9-MILE W/ 3 STATIONS, HIGHLAND TO N.HOLLYWOOD STA. 15,370+ 746= 16,117 118,630+5,754=124,384	00/01 01/02	Subway is completed. Construction phase for pedestrian underpass and 101 overpass. Completions February FY04.
LOS ANGELES COUNTY MTA	LA29212X	SCAB	0	METRO RAIL BLUE LINE – PASADENA EXT UNION STA TO SIERRA MADRE VILLA STA 13.5 MILES, 12 STATIONS	00/01 01/02	Project under construction. To be completed by 12/30/06.
LOS ANGELES COUNTY MTA	LA963755	SCAB	0	CHINATOWN INTERMODAL IMPROVEMENT TO DEVELOP A CONNECTION FROM BLUE LINE - PASADENA (CHINATOWN STATION TO BROADWAY STREET) 97-98 TCI	00/01	Under construction. About 10-20% done. Will be open for revenue on 06/03.
LOS ANGELES COUNTY MTA	LA974036	SCAB	0	EL SEGUNDO GREEN LINE SHUTTLE OPERATE THREE SEPARATE PEAK HOUR SHUTTLE SERVICES CONNECTING METRO GREEN LINE WITH EMPLOYMENT DISTRICT SERVICE OPERATES ON WEEKDAYS ONLY	00/01	Project completed in FY01.
LOS ANGELES COUNTY MTA	LA974049	SCAB	0	METRO GREEN LINE SHUTTLE-LAKEWOOD. STATION LINE 631 A RAIL FEEDER SERVICE FIXED ROUTE DURING PEAK HOURS FLEXIBLE UNSCHEDULED STOPS AT MIDDAY	00/01	Still operating will be complete in 09/02.
LOS ANGELES COUNTY MTA	LA990306	SCAB	0	RAPID BUS PROGRAM - 4 – FORTY FOOT BUSES. ALSO FACILITY: BUS STOP DESIGN AND CONSTRUCTION, TECHNOLOGY UPGRADING, OPERATING SUPPORT.	02/03 03/04	Preliminary stages, PE. Completion expected on FY05.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
LOS ANGELES COUNTY MTA	R626TA	SCAB	0	METRO RAIL BLUE LINE – PASADENA EXT AT CHINATOWN METROLINK STATION - ACCESS IMPROVEMENTS	00/01	Project is in the PE phase. Will be completed in July FY03.
LOS ANGELES, CITY OF	LA0B7024	SCAB	0	METRO RED LINE MELROSE SHUTTLE-ACQUISITION OF 2 LOW FLOOR, PROPANE-POWERED, 30-FOOT BUSES WILL BE USED IN THE OPERATION OF A NEW HIGH FREQUENCY SHUTTLE	01/02	In the construction phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA0B7026	SCAB	0	METRO RED LINE/WEST HOLLYWOOD/BEVERLY CENTER/CEDAR-SINAI SHUTTLE-ACQUIRE 7 NEW 30-FOOT, PROPANE-FUELED, DASH STYLE BUSES FOR THE OPERATION OF A HIGH FREQUENCY SHUTTLE	00/01	In the construction phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA0B7029	SCAB	0	MID-CITIES ET AL TRANSIT HUBS-TWO AREAS INCLUDE MID-CITIES TRANSIT HUBS (5), WINDWARD CIRCLE TRANSIT HUB (1)	01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA0B7034	SCAB	0	SUN VALLEY INTERMODAL TRANSIT CENTER; PEDESTRIAN CROSSING/BUS STOP IMPROVEMENT-PROVIDE PED. CROSSINGS AT EACH END OF THE PLATFORM OF SOON TO BE BUILT SUN VALLEY METROLINK STATION	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA0B7274	SCAB	0	CITYWIDE ST PEDESTRIAN IMPROVEMENT-CONSISTS OF A SERIES OF STREETSCAPE ENHANCEMENTS WITHIN DOWNTOWN LA DESIGNED TO STRENGTHEN THE PEDESTRIAN LINKAGE BETWEEN DOWNTOWN DESTINATIONS.	00/01	In the construction phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA0B7278	SCAB	0	NORTHEAST COMMUNITY LINKAGES PHASE II-HIGHLIGHT PEDESTRIAN CONNECTIONS W/RAIL & BUS LINES ALONG MARMION WAY AND AT PASADENA AVE, FIGUEROA ST, FRENCH AVE, AND AVE 45, 50, 60, 61.	00/01	In the construction phase; to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA0B7285	SCAB	0	ALISO VILLAGE PEDESTRIAN LINKAGE PROJECT-LINK THE NEW RECONSTRUCTED ALISO VILLAGE PUBLIC HOUSING DEVELOPMENT TO THE 2ND ST TRANSIT WAY & METRO RAIL STATION AT FIRST & BOYLE ST.	00/01 01/02	In the ROW phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA0B7293	SCAB	0	SAN PEDRO PEDESTRIAN WAY-PROVIDE PEDESTRIAN ACCESS WAYS LINKING EXISTING TRANSIT FACILITIES AND PROPOSED PARKING STRUCTURE TO SURROUNDING & OTHER DESTINATIONS IN DOWNTOWN SAN PEDRO	00/01	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA962445	SCAB	0	WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY	00/01	In the construction phase to be completed by 12/31/03.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
LOS ANGELES, CITY OF	LA974040	SCAB	0	METRO GREEN LINE SHUTTLE - AVIATION STATION TO CITY BUS CENTER OPERATE TWO WEEKDAY, PEAK HOUR SHUTTLE SERVICE	00/01	In the construction phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA974061	SCAB	0	CONEJO VALLEY TO WEST SAN FERNANDO-EXPRESS SHUTTLE NEW PEAK PERIOD COMMUTER SHUTTLE SERVICE RUN ALONG VENTURA FWY	00/01	Completed
LOS ANGELES, CITY OF	LA974165	SCAB	0	MACARTHUR PARK STATION IMPROVEMENTS INCLUDE DESIGN AND CONSTRUCTION OF A PLAZA TO ACCOMMODATE PUBLIC ACCESS (PEDESTRIAN ENTRANCES, WALKWAYS, BICYCLE FACILITIES)	00/01	In the construction phase to be completed by 12/31/02.
LOS ANGELES, CITY OF	LA990304	SCAB	0	LOS ANGELES, CA SAN FERNANDO VALLEY SMART SHUTTLE BUSES T21 TRANSIT DEMO PRJ # 66 6 VEHICLES, 3 GASOLINE, AND 3 CLEAN DIESEL POWERED	00/01	Completed
LOS ANGELES, CITY OF	LA996000	SCAB	0	DASH PICO UNION/ ECHO PRK VEH ACQ PURCHASE ONE BUS TO RELIEVE OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996001	SCAB	0	DASH EL SERENO/CTY TERR VEH ACQ PURCHASE2 BUSES TO REDUCE OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996002	SCAB	0	DASH WILMINGTON VEH ACQUISITION PURCHASE 2 BUSES TO RELIEVE OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996003	SCAB	0	DASH WATTS VEH ACQUISITION PURCH 2 VEH'S TO REDUCE EXISTING OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996004	SCAB	0	DASH KING-EAST VEH ACQUISITION FINANCE THE ACQ OF 5 BUSES TO REDUCE OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/06.
LOS ANGELES, CITY OF	LA996005	SCAB	0	DASH HOLLYWOOD VEH ACQUISITION ACQUIRE TWO BUSES TO REDUCE EXISTING OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996006	SCAB	0	DASH VERMONT-MAIN VEH ACQUISITION PURCH 5 BUSES TO RELIEVE EXISTING OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/06
LOS ANGELES, CITY OF	LA996007	SCAB	0	DASH MANCHSTR-FLORNCE VEH ACQ PURCH 5 BUSES TO RELIEVE EXISTING OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/06
LOS ANGELES, CITY OF	LA996010	SCAB	0	COMM EXPRESS 448 VEH ACQUISITION PURCH 3 BUSES TO REDUCE EXISTING OVERCROWDING	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996011	SCAB	0	ROWAN SHUTTLE VEH ACQUISITION PURCH 2 BUSES TO REDUCE EXISTING OVERCROWDED CONDITIONS	00/01 01/02	In the construction phase to be completed by 12/31/03.
LOS ANGELES, CITY OF	LA996012	SCAB	0	DNTWN SAN PEDRO TRAN HUB DEV MIXED TRANSIT HUB IN SAN PEDRO P/E ONLY.	00/01 01/02	In the PE phase to be completed by 6/30/03.
LOS ANGELES, CITY OF	R627TA	SCAB	0	METRO RAIL RED LINE AT WESTLAKE COMMUNITY INTERMODAL INTERCEPT FACILITY - DESIGN 1,100 SPACE PARKING STRUCTURE; CROSS STREETS ARE ALVARADO/MACARTHUR	00/01	In the construction phase to be completed by 12/30/02.

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LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
MONTEREY PARK	LA996067	SCAB	0	TRANSIT VEHICLE PURCHASE PURCH 2 HVY DUTY BUSES AND 1 PARATRANSIT VEH TO ACCOMMODATE EXISTING OVERCROWDING	00/01	Completed.
PASADENA	LA0B215	SCAB	0	PURCHASE OF (5) 30-FOOT ALTERNATIVE FUEL EXTENSION VEHICLES (GTIP)	00/01	In the construction phase to be completed by 12/31/03.
SANTA CLARITA	LA0B7019	SCAB	0	SANTA CLARITA REGIONAL TRANSIT CENTER-LOCATE IN VALENCIA TOWN CENTER, SERVE AS A HUB FOR THE 10 TRANSIT ROUTES, REDUCE AVERAGE 15 MINUTES FOR MANY CROSS-TOWN TRIPS	01/02	Completed.
SANTA CLARITA	LA0B7020	SCAB	0	ADDITIONAL (150) PARKING AT NEWHALL METROLINK STATION-CONSTRUCT ADEQUATE PARKING AT THE NEWHALL METROLINK STATION, INCLUDE PARK & RIDE, KISS & RIDE AND DISABLED-ACCESS SPACES	01/02	Appraisals completed. ROW to be acquired by June 2002. Construction to start in August 2002.
SANTA CLARITA	LA973024	SCAB	0	IMPROVE PEDESTRIAN ACCESS TO TRANSIT STOPS, INSTALLING CROSSWALKS, SIDE- WALKS, AND PEDESTRIAN-ACTUATED TRAFFIC SIGNALS @ 17 TRANSIT STOPS VARIOUS LOCATIONS, PROJECT EXEMPT	01/02	Project complete.
SANTA FE SPRINGS	LA974032	SCAB	0	SANTA FE SPRINGS METRO EXPRESS EXPAND ON THE CITY'S FIXED ROUTE CIRCULATOR TO PROVIDE FEEDER SERVICE TO THE NORWALK/SANTA FE SPRINGS METROLINK STATION	00/01	Completed
SANTA MONICA	LA973503	SCAB	0	DOWNTOWN TRANSIT MALL: TRANSFER STOPS IMPROVMENT PROJECT SANTA MONICA BLVD., & BROADWAY FROM OCEAN AVE. TO FIFTH STREET	00/01	Project in the PE phase. Expected to be complete in FY02.
SANTA MONICA	LA990725	SCAB	0	EXPANSION VEHICLES: (22) 40' CLEAN DIESEL TRANSIT VEHICLES (11) 26' ELECTRIC TRANSIT VEHICLES	00/01	Project under construction to be completed by 12/31/03.
SANTA MONICA	LA990726	SCAB	0	BIKE RACKS (CFP/6089)	00/01	Project under construction to be completed by 12/31/06.
SOUTH PASADENA	LA996090	SCAB	0	BLUE LINE - MISSION MERIDIAN TRANSIT ORIENTED PARKING, SOUTH PASADENA – WILL CONSIST OF 194 CAR PARKING GARAGE (PARK-N-RIDE), INCLUDING 134 SPACES FOR TRANSIT USERS AND 30 SPACES FOR BICYCLES ADJACENT TO STRUCTURE	00/01	Environmental and Design stages. Completion 12/03.
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	LA0B7009	VAR	0	ANTELOPE VALLEY LINE IMPROVEMENTS-INCREASE CAPACITY AND REDUCE TRAVEL TIME ON THIS COMMUTER RAIL AND FREIGHT SERVICE LINE BETWEEN LANCASTER AND LOS ANGELES	00/01 01/02	Project hasn't gone out for a bid yet. Expected completion date is July FY03.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
SOUTHERN CALIF REGIONAL RAIL AUTHORITY	LA963758	SCAB	0	PURCHASE METROLINK CARS & LOCOMOTIVES	00/01	Ongoing project. In the process of procuring 28 cars. Completion expected in FY04.
VARIOUS AGENCIES	LA973039	SCAB	0	ACCESS SERVICES INC. FLEET EXPANSION VEHICLES 46 MINI -- VANS	00/01	Paratransit Project in the PE phase.
VARIOUS AGENCIES	LA9811029	SCAB	0	COMMUNITY HEALTH FOUNDATION OF EAST LA - EXPANSION VEHICLE -- 1 8-PASSGENGER MODIFIED VAN	00/01	Completed.
VARIOUS AGENCIES	LA9811033	SCAB	0	SANTA MARTA HOSPITAL -- EXPANSION VEHICLE ONE 6-PASSENGER MINIVAN	00/01	Completed in FY01.
VARIOUS AGENCIES	LA9811034	SCAB	0	SANTA MARTA HOSPITAL -- EXPANSION VEHICLE ONE 8-PASSENGER MODIFIED VAN	00/01	Completed in FY01.
VARIOUS AGENCIES	LA9811037	SCAB	0	DOWNEY COMMUNITY HOSPITAL EXPANSION VEHICLES - SIX 8-PASSENGER MODIFIED VANS	00/01	Completed in FY01.
VARIOUS AGENCIES	LA9811039	SCAB	0	PEOPLE COORDINATED SERVICES EXPANSION VEHICLE - ONE 17-PASSENGER SMALL BUS	00/01	Completed.
VARIOUS AGENCIES	LA9811045	SCAB	0	TARZANA TREATMENT CENTER EXPANSION VEHICLE - ONE 8-PASSENGER MODIFIED VAN	00/01	Completed in FY01.
VARIOUS AGENCIES	LA9811046	SCAB	0	TARZANA TREATMENT CENTER EXPANSION VEHICLE - ONE 22-PASSENGER MEDIUM BUS	00/01	Completed in FY01.
VARIOUS AGENCIES	LA9811061	SCAB	0	VILLA ESPERANZA EXPANSION VEHICLES 2 8-PSGR. MODIFIED VANS	00/01	Completed.
VARIOUS AGENCIES	LA9811069	SCAB	0	NORTHEAST VALLEY HEALTH CORP EXPANSION VEHICLES -- TWO 6 PASSENGER MINI VANS	00/01	Completed.
VARIOUS AGENCIES	LA990733	SCAB	0	WHITE MEMORIAL MEDICAL CENTER VEHICLE EXPANSION (1) 8 PSGR MODIFIED VAN	00/01	Completed.
VARIOUS AGENCIES	LA990740	SCAB	0	SANTA CLARITA VALLEY COMMITTEE ON AGING - EXPANSION VEHICLES - (2) 17 PASSENGER SMALL BUSES	00/01	Paratransit project in the PE phase.
VARIOUS AGENCIES	LA990741	SCAB	0	PROTOTYPES - EXPANSION VEHICLE ONE (1) 8-PASSENGER MODIFIED VAN	00/01	Completed in FY01.
VARIOUS AGENCIES	LA990742	SCAB	0	PROTOTYPES - EXPANSION VEHICLE ONE (1) 6-PASSENGER MODIFIED VAN	00/01	Completed in FY01.
VARIOUS AGENCIES	LA990743	SCAB	0	KOREAN HEALTH, EDUCATION, INFO & RESEARCH CENTER (KHEIR)- EXPANSION ONE (1) 6-PASSENGER MINIVAN	00/01	Completed.
VARIOUS AGENCIES	LA990744	SCAB	0	KOREAN HEALTH, EDUCATION, INFO & RESEARCH CENTER (KHEIR)- EXPANSION ONE (1) 17-PASSENGER SMALL BUS	00/01	In the PE phase. To be completed in FY02
VARIOUS AGENCIES	LA990745	SCAB	0	HEALTHVIEW, INC - EXPANSION VEH. - TWO (8) PASSENGER MODIFIED VANS	00/01	Completed.
VARIOUS AGENCIES	LA990746	SCAB	0	HEALTHVIEW, INC. - EXPANSION VEH. ONE (1) 17 PASSENGER SMALL BUS	00/01	Completed in FY01.

LOS ANGELES COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
VARIOUS AGENCIES	LA990748	SCAB	0	FOUNDATION FOR THE JUNIOR BLIND VEHICLE EXPANSION (2) 8 PSGR VANS	00/01	Paratransit project in the PE phase.
VARIOUS AGENCIES	LA990749	SCAB	0	EASTER SEAL SOUTHERN CALIFORNIA VEHICLE EXPANSION (2) 22 PSGR BUSES	00/01	Paratransit project in the PE phase.
VARIOUS AGENCIES	LA990750	SCAB	0	DOWNEY COMMUNITY HOSPITAL - VEHICLE EXPANSION (1) 22 PSGR BUSES	00/01	In the construction phase to be completed by 12/31/03.
VARIOUS AGENCIES	LA990751	SCAB	0	DOWNEY COMMUNITY HOSPITAL - VEHICLE EXPANSION (6) 8 PSGR VANS	00/01	In the construction phase to be completed by 12/31/06.
VARIOUS AGENCIES	LA990753	SCAB	0	CITY OF COMPTON - VEHICLE EXPANSION (3) 17 PSGR BUSES WITH MOBILE RADIOS	00/01	In the construction phase to be completed by 12/31/03.

2002 REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM (RTIP) (FY2002/2003-2007/2008) – TCM PROJECTS

Update of TCM projects in 2001 RTIP TCM Implementation Status report:
(Same basic report format as 2001 RTIP)

ORANGE COUNTY - TCMs

PROJECT ID: ORA55001
PROJECT DESCRIPTION: SANTA ANA: PURCHASE AND INSTALLATION OF BICYCLE LOCKERS CITYWIDE.
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: COMPLETE

PROJECT ID: ORA55229
PROJECT DESCRIPTION: BUS STOP ACCESSIBILITY IMPROVEMENTS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: COMPLETE 6/02

PROJECT ID: ORA55263
PROJECT DESCRIPTION: ITS – ORANGE COUNTY MODEL DEVELOPMENT PROJECT TRAVEL TIP EXPANSION
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: COMPLETED 12/01

PROJECT ID: ORA008 **ROUTE:** 22
PROJECT DESCRIPTION: IN CITY OF GARDEN GROVE EUCLID, BROOKHURST, MAGNOLIA, HARBOR, AND FAIRVIEW SIGNAL COORDINATION AT FREEWAY RAMPS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: COMPLETE

TCMs project status using new reporting format for 2002 RTIP:

ORANGE COUNTY - TCMs - LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
HUNTINGTON BEACH	ORA990901	SCAB	0	FIBER OPTIC INTERTIE BETWEEN CITY & CALTRANS. UPGRADE TRAFFIC SIGNAL CONTROL SYSTEM AND ADD CCTV CAMERAS.	00/01	ABOUT TO ENTER CONSTRUCTION COMPLETION DATE: 12/01/02
MISSION VIEJO	ORA980801	SCAB	0	OSO CREEK TRAIL BRIDGE LINKS NORTH/SOUTH SIDES OF TRAIL 150 FT IN LENGTH 300 FT OF S. GERONIMO RD RECREATIONAL TRAILS PROGRAM	00/01	COMPLETED 3/2001
MISSION VIEJO	ORA990902	SCAB	0	REMOTE TMC AND TRAVLER/PUBLIC INFO ACCESS CENTER. PROVIDES TRAFFIC INFO TO PUBLIC LIBRARIES. EST COMM INTERTIE BETWEEN OCTA AND CALTRANS	00/01 01/02	DESIGN COMPLETED 2001. CURRENTLY IN CONSTRUCTION PHASE PENDING FHWA & CALTRANS AUTHORIZATION.
ORANGE, CITY OF	ORA990452	SCAB	0	TUSTIN BRANCH RAIL TRAIL CONVERT RAILS TO BIKE TRAILS FROM TUSTIN THROUGH VILLA PARK AND ORANGE TO THE SANTA ANA RIVER CONNECTS 9 MILE TRAIL	00/01 01/02	Environmental/Design/ROW phase. Extend Design/Engineering to 02/03 and construction to 03/04.
SAN CLEMENTE	ORA990451	SCAB	0	MULTI-USE TRAIL IN SAN CLEMENTE CONSTUCTED PARALLEL TO RAILROAD TRACKS. 2.6 MILES LONG.	00/01 01/02	Design/Engineering

ORANGE COUNTY - TCMs - LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
SANTA ANA	ORA990903	SCAB	0	PACIFIC ELECTRIC BIKE TRAIL. RESURFACE PEROW FROM MACFADDEN TO CHESTNUT. PHASE III ONLY. RECREATIONAL TRAILS PROGRAM.	00/01	COMPLETE
VARIOUS AGENCIES	ORA990906	SCAB	0	LUMP SUM. TEA FUNDS FOR BICYCLE AND PEDESTRIAN FACILITY PROJECTS THROUGHOUT ORANGE COUNTY.	00/01 01/02	ESTIMATED DATE OF COMPLETION: 06/01/03

ORANGE COUNTY - TCMs - STATE HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CALTRANS	6490	SCAB	5	IN ANAHEIM FROM ROUTE 5/22/57 INTERCHANGE TO BEACH BOULEVARD; CONSTRUCT TMA FOR I-5.	00/01	Under construction (I-5 project, TMC activities, 90% complete).
CALTRANS	10167	SCAB	5	IN BUENA PARK FROM SR-91 TO LA COUNTY LINE ADD 1 HOV LANE IN EACH DIRECTION	00/01	Under construction; 90% complete.
CALTRANS	ORA000195	SCAB	22	BUILD MAINLINE HOV LANES ON SR22 FROM VALLEYVIEW TO GLASSELL. DESIGN, ROW, AND CONSTRUCTION. (PROJECT ADMIN. BY OCTA)	00/01	Under construction
SANTA ANA	550	SCAB	55	IN SANTA ANA AT ALTON AVE CONSTRUCT OVERCROSSING & HOV ACCESS RAMPS	05/06	Environmental clearance delayed due to issues w/ HPSR report
CALTRANS	1332	SCAB	55	IN CITY OF ORANGE_WIDEN FREEWAY FROM RTE 22 TO RTE 91 EXIST 8-LN FWY INCL. 2 STND HOV LNS ADD 2 MIXED FLOW LANES AND_AUX LNS; OC @ LAVETA, MEATS & KATELLA (98 STIP PROJECT)	00/01 01/02	Under construction; near completion; working on claims issues; completion date 06/30/05
CALTRANS	ORA55073	SCAB	73	WIDEN FROM BIRCH TO I-405; ADD (1) MIXED FLOW LANE IN NB DIR; NB AUX LANE; SOUNDWALLS; AND (1) HOV LANE IN EACH DIR. NEAR SR55 INTERCHANGE (98 STIP)	00/01	Project ready to advertise for construction
CALTRANS	1240	SCAB	91	IN BUENA PARK & BREA FROM L.A. COUNTY LINE TO STE 57 - SEGMENT 2 EXIST 8-LN FWY ADD 2 HOV LANES AND AUXILLIARY LANES.	00/01	Complete
CALTRANS	1250	SCAB	91	IN ANAHEIM AT STE 57/91 - CONSTRUCT 57/91 INTERCHANGE WITH HOV DIRECT CONNECTORS – TRANSITWAY	00/01	Complete
CALTRANS	6951	SCAB	405	405/55 INTERCHANGE SO. TRANSITWAY MOS1 EXISTING 4 MIXED 1 HOV ON SR55 & I-405 EXIST IS 5 MF & 1 HOV ADD HOV DIRECT TRANSITWAY FROM SR55 TO I-405	00/01	Design
CALTRANS	5242	SCAB	605	I-405 TO LA CO LINE ADD 1 HOV LANE IN EA. DIR.; COMPLETES I-605 INTERCOUNTY GAP IN SO. CAL HOV SYSTEM IN (ITIP PROJECT)	00/01 01/02	Design

ORANGE COUNTY - TCMs - TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
ANAHEIM	ORA010202	SCAB	0	PURCHASE (10) 22 FOOT ELECTRIC BUSES FOR ANAHEIM RESORT AREA	01/02	BUSSES PURCHASED, ARE BEING TESTED, ONROAD 05/01/02
BUENA PARK	ORA55286	SCAB	0	BUENA PARK COMMUTER RAIL STATION AT DALE STREET AND MALVERN	00/01	DESIGN PHASE. COMPLETE DATE NEEDS TO BE CHANGED TO 12/31/02 DUE TO WORK TO DONE BY RAILROAD.
LAGUNA NIGUEL	ORA9530	SCAB	0	LOS ANGELES/SAN DIEGO CORRIDOR MISSION VIEJO/LAGUNA NIGUEL STATION	00/01	UNDER CONSTRUCTION WILL BE COMPLETE 04/01/02
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA000104	SCAB	0	TRANSITWAY IMPROVEMENTS AT IRVINE TRANSPORTATION CENTER; BUILD 900 SPACE PARKING STRUCTURE, INCLUDING ENVIRONMENTAL, DESIGN AND CONSTRUCTION.	00/01 01/02	WILL INITIATE DESIGN PHASE IN YEAR 2003.
ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA65002	SCAB	0	RIDESHARE SERVICES RIDEGUIDE, DATABASE, CUSTOMER INFO, AND MARKETING. (ORA. CO. PORTION).	00/01 01/02	6/01 COMPLETE 6/02 COMPLETE
TUSTIN	R612TA	SCAB	0	TUSTIN COMMUTER RAIL STATION. METROLINK - SBD/RIVERSIDE/IRVINE	00/01	COMPLETE
YORBA LINDA	ORA981103	SCAB	0	IN YORBA LINDA, CONSTRUCT COMMUTER RAIL STATION AND PARK AND RIDE (347 SPACES) NEAR ESPERANZA RD AND NEW RIVER ST	00/01 01/02	DESIGN PHASE

2002 REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM (RTIP) (FY2002/2003-2007/2008) – TCM PROJECTS

Update of TCM projects in 2001 RTIP TCM Implementation Status report:
(Same basic report format as 2001 RTIP)

RIVERSIDE COUNTY - TCMs

PROJECT ID: 41053
PROJECT DESCRIPTION: VARIOUS LOCATIONS - CLASS I BIKEWAY AND PEDESTRIAN SIDEWALKS WITH HANDICAP RAMPS
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Completed

PROJECT ID: 41054
PROJECT DESCRIPTION: RIVER ROAD, PEDLEY ROAD, AND SANTA ANA RIVER TRAIL – TRAFFIC SIGNAL AND TRAIL ACCESS FOR PEDESTRIAN AND EQUESTRIANS
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Completed

PROJECT ID: RIV520115
PROJECT DESCRIPTION: IN COACHELLA VALLEY AREA 2 EXPANSION 30 FOOT ELECTRIC VEHICLE (2 ELECTRIC BUS FOR SHUTTLE SERVICE)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Completed

PROJECT ID: RIV520116
PROJECT DESCRIPTION: IN COACHELLA VALLEY AREA 5 CNG EXPANSION VANS (2 IN 97/98 & 3 IN 98/99)
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Completed

PROJECT ID: RIV520159
PROJECT DESCRIPTION: PURCHASE ROLLING STOCK FOR EXISTING COMMUTER RAIL LINES (JOINT PROJECT WITH LACMTA – TOTAL ACQUISITION OF 14 CARS)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Completed

PROJECT ID: 4632VFF **ROUTE:** 60
PROJECT DESCRIPTION: IN AND NEAR RIVERSIDE FROM VALLEY WAY UNDERCROSSING TO RTE 215 & ON RTE 215 FROM RTE 60 TO UNIV. AVE. UNDERCROSSING - 6 LANE FWY ADD 2 HOV LANES
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Completed

TCMs project status using new reporting format for 2002 RTIP:

RIVERSIDE COUNTY - TCMs - LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CITIES & COUNTY	19814	SCAB	0	ALONG SANTA ANA RIVER - 1.4 MILE BIKEWAY	00/01	Completed

RIVERSIDE COUNTY - TCMs - STATE HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CALTRANS	33480 (combined into 0121D in 2002 TIP)	SCAB	215	FROM EL CERRITO DR TO RTE 60/91/215 IC -- CONSTRUCT IC; ADD 2 HOV LANES (1 LANE IN EACH DIRECTION), AND TRUCK CLIMBING LANE (SB)	00/01 01/02	In Design. Combined into 0121D.
CALTRANS	46681 (combined into 0121D in 2002 TIP)	SCAB	215	FROM BOX SPRINGS RD I/C TO EL CERRITO DR I/C ADD 2 HOV LANES, AND TRUCK CLIMBING LANES (SB) -- (ONE IN EACH DIRECTION)	00/01	In Design. Combined into 0121D.
CALTRANS	46730 (combined into 0121D in 2002 TIP)	SCAB	215	FROM BOX SPRINGS OH TO .4 MI N/O FAIR ISLE DR. RECONST IC; ADD 2 HOV LANES, AND TRUCK CLIMBING LANE (SB) -- (1 IN EACH DIRECTION)	02/03	In Design. Combined into 0121D. Five past I-215 corridor improvement TIP projects combined into Project 0121D. I-215/SR91/SR60, RIV I-215 Corridor Improvement Project Funding Years: FY 02/03 to 06/07; Completion Date: 12/30/07.
CALTRANS	354801	SCAB	60	JUNCTION ROUTE 15 TO VALLEY WAY - ADD 1 HOV LANE AND 1 MIXED FLOW LANE IN EACH DIRECTION INCLUDING WIDEN 5 UC'S AND 1 OH	00/01 01/02	Design/Engineering
MORENO VALLEY	RIV520152	SCAB	60	SR60 AT NASON INTERCHANGE CONSTRUCT HOV BYPASS LANES ON EASTBOUND AND WESTBOUND ON RAMPS	00/01	Completed
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV010212	SCAB	91	ADD HOV LANES THROUGH DOWNTOWN RIVERSIDE - MARY STREET TO RTE 60/215 JCT IN RIVERSIDE -- (DESIGN AND ENGINEERING PORTION ONLY)	00/01	Design/Engineering
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	46360	SCAB	60	IN RIVERSIDE AND MORENO VALLEY ON SR60 FROM RT 215 TO REDLANDS BLVD ADD 2 HOV LANES	01/02	Design/Engineering
TEMECULA	RIV62029	SCAB	79	AT HWY 79 SO AND LA PAZ, ACQUIRE LAND, DESIGN AND CONSTRUCT PARK AND RIDE - 250 SPACES	02/03	Design/Engineering

RIVERSIDE COUNTY - TCMs - TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
BEAUMONT	RIV32134	SCAB	0	IN RIVERSIDE CITY OF BEAUMONT, PURCHASE 7 BUSES W/ LIFTS & TIEDOWNS & 2-WAY RADIOS (5 REP, 2 EXP, 3 IN 0/1, 2 IN2/3, 2 IN 5/6)	00/01	Completed. Expansion buses have been purchased. (Remaining to be purchased are replacement vehicles).
HEMET	RIV990708	SCAB	0	CONSTRUCT TRANSPORTATION/ TRANSIT CENTER/PARK-N-RIDE LOT ON CORNER OF HARVARD AND LATHAM AVE, APP 100 SPACES	00/01 01/02	Design/Engineering

RIVERSIDE COUNTY - TCMs - TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
NORCO	990910	SCAB	0	In City of Norco Development of Crestview Non-motorized Trail Project	00/01	Completed
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	0006S	SCAB	0	METROLINK - SAN BERNARDINO SUBDIVISION TIER II NEW STATIONS AT MAIN ST AND BNSF RR CROSSING IN CORONA AND VAN BUREN BLVD AND BNSF RR CROSSING IN RIVERSIDE (see RIV 011243 in 2002 RTIP Project Listing)	00/01 01/02	Design/Engineering
RIVERSIDE COUNTY TRANS COMMISSION (RCTC)	RIV520111	SCAB	0	REGIONAL RIDESHARE	00/01 01/02	In progress. Various Ridesharing project elements being implemented as part of the multi-year project.
RIVERSIDE TRANSIT AGENCY	RIV000605	SCAB	0	DEBT FINANCING FOR 57 TRANSIT COACHES, 25 REPLACEMENT, 32 EXPANSION	00/01 01/02	In progress - on going financing as buses are procured.

2002 REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM (RTIP) (FY2002/2003-2007/2008) – TCM PROJECTS

Update of TCM projects in 2001 RTIP TCM Implementation Status report:
(Same basic report format as 2001 RTIP)

SAN BERNARDINO COUNTY - TCMs

PROJECT ID: SBD31088
PROJECT DESCRIPTION: BUS FLEET EXPANSION; PURCHASE 40' EXPANSION COACHES & AUXILIARY EQUIPMENT, CNG - 9 COACHES IN 2001; 1 COACH IN 2003
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: FY01 MONIES OBLIGATED; FY03 ON SCHEDULE

PROJECT ID: 44370 **ROUTE:** 30
PROJECT DESCRIPTION: NEAR FONTANA
FROM 0.2 MI E OF SIERRA AVE TO LINDEN AVE CONSTRUCT 6-LANE FWY & 2 HOV LANES
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: SR 30/210 PROJECT UNDER CONSTRUCTION-SEGMENTS 8-11 WERE ROLLED UP INTO 20620 EA

PROJECT ID: 44380 **ROUTE:** 30
PROJECT DESCRIPTION: IN RIALTO, 0.16 KM E/O LINDEN TO 0.16 KM W/O WILLOW AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 9)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: SR 30/210 PROJECT UNDER CONSTRUCTION-SEGMENTS 8-11 WERE ROLLED UP INTO 20620 EA

PROJECT ID: 59101 **ROUTE:** 30
PROJECT DESCRIPTION: IN RIALTO & SBD, 0.16KM W/O WILLOW AVE. TO 0.16KM W/O MACY ST. CONSTRUCT 6-LANE FREEWAY & 2 HOV LANES (SEGMENT 10)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: SR 30/210 PROJECT UNDER CONSTRUCTION-SEGMENTS 8-11 WERE ROLLED UP INTO 20620 EA

PROJECT ID: SBD990305
PROJECT DESCRIPTION: METROLINK/SAN BERNARDINO LINE CONSTRUCT A SECOND PLATFORM, PASSENGER SHELTERS AND INFORMATION KIOSKS.
FUNDING YEAR: 1999/00
IMPLEMENTATION STATUS: PROJECT UNDERWAY-CITY PLANS ON OBTAINING CTC VOTE FOR CONSTRUCTION IN EARLY 2002

PROJECT ID: SBD59209
PROJECT DESCRIPTION: METROLINK STA., PHASE 2 SW CORNER OF MILLIKEN & AT & SF RAILROAD; EXPAND PARKING LOT FROM 330-1,000 SPACES, EXTEND SOUTH PLATFORM, ADD SHADE STRUCTURES
FUNDING YEAR: 1999/00
IMPLEMENTATION STATUS: COMPLETED 10/01/01

PROJECT ID: 981118
PROJECT DESCRIPTION: BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER
FUNDING YEAR: 2001/02
IMPLEMENTATION STATUS: ON SCHEDULE. FUNDS ALLOCATED FOR PSE AND ROW.

SAN BERNARDINO COUNTY - TCMs

PROJECT ID: 990801
PROJECT DESCRIPTION: RUNNING SPRINGS VILLAGE TRAIL - IMPROVE RECREATIONAL TRAIL BETWEEN TWO MAJOR TRANSPORTATION FACILITIES
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: UNDERWAY-DEPARTMENT OF FORESTRY IS LEAD

PROJECT ID: 44400 **ROUTE:** 30
PROJECT DESCRIPTION: RTE 30 - 0.1 MILE W/O MACY ST TO 'H' ST. RTE 215 - 0.1 MILE S/O MUSCUPIABE DR. TO UNIVERSITY PKWY (SEGMENT 11/PHASE 1)
FUNDING YEAR: 2000/01
IMPLEMENTATION STATUS: 30/210 PROJECT UNDER CONSTRUCTION WITH PARTIAL COMPLETION - SEGMENTS 8-11 ROLLED INTO 20620 CORRIDOR DESCRIPTION

PROJECT ID: 200056
PROJECT DESCRIPTION: GREEN VALLEY LAKE - AREA IMPROVEMENTS ROADWAY SHOULDER FOR PAVED WALKWAY, STRUCTURAL REHAB., DIRT TRAIL IMPROVEMENTS
FUNDING YEAR: 2000/01
IMPLEMENTATION STATUS: COMPLETED 12/00

PROJECT ID: 200077
PROJECT DESCRIPTION: BUS SYSTEM - PURCHASE EXPANSION ALT FUEL BUSES (01-13), (02-14)
FUNDING YEAR: 2000/01
IMPLEMENTATION STATUS: 01 FUNDS GRANTED; 02 ON SCHEDULE

TCMs project status using new reporting format for 2002 RTIP:

SAN BERNARDINO COUNTY - TCMs - LOCAL HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
GRAND TERRACE	SBD31860	SCAB	0	MAIN STREET MT. VERNON AVENUE TO W. CITY LIMITS PROVIDE BICYCLE LANES	00/01	COMPLETED WITH BLA FUNDS
REDLANDS	200065	SCAB	0	NEW ELECTRIC SHUTTLE FOR DOWNTOWN REDLANDS	00/01	COMPLETED
REDLANDS	200071	SCAB	0	PURCHASE (3) NEW CNG VANS FOR VANPOOL FOR CITY OF REDLANDS	00/01	COMPLETED
SANBAG	SBD031505	SCAB	0	VARIOUS LOCATIONS - LUMP SUMS LTF, ARTICLE 3 BICYCLE/PEDESTRIAN PROJECTS	00/01 01/02	PROJECTS ON-GOING
SANBAG	200074	VAR	0	LUMP SUM - TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS	00/01 01/02	PROJECTS ON-GOING
SCAG	924165	SCAB	0	RIDESHARE ACTIVITIES	00/01	ALL FUNDS OBLIGATED-UNTIL NEXT TRANSPORTATION ACT-ON-GOING PROGRAM

SAN BERNARDINO COUNTY - TCMs - STATE HIGHWAYS (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CALTRANS	711	SCAB	215	NEAR COLTON AND SAN BERNARDINO FROM ROUTE 10 TO ROUTE 66 AT VARIOUS LOCATIONS - NORTHBOUND AND SOUTHBOUND AUXILIARY LANES WITH RIGHT OF WAY FOR FUTURE HOV LANES	00/01	PROJECT DESIGN UNDERWAY-PROJECT EAS ARE ALL INCLUDED UNDER 713-AS CORRIDOR PROJECT
CALTRANS	713	SCAB	215	SAN BERNARDINO, RTE 10 TO RTE 30 ADD 2 HOV LANES AND OPERATIONAL IMPROVEMENTS, PE ONLY	00/01	UNDERWAY; PROJECT HAS NEW DESCRIPTION AND IS NOW DESCRIBED AS A CORRIDOR PROJECT; ALL OTHER EAS WERE COMBINED BECAUSE PROJECT INCLUDES WHOLE CORRIDOR DESCRIPTION
CALTRANS	716	SCAB	215	IN SAN BERNARDINO, NINTH ST. TO N/O 16TH ST. - ADD 2 HOV LANES ONE IN EACH DIRECTION AND OPERATIONAL IMPROVEMENTS (NON CAPACITY TYPE IMPROVEMENTS)	00/01	COMBINED INTO 713
CALTRANS	00719	SCAB	215	I-215 NORTH FROM MUSCUPIABE TO RTE. 30 (SEG. 5) ADD 2 HOV LANES AND OPERATIONAL IMPROVEMENTS	01/02	COMBINED INTO 713
CALTRANS	20620	SCAB	30	UPLAND TO SAN BERNARDINO FROM LOS ANGELES COUNTY LINE TO ROUTE 215 - 8 LANE FREEWAY INCLUDING 2 HOV LANES (6+2) - 210 CORRIDOR PROJECT	00/01 01/02	CONSTRUCTION UNDERWAY-CORRIDOR COMPLETION EXPECTED IN 05/06
CALTRANS	44301	SCAB	30	IN UPLAND, LA/SBD CO LINE TO MOUNTAIN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 1)	00/01	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED
CALTRANS	44311	SCAB	30	IN UPLAND, MOUTAIN AVE. TO 0.1 MI. W/O CUCAMONGA CYN WASH CONSTRUCT 6 LANE FWY & 2 HOV LANES & CAMPUS AVE UC (SEG. 2)	00/01	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED
CALTRANS	44321	SCAB	30	IN RANCHO CUCAMONGA, 0.1 MI. W/O CUCAMONGA CANYON WASH TO HERMOSA AV CONSTRUCT 6 LANE FWY & 2 HOV LANES (SEGMENT 3)	00/01	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED
CALTRANS	44331	SCAB	30	IN RANCHO CUCAMONGA, HERMOSA AVE TO 0.6 KM E/O MILLIKEN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT4)	00/01 01/02	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED
COLTON	SBD41245	SCAB	10	PARK AND RIDE ALT. FUEL FACILITY AT I-10 AND SPERRY	02/03	SCHEDULE DELAY; CALTRANS RESCOPED THE PROJECT AND ARE ADDING RAMPS AND INTERCHANGE IMPROVEMENTS ALONG WITH THIS PROJECT
SANBAG	SBD0194	SCAB	30	NEAR FONTANA FROM 0.5 MI E OF HEMLOCK TO 0.2 MI E OF SIERRA AVE CONSTRUCT 6-LANE FWY & 2 HOV LANES	00/01	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED
SANBAG	44340	SCAB	30	IN SAN BERNARDINO COUNTY FROM MILLIKEN AVE TO 0.4 MI WEST OF EAST AVE CONSTRUCT 8-LN FWY WITH 2 HOV LANES **SEE STIP PPNO #193B, C & S	00/01	CONSTRUCTION UNDERWAY-FEDERAL FUNDS OBLIGATED

SAN BERNARDINO COUNTY - TCMs – TRANSIT (Reporting on TCM projects identified in first two years of 2001 RTIP, i.e., FY00/01 & FY01/02)

LEAD AGENCY	PROJECT ID	AIR BASIN	RTE	DESCRIPTION	YEAR	TCM PROJECT STATUS
CHINO	SBD41220	SCAB	0	CHINO AVENUE/CENTRAL TO 6TH STS. MULTI-MODAL TRANSPORTATION CENTER INCLUDES PARK-N-RIDE LOT WITH 125 SPACES	00/01 01/02	PROJECT UNDERWAY FEDERAL FUNDS ALLOCATED FOR PSE AND ROW
OMNITRANS	981119	SCAB	0	TRANSIT INTERMODAL FACILITIES - FONTANA TRANSCENTER - EXPAND BUS BAYS, IMPROVE LANDSCAPING, SIGNALS AND PEDESTRIAN AND PASSENGER FACILITIES	00/01	PROJECT UNDERWAY FEDERAL FUNDS ALLOCATED FOR PSE AND ROW
ONTARIO	200094	SCAB	0	EAST ONTARIO METROLINK PHASE II DEVELOPMENT	02/03	SCHEDULE DELAY DUE TO ENVIRONMENTAL ISSUES
SANBAG	200175	SCAB	0	PURCHASE TWO LOCOMOTIVES-PROJECT IS CO-OP WITH RCTC,LACMTA,OCTA, AND VCTC. NEEDED FOR GROWTH IN RIDERSHIP ON METROLINK.	01/02	COMPLETED
SCRAA/LACMTA/ SANBAG	991213	SCAB	0	SAN BERNARDINO LINE CAPACITY IMPROVEMENTS (TRACK IMPROVEMENTS)-FREMONT & MARENGO SIDINGS	00/01	PROJECT UNDERWAY AND INCLUDES ADDITIONAL METROLINK FACILITIES AND UPGRADES

2000 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

ANALYSIS OF IMPLEMENTATION

The implementation status of applicable TCMs (organized by county):

Los Angeles County Metropolitan Transportation Authority

PROJECT ID: LA974170
PROJECT DESCRIPTION: AGOURA HILLS PARK&RIDE LOT INCREASE CAPACITY IN AGOURA HILLS AREA FROM 93 TO 193 SPACES LOCATED ON THE CONGESTED 101 FWY
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Ongoing.

PROJECT ID: LA974065
PROJECT DESCRIPTION: AVTA BIKE RACK ON BUS PROGRAM ANTELOPE VALLEY TRANSIT AUTH. PROCURE AND INSTALL 25 SPORTWORKS BICYCLE ON AVTA BUS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID: 16113
PROJECT DESCRIPTION: ON CATALINA ISLAND FROM AVALON TO NORTH END OF ISLAND - 2 MILE BIKEWAY WITH SCENIC OVERLOOK
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA8STIP13
PROJECT DESCRIPTION: BURBANK LOCAL TRANSIT PURCHASE OF TWO ELETRIC BUSES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA000548 **ROUTE:** 10
PROJECT DESCRIPTION: FROM PUENTE TO CITRUS- HOV LANES FROM 8 TO 10 LANES (C-ISTEA 77720) (98 RTP)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA01347 **ROUTE:** 14
PROJECT DESCRIPTION: RTE 14 FROM PEARBLOSSOM HWY TO AVE P-8 - HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA01348 **ROUTE:** 14
PROJECT DESCRIPTION: RTE 14 FROM ESCONDIDO CYN RD. TO PEARBLOSSOM HWY - HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA963724 **ROUTE:** 30
PROJECT DESCRIPTION: IN LA VERNE AND CLAREMONT FROM FOOTHILL BLVD. TO SAN BERNARDINO COUNTY LINE - NEW 8 LANE FWY INCLUDING 2 HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 126310 **ROUTE:** 30
PROJECT DESCRIPTION: IN CLAREMONT FROM PADUA AVENUE TO SAN BERNARDINO COUNTY LINE – NEW 8 LANE FREEWAY INCLUDING 2 HOV LANES AND INTERCHANGE
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 12640 **ROUTE:** 30
PROJECT DESCRIPTION: IN CLAREMONT FROM TOWNE AVE TO PADUA AVE - NEW 8 LANE FREEWAY INCLUDING 2 HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 17210 **ROUTE:** 30
PROJECT DESCRIPTION: IN CLAREMONT FROM FOOTHILL BLVD. TO SAN BERNARDINO COUNTY LINE – NEW 8 LANE FREEWAY INCLUDING 2 HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 12570 **ROUTE:** 60
PROJECT DESCRIPTION: IN AND NEAR INDUSTRY FROM 0.5 MILE WEST OF OLD BREA CANYON RD TO 0.5 MI. E. OF GRAND AVE. - HOV DIRECT CONNECTORS & COLLECTOR ROAD
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 11985 **ROUTE:** 405
PROJECT DESCRIPTION: NEAR HAWTHORNE AND CULVER CITY FROM ROUTE 105 TO ROUTE 90 - 6 LANE FREEWAY ADD 2 HOV LANES
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: 1178A **ROUTE:** 405
PROJECT DESCRIPTION: IN LA & CULVER CITY FROM RTE 90 to RTE 10 - HOV LANES (SB 5+0 TO 5+1; NB5+0 TO 5+1 HOV) 98CTIP $ FUND NB LN, ALSO PAYS FOR PART OS SB $ DELETED FROM 96STIP
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA000777 **ROUTE:** 405
PROJECT DESCRIPTION: FROM ROUTE 10 TO ROUTE 101 TO EXISTING 8-10 LANE FWY ADD TWO HOV LANES (SB:4+0; 5+0 TO 5+1 HOV)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974042
PROJECT DESCRIPTION: HARBOR TRANSITWAY SHUTTLE WEEKDAYS & SAT. SVC BTW HARBOR TRANSIT STAS @ CARSON & REGION. DESTINATIONS & EMPLOYMENT CTRS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974019
PROJECT DESCRIPTION: CLAREMONT VILLAGE WEST TRANSIT LINKAGES CREATE A TRANSIT ORIENTED DISTRICT LINK PEDESTRIAN AND BICYCLE NETWORK
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID:	LA71702
PROJECT DESCRIPTION:	REPLACE TWO FIXED ROUTE BUSES
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA974406
PROJECT DESCRIPTION:	MLK Jr. PARK AND RIDE EXPANSION PROJECT – PURCHASE LAND & CONSTRUCT 100 NEW PKG SPACES and PROVIDE SECURITY SURVEILLANCE
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA963754
PROJECT DESCRIPTION:	METROLINK SAN BERNARDINO LINE AT COVINA STATION - PARKING ACCESS ENHANCEMENTS (PHASE II)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA973005
PROJECT DESCRIPTION:	BUS EXPANSION: ALTERNATIVE FUEL (TROLLEY BUS)
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	4U006
PROJECT DESCRIPTION:	METRO RAIL GREEN LINE AT DOUGLAS STREET STATION - SIDEWALKS AND HANDICAPPED ACCESS
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA62401
PROJECT DESCRIPTION:	REPLACE 33 BUSES (40') PER YEAR -- $360K/BUS
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA53903
PROJECT DESCRIPTION:	REPLACEMENT BUSES: FY97=3; FY98=6; FY99=2; FY01=2; FY02=1; FY03=2.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA960111
PROJECT DESCRIPTION:	AVENUE I SIGNAL SYNCH FROM E.10TH St. EAST TO W.10th St. - 6 SIGNALS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA960112
PROJECT DESCRIPTION:	W. 10TH ST. SIGNAL SYNCHRONIZATION. PHASE 3 FROM AVE. O-8 TO AVE. M
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA960113
PROJECT DESCRIPTION:	AVENUE M – 10th ST. EAST TO 10th ST. WEST SIGNAL SYNCH
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA960114
PROJECT DESCRIPTION:	AVE. L SIGNAL SYNCH FROM 10th ST. EAST TO 10th ST. WEST - 4 SIGNALS.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.
PROJECT ID:	LA962287
PROJECT DESCRIPTION:	SIERRA HIGHWAY INTERCONNECT PHASE I FROM AVE K TO AVE M - FIBER OPTIC INTERCONNECT PROJECT (INTERCONNECT 4 SIGNALS)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.
PROJECT ID:	LA000345
PROJECT DESCRIPTION:	LONG BEACH TRANSIT FACILITY CONSTRUCT LONG BEACH BUS FACILITY
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.
PROJECT ID:	LA64801
PROJECT DESCRIPTION:	PURCHASE (9) 40' REPLACEMENT BUSES WITH LIFTS
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Completed.
PROJECT ID:	LA974047
PROJECT DESCRIPTION:	BRIDGE FINANCING FOR LONG BEACH BIKE STATION CONTINUATION OF OPERATION SHOWCASE BIKES AS AN ALTERNATIVE TO DRIVING
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.
PROJECT ID:	LA962316
PROJECT DESCRIPTION:	SELAC-TRAFFIC SIGNAL SYNCH. CORRIDORS PROJECT SIGNAL SYNCH & BUS SPEED IMPROVEMENT PROJECT
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.
PROJECT ID:	LA974243
PROJECT DESCRIPTION:	WEST SAN GABRIEL VALLEY SIGNAL SOM & BUS SPEED IMPROVEMENTS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.
PROJECT ID:	LA962315
PROJECT DESCRIPTION:	POMONA VALLEY TRAFFIC SIGNAL FORUM IMPROVEMENT PROJECT REGIONALLY SIGNIFICANT IMPROVEMENT SIGNAL COORDIN./MONITOR.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.
PROJECT ID:	4U004
PROJECT DESCRIPTION:	IN LOS ANGELES FROM PICO STATION LOS ANGELES CONVENTION CENTER – SIDEWALKS AND PEDESTRIAN CONNECTIONS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.
PROJECT ID:	LA000487
PROJECT DESCRIPTION:	PARK AND RIDE LOT (850 SPACES) LANKERSHIM & CHANDLER – RED LINE.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA29202X
PROJECT DESCRIPTION:	METRO RED LINE MOS-3: N. HOLLYWOOD 5.9 MILES WITH 3 STATIONS HIGHLAND STA. TO N. HOLLYWOOD STA
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA29212X
PROJECT DESCRIPTION:	METRO RAIL BLUE LINE - PASADENA EXT UNION STA TO SIERRA MADRE VILLA STA - 13.5 MILES, 12 STATIONS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA79203
PROJECT DESCRIPTION:	LA STANDARD LIGHT RAIL CAR PROCUREMENT FOR GREEN AND BLUE LINES (52) POSSIBLE DEFENSE CONVERSION FUNDS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA962356
PROJECT DESCRIPTION:	SOUTH BAY JPA SYNCHRONIZATION & BUS SPEED IMPROVEMENTS (TRANSIT PRIORITY SYSTEM)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA963544
PROJECT DESCRIPTION:	PURCHASE 6 ADVANCED TECHNOLOGY TRANSIT BUSSES (ATTB) TO REPLACE EXISTING VEHICLES
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA9703001
PROJECT DESCRIPTION:	RIDESHARE EMPLOYER SERVICE INCLUDING RIDEGUIDE/SURVEY REGISTRATION, TDM ASSISTANCE, SPECIAL MARKETING & MONITORING
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974000
PROJECT DESCRIPTION:	BICYCLE PARKING AT FACILITIES LOCKERS AND RACKS AT 20 LOCATIONS 134 BIKE RACKS AND 54 BIKE LOCKERS
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974006
PROJECT DESCRIPTION:	UNION STA. GATEWAY BIKE STA. (BIKE RACKS/LOCKERS, BICYCLE REPAIR/ ACCESSORY SALES, SHOWERS/CHANGING FACILITIES, LIMITED FOOD SVC.)
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974007
PROJECT DESCRIPTION:	REGIONAL BIKE RACKS ON BUSES INSTALL BICYCLE RACKS ON ALL 2,020 BUSSES IN MTA TRANSIT FLEET
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA974036
PROJECT DESCRIPTION:	EL SEGUNDO GREEN LINE SHUTTLE OPERATES 3 PEAK HR SERVICES CONNECTING GREEN LINE W/ EMPLOYMENT DIST. (WEEKDAYS ONLY)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	R626TA
PROJECT DESCRIPTION:	METROLINK RAIL BLUE LINE - PASADENA EXT AT CHINATOWN METROLINK STATION - ACCESS IMPROVEMENTS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974165
PROJECT DESCRIPTION:	MacARTHUR PARK STA. IMPROVEMENTS for DESIGN/CONSTRUCTION OF a plaza for PUBLIC ACCESS (PED. ENTRANCES, WALKWAYS, BIKE FACILITIES)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974193
PROJECT DESCRIPTION:	TRANSIT CENTERS – DEVELOP OR EXPAND 3 TRANSIT CENTERS (IMPROVE EXISTING BUS STOP/CENTER)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	4U005
PROJECT DESCRIPTION:	METROLINK VAN NUYS STATION BETWEEN WILLIS AVENUE AND RAYNER STREET – PEDESTRIAN OVERCROSSING
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA000623
PROJECT DESCRIPTION:	TAYLOR YARD - DWP BIKEWAY EASEMENT PEDESTRIAN BRIDGE CLASS 1
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA962076
PROJECT DESCRIPTION:	SAN FERNANDO RD METROLINK BIKE PATH PHASE I (1.9 MILES OF CLASS I) (1.75 MILES OF CLASS II ON SAN FERNANDO ROAD)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA962098
PROJECT DESCRIPTION:	BOYLE HEIGHTS ATSAC PROJECT COMPUTER BASED REAL TIME TRAFFIC SIGNAL MONITORING SYSTEM
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA962102
PROJECT DESCRIPTION:	MID-CITIES BUS SPEED IMPROVEMENTS (PEAK-HOUR ONLY)
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID: LA962104
PROJECT DESCRIPTION: WESTSIDE BUS SPEED IMPROVEMENT PROJECT
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962106
PROJECT DESCRIPTION: ADARIVE TRAFFIC CONTROL SYSTEM COMPUTER BASED REAL TIME TRAFFIC SIGNAL MONITORING SYSTEM
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA962107
PROJECT DESCRIPTION: SMART CORRIDOR OPERATION ENHANCEMENT
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962113
PROJECT DESCRIPTION: CENTRAL/EAST LOS ANGELES BUS SPEED IMPROVEMENT PROJECT (INCREASES SPEED FOR FIXED-ROUTE TRANSIT BY SIGNAL PRIORITY)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962121
PROJECT DESCRIPTION: VICTORY/VANOWEN BUS PRIORITY TREATMENTS (SIGNAL COORDIN.)
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962127
PROJECT DESCRIPTION: SYLMAR/SAN FERNANDO BUS TERMINAL AND TIMED TRANSFER CONNECTION CENTER
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962148
PROJECT DESCRIPTION: WESTLAKE COMMUNITY BASED INTERCEPT INTERMODAL FACILITY (96 CALL, CAT 2)
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA962158
PROJECT DESCRIPTION: W. VALLEY SMART SHUTTLE DEMONSTRATION PROJECT (NO SHUTTLE #)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA962167
PROJECT DESCRIPTION: BIKE RACK AND PARKING PROGRAM
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA962173
PROJECT DESCRIPTION: WESTLAKE/MACARTHUR PARK - SMART SHUTTLE DEMONSTRATION PROJECT (NO SHUTTLE NUMBER)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA970901
PROJECT DESCRIPTION: ATSAC & BUS PRIORITY INFRASTRUCTURE 138 SIGNALIZED INTERSECTIONS INSTALLATION
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA970902
PROJECT DESCRIPTION: ATSAC & BUS PRIORITY INFRASTRUCTURE 42 SIGNALIZED INTERSECTIONS INSTALLATION
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA970903
PROJECT DESCRIPTION: ATSAC & BUS PRIORITY INFRASTRUCTURE 109 SIGNALIZED INTERSECTIONS INSTALLATION
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974040
PROJECT DESCRIPTION: METRO GREEN LINE SHUTTLE, AVIATION STATION TO CITY BUS CENTER OPERATE TWO WEEKDAY, PEAK HOUR SHUTTLE SERVICE
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974044
PROJECT DESCRIPTION: BICYCLE RACK ON BUSES-HARBOR AREA ADD BIKE RACKS ON THE LADOT LINES WHICH EXCLUSIVELY SERVE THE HARBOR AREA
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974054
PROJECT DESCRIPTION: KOREATOWN - METRO DASH LINK CONNECT RESID. & BUSINESS AREAS W/ 3 RED LINE STAS ALONG WILSHIRE (ALLOWS FOR SOME RTE. DEVIATION)
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974058
PROJECT DESCRIPTION: EXPOSITION PARK COMPLEX -- INSTALL APPROX. 80 BICYCLE SPACES AT 10 HIGHLY VISIBLE ENTRY LOCATIONS AT MAJOR INSTITUTIONS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974072
PROJECT DESCRIPTION: CHATSWORTH TRANSIT STATIONS BIKE STATION INCLUDE CHANGING ROOMS, BIKE REPAIR, SALES, RENTAL SHOP, AND BIKE LOCKERS
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962148
PROJECT DESCRIPTION: METRO RAIL RED LINE AT WESTLAKE COMMUNITY INTERMODAL INTERCEPT FACILITY - PARKING STRUCTURE (PHASE I AND II)
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA962314
PROJECT DESCRIPTION: EAST SAN GABRIEL VALLEY SOM PILOT PROJECT - TRAFFIC SIGNALS INTERCONNECT PROJECT
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA55012
PROJECT DESCRIPTION: REPLACE BUSES - 1997 40' BUSES, 1998 5 40' BUSES, 2000 5 40' BUSES
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA55201
PROJECT DESCRIPTION: CONTINUING PROJECT - BUS STOP IMPROVEMENTS (AMENITIES,SHELTERS)
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA55206
PROJECT DESCRIPTION: DAR REPLACEMENT VANS; ONE NEW VAN AND ONE REPLACEMENT VAN
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974020
PROJECT DESCRIPTION: MONTEREY PK DOWNTOWN PKG COMPLEMENT to CURRENT EFFORTS FOR IMPLEMENTATION OF A PEDEST. PLAZA W/IN THE PROJECT AREA.
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA022191
PROJECT DESCRIPTION: PASADENA - REGIONAL SIGNAL SYNCH & SMART CORRIDOR
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA974409
PROJECT DESCRIPTION: POMONA TELEBUSINESS WORKCENTER: BRIDGING THE GAP ADD TELECONFERENCING CAPABILITIES AND INCREASE MARKETING OF CTR
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: Completed.

PROJECT ID: LA973506
PROJECT DESCRIPTION: ROLLING STOCK ACQUISITION UP TO 5 LOCOMOTIVES & 30 CARS
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA974096
PROJECT DESCRIPTION: SANTA CLARITA COMMUTE CONNECT OPERATION - PROPANE-FUELED EXP. BUSES TO LINK EMPLOYMENT CTRS W/ SANTA CLARITA METROLINK STA.
FUNDING YEARS: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: LA003255
PROJECT DESCRIPTION: SANTA CLARA RIVER REGIONAL COMMUTER BIKEWAY (93/94 CFP, CAT. 8, 255) CLASS 1 14.5 MILES PH.II
FUNDING YEARS: 1997/98
IMPLEMENTATION STATUS: Completed.

PROJECT ID:	LA974062
PROJECT DESCRIPTION:	SANTA CLARITA BICYCLE STA. METROLINK STA. INCLUDE SECURE SPACES FOR 50 BIKES, CHANGING & REST ROOMS, BIKE REPAIR, SALES, & RENTALS
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974204
PROJECT DESCRIPTION:	NORWALK/SANTA FE SPRINGS TRANSPORTATION CTR EXPANSION, PARK-&-RIDE FOR 67 VEHICLES, KISS-AND-RIDE PASSENGER DROP OFF AREA
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA974405
PROJECT DESCRIPTION:	ARTESIA STA PED. WAY TO PROVIDE SAFE DIRECT ACCESS TO EASTBOUND PEDESTRIANS AT BLUE LINE STA. (INCLUDE SIGNALIZED PED CROSSING)
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA974032
PROJECT DESCRIPTION:	SANTA FE SPRINGS METROEXPRESS EXPAND ON THE CITY'S FIXED ROUTE CIRCULATOR TO PROVIDE FEEDER SERVICE TO THE NORWALK/SANTA FE SPRINGS METROLINK STATION
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA002047
PROJECT DESCRIPTION:	SANTA MONICA SMART CORRIDOR EXTENSION
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	LA57110
PROJECT DESCRIPTION:	BUS REPLACEMENT: FY 1997: 25 BUSES; FY1998: 31 BUSES; FY2000: 15 BUSES; FY2001: 12 BUSES; FY2002: 10 BUSES
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	927331
PROJECT DESCRIPTION:	RIDESHARE ACTIVITIES
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	Completed.

PROJECT ID:	LA974419
PROJECT DESCRIPTION:	BLUE LINE MISSION STREET STATION PARK-AND-RIDE LOT WILL CONSIST OF 130 SPACES AND 300 SQUARE FEET FOR BICYCLES
FUNDING YEARS:	1997/98
IMPLEMENTATION STATUS:	Replaced by Project ID LA996090

PROJECT ID:	LA974059
PROJECT DESCRIPTION:	WEST HOLLYWOOD COMMUTER CENTER TO BE LOCATED IN A HIGHLY VISIBLE STOREFRONT ALONG SANTA MONICA BLVD.
FUNDING YEARS:	1998/99
IMPLEMENTATION STATUS:	On-going.

Orange County Transportation Authority

PROJECT ID: ORA1870
PROJECT DESCRIPTION: PURCHASE STANDARD REPLACEMENT BUSES
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: ORA35
PROJECT DESCRIPTION: TRAFFIC OPERATIONS CONTROL CENTER
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Completed.

PROJECT ID: ORA55001
PROJECT DESCRIPTION: SANTA ANA: PURCHASE AND INSTALLATION OF BICYCLE LOCKERS CITYWIDE.
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Initiated/Ongoing (Awarded).

PROJECT ID: ORA55229
PROJECT DESCRIPTION: BUS STOP ACCESSIBILITY IMPROVEMENTS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing (Awarded).

PROJECT ID: ORA55263
PROJECT DESCRIPTION: ITS – ORANGE COUNTY MODEL DEVELOPMENT PROJECT TRAVEL TIP EXPANSION
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing (Awarded).

PROJECT ID: ORA55286
PROJECT DESCRIPTION: BUENA PARK COMMUTER RAIL STATION
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project on Schedule for FY2000/01.

PROJECT ID: ORA9505
PROJECT DESCRIPTION: CITY OF SANTA ANA REGIONAL TRANSPORTATION CENTER ENGINEERING, DESIGN, CONSTRUCTION OF 423 SPACE PARKING STRUCTURE & WALKWAY
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Completed.

PROJECT ID: ORA9530
PROJECT DESCRIPTION: LA/SAN DIEGO CORRIDOR MISSION VIEJO/LAGUNA NIGUEL STATION
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project scheduled for completion on 03/03/03. Delayed schedule due to cost adjustments and ROW issues. Additional funding has been obtained to accommodate higher construction costs and the ROW is currently being negotiated.

PROJECT ID: R474TB
PROJECT DESCRIPTION: METROLINK – RIV/LA VIA FULLERTON AT FULLERTON TRANSPORTATION CENTER – PARKING EXPANSION
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Completed.

PROJECT ID: R612TA
PROJECT DESCRIPTION: METROLINK – SBD/RIVERSIDE/IRVINE TUSTIN STATION - NEW STATION AND PARKING FACILITY
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: 10167 **ROUTE:** 5
PROJECT DESCRIPTION: BUENA PK FROM SR-91 TO LA COUNTY LINE ADD 1 HOV LANE IN EACH DIR.
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: 01260FF **ROUTE:** 5
PROJECT DESCRIPTION: SANTA ANA FROM RTE 22 TO RTE 91 – 6 LANE FWY ADD 2 MIXED FLOW LANES, 2 HOV LANES, AND RECONSTRUCT INTERCHANGES INCLUDE GENE AUTRY & ORANGEWOOD
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: ORA008 **ROUTE:** 22
PROJECT DESCRIPTION: IN CITY OF GARDEN GROVE EUCLID, BROOKHURST, MAGNOLIA, HARBOR, AND FAIRVIEW SIGNAL COORDINATION AT FREEWAY RAMPS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing (Awarded).

PROJECT ID: 550 **ROUTE:** 55
PROJECT DESCRIPTION: SANTA ANA @ ALTON AVE CONSTRUCT OVERPASS & HOV ACCESS RAMPS
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: ORA55073 **ROUTE:** 73
PROJECT DESCRIPTION: ROUTE 73 WIDENING FROM BIRCH STREET TO I-405 ADD ONE HOV LANE AND MIXED FLOW LN NEAR ROUTE 55 INTERCHANGE
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: 1240 **ROUTE:** 91
PROJECT DESCRIPTION: IN BUENA PARK & BREA FROM LA COUNTY LINE TO RTE 57 - SEGMENT 2 EXIST 8-LN FWY ADD 2 HOV LANES AND AUXILLIARY LANES
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Initiated/Ongoing.

PROJECT ID: ORA55226 **ROUTE:** 91
PROJECT DESCRIPTION: SR91/KRAEMER BLVD IC, MOTORIST INFORMATION SYSTEM, IM=TSM
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Project Completed.

Riverside County Transportation Commission

PROJECT ID: 41049
PROJECT DESCRIPTION: BELARDO RD. CORRIDOR - 1.4 Mi. BIKEWAY WITH LIGHTING & BIKE RACKS
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Obligated.

PROJECT ID:	41053
PROJECT DESCRIPTION:	VARIOUS LOCATIONS - CLASS I BIKEWAY AND PEDESTRIAN SIDEWALKS WITH HANDICAP RAMPS
FUNDING YEAR:	1997/98
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	41054
PROJECT DESCRIPTION:	RIVER ROAD, PEDLEY ROAD, AND SANTA ANA RIVER TRAIL – TRAFFIC SIGNAL AND TRAIL ACCESS FOR PEDESTRIAN AND EQUESTRIANS
FUNDING YEAR:	1997/98
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	RIV32134
PROJECT DESCRIPTION:	IN RIVERSIDE CITY OF BEAUMONT PURCHASE TWO BUSES W/ LIFTS & TIEDOWNS (1 Replacement, 1 Expansion)
FUNDING YEAR:	1998/99
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	RIV32166
PROJECT DESCRIPTION:	IN CITY OF RIVERSIDE SPECIAL SERVICES PURCHASE SIX REPLACEMENT VANS W/LIFTS AND TIEDOWNS
FUNDING YEAR:	1998/99
IMPLEMENTATION STATUS:	Pending FTA approval.

PROJECT ID:	RIV32228
PROJECT DESCRIPTION:	IN WESTERN RIVERSIDE COUNTY PURCHASE 3 REPLACEMENT CNG TRANSIT COACHES, RADIOS & FAREBOXES
FUNDING YEAR:	1998/99
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	RIV520111
PROJECT DESCRIPTION:	RIDESHARING
FUNDING YEAR:	1998/99
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	RIV520115
PROJECT DESCRIPTION:	IN COACHELLA VALLEY AREA 2 EXPANSION 30 FOOT ELECTRIC VEHICLE (2 ELECTRIC BUS FOR SHUTTLE SERVICE)
FUNDING YEAR:	1997/98
IMPLEMENTATION STATUS:	Obligated.

PROJECT ID:	RIV520116
PROJECT DESCRIPTION:	IN COACHELLA VALLEY AREA 5 CNG EXPANSION VANS (2 IN 97/98 & 3 IN 98/99)
FUNDING YEAR:	1998/99
IMPLEMENTATION STATUS:	Purchased 97/98 coaches, 98/99 pending FTA grants approval.

PROJECT ID:	RIV520117
PROJECT DESCRIPTION:	IN RIVERSIDE CITY OF BANNING PURCHASE 3 REPLACEMENT 35-PASSENGER COACHES W/LIFT & TIEDOWNS (2 IN 97/98, 1 IN 00/01)
FUNDING YEAR:	1997/98
IMPLEMENTATION STATUS:	Obligated 97/98 coaches.

PROJECT ID: RIV520134
PROJECT DESCRIPTION: IN WESTERN RIVERSIDE COUNTY PURCHASE 6 REPLACEMENT COACHES W/LIFTS & RADIOS (2 IN 98/99, 4 IN 99/00)
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Purchased 98/99 coaches, 99/00 coaches pending FTA grant approval.

PROJECT ID: RIV520154
PROJECT DESCRIPTION: LUMP SUM SIGNAL SYNCHRONIZATION PROJECTS AT VARIOUS LOCATIONS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Obligated.

PROJECT ID: RIV520159
PROJECT DESCRIPTION: PURCHASE ROLLING STOCK FOR EXISTING COMMUTER RAIL LINES (JOINT PROJECT WITH LACMTA – TOTAL ACQUISITION OF 14 CARS)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Obligated.

PROJECT ID: RIV62042
PROJECT DESCRIPTION: VALLEY-WIDE SIGNAL SYNCHRONIZATION INTERCONNECT OF 400 SIGNALS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Engineering has been obligated. A STIP amendment moved the rest of the funds to 99/00. This is ongoing and the rest of the funds will be allocated this fiscal year.

PROJECT ID: RIV62043
PROJECT DESCRIPTION: SUNLINE METROLINK BUS PURCHASE
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Pending FTA grant approval.

PROJECT ID: 4632VFF **ROUTE:** 60
PROJECT DESCRIPTION: IN AND NEAR RIVERSIDE FROM VALLEY WAY UNDERCROSSING TO RTE 215 & ON RTE 215 FROM RTE 60 TO UNIV. AVE. UNDERCROSSING - 6 LANE FWY ADD 2 HOV LANES
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Awarded.

San Bernardino Associated Governments

PROJECT ID: SBD31088
PROJECT DESCRIPTION: BUS FLEET EXPANSION - PURCHASE 40' EXPANSION COACHES & AUXILLARY EQUIPMENT, CNG - 01-8, 03-1
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Rollover project, on-going.

PROJECT ID: SBD32236
PROJECT DESCRIPTION: ONTARIO REG. TRAFFIC INFO. SYSTEM -- VARIOUS STREETS NEAR AIRPORT – FIX SIGNAGE, CHANGEABLE MESSAGE SIGNS & BOARDS
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: On-going.

PROJECT ID: SBD41020
PROJECT DESCRIPTION: PARATRANSIT VEHICLES - PURCHASE 17 PASSENGER LIFT EQUIPPED CNG REPLACEMENT VANS, 98-27
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Complete.

PROJECT ID: SBD41022
PROJECT DESCRIPTION: PARATRANSIT - VEHICLES REPLACEMENT ALT. FUEL, 03-45, 04-36
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Rollover project, on-going.

PROJECT ID: SBD41179
PROJECT DESCRIPTION: TRANSFER POINT FACILITY WITH BUS BAYS LAND ACQUISITION AND CONSTRUCTION IN DOWNTOWN SAN BERNARDINO
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Complete.

PROJECT ID: SBD59203
PROJECT DESCRIPTION: PEDESTRIAN FACILITY IMPROVEMENTS AT RIALTO METROLINK STA. BTW ORANGE & RIVERSIDE Ave. (IN ALLEY BTW METROLINK & DOWNTOWN)
FUNDING YEAR: 2002/03
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: SBD59254
PROJECT DESCRIPTION: METROLINK - LOCOMOTIVE RETROFIT FOR NATURAL GAS
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Complete.

PROJECT ID: SBD88357
PROJECT DESCRIPTION: LA CADENA VALLEY BOULEVARD TO MOUNT VERNON SIGNAL INTERCONNECT
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Complete.

PROJECT ID: SBD94163
PROJECT DESCRIPTION: FUNDING FOR COMMUTER COMPUTER
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Rollover project, on-going.

PROJECT ID: SBD41245 **ROUTE:** 10
PROJECT DESCRIPTION: PARK AND RIDE FACILITY N/O I-10 AT SPERRY AND FAIRWAY DEVELOPMENT OF 70 PARKING SPACES FOR COMMUTER VEHICLE PARKING
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 44370 **ROUTE:** 30
PROJECT DESCRIPTION: NEAR FONTANA
FROM 0.2 MI E OF SIERRA AVE TO LINDEN AVE CONSTRUCT 6-LANE FWY & 2 HOV LANES
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 44380 **ROUTE:** 30
PROJECT DESCRIPTION: IN RIALTO, 0.16 KM E/O LINDEN TO 0.16 KM W/O WILLOW AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 9)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 59101 **ROUTE:** 30
PROJECT DESCRIPTION: IN RIALTO & SBD, 0.16KM W/O WILLOW AVE. TO 0.16KM W/O MACY ST. CONSTRUCT 6-LANE FREEWAY & 2 HOV LANES (SEGMENT 10)
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 711 **ROUTE:** 215
PROJECT DESCRIPTION: NEAR COLTON AND SAN BERNARDINO FROM ROUTE 10 TO ROUTE 66 AT VARIOUS LOCATIONS – NORTHBOUND AND SOUTHBOUND AUXILIARY LANES WITH RIGHT OF WAY FOR FUTURE HOV LANES.
FUNDING YEAR: 1997/98
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 713 **ROUTE:** 215
PROJECT DESCRIPTION: SAN BERNARDINO, RTE 10 TO RTE 30 ADD 2 HOV LANES, MODIFY OVERCROSSING PE ONLY (INITIATED)
FUNDING YEAR: 1998/1999
IMPLEMENTATION STATUS: Initiated.

ADDED PROJECTS:

PROJECT ID: SBD990305
PROJECT DESCRIPTION: METROLINK/SAN BERNARDINO LINE CONSTRUCT A SECOND PLATFORM, PASSENGER SHELTERS AND INFORMATION KIOSKS.
FUNDING YEAR: 1999/00
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: SBD59209
PROJECT DESCRIPTION: METROLINK STA., PHASE 2 SW CORNER OF MILLIKEN & AT & SF RAILROAD – EXPAND PARKING LOT FROM 330-1,000 SPACES, EXTEND SOUTH PLATFORM, ADD SHADE STRUCTURES
FUNDING YEAR: 1999/00
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: SBD981118
PROJECT DESCRIPTION: BUS SYSTEM - PASSENGER FACILITIES: DESIGN AND BUILDING OF ONTARIO TRANSCENTER
FUNDING YEAR: 2001/02
IMPLEMENTATION STATUS: To be implemented.

PROJECT ID: 9908001
PROJECT DESCRIPTION: Running Springs – Village Trail
FUNDING YEAR: 1998/99
IMPLEMENTATION STATUS: Initiated.

PROJECT ID: 990602
PROJECT DESCRIPTION: METROLINK CAPITAL MAINTENANCE
FUNDING YEAR: 2000/01
IMPLEMENTATION STATUS: ON-GOING.

PROJECT ID: 200037
PROJECT DESCRIPTION: 4 MILE ROUTE WITHIN THE CITY OF REDLANDS – LOCAL TRANSPORTATION SERVICE UTILIZING CNG POWERED, RUBBER WHEEL TROLLEYS
FUNDING YEAR: 1999/00
IMPLEMENTATION STATUS: Initiated.

PROJECT ID:	SBD90105	
PROJECT DESCRIPTION:	Bus system – Bus Replacements ALT. FUEL, 01-21, 02-16, 03-19, 04-13	
FUNDING YEAR:	1999/00	
IMPLEMENTATION STATUS:	On-going.	

PROJECT ID:	716	**ROUTE:** 215
PROJECT DESCRIPTION:	SAN BERNARDINO, 0.2 MI S/O 9TH ST TO 0.4 MI N/O 16TH ST WIDEN FWY, MODIFY INTERCHANGES CONSTRUCT COLLECTOR-DISTRIBUTOR ROAD	
FUNDING YEAR:	1999/00	
IMPLEMENTATION STATUS:	Initiated.	

PROJECT ID:	20620	**ROUTE:** 30
PROJECT DESCRIPTION:	UPLAND TO SAN BERNARDINO FROM LOS ANGELES COUNTY LINE TO ROUTE 215 - 8 LANE FREEWAY INCLUDING 2 HOV LANES (R.O.W. ONLY)	
FUNDING YEAR:	1996/97	
IMPLEMENTATION STATUS:	Initiated.	

PROJECT ID:	44301	**ROUTE:** 30
PROJECT DESCRIPTION:	IN UPLAND, LA/SBD CO LINE TO MOUNTAIN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 1)	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Under construction.	

PROJECT ID:	44311	**ROUTE:** 30
PROJECT DESCRIPTION:	IN UPLAND, MOUTAIN AVE. TO 0.1 MILE W/O CUCAMONGA CANYON WASH CONSTRUCT 6 LANE FWY & 2 HOV LANES & CAMPUS AVE. UC (SEGMENT 2)	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Under construction.	

PROJECT ID:	44321	**ROUTE:** 30
PROJECT DESCRIPTION:	IN RANCHO CUCAMONGA, 0.1 MILE W/O CUCAMONGA CANYON WASH TO HERMOSA AV CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT 3)	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Under construction.	

PROJECT ID:	44331	**ROUTE:** 30
PROJECT DESCRIPTION:	IN RANCHO CUCAMONGA, HERMOSA AVE TO 0.6 KM E/O MILLIKEN AVE. CONSTRUCT 6 LANE FREEWAY & 2 HOV LANES (SEGMENT4)	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Under construction.	

PROJECT ID:	44400	**ROUTE:** 30
PROJECT DESCRIPTION:	RTE 30 - 0.1 MILE W/O MACY ST TO 'H' ST. RTE 215 - 0.1 MILE S/O MUSCUPIABE DR. TO UNIVERSITY PKWY (SEGMENT 11/PHASE 1)	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Initiated.	

PROJECT ID:	200056	
PROJECT DESCRIPTION:	GREEN VALLEY LAKE - AREA IMPROVEMENTS ROADWAY SHOULDER FOR PAVED WALKWAY, STRUCTURAL REHAB., DIRT TRAIL IMPROVEMENTS	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	To be implemented.	

PROJECT ID:	980901	**ROUTE:** 30
PROJECT DESCRIPTION:	ON SR 30 FROM LA CO. LINE TO .5 MILES EAST OF ETIWANDA AVE. CONSTRUCT 12 OVERCROSSINGS & UNDERCROSSINGS FOR SEGS. 1-5	
FUNDING YEAR:	2000/01	
IMPLEMENTATION STATUS:	Initiated.	

PROJECT ID:	200068
PROJECT DESCRIPTION:	UPGRADE AND SYNCHRONIZE TRAFFIC SIGNALS ON PARALLEL/ INTERSECTING ARTERIALS ALONG I-10 AND SR-60 FREEWAY CORRIDORS
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	Initiated.

PROJECT ID:	200062
PROJECT DESCRIPTION:	40TH ST FROM KENDALL DR TO SEPULVEDA AV – SIGNAL INTERCONNECT A TOTAL OF 6 TRAFFIC SIGNALS
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	To be implemented.

PROJECT ID:	200077
PROJECT DESCRIPTION:	BUS SYSTEM – PURCHASE EXPANSION ALT FUEL BUSES (01-13), (02-14)
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	On-going.

PROJECT ID:	200072
PROJECT DESCRIPTION:	GRAND AVE., PEYTON DRIVE, CHINO AVENUE AND CHINO HILLS PARKWAY – TRAFFIC SIGNAL SYNCHRONIZATION AND TRAFFIC OPERATION CENTER
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	To be implemented.

PROJECT ID:	200073
PROJECT DESCRIPTION:	ANDERSON ST./TIPPECANOE FROM UNIVERSITY COURT TO HOSPITALITY LANE – PROVIDE TRAFFIC SIGNAL COORDINATION AND TIMING INTERCONNECT 7 TRAFFIC SIGNALS, INSTALL EMERG. PRE-EMPTION
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	To be implemented.

PROJECT ID:	200074
PROJECT DESCRIPTION:	LUMP SUM – TRANSPORTATION ENHANCEMENT ACTIVITIES PROJECTS FOR SAN BERNARDINO COUNTY-BIKE/PED PROJECTS
FUNDING YEAR:	2000/01
IMPLEMENTATION STATUS:	To be implemented.

PROJECT ID:	SBD41065
PROJECT DESCRIPTION:	PARATRANSIT-VECHICLES: REPLACEMENT ALT. FUEL, 99-1, 00-4, 02-1
FUNDING YEAR:	2001/02
IMPLEMENTATION STATUS:	On-going.

1998 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

ANALYSIS OF IMPLEMENTATION

Implementation status of applicable TCMs are organized by county.

Los Angeles County Metropolitan Transportation Authority

Project ID: 7051
Project Description: METROLINK - VENTURA LINE
NORTHRIDGE STATION - CONSTRUCTION
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED**

Project ID: 10501 Route: 30
Project Description: IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNARDINO COUNTY LINE - CONSTRUCT EIGHT LANE FREEWAY INCLUDING TWO HIGH OCCUPANCY VEHICLE LANES
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: 11267 Route: 110
Project Description: CONSTRUCT TWO TRANSIT STATIONS
HARBOR TRANSITWAY STATIONS
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED**

Project ID: 11768
Project Description: AT VARIOUS LOCATIONS
SIGNAL SYNCHRONIZATION
Funding Years: FY 1996/97
Implementation Status: **PROJECT IMPLEMENTED**

Project ID: 12560 Route: 14
Project Description: NEAR SANTA CLARITA, FROM SAND CANYON ROAD TO ESCONDIDO CANYON ROAD - FOUR LANE FREEWAY ADD TWO HIGH OCCUPANCY VEHICLE LANES WITH TRUCK CLIMBING LANES (6+0 TO 6+2)
Funding Years: FY 1997/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: 12640 Route: 30
Project Description: IN CLAREMONT, FROM TOWNE AVENEUE TO PADUA AVENUE - CONSTRUCT EIGHT LANE FREEWAY INCLUDING TWO HIGH OCCUPANCY VEHICLE (HOV) LANES
Funding Years: FY 1997/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: LA000274 Route: 2
Project Description: FROM SEPULVEDA TO MORENO EXISTING 3 LANES; PROPOSED 4 + HOV (4+2)
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: LA000357 Route: 5
Project Description: FROM ROUTE 170 TO ROUTE 118 HOV LANES (10 TO 12 LANES)
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: LA000358 Route: 5
Project Description: FROM ROUTE 134 TO ROUTE 170 HOV LANES (8 TO 10 LANES)
Funding Years: FY 1996/97
Implementation Status: **PROJECT IMPLEMENTED.**

Project ID: LA000362 Route: 60
Project Description: FROM ROUTE 605 TO BREA CYN ROAD HOV LANE (FROM 8-10 TO 10-12 LANES)
Funding Years: FY 1996/97
Implementation Status: **PROJECT IMPLEMENTED.**

Project ID: LA000544 Route: 60
Project Description: IN AND NEAR POMONA FROM ROUTE 57 TO SAN BERNARDINO COUNTY LINE -- HOV LANES (8 LANES PLUS 2 HOV)
Funding Years: FY 1997/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: LA000546 Route: 57
Project Description: HOV CONNECTORS RTE. 57/60 FROM 8 TO 10 LANES HOV
Funding Years: FY 1997/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID:	LA000777	Route: 405
Project Description:	FROM ROUTE 10 TO ROUTE 101 TO EXISTING 8-10 LANE FREEWAY ADD TWO HOV LANES	
Funding Years:	FY 1997/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	LA002047
Project Description:	SANTA MONICA SMART CORRIDOR EXTENSION
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA002506
Project Description:	DASH SHERMAN OAKS SHUTTLE PROGRAM (93/99 TDM)
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA002556
Project Description:	BLUE LINE WILLOW STATION PARKING STRUCTURE
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA002633
Project Description:	THOMPSON CREEK BICYCLE TRAIL (93/97 CFP; BIKE PROGRAM) CLASS I (2 MILES)
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA003626
Project Description:	DOMINGUEZ CHANNEL BICYCLE TRAIL PHASE. I (93/94 CFP, CAT. 8, 626) CLASS I
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA01344	Route: 5
Project Description:	RT 5 FROM RT 118 TO RT 14 FROM 10 TO 12 LANES HOV LANES	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	LA01347	Route: 14
Project Description:	RT 14 FROM PEARBLOSSOM HWY TO AVE P-8 HOV LANES (4 TO 6 LANES)	
Funding Years:	FY 1997/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	LA01348	Route: 14
Project Description:	RT 14 FROM ESCONDIDO CYN RD. TO PEARBLOSSOM HWY - HOV LANES (4 TO 6 LANES)	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	LA022140
Project Description:	EXPOSITION RIGHT-OF-WAY REGIONAL BIKEWAY CLASS I (8.8 MILES) CLASS II (2.6 MILES)
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA022191
Project Description:	PASADENA REG SIGNAL SYNCH & SMART CORRIDOR
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA02556A
Project Description:	TRAFFIC OPERATION SYSTEM #4 RT.2 RT.5/RT.210 RT.14 RT.5/RT.48 RT.30 RT.210/RT.66 RT.42 RT.210/RT.WILLOW
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA29202
Project Description:	METRO RED LINE MOS-3: HOLLYWOOD/VINE TO LANKERSHIM/CHANDLER (1) & WILSHIRE/WESTERN TO PICO/SAN VICENTE (2) EASTSIDE (3)
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA29211
Project Description:	PASADENA TRANSPORTATION CENTER
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA29212
Project Description:	METRO RAIL BLUE LINE - PASADENA EXT (SIERRA MADRE VILLA) TO LA
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA29225
Project Description:	LA-RIVERSIDE (VIA UP) COMMUTER RAIL (LAUPT - RIVERSIDE STATION) COMPLETION OF TRACK UPGRADE
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA51602
Project Description:	BUS REPLACEMENT OF 5 BUSES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA52605
Project Description:	PURCHASE 10 ENGINES AND 10 TRANSMISSION PACKAGES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA52606
Project Description:	REPLACE 19 TRANSIT BUSES
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA53903
Project Description:	PURCHASE 3 REPLACEMENT VANS, 2 WITH LIFTS
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA55012
Project Description:	REPLACE 7 BUSES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA55201
Project Description:	ON GOING BUS STOP MAINTENANCE; REPLACEMENT OF ITEMS DUE TO DAMAGE AND NORMAL WEAR AND TEAR
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA57110
Project Description:	BUS REPLACEMENT FY 1997: 25 FY 1998: 16 BUSES FY 1999: 15 BUSES
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA5B214
Project Description:	CITY OF INGLEWOOD/METRO RIDE, INC. SHUTTLE BUS OPERATION
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA5B218
Project Description:	TRANSPORTATION CONCEPTS DOWNEY - SHUTTLE BUS OPERATION ALSO KNOWN AS THE LAKEWOOD SHUTTLE #631
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA65406
Project Description:	REPLACE BUSES FY'97 18 BUSES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA65408
Project Description:	MAJOR BUS COMPONENTS (2 ENGINES & 2 TRANSMISSIONS)
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA66100
Project Description:	REPLACEMENT OF 40' TRANSIT COACHES WITH ALTERNATIVE FUELED COACHES 30 BUSES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA66101
Project Description:	REPLACEMENT OF FOUR 30' COACHES WITH ALTERNATIVE FUEL (ELECTRIC, CNG)
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA66102
Project Description:	REPLACE TRANSIT COACHES WITH ALTERNATIVELY FUELED 40' COACHES 4 BUSES
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA7031
Project Description:	IN LA COUNTY AT VARIOUS LOCATIONS SYNCHRONIZE SIGNALS PILOT AREA PROJECT
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA71702
Project Description:	REPLACE THREE FIXED ROUTE BUSES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA75054
Project Description:	REPLACE 4 FIX RTE. BUSES
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA79203
Project Description:	LA STANDARD LIGHT RAIL CAR PROCUREMENT FOR GREEN AND BLUE LINES__(74) P'SBLE FED DEFENSE CONVERSION FUNDS AND ADD'L OUTYEAR PC40
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA85010
Project Description:	GLOBAL POSITIONING SYSTEM (GPS) TRACKING SYSTEM
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA85055
Project Description:	REPLACE 4 FIX RTE. BUSES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA96001
Project Description:	BUS-ROLLING STOCK - 67 BUSES
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	LA960139
Project Description:	OCEAN AVE, BROADWAY, OCEAN PARK BLVD, MAIN STREET UPDATE EXISTING OUTDATED SIGNALS, CONTROLLERS, SYNCHRONIZED SIGNALS
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA960181
Project Description:	RAIL MODE AND RENOVATION PROGRAM
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	LA962206	Route: 405
Project Description:	FROM RT 90 TO RT 10__HOV LANES PROJECT (FROM 8+0 TO 8+2 HOV)	
Funding Years:	FY 1997/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	LA9703Z
Project Description:	LOCOMOTIVE EMISSIONS REDUCTION PROGRAM STUDY STATE FUNDS ARE PVEA
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Orange County Transportation Authority

Project ID:	1240	Route: 91
Project Description:	IN BUENA PARK & BREA FROM L.A. COUNTY LINE TO RTE 57 SEGMENT 2 EXIST 8-LN FWY ADD 2 HOV LANES AND AUXILIARY_LANES	
Funding Years:	FY 1996/97, 97/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	1250	Route: 91
Project Description:	IN ANAHEIM AT RTE 57/91 CONSTRUCT 57/91 INTERCHANGE WITH HOV DIRECT CONNECTORS - TRANSITWAY	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	1260	Route: 5
Project Description:	IN ANAHEIM RECONSTR GENE AUTRY WAY INTERCHNG FROM I-5 HOV FACILITY TO BETMOR LN INCLUDED AS PART OF I-5 WIDENING SEE #2850 & #2850A (93 RME)	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	9530	
Project Description:	LOS ANGELES/SAN DIEGO CORRIDOR MISSION VIEJO/LAGUNA NIGUEL STATION - RIGHT OF WAY ACQUISTION, PLATFORMS, AND PARKING FACILITY	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	01260EE	Route: 5
Project ID:		
Project Description:	IN SANTA ANA AND ANAHEIM FROM RTE 22 TO RTE 91 ON EXISTING 6-LANE FWY ADD 2 MIXED FLOW LANES, TWO HIGH OCCUPANCY VEHICLE LANES, & RECONSTRUCT INTERCHANGES	
Funding Years:	FY 1996/97, 97/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID: ORA157
Project Description: PURCHASE 170 REPLACEMENT VANS
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: ORA175
Project Description: RTE 405/55 TRANSITWAY MIT ND (11/93)
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: ORA187
Project Description: DEBT SERVICE FOR 1993 COP FUNDING MISCELLANEOUS CAPITAL PROJECTS
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: ORA1870
Project Description: PURCHASE 259 REPLACEMENT BUSES STANDARD 40FT BUSES
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: ORA37136
Project Description: ORANGE COMMUTER RAIL STATION IMPROVEMENTS
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED.**

Riverside County Transportation Commission

Project ID: 41062
Project Description: UNIVERSITY AVENUE FROM CHICAGO AVENUE TO ROUTE 60 - PEDESTRIAN LIGHTING, LANDSCAPING, BENCHES, AND HANDICAPPED ACCESSIBILITY
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED.**

Project ID: 46322 Route: 60
Project Description: NEAR RIVERSIDE, FROM VALLEY WAY TO UNIVERSITY - FOUR AND SIX LANE FRWY ADD 2 HOV LANES (STAGE 2)
Funding Years: FY 1996/97
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: 46360 Route: 60
Project Description: IN RIVERSIDE AND MORRENO VALLEY, FROM ROUTE 215 TO REDLANDS BOULEVARD - FOUR LANE FREEWAY ADD TWO HIGH OCCUPANCY VEHICLE (HOV) LANES
Funding Years: FY 1996/97
Implementation Status: **SEE APPENDIX - LETTER DATED MAY 19, 1998.**

Project ID: 46720 Route: 215
Project Description: IN CITY OF RIVERSIDE FROM WEST JCT RTE 60 TO SAN BERNARDINO COUNTY LINE EXISTING 6-LN FWY ADD 2 HOV LANES
Funding Years: FY 1996/97
Implementation Status: **SEE APPENDIX - LETTER DATED MAY 19, 1998.**

Project ID: RIV32086
Project Description: COMMUTER TRANSPORTATION SERVICES RIDESHARE SERVICES
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED.**

Project ID: RIV32120
Project Description: IN RIVERSIDE COUNTY CITY OF BANNING PURCHASE ONE REPLACEMENT 12-PASSENGER VAN W/LIFT & TIEDOWNS
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED.**

Project ID: RIV32145
Project Description: IN RIVERSIDE CITY OF CORONA - PURCHASE FIVE REPLACEMENT VANS W/LIFTS & TIEDOWNS, RADIOS
Funding Years: FY 1997/98
Implementation Status: **PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	RIV32162
Project Description:	IN RIVERSIDE CITY OF RIVERSIDE SPECIAL SERVICES PURCHASE OF FOUR REPLACEMENT VANS W/LIFTS AND TIEDOWNS
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	RIV32164
Project Description:	IN RIVERSIDE CITY OF RIVERSIDE SPECIAL SERVICES PURCHASE ONE REPLACEMENT VAN W/LIFTS AND TIEDOWNS
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	RIV32172
Project Description:	IN RIVERSIDE_COUNTY PALO VERDE VALLEY TRANSIT AGENCY PURCHASE ONE REPLACEMENT MID-SIZE BUS W/ LIFT RADIO, FAREBOX & TIEDOWNS
Funding Years:	FY 1996/97
Implementation Status:	**PURCHASED MINI-BUS INSTEAD OF MID-SIZE BUS.**

Project ID:	RIV32174
Project Description:	IN RIVERSIDE COUNTY PALO VERDE VALLEY TRANSIT AGENCY PURCHASE ONE REPLACEMENT VAN W/ LIFT & TIEDOWNS
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	RIV32228
Project Description:	IN WESTERN RIVERSIDE COUNTY PURCHASE 3 REPLACEMENT TRANSIT COACHES, RADIOS & FAREBOXES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	RIV32359
Project Description:	IN MORENO VALLEY ON SR60/MORENO BEACH CONSTRUCT 200 SPACE PARK N RIDE LOT.
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV32392
Project Description:	IN WESTERN RIVERSIDE COUNTY DEBT SERVICE PAYMENT FOR TEN EXPANSION COACHES (COPS)
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV32397
Project Description:	IN WESTERN RIVERSIDE COUNTY PURCHASE 11 REPLACEMENT DIAL-A-RIDE VANS
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT DELETED, DUPLICATE OF PROJECT RIV32400.**

Project ID:	RIV32412
Project Description:	IN COACHELLA VALLEY AREA LEASE/PURCHASE MOTOR COACHES FY 1996/97 - 98/99
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV32420
Project Description:	IN COACHELLA VALLEY AREA 2 REPLACE. PARATRANSIT VEH.
Funding Years:	FY 1996/97, 97/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52015
Project Description:	IN CATHEDRAL CITY ON DATE PALM FROM 30TH AVE TO PEREZ RD - INTERCONNECT OF 12 TRAFFIC SIGNALS, IN-HOUSE CONTROL PC SYSTEM
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52018
Project Description:	IN CATHEDRAL CITY ON RAMON ROAD FROM LANDAU BL TO DATE PALM DR - INTERCONNECT OF 5 TRAFFIC SIGNALS
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52019
Project Description:	IN CATHEDRAL CITY ON PALM CANYON FROM GOLF CLUB DR TO CATHEDRAL CANYON DR - INTERCONNECT OF 4 TRAFFIC SIGNALS
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52020
Project Description:	IN MURRIETA INSTALL INTELLIGENT TRAFFIC SURVEILLANCE SYSTEM
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52021 Route: 91
Project Description:	IN CORONA HOV ON RAMPS AT 3 LOCATIONS ON SR91 (SERFAS CLUB WB, LINCOLN WB, AND MCKINLEY WB, ADD ONE HOV BYPASS LANE ON EXISTING RAMPS AT SERFAS)
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52022
Project Description:	IN PALM SPRINGS CITYWIDE SIGNAL INTERCONNECT ON INDIAN CANYON DRIVE AND ON TAHQUITZ CANYON WAY
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52024
Project Description:	IN MORENO VALLEY CITYWIDE SIGNAL INTERCONNECT ON PERRIS BLVD AND ON ALESSANDRO BLVD
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52025
Project Description:	IN RIVERSIDE COUNTY ON SR 79 NORTH FROM MARGARITA ROAD TO MURRIETA HOT SPRINGS ROAD - INTERCONNECT OF 3 TRAFFIC SIGNALS
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52026
Project Description:	IN RIVERSIDE COUNTY ON SR 79 SOUTH FROM I15 TO BUTTER-FIELD STAGE RD - INTERCONNECT OF 6 TRAFFIC SIGNALS
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT DELAYED PENDING COMPLETION OF SR79 WIDENING (SEE LETTER IN APPENDIX)**

Project ID:	RIV52027
Project Description:	IN RIVERSIDE COUNTY SIGNAL INTERCONNECT ON MISSION BLVD FROM SR60 TO PYRITE AND VAN BUREN FROM BELLEGRAVE TO RUTILE
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52028
Project Description:	IN MURRIETA AT LOS ALAMOS - SIGNAL INTERCONNECT (PHASE 2 - HEACOCK & GATEWAY PLAZA ENTRANCE) WEST OF WHITEWOOD RD.
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	RIV52106
Project Description:	VALLEY RESOURCE CENTER ONE EXPNASION VAN WITH MOBILE RADIO
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

Project ID:	RIV52107
Project Description:	MEDITRANS SERVICES INC. ONE REPLACEMENT VEHICLE
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT COMPLETED.**

San Bernardino Associated Governments

Project ID:	711	Route: 215
Project Description:	NEAR COLTON AND SAN BERNARDINO, FROM ROUTE 10 TO ROUTE 66 AT VARIOUS LOCATIONS - NORTHBOUND AND SOUTHBOUND AUXILIARY LANES WITH RIGHT OF WAY FOR FUTURE HOV LANES	
Funding Years:	FY 1996/97, 97/98	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID:	20621	Route: 30
Project Description:	IN SAN BERNARDINO COUNTY FROM LOS ANGELES COUNTY LINE TO MOUNTAIN AVE CONSTRUCT 8-LN FWY WITH 2 HOV LANES	
Funding Years:	FY 1996/97	
Implementation Status:	**PROJECT INITIATED/ONGOING.**	

Project ID: SBD0129 Route: 10
Project Description: IN MONTCLAIR & UPLAND FROM LOS ANGELES COUNTY LINE TO GROVE AVE. ADD 2 HOV LNS. AUX LNS./SOUNDWALLS
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: SBD031171
Project Description: CITRUS AVENUE AT BASELINE AVENUE TRAFFIC SIGNAL MODIFICATION AND INTERSECTION IMPROVEMTS (TURN LNS)
Funding Years: FY 1996/97
Implementation Status: **PROJECT COMPLETED.**

Project ID: SBD031506
Project Description: RIDESHARING CONTRIBUTIONS FOR RIDESHARE ACTIVITIES IN COOP WITH CTS
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING**

Project ID: SBD31088
Project Description: BUS FLEET EXPANSION PURCHASE 16 40' EXPANSION COACHES & AUXILLARY EQUIPMENT, CNG
Funding Years: FY 1996/97, 97/98
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID: SBD31093
Project Description: BUS FLEET EXPANSION PURCHASE 8 40' EXPANSION COACHES & AUXILLARY EQUIPMENT, CNG
Funding Years: FY 1997/98
Implementation Status: **PROJECT DELETED, ADDED TO PROJECT SBD31088.**

Project ID: SBD31828
Project Description: CAMINO DEL CIELO/PINION AT STATE ROUTE 62 - CONSTRUCT PARK AND RIDE FACILITY
Funding Years: FY 1996/97
Implementation Status: **PROJECT INITIATED/ONGOING.**

Project ID:	SBD31853
Project Description:	BARTON ROAD - 22430 BARTON ROAD (WEST OF I-215) CONST. 48 VEHICLE PARK & RIDE LOT
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT DELETED, DUPLICATE OF PROJECT SBD31854.**

Project ID:	SBD31854
Project Description:	BARTON ROAD AT LA CROSSE AVENUE CONST. 60 VEHICLE PARK & RIDE LOT
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT DELAYED UNTIL FY98/99.**

Project ID:	SBD31860
Project Description:	MAIN STREET MT. VERNON AVENUE TO W. CITY LIMITS PROVIDE BICYCLE LANES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	SBD41202
Project Description:	ARROW RTE. MILLIKEN AVE TO EAST ST. WIDEN PORTIONS FROM 2-4 LANES (APPROX. 12,000 FT.)_SPOT WIDEN PLUS MARKED BIKE LANES (CLASS 3)
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	SBD41287
Project Description:	GRAND TERRACE MULTIMODAL TRANSFER PT FACILITY REHAB. OF A VACANT 12,000 FT. COMMERCIAL BUILDING AND PARK-N-RIDE WITH 57 SPACES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT DELAYED UNTIL FY98/99.**

Project ID:	SBD41322
Project Description:	9TH ST./H TO SIERRA WAY - MODIFY EXISTING TRAFFIC SIGNAL TO ADD PEDESTRIAN SIGNALS AND LOOPS ON THE SIDE STREETS
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT INITIATED/ONGOING.**

Project ID:	SBD41436 Route: 83
Project Description:	EUCLID AVE., SPRR R/W A" ST ,MEMORIAL PARK CAMPUS AVE. 16TH ST" AND FOOTHILL BLVD. - CONSTRUCTION OF SELECTED BICYCLE ROUTES
Funding Years:	FY 1997/98
Implementation Status:	**PROJECT ON SCHEDULE FOR FY97/98.**

Project ID:	SBD41437
Project Description:	CITY OF UPLAND - UPLAND TOWN CENTER ACCESS IMPROVEMENTS TO TOWN CENTER INCLUDING PEDESTRIAN AND BICYCLE AMENDMENTS. UPGRADE PEDESTRIAN ALLEY WAYS.
Funding Years:	FY 1996/97
Implementation Status:	**PROJECT INITIATED/ONGOING.**

1996 RTIP Committed Transportation Control Measures (TCMs)

Project Listing Report

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
7051	LA	TR8S	METROLINK - VENTURA LINE NORTHRIDGE STATION - CONSTRUCTION	STA	1997	0	0	700	700
10501	LA	HE14A	IN LA VERNE AND CLAREMONT, FROM FOOTHILL BOULEVARD TO SAN BERNAR-DINO COUNTY LINE - CONSTRUCT EIGHT LANE FREEWAY INCLUDING INCLUDING TWO HIGH OCCUPANCY VEHICLE LANES	CM	1998	1528	5100	0	6628
				PC25	1997	599	0	0	599
				PC25	1998	0	0	17600	17600
				STP	1997	0	1989	0	1989
				STP	1998	0	13193	0	13193
				STSM	1997	198	0	0	198
				STSM	1998	808	0	0	808
11267	LA	HB6B	CONSTRUCT TWO TRANSIT STATIONS HARBOR TRANSITWAY STATIONS	STP	1997	0	0	8000	8000
11768	LA	HB4NL	AT VARIOUS LOCATION SIGNAL SYNCHRONIZATION	STP	1997	0	0	2622	2622
12560	LA	HB5	NEAR SANTA CLARITA, FROM SAND CANYON ROAD TO ESCONDIDO CANYON ROAD - FOUR LANE FREEWAY ADD TWO HIGH OCCUPANCY VEHICLE LANES WITH TRUCK CLIMBING LANES(6+0 TO 6+2)	NH	1998	0	0	11111	11111
12640	LA	HE14A	IN CLAREMONT, FROM TOWNE AVENEUE TO PADUA AVENUE - CONSTRUCT EIGHT LANE FREEWAY INCLUDING TWO HIGH OCCUPANCY VEHICLE (HOV) LANES	STP	1998	0	810	0	810
0219N	LA	HE14A	NEAR SOUTH PASADENA, FROM ROUTE 10 TO ROUTE 210 REPAIR/PRESERVATION OF HISTORIC BLD	IM	1997	0	3200	0	3200
LA000274	LA	HB5	FROM SEPULVEDA TO MORENO EXISTING 3 LANES; PROPOSED 4 + HOV (4+2)	CITY	1997	0	0	912	912
				CITY	1998	0	0	911	911
				DEMO	1997	617	0	1020	1637
				DEMO	1998	617	0	1021	1638
			(93/94 CFP; CAT. 2, 210)	FTA3	1997	1041	0	1719	2760
				FTA3	1998	1041	0	1719	2760
				PC25	1998	0	0	2208	2208
LA000357	LA	HB5	FROM ROUTE 170 TO ROUTE 118 HOV LANES (10 TO 12 LANES) (CFP 345)	CM	1997	317	0	0	317
				CM	1998	0	0	1254	1254
				STSM	1997	41	0	0	41
				STSM	1998	0	0	162	162

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA000358	LA	HB5	FROM ROUTE 134 TO ROUTE 170	CM	1997	1342	0	0	1342
	LA	HB5	HOV LANES (8 TO 10 LANES)	STPL-R	1997	136	0	0	136
	LA	HB5	(CFP 346)	STSM	1997	192	0	0	192
LA000362	LA	HB5	FROM ROUTE 605 TO BREA CYN ROAD	STPL-R	1997	2112	0	0	2112
	LA	HB5	HOV LANE (FROM 8&10 TO10&12 LANES)	STSM	1997	274	0	0	274
LA000544	LA	HB5	IN AND NEAR POMONA	CM	1998	0	0	8310	8310
	LA	HB5	FROM ROUTE 57 TO SAN BERNARDINO	STSM	1998	0	0	1077	1077
			COUNTY LINE__HOV LANES						
			(8 LANES PLUS 2 HOV)						
			(C-ISTEA 77716; CFP 356)						
LA000546	LA	HB5	HOV CONNECTORS RTE. 57/60	CM	1998	0	0	1457	1457
			FROM 8 TO 10 LANES HOV	STSM	1998	0	0	189	189
			(C-ISTEA 777718; CFP 359)						
LA000777	LA	HB5	FROM ROUTE 10 TO ROUTE 101	CM	1998	1417	0	0	1417
			TO EXISTING 8-10 LANE FREEWAY ADD	PC25	1998	5588	0	5000	10588
			TWO HOV LANES	STSM	1998	183	0	0	183
LA002047	LA	HB4NA	SANTA MONICA SMART CORRIDOR EXTEN-	PC25	1997	0	0	11	11
			SION		1998	0	0	254	254
LA002506	LA	TR1	DASH SHERMAN OAKS SHUTTLE PROGRAM	CM	1997	270	0	0	270
	LA	TR1	(93/99 TDM)	CM	1998	280	0	0	280
	LA	TR1	PUSHOUT ONE YEAR	PROPALR	1997	172	0	0	172
	LA	TR1		PROPALR	1998	219	0	0	219
LA002556	LA	HB6	BLUE LINE WILLOW STATION PARKING	PC25	1997	0	0	3117	3117
			STRUCTURE	STA	1997	0	0	6005	6005
LA002633	LA	HB8	THOMPSON CREEK BICYCLE TRAIL	PC25	1997	0	0	19	19
			(93/97 CFP; BIKE PROGRAM)						
			CLASS I (2 MILES)						
LA003626	LA	HB8	DOMINGUEZ CHANNEL BICYCLE_TRAIL	PC25	1997	0	0	340	340
			PH. I	PC25	1998	0	0	425	425
			(93/94 CFP, CAT. 8, 626)						
			CLASS I						

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA01344	LA	HB5	RT 5 FROM RT 118 TO RT 14	STPL-R	1997	422	0	0	422
			FROM 10 TO 12 LANES	STSM	1997	55	0	0	55
			HOV LANES						
LA01347	LA	HB5	RT 14 FROM PEARBLOSSOM HWY TO AVE	CM	1998	0	0	1947	1947
			P-8	STSM	1998	0	0	252	252
			HOV LANES (4 TO 6 LANES)						
LA01348	LA	HB5	RT 14 FROM ESCONDIDO CYN RD. TO	PC25	1997	0	0	5683	5683
			PEARBLOSSOM HWY	STPL-R	1997	2923	0	0	2923
			HOV LANES (4 TO 6 LANES)	STSM	1997	377	0	0	377
LA022140	LA	HB8	EXPOSITION RIGHT-OF-WAY REGIONAL	PC25	1997	376	0	543	919
			BIKEWAY	PC25	1998	0	0	291	291
			CLASS I (8.8 MILES)	STPE	1997	0	0	4647	4647
			CLASS II (2.6 MILES)						
LA022191	LA	HB4NL	PASADENA	STPL-R	1997	0	0	1129	1129
			REG SIGNAL SYNCH & SMART CORRIDOR	STSM	1997	0	0	146	146
LA02556A	LA	HB4NN	TOS #4	CM	1998	0	0	2124	2124
			RT.2 RT.5/RT.210	STSM	1998	0	0	212	212
			RT.14 RT.5/RT.48						
			RT.30 RT.210/RT.66						
			RT.42 RT.210/WILLOW, ETC.						
LA29202	LA	TR8	METRO RED LINE MOS-3:	CM	1997	0	0	20000	20000
			HOLLYWOOD/VINE TO LANKERSHIM/	CM	1998	0	0	20000	20000
			CHANDLER (1) & WILSHIRE/WESTERN TO	FTA3	1997	0	0	158800	158800
			PICO/SAN VICENTE (2) EASTSIDE (3)	FTA3	1998	0	0	179000	179000
			(FY 2001 STO 50,000 - 96STIP 75%)	LTF	1997	0	0	340749	340749
				LTF	1998	0	0	257352	257352
				P116	1997	0	0	15000	15000
				STP	1997	0	0	10000	10000
				STP	1998	0	0	10000	10000
				STSM	1997	0	0	2591	2591
LA29211	LA	TR9S	PASADENA TRANSPORTATION CENTER	BOND	1997	0	0	6600	6600
			-9114	CO	1997	0	0	4800	4800
				LTF	1997	0	0	2200	2200

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA29212	LA	TR9	METRO RAIL BLUE LINE - PASADENA EXT	BOND	1997	0	0	41900	41900
			(SIERRA MADRE VILLA) TO LA	BOND	1998	0	0	41600	41600
			(9109, A, C, D)	PC25	1997	0	0	22434	22434
				PC25	1998	0	0	23879	23879
				PC40	1997	0	0	2356	2356
				PC40	1998	0	0	3400	3400
LA29225	LA	TR8	LA-RIVERSIDE (VIA UP) COMMUTER RAIL	BOND	1997	0	0	860	860
			(LAUPT - RIVERSIDE STATION)	PC10	1997	0	0	860	860
			(BONDS = PROP 108 FUNDS)						
			COMPLETION OF TRACK UPGRADE						
LA51602	LA	TR6A3	BUS REPLACEMENT_OF 5 BUSES	FTA9	1998	0	0	200	200
				PROPALR	1998	0	0	50	50
LA52101	LA	TR6	FY 1997 COP DEBT SERVICE	FTA9	1997	0	0	1400	1400
			LOCAL MATCH IS IN-KIND THROUGH	FTA9	1998	0	0	1400	1400
			REAL ESTATE	LTF	1997	0	0	350	350
				LTF	1998	0	0	350	350
LA52402	LA	TR6A3	FY 1997 - 99 EXISTING BUS FLEET COP	FTA9	1997	0	0	3304	3304
			SUTRO A	FTA9	1998	0	0	3470	3470
				PROPA	1997	0	0	2556	2556
				PROPA	1998	0	0	2414	2414
LA52603	LA	TR6A3	ANNUAL TIRE PURCHASE	FTA9	1997	0	0	129	129
				FTA9	1998	0	0	129	129
				TDA4	1997	0	0	32	32
				TDA4	1998	0	0	32	32
LA52605	LA	TR6A2	PURCHASE 10 ENGINES AND 10	STPL-R	1997	0	0	219	219
			TRANSMISSION PACKAGES	TDA4	1997	0	0	43	43
LA52606	LA	TR6A3	REPLACE 19 TRANSIT BUSES	FTA9	1997	0	0	708	708
				FTA9	1998	0	0	1772	1772
				TDA4	1997	0	0	171	171
				TDA4	1998	0	0	443	443
LA53903	LA	TR6A3	PURCHASE 3 REPLACEMENT VANS,	FTA9	1997	0	0	231	231
			2 WITH LIFTS	FTA9	1998	0	0	108	108
				PROPALR	1997	0	0	57	57
				PROPALR	1998	0	0	27	27

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA55012	LA	TR6A3	REPLACE 7 BUSES	FTA9	1997	0	0	1680	1680
				TDA4	1997	0	0	420	420
LA55201	LA	TR6H1	ON GOING BUS STOP MAINTENANCE;	FTA9	1997	0	0	160	160
			REPLACEMENT OF ITEMS DUE TO	TDA4	1997	0	0	40	40
			DAMAGE AND NORMAL WEAR AND TEAR						
LA56702	LA	TR6A3	BUS VEHICLE LEASE	FTA9	1997	0	0	611	611
				FTA9	1998	0	0	611	611
				PROPALR	1997	0	0	200	200
				PROPALR	1998	0	0	200	200
LA57110	LA	TR6A3	BUS REPLACEMENT	FTA9	1997	0	0	6600	6600
			FY 1997: 25	FTA9	1998	0	0	4224	4224
			FY 1998: 16 BUSES	TDA4	1997	0	0	1650	1650
			FY 1999: 15 BUSES	TDA4	1998	0	0	1056	1056
LA57808	LA	TR6A3	DEBT SERVICE ON COPS	FTA9	1997	0	0	325	325
				FTA9	1998	0	0	313	313
				TDA4	1997	0	0	67	67
				TDA4	1998	0	0	63	63
LA5B214	LA	TR6A	CITY OF INGLEWOOD/METRO RIDE, INC.	CM	1997	0	0	636	636
			SHUTTLE BUS OPERATION	LTF	1997	0	0	92	92
LA5B218	LA	TR6A	TRANSPORTATION CONCEPTS	CM	1997	0	0	275	275
			DOWNEY - SHUTTLE BUS OPERATION	LTF	1997	0	0	32	32
			ALSO KNOWN AS THE LAKEWOOD SHUTTLE						
			#631						
LA65004	LA	TR9A2	RAIL PARTS - MBL $1.2 MILLION,	FTA3	1997	0	0	1600	1600
			MRL $.5 MILLION	FTA3	1998	0	0	1600	1600
				TDA4	1997	0	0	400	400
				TDA4	1998	0	0	400	400
LA65009	LA	TR6A2	BUS REHABILITATION;INTERIOR AND	FTA9	1998	0	0	201	201
			EXTERIOR COSMETIC REHABILITATION	TDA4	1998	0	0	50	50
LA65406	LA	TR6A3	REPLACE BUSES FY'97	FTA9	1997	0	0	800	800
			18 BUSES	PROPALR	1997	0	0	200	200

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA65408	LA	TR6A2	MAJOR BUS COMPONENTS	FTA9	1997	0	0	116	116
			(2 ENGINES & 2 TRANSMISSIONS)	FTA9	1998	0	0	40	40
				PROPALR	1997	0	0	29	29
				PROPALR	1998	0	0	10	10
LA66100	LA	TR6A3	REPLACEMENT OF 40' TRANSIT COACHES	FTA9	1997	0	0	4715	4715
			WITH ALTERNATIVELY FUELED COACHES	PROPA	1997	0	0	1795	1795
			30 BUSES						
LA66101	LA	TR6A3	REPLACEMENT OF FOUR 30' COACHES	FTA9	1997	0	0	985	985
	LA	TR6A3	WITH ALTERNATIVE FUEL (ELECTRIC,	PROPA	1997	0	0	375	375
			CNG)						
LA66102	LA	TR6A3	REPLACE TRANSIT COACHES WITH	FTA9	1998	0	0	650	650
	LA	TR6A3	ALTERNATIVELY FUELED 40' COACHES	PROPA	1997	0	0	246	246
			4 BUSES						
LA7031	LA	HB4NL	IN LA COUNTY	STP	1997	0	0	2541	2541
			AT VARIOUS LOCATIONS						
			SYNCHRONIZE SIGNALS						
			PILOT AREA PROJECT						
LA71702	LA	TR6A3	REPLACE THREE FIXED ROUTE BUSES	FTA9	1997	0	0	220	220
				PROPALR	1997	0	0	220	220
LA75054	LA	TR6A3	REPLACE 4 FIX RTE. BUSES	FTA9	1997	0	0	960	960
				TDA4	1997	0	0	240	240
LA79203	LA	TR9A	LA STANDARD LIGHT RAIL CAR	PC40	1997	0	0	29561	29561
			PROCUREMENT FOR GREEN AND BLUE	PC40	1998	0	0	20900	20900
			LINES__(74)	STP	1997	0	0	28900	28900
			P'SBLE FED DEFENSE CONVERSION FUNDS						
			AND ADD'L OUTYEAR PC40						
LA85010	LA	TR6	GLOBAL POSITIONING SYSTEM (GPS)	FTA9	1998	0	0	240	240
			TRACKING SYSTEM	TDA4	1998	0	0	60	60
LA85055	LA	TR6A3	REPLACE 4 FIX RTE. BUSES	FTA9	1998	0	0	960	960
			REPLACE 4 FIX RTE. BUSES	TDA4	1998	0	0	240	240

TCM1 PROJECTS IN LOS ANGELES COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
LA96001	LA	TR6A3	BUS-ROLLING STOCK	FTA9	1997	0	0	44764	44764
				FTA9	1998	0	0	44764	44764
				TDA4	1997	0	0	11191	11191
				TDA4	1998	0	0	11191	11191
LA960139	LA	HB4NL	OCEAN AVE, BROADWAY, OCEAN PARK	LTF	1997	0	0	375	375
			BLVD, MAIN STREET	LTF	1998	0	0	100	100
			UPDATE EXISTING OUTDATED SIGNALS,	STPL	1997	150	0	0	150
			CONTROLLERS, SYNCHRONIZED SIGNALS	STPL	1998	0	0	400	400
LA960181	LA	TR8	RAIL MODE AND RENOVATION PROGRAM	FTA3	1997	0	0	2903	2903
				LTF	1997	0	0	726	726
LA962206	LA	HB5	FROM RT 90 TO RT 10__HOV LANES	CM	1998	3995	0	0	3995
	LA	HB5	PROJECT (FROM 8+0 TO 8+2 HOVE)	STSM	1998	515	0	0	515
			SOUTHBOUND HOV ONLY						
LA9703Z	LA	TR8A	LOCOMOTIVE EMISSIONS	PC10	1997	0	0	355	355
	LA	TR8A	REDUCTION PROGRAM STUDY	PC10	1998	0	0	250	250
	LA	TR8A	STATE FUNDS ARE PVEA	TSTA	1997	0	0	80	80
SCAG0703D	VAR	HB6	SCAG REGIONAL RIDESHARE PROGRAM	STP	1997	0	0	3580	3580

TCM1 PROJECTS IN ORANGE COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
1240	ORA	HE13A	IN BUENA PARK & BREA	CITY	1997	1593	464	2955	5012
			FROM L.A. COUNTY LINE TO RTE 57	CM	1997	0	0	20000	20000
			SEGMENT 2	CM	1998	0	0	4500	4500
			EXIST 8-LN FWY ADD 2 HOV LANES	ORA-FWY	1997	13666	3852	34841	52359
			AND AUXILIARY_LANES	ORA-TRN	1997	0	0	212	212
				STA	1997	4332	0	3337	7669
				STPL-R	1997	0	176	944	1120
				STSM	1997	0	0	3174	3174
1250	ORA	HB5	IN ANAHEIM	CITY	1997	6107	7839	20219	34165
			AT RTE 57/91	ORA-FWY	1997	9877	1000	37910	48787
			CONSTRUCT 57/91 INTERCHANGE WITH	STA	1997	202	0	826	1028
			HOV DIRECT CONNECTORS - TRANSITWAY						
1260	ORA	HE13A	IN ANAHEIM	CITY	1997	0	0	1017	1017
			RECONSTR GENE AUTRY WAY INTERCHNG	ORA-RIP	1997	0	0	173	173
			FROM I-5 HOV FACILITY TO BETMOR LN	STPL-R	1997	0	0	7698	7698
			INCLUDED AS PART OF I-5 WIDENING						
			SEE #2850 & #2850A (93 RME)						
9530	ORA	TR8S	LOS ANGELES/SAN DIEGO CORRIDOR	CITY	1997	0	2100	1500	3600
			MISSION VIEJO/LAGUNA NIGUEL STATION	TPD	1997	0	0	2100	2100
			- RIGHT OF WAY ACQUISTION,						
			PLATFORMS, AND PARKING FACILITY						
01260EE	ORA	HE13A	IN SANTA ANA AND ANAHEIM	CITY	1997	0	0	4783	4783
			FROM RTE 22 TO RTE 91 ON EXISTING	CITY	1998	0	0	9382	9382
			6-LANE FWY ADD 2 MIXED FLOW	IM	1997	0	2000	125605	127605
			LANES, TWO HIGH OCCUPANCY VEHICLE	IM	1998	0	0	110246	110246
			LANES, & RECONSTRUCT INTERCHANGES	ORA-FWY	1997	0	302897	117248	420145
				ORA-FWY	1998	0	67551	115931	183482
				STPL-R	1997	0	0	6976	6976
				STPL-R	1998	0	0	7698	7698
ORA157	ORA	TR6A3	PURCHASE 170 REPLACEMENT VANS	FTA9	1997	0	0	2333	2333
			VANS	FTA9	1998	0	0	2426	2426
				TDA4	1997	0	0	583	583
				TDA4	1998	0	0	607	607
ORA175	ORA	TR2I	RTE 405/55 TRANSITWAY	FTA3	1997	0	0	7500	7500
			MIT ND (11/93) FONSI (7/27/94)	FTA3	1998	0	0	35000	35000
				GEN	1997	0	0	3500	3500
				GEN	1998	0	0	17500	17500

TCM1 PROJECTS IN ORANGE COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
ORA187	ORA	TR6A3	DEBT SERVICE FOR 1993 COP FUNDING	FTA9	1997	0	0	2353	2353
			MISCELLANEOUS CAPITAL PROJECTS	FTA9	1998	0	0	2273	2273
				TSTA	1997	0	0	588	588
				TSTA	1998	0	0	568	568
ORA1870	ORA	TR6A3	PURCHASE 259 REPLACEMENT BUSES	FTA9	1997	0	0	7221	7221
			STANDARD 40FT BUSES	FTA9	1998	0	0	9691	9691
				TDA4	1997	0	0	1805	1805
				TDA4	1998	0	0	2422	2422
ORA37136	ORA	TR8S	ORANGE	CITY	1997	0	110	130	240
			COMMUTER RAIL STATION	FTA26	1997	0	440	520	960
			IMPROVEMENTS						

TCM1 PROJECTS IN RIVERSIDE COUNTY

PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
41062	RIV	TEA1A	UNIVERSITY AVENUE FROM CHICAGO	CITY	1997	0	0	225	225
			AVENUE TO ROUTE 60 - PEDESTRIAN	STPE	1997	0	0	900	900
			LIGHTING, LANDSCAPING, BENCHES, AND						
			HANDICAPPED ACCESSIBILITY						
46322	RIV	HE13A	NEAR RIVERSIDE, FROM VALLEY WAY TO	NH	1997	0	0	30878	30878
			UNIVERSITY - FOUR AND SIX LANE FRWY						
			ADD 2 HOV LANES (STAGE 2)						
46360	RIV	HE13A	IN RIVERSIDE AND MORRENO VALLEY,	NH	1997	0	395	25755	26150
			FROM ROUTE 215 TO REDLANDS						
			BOULEVARD - FOUR LANE FREEWAY ADD						
			TWO HIGH OCCUPANCY VEHICLE (HOV)						
			LANES						
46720	RIV	HB5	IN CITY OF RIVERSIDE	XRIV	1997	0	0	16073	16073
			FROM WEST JCT RTE 60 TO SAN						
			BERNARDINO COUNTY LINE						
			EXISTING 6-LN FWY ADD 2 HOV LANES						
0005R	RIV	TR8	METROLINK - SBD/RIVERSIDE/IRVINE	BOND	1997	0	0	13300	13300
			SAN JACINTO BRANCH LINE	BOND	1998	0	0	11800	11800
			RIGHT OF WAY RELATED INMPROVEMENTS						
RIV0030C	RIV	HE11A	IN RIVERSIDE COUNTY	CITY	1997	800	0	0	800
			AT GALENA ST	STPL	1997	2100	0	0	2100
			CONSTRUCT INTERCHANGE	XRIV	1997	800	1250	5358	7408
RIV32086	RIV	HB6	COMMUTER TRANSPORTATION SERVICES	STPL	1997	0	0	295	295
			RIDESHARE SERVICES	XRIV	1997	0	0	800	800
RIV32120	RIV	TR6A3	IN RIVERSIDE COUNTY	FTA18	1997	0	0	36	36
			CITY OF BANNING						
			PURCHASE ONE REPLACE. 12-PASSENGER						
			VAN W/LIFT & TIEDOWNS						
RIV32145	RIV	TR6A3	IN RIVERSIDE	FTA9	1998	0	0	280	280
			CITY OF CORONA	TDA4	1998	0	0	70	70
			PURCHASE FIVE REPLACEMENT VANS						
			W/LIFTS & TIEDOWNS, RADIOS						

TCM1 PROJECTS IN RIVERSIDE COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
RIV32162	RIV	TR6A3	IN RIVERSIDE	FTA9	1997	0	0	150	150
			CITY OF RIVERSIDE SPECIAL SERVICES	TDA4	1997	0	0	38	38
			PURCHASE OF FOUR REPLACEMENT VANS						
			W/LIFTS AND TIEDOWNS						
RIV32164	RIV	TR6A3	IN RIVERSIDE	FTA9	1998	0	0	40	40
			CITY OF RIVERSIDE SPECIAL SERVICES	TDA4	1998	0	0	10	10
			PURCHASE ONE REPLACEMENT VANS						
			W/LIFTS AND TIEDOWNS						
RIV32172	RIV	TR6A3	IN RIVERSIDE_COUNTY	TDA4	1997	0	0	55	55
			PALO VERDE VALLEY TRANSIT AGENCY						
			PURCHASE ONE REPLACE. MID-SIZE BUS						
			W/ LIFT RADIO, FAREBOX & TIEDOWNS						
RIV32174	RIV	TR6A3	IN RIVERSIDE_COUNTY	TDA4	1998	0	0	55	55
			PALO VERDE VALLEY TRANSIT AGENCY						
			PURCHASE ONE REPLACEMENT VAN W/LIFT						
			& TIEDOWNS						
RIV32228	RIV	TR6A3	IN WESTERN RIVERSIDE COUNTY	FTA9	1998	0	0	360	360
			PURCHASE 3 REPLACEMENT TRANSIT	TDA4	1998	0	0	90	90
			COACHES, RADIOS & FAREBOXES						
RIV32231	RIV	TR6H1	IN WESTERN RIVERSIDE COUNTY	FTA9	1998	0	0	80	80
			PURCHASE BUS STOP AMENITIES	TDA4	1998	0	0	20	20
RIV32359	RIV	HB6A	IN MORENO VALLEY	CM	1997	0	0	300	300
			ON SR60/MORENO BEACH	STSM	1997	0	0	41	41
			CONSTRUCT 200 SPACE PARK N RIDE LOT						
RIV32392	RIV	TR6	IN WESTERN RIVERSIDE COUNTY	FTA9	1997	0	0	346	346
			DEBT SERVICE PAYMENT FOR TEN	FTA9	1998	0	0	336	336
			EXPANSION COACHES (COP'S)	TDA4	1997	0	0	87	87
				TDA4	1998	0	0	84	84
RIV32397	RIV	TR6A3	IN WESTERN RIVERSIDE COUNTY	FTA9	1998	0	0	456	456
			PURCHASE 11 REPLAC. DIAL-A-RIDE	TDA4	1998	0	0	114	114
			VANS						
RIV32398	RIV	TR6A1	IN WESTERN RIVERSIDE COUNTY	FTA9	1998	0	0	120	120
			PURCHASE ONE EXPANSION MINI-BUS	TDA4	1998	0	0	30	30

TCM1 PROJECTS IN RIVERSIDE COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
RIV32412	RIV	TR6A	IN COACHELLA VALLEY AREA	FTA9	1997	0	0	550	550
			LEASE/PURCHASE MOTOR COACHES	FTA9	1998	0	0	550	550
			FY 1996/97 - 98/99	TDA4	1997	0	0	150	150
				TDA4	1998	0	0	150	150
RIV32420	RIV	TR6A3	IN COACHELLA VALLEY AREA	FTA9	1997	0	0	80	80
			2 REPLACE. PARATRANSIT VEH.	FTA9	1998	0	0	80	80
				XRIV	1997	0	0	20	20
				XRIV	1998	0	0	20	20
RIV32531	RIV	HE11A	IN PERRIS AT EVANS ROAD/ELLIS AVENUE CONSTRUCT INTERCHANGE;WIDEN ELLIS AVE. TO 6 LANES.	CITY	1997	0	0	12000	12000
RIV52000	RIV	HB4NK	IN RIVERSIDE COUNTY	CITY	1997	35	0	59	94
			LUMP SUM HWY OPERATION IMPROVEMENT	STPL	1997	0	0	708	708
			PROJECTS-INTERSECTION SIGNALIZATION AT INDIVIDUAL LOCATIONS	STPL	1998	0	0	1025	1025
RIV52015	RIV	HB4NL	IN CATHEDRAL CITY	CITY	1997	0	0	16	16
			ON DATE PALM FROM 30TH AVE TO PEREZ RD - INTERCONNECT OF 12 TRAFFIC SIGNALS,IN-HOUSE CONTROL PC SYSTEM	STPL	1997	0	0	120	120
RIV52018	RIV	HB4NL	IN CATHEDRAL CITY	CITY	1997	0	0	25	25
			ON RAMON ROAD FROM LANDAU BL TO DATE PALM DR - INTERCONNECT OF 5 TRAFFIC SIGNALS	STPL	1997	0	0	196	196
RIV52019	RIV	HB4NL	IN CATHEDRAL CITY	CITY	1997	0	0	42	42
			ON PALM CANYON FROM GOLF CLUB DR TO CATHEDRAL CANYON DR - INTERCONNECT OF 4 TRAFFIC SIGNALS	STPL	1997	0	0	324	324
RIV52020	RIV	HB4NL	IN MURRIETA INSTALL INTELLIGENT TRAFFIC SURVEILLANCE SYSTEM	CM	1997	0	0	236	236
RIV52021	RIV	HB6	IN CORONA	CITY	1997	0	0	133	133
			HOV ON RAMPS AT 3 LOCATIONS ON SR91 (SERFAS CLUB WB, LINCOLN WB, AND MCKINLEY WB,_ADD ONE HOV BYPASS LANE ON EXISTING RAMPS AT SERFAS)	CM	1997	0	0	1024	1024

TCM1 PROJECTS IN RIVERSIDE COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
RIV52022	RIV	HB4NL	IN PALM SPRINGS	CITY	1997	0	0	152	152
			CITYWIDE SIGNAL INTERCONNECT ON INDIAN CANYON DRIVE AND ON TAHQUITZ CANYON WAY	STPL	1997	0	0	1176	1176
RIV52024	RIV	HB4NL	IN MORENO VALLEY CITYWIDE SIGNAL INTERCONNECT ON PERRIS BLVD AND ON ALESSANDRO BLVD	CM	1997	0	0	55	55
RIV52025	RIV	HB4NL	IN RIVERSIDE COUNTY ON SR 79 NORTH FROM MARGARITA ROAD TO MURRIETA HOT SPRINGS ROAD - INTERCONNECT OF 3 TRAFFIC SIGNALS	CM	1997	0	0	97	97
RIV52026	RIV	HB4NL	IN RIVERSIDE COUNTY ON SR 79 SOUTH FROM I15 TO BUTTER-FIELD STAGE RD - INTERCONNECT OF 6 TRAFFIC SIGNALS	CM	1997	0	0	226	226
RIV52027	RIV	HB4NL	IN RIVERSIDE COUNTY SIGNAL INTERCONNECT ON MISSION BLVD FROM SR60 TO PYRITE AND VAN BUREN FROM BELLEGRAVE TO RUTILE	CM	1997	0	0	310	310
RIV52028	RIV	HB4NL	IN MURRIETA AT LOS ALAMOS - SIGNAL INTERCONNECT (PHASE 2 - HEACOCK & GATEWAY PLAZA ENTRANCE) WEST OF WHITEWOOD RD.	CM	1997	0	0	16	16
RIV52106	RIV	TR6A1	VALLEY RESOURCE CENTER ONE EXPNASION VAN WITH MOBILE RADIO	FTA16	1997	0	0	58	58
RIV52107	RIV	TR6A2	MEDITRANS SERVICES INC. ONE REPLACEMENT VEHICLE	FTA16	1997	0	0	56	56

TCM1 PROJECTS IN SAN BERNARDINO COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
711	SBD	HB5	NEAR COLTON AND SAN BERNARDINO,	IM	1997	0	304	0	304
			FROM ROUTE 10 TO ROUTE 66 AT	IM	1998	0	1934	6851	8785
			VARIOUS LOCATIONS - NORTHBOUND AND	XSBD	1998	0	0	100	100
			SOUTHBOUND AUXILIARY LANES WITH						
			RIGHT OF WAY FOR FUTURE HOV LANES						
5128	SBD	TR8	METROLINK - SAN BERNARDINO LINE	TPD	1997	0	0	749	749
			REDLANDS RAIL EXTENSION - DESIGN	XSBD	1997	0	0	749	749
			AND CONSTRUCTION						
			PER REVISED 94TCI LIST						
20621	SBD	HE14A	IN SAN BERNARDINO COUNTY	NH	1997	0	0	61303	61303
			FROM LOS ANGELES COUNTY LINE TO						
			MOUNTAIN AVE						
			CONSTRUCT 8-LN FWY WITH 2 HOV LANES						
			**SEE STIP PPNO #193B, C & S FOR						
SBD0129	SBD	HB5	IN MONTCLAIR & UPLAND	CM	1997	0	0	8140	8140
			FROM LOS ANGELES COUNTY LINE	CM	1998	0	0	23741	23741
			TO GROVE AVE.	STSM	1998	0	0	4025	4025
			ADD 2 HOV LNS. AUX LNS./SOUNDWALLS/	XSBD	1997	596	0	0	596
			(LIMITS CHANGED-COMBINE PROJ.W/129D						
SBD031171	SBD	HB4NK	CITRUS AVENUE	STPL	1997	10	0	240	250
			AT BASELINE AVENUE						
			TRAFFIC SIGNAL MODIFICATION AND						
			INTERSECTION IMPROVEMTS (TURN LNS)						
SBD031466	SBD	HB4NK	BEAR VALLEY CUTOFF	CITY	1997	5	5	65	75
			AT STATE HIGHWAY 18	SLP	1997	5	5	65	75
			INSTALL TRAFFIC SIGNAL						
SBD031467	SBD	HB4NK	OASIS ROAD	CITY	1998	5	5	65	75
			AT STATE HIGHWAY 18	SLP	1998	5	5	65	75
			INSTALL TRAFFIC SIGNAL						
SBD031468	SBD	HB4NK	PHELAN ROAD	CO	1998	5	5	65	75
			AT STATE HIGHWAY 138	SLP	1998	5	5	65	75
			INSTALL TRAFFIC SIGNAL						
SBD031481	SBD	HB4NK	CREST FOREST DRIVE	CO	1998	5	5	65	75
			AT STATE ROUTE 38	SLP	1998	5	5	65	75
			INSTALL TRAFFIC SIGNAL						

TCM1 PROJECTS IN SAN BERNARDINO COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
SBD031506	SBD	HB6	RIDESHARING	STP	1997	0	0	300	300
			CONTRIBUTIONS FOR RIDESHARE	STP	1998	0	0	325	325
			ACTIVITIES IN COOP WITH CTS						
SBD31046	SBD	TR6A3	PARATRANSIT VEHICLES	CM	1998	0	0	177	177
			PURCHASE 3 REPLACEMENT LIFT-	LTF	1998	0	0	108	108
			EQUIPPED ALT. FUEL PARATRANS VEH.	TSTA	1998	0	0	80	80
SBD31088	SBD	TR6A1	BUS FLEET EXPANSION	FTA9	1997	0	0	2278	2278
			PURCHASE 8 40' EXPANSION COACHES	TSTA	1997	0	0	570	570
			& AUXILLARY EQUIPMENT, CNG						
SBD31093	SBD	TR6A1	BUS FLEET EXPANSION	FTA9	1998	0	0	2370	2370
			PURCHASE 8 40' LIFT-EQUIPPED CNG	TSTA	1998	0	0	592	592
			EXPANSION COACHES FY 98						
SBD31094	SBD	TR6A3	REPLACEMENT OF COMMUNITY SHUTTLE	FTA9	1998	0	0	262	262
			VANS	TSTA	1998	0	0	66	66
			PURCHASE 4 17-PASSENGER LIFT-						
			EQUIPPED CNG REPLACEMENT VANS						
SBD31556	SBD	TR6A3	REPLACEMENT VEHICLE	CM	1997	0	0	97	97
			PURCHASE 1 25 PASSENGER ACCESS.	TSTA	1997	0	0	13	13
			ALT. FUEL BUS						
SBD31557	SBD	TR6A3	REPLACEMENT VEHICLES	LTF	1998	0	0	50	50
			PURCHASE 1 ACCESSIBLE MINIVAN						
SBD31558	SBD	TR6A3	REPLACEMENT VEHICLES	CM	1998	0	0	259	259
			PURCHASE 4 REPLACEMENT 15 PASSENGER	TSTA	1998	0	0	34	34
			ACCESS. ALT.FUEL PARATRANS VANS						
SBD31595	SBD	TR6A3	CAPITAL	LTF	1997	0	0	100	100
			PURCHASE 4 REPLACEMENT ACCESSIBLE	TSTA	1997	0	0	50	50
			ALT. FUEL PARATRANSIT VEHICLES	TSTA	1998	0	0	100	100
SBD31765	SBD	HB4NK	SHAY ROAD	SLP	1997	6	0	54	60
			AT STATE ROUTE 38	XSBD	1997	6	0	54	60
			INSTALL TRAFFIC SIGNAL						
SBD31828	SBD	HB6A	CAMINO DEL CIELO/PINION	CITY	1997	63	0	45	108
			AT STATE ROUTE 62	CM	1997	0	0	345	345
			CONSTRUCT PARK AND RIDE FACILITY	STSM	1997	0	0	40	40

TCM1 PROJECTS IN SAN BERNARDINO COUNTY

PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
SBD31832	SBD	HB4NK	BRYANT STREET	CITY	1997	10	0	0	10
			AT FIR AVENUE	CITY	1998	0	0	115	115
			INSTALL TRAFFIC SIGNAL						
SBD31853	SBD	HB6A	BARTON ROAD	CITY	1997	0	0	38	38
			22430 BARTON ROAD (WEST OF I-215)	CM	1997	0	0	75	75
			CONST. 48 VEHICLE PARK & RIDE LOT	STSM	1997	20	0	55	75
SBD31854	SBD	HB6A	BARTON ROAD	CM	1997	0	0	16	16
			AT LA CROSSE AVENUE	LTF	1997	25	0	0	25
			CONST. 60 VEHICLE PARK & RIDE LOT	STSM	1997	0	0	188	188
SBD31860	SBD	HB8	MAIN STREET	STPL	1998	8	13	66	87
			MT. VERNON AVENUE TO W. CITY LIMITS	TDA3	1998	8	13	66	87
			PROVIDE BICYCLE LANES						
SBD32225	SBD	HE11A	IN ONTARIO	CITY	1997	11	0	126	137
			2600 FT. EASTERLY AND WESTERLY OF	DEMO	1997	44	0	502	546
			HAVEN AVENUE						
			LANDSCAPING & IRRIGATION OF THE HAV						
			EN AVE. FED GROUND ACCESS						
SBD41019	SBD	TR6A3	EXPANSION OF COMMUNITY SHUTTLE VANS	FTA9	1997	0	0	240	240
			FY 1997	STAL-L	1997	0	0	60	60
			PURCHASE 1 25' ELECTRIC EXPANSION						
			SHUTTLE BUS						
SBD41045	SBD	TR6A3	REPLACEMENT VEHICLE	CM	1997	0	0	118	118
			PURCHASE 2 REPLACEMENT 15 PASSENGER	TSTA	1997	0	0	15	15
			ACCESS. ALT FUEL PARATRANS VEHICLES						
SBD41112	SBD	TR6A3	COMMUNTIY SHUTTLE VANS (FY 1977)	FTA9	1997	0	0	480	480
			=- PURCHASE TWO TWENTY FIVE FOOT	STAL-L	1997	0	0	120	120
			ELECTRIC REPLACEMENT SHUTTLE BUSES						
SBD41116	SBD	TR6A3	CAPITAL	LTF	1997	0	0	48	48
			PURCHASE 1 REPLACEMENT ACCESSIBLE	TSTA	1997	0	0	102	102
			ALT FUEL BUS						
SBD41117	SBD	TR6A3	CAPITAL	LTF	1998	0	0	11	11
			PURCHASE 1 REPLACEMENT VEHICLE FOR	TSTA	1998	0	0	9	9
			THE VVTA ADMINISTRATOR						

TCM1 PROJECTS IN SAN BERNARDINO COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
SBD41131	SBD	TR6H2	RECONSTRUCTION OF MAINTENANCE	FTA9	1997	420	0	0	420
			FACILITY - ARCHITECTURAL/ENGINEER-	FTA9	1998	0	0	6670	6670
			ING SERVICES	TSTA	1997	105	0	0	105
				TSTA	1998	0	0	1669	1669
SBD41135	SBD	HB4NK	SR 18 AND STANFIELD CUTOFF	CITY	1997	0	0	35	35
			TRAFFIC SIGNAL AND INTERSECTION	STP	1997	0	0	307	307
			IMPROVEMENTS - 2 MERGE LANES ON						
			EAST SIDE OF INTERSECTION 275 FT.						
			(PER CALTRANS REQUIREMENTS)						
SBD41202	SBD	HE13A	ARROW RTE. MILLIKEN AVE TO EAST ST.	XSBD	1998	100	0	0	100
			WIDEN PORTIONS FROM 2-4 LANES						
			(APPROX. 12,000 FT.)_SPOT WIDEN						
			PLUS MARKED BIKE LANES (CLASS 3)						
SBD41203	SBD	HB4NK	BASELINE ROAD & I-15 INTERSECTION	AB2766	1997	0	0	138	138
			INSTALL TRAFFIC SIGNAL	CITY	1997	0	0	138	138
SBD41234	SBD	HB4NK	PEYTON DRIVE @ GLEN RIDGE DRIVE	CITY	1997	0	0	14	14
			NEW TRAFFIC SIGNAL INSTALLATION	STPL	1997	0	0	120	120
SBD41235	SBD	HB4NK	PEYTON DRIVE @ VALLEY VISTA	CITY	1997	0	0	14	14
			NEW TRAFFIC SIGNAL INSTALLATION	STPL	1997	0	0	120	120
SBD41287	SBD	TR2I	GRAND TERRACE MULTIMODAL TRANSFER	CITY	1997	110	0	390	500
			PT FACILITY REHAB. OF A VACANT	STP	1997	0	400	100	500
			12,000 FT. COMMERCIAL BUILDING AND						
			PARK-N-RIDE WITH 57 SPACES						
SBD41322	SBD	HB8	9TH ST./H TO SIERRA WAY	STPL	1998	10	0	110	120
			MODIFY EXISTING TRAFFIC SIGNAL TO						
			ADD PEDESTRIAN SIGNALS AND LOOPS						
			ON THE SIDE STREETS						
SBD41418	SBD	HB4NK	FRANCIS AVE. - LA COUNTY LINE -	SLP	1997	4	0	0	4
			CHINO CITY LIMIT	SLP	1998	0	0	36	36
			RECONSTRUCT LEFT TURN LANE & ADD	XSBD	1997	36	0	0	36
			TRAFFIC SIGNAL (NO LANES ADDED)	XSBD	1998	0	0	324	324

TCM1 PROJECTS IN SAN BERNARDINO COUNTY									
PROJ_ID	CO	CODE	DESCRPTION	FUND	YEAR	ENG	RW	CON	TOT
SBD41436	SBD	TEA1	EUCLID AVE., SPRR R/W A" ST ,MEMORIAL PARK CAMPUS AVE. 16TH ST" AND FOOTHILL BLVD. - CONSTRUCTION	STPE	1998	23	0	128	151
SBD41437	SBD	TEA1	CITY OF UPLAND - UPLAND TOWN CENTER	AB2766	1997	8	0	43	51
			ACCESS IMPROVEMENTS TO TOWN CENTER	BONDL	1997	5	0	28	33
			INCLUDING PEDESTRIAN AND BICYCLE	CITY	1997	159	0	893	1052
			AMENDMENTS. UPGRADE PEDESTRIAN	STPE	1997	150	0	850	1000
			ALLEY WAYS.						