CHAPTER 10

LOOKING BEYOND CURRENT REQUIREMENTS

INTRODUCTION

This Chapter presents additional analyses which are not required under law to be included in this Final 2007 AQMP, but are presented here for informational purposes because they have significant future implications to the region's ability to reach clean air. Specifically this chapter provides a first look at projected ozone concentrations beyond the 2024 attainment year and the impact of the new federal 24-hour PM2.5 ambient air quality standard.

A FIRST LOOK AT THE YEAR 2030 OZONE AIR QUALITY

With continued growth in the South Coast Air Basin, concerns have been raised whether the South Coast Air Basin can maintain the federal ozone air quality standard beyond 2024. As such, an ozone air quality analysis for 2030 was performed. Data on the projected growth in the Basin and surrounding areas were provided by SCAG.

The future year (2030) ozone air quality projections suggest that additional emissions reductions will be required to offset growth to maintain the 8-hour ozone standard. Mobile source emissions projections through 2030 indicate that continued reductions in VOC, NOx and CO will occur as newer vehiles are introduced. Mobile source VOC and NOx emissions will be reduced by about 25 and 15 percent respectively. CO emissions will be reduced by roughlt 15 percent, assuring continued maintenance of the federal standard. Nominal growth is projected in the area source category that will partially act to offset the mobile source VOC reductions by 2030. Since the projected growth in this category is small, it is not expected to reverse the trend of lowering ambient ozone concentrations.

PROPOSAL TO CONSIDER NEW FEDERAL AIR QUALITY STANDARDS FOR OZONE

The CAA requires U.S. EPA to periodically review the existing air quality standards in light of the findings of new and emerging epidemiololgical and health studies. As part of this process, EPA is considering modifications to the current 8-hour average ozone standard of 0.08 ppm which is based on a three year average of the 4^{th} highest value at an air monitoring station. No formal proposal has been relased to the pubic to date, however, it is anticipated that a recommendations will be put forth in the Spring of 2007. The discussions in the proposal would involve the structure of the standard that could potentially result in an equivalent lowering of the standard as it exists to below 0.08 ppm. Should the 8-hour ozone standard be lowered, it will require a SIP revision with a new attainment date. The attainment strategy would likely call for further NOx reductions.

NEW FEDERAL AIR QUALITY STANDARDS FOR FINE PARTICULATES

In September 2006, U.S. EPA revised the national ambient air quality standards for particulate matter.

As part of the requirements of the CAA, every five years the U.S. EPA must review the ambient air quality standards and propose revisions, if necessary, to "protect public health with an adequate margin of safety," based on the latest, best-available science. This review process includes a comprehensive evaluation of the latest health studies; a redrafting, if appropriate, of the relevant pollutant criteria document; and a staff report recommending the position of the U.S. EPA staff relative to the air quality standards. Further, these documents and U.S. EPA staff recommendation are reviewed by a panel of independent experts authorized by the CAA, the Clean Air Science Advisory Committee (CASAC).

In promulgating the new standards, U.S. EPA followed the elaborate review process described above, which took several years to complete. The evaluation of thousands of peer-reviewed scientific studies led to the conclusion that existing standards for the two pollutants, ozone and particulates, were not adequately protective of public health and resulted in the promulgation of the new standards. The studies indicated that for PM2.5, short-term exposures at levels below 24-hour standard of 65 $\mu g/m^3$ were found to cause acute health effects, including asthma attacks, breathing and respiratory problems. With regards to the annual PM2.5standard debate focused on a proposal to lower the standard from the current value of by as much as three $\mu g/m^3$.

The debate also extended to coarse particulate matter. The proposal would have revoked the annual PM10 standard and replaced it with an annual PM10-2.5 standard In addition, the 24-hour PM10 standard would remain in effect for selected urban areas until implementation of a new 24-hour average PM10-2.5 standard could be finalized. The final rule revoked the annual PM10 standard, but kept the 24-hour standard in place. No action was taken to create either a 24-hour or annual PM10-2.5 "coarse" standard.

What are the Health Concerns?

A brief summary of the effects associated with these pollutant exposures at levels observable in Southern California is presented. A more detailed discussion of health effects is provided in Appendix I.

The major categories of adverse health effects associated with PM2.5 include: increase in mortality associated with acute and chronic exposures; exacerbation of preexisting respiratory and cardiovascular diseases leading to an increase in hospital admissions and emergency room visits; school absences; work loss days and restricted activity days; changes in lung function and structure; and altered lung defense mechanisms.

A review and statistical analysis of recent population studies published on acute adverse effects of PM2.5 indicates that an incremental increase can lead to a significant increase in both mortality and morbidity risks. The elderly, people with preexisting respiratory and/or cardiovascular disease(s) and children appear to be most susceptible to the effects of PM2.5. These findings suggest that even when an area meets the existing NAAQS for PM2.5 the community is likely to continue to have the adverse impact from ambient PM2.5 exposures.

The focus on the health effect of particulate matter exposure has moved through the years from epidemiological assessments of total supended particulates to the impacts from the respireable portions less than 10 micons in size. More and more studies confirm the impacts of both PM10 and PM2.5 on health with greater focus on smaller particles. Current research is focusing on the health impacts of ultrafine particulate of aerodynamic diameter less than 1 micron. An extensive discussion on ultrafine particulate its characterisitics, health impacts and prospect for future control is presented in Chapter 11 of this document.

What is the new Federal PM Standard?

On September 21, 2006, U.S. EPA signed the "Final Revisions to the National Ambient Air Quality Standards for Particle Pollution (Particulate Matter)." Through this action U.S. EPA established a lower 24-hour average standard for the fine fraction of particulates. The new 24-hour average PM2.5 standard is set at 35 $\mu g/m^3$. No changes were made to existing annual PM2.5 standard which remains at 15 $\mu g/m^3$. The annual component of the standard was set to provide protection against typical day-to-day exposures as well as longer-term exposures, while the daily component protects against more extreme short-term events. For the new 24-hour PM2.5 standard, the form of the standard continues to be based on the 98^{th} percentile of 24-hour PM2.5 concentrations measured in a year (averaged over three years) at the monitoring site with the highest measured values in an area. This form of the standard will reduce the impact of a single high exposure event that may be due to unusual meteorological conditions and thus provide a more stable basis for effective control programs.

EPA's action immediately revoked the annual PM10 standard, yet retained the 24-hour average standard at the current level (150 $\mu g/m^3$). No action was taken to establish either an annual or short-term "coarse particulate" PM10-2.5 standard.

While retaining the 24-hour PM10 standard, U.S. EPA has also retained the current form of the 24-hour PM10 standard set at 150 $\mu g/m^3$. not to be exceeded more than once per year averaged over a three year period.

Implementation of the New Federal Standard

It is expected that EPA will designate the new 24-hour PM2.5 nonattainment areas by Novemeber 2009, and they will become effective April 2010. A SIP revision will be due to EPA by April, 2013 demonstrating an attainment date of April, 2015 with a possible extension to April, 2020. The modifications made to the 24-hour PM2.5 standard will not change the planning requirements for the 2007 AQMP attainment demonstration. However, the plan should be designed with the new standard in mind with respect to the need for future controls. The existing standard of 65 $\mu g/m^3$ standard that will remain in effect until 2010.

Assessment of the New Federal 24-Hour $PM_{2.5}$ Standard

A comparison of the current PM2.5 standards, the PM10 24-hour standard and the new 24-hour PM2.5 standard for 2005, 2015 and 2021 are shown in Table 10-1. The 2005 values are derived from the measurements sampled through the routine Basin particulate air monitoring. The 2005 design values are presented to assess compliance to the federal standards. The 2015 and 2021 PM2.5 and PM10 values are estimated from the particulate modeling applications (discussed in Chapter 5 and Appendix V).

While the 2005 maximum 24-hour avererage PM2.5 concentration exceeded the 65 $\mu g/m^3$ threshold, the design value for the Basin based on a 3-year average of the 98^{th} percentile observation met the standard. When the 2005 maximum 24-hour average concentration and 3-year design value is compared to the new standard, the concentration exceeds the threshold by 279 percent and the design value by 85 percent. The 2005 Basin annual average PM2.5 maximum concentraion of 21.0 $\mu g/m^3$ was 40 above the federal standard and contributed to a design value of 22.6 $\mu g/m^3$ which was 51 percent above the standard. The maximum observed 24-hour average PM10 concentration in 2005 was approximately 80 percent of the federal standard and the 3-year average standard is met.

As projected in 2015, the current 24-hour PM2.5 and PM10 average and annual PM2.5 standard will be met. The estimated 24-hour average 2015 design value of 57 $\mu g/m^3$ will exceed the new PM2.5 standard by 63 percent. The current simulations project a similar profile for particulate air quality in 2021. The projected 24-hour PM2.5 design value is expected to exceed the new standard PM2.5 by 49 percent.

It is also important in looking into the future to understand the significant components of PM2.5 as projected for the years 2015 and 2021. The 2005 annual average PM2.5 mass is comprised of approximately 60 percent ammonium, nitrate and sulfate. Figure 10-1 shows the relative contributions of these components to the total annual mass in 2015 and the 24-hour maximum concentration in 2021. Ammonium, nitrate and sulfate increase slightly to approximately 463 percent in 2015. Other's, including crustal

metals, sea salts, organic and elemental carbon are percentage-wise lesser contributors to the total mass in 2015. By 2021, the estimated 24-hour average maximum PM2.5 will continue to be mostly comprised of ammonium, sulfate and nitrate, (64 percent of the mass), despite the significant NOx and SOx emissions reductions. The other's category will contribute about 12 percent to the total mass. Background conditions will become very important to future year standard attainment for both annual and episodic (24-hour) basis.

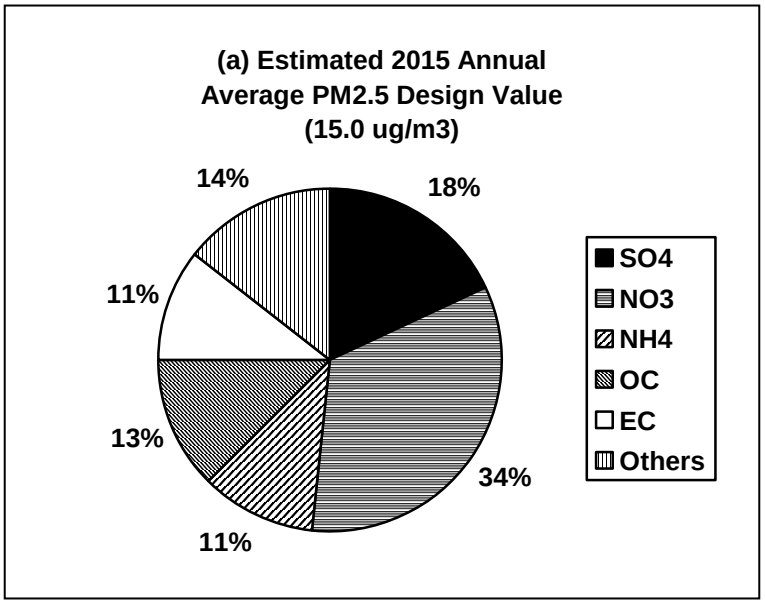
TABLE 10-1

Comparison of Federal Particulate Matter Standards

Standard	Observed Max Value ($\mu g/m^3$)	% above Std.	Design Value ($\mu g/m^3$)	% above Std	Predicted Design ($\mu g/m^3$)	% above Std	Predicted Design ($\mu g/m^3$)	% above Std
	2005		2005		2015 Controlled		2021 Controlled	
Current 24-hour (150 $\mu g/m^3$)	131	Met	117	Met	111	Met	~93	Met
Current Annual PM2.5 (15 $\mu g/m^3$)	21.0	40	22.6	51	15.0	Met	15.0 <	Met
Current 24-hour PM2.5 (65 $\mu g/m^3$)	133	104	64.8	Met	57	Met	52	Met
New 24-hr PM2.5 (35 $\mu g/m^3$)	133	279	64.8	85	57	63	52	49

CALIFORNIA PM AIR QUALITY STANDARDS

On June 2002, CARB also adopted stricter standards for particulate matter that affect both the coarse as well as fine particulate fraction. The recently adopted standards reduced the PM10 annual average standard from 30 microgram per cubic meter to 20 micrograms per cubic meter and retained the 24-hour PM_{10} standard of 50 micrograms per cubic meter. The PM2.5 annual average standard was set at 12 micrograms per cubic meter. The California standards are one third the federal PM10 24-hour standard, 80 percent the federal annual PM2.5 threshold. Obviously, achieving these standards poses an even greater challenge than meeting the new federal 8-hour ozone and PM2.5 standards.



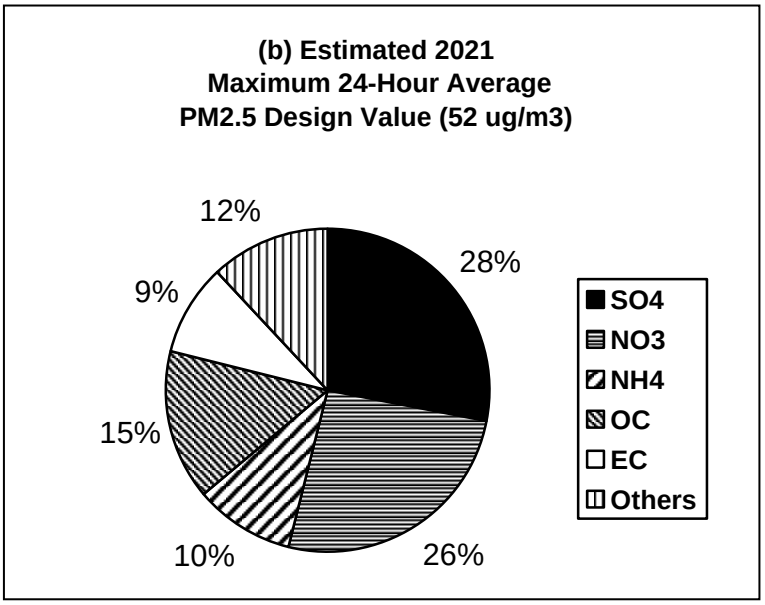


FIGURE 10-1

PM2.5 Components in the (a) estimated 2015 Annual Average Design Value and (b) estimated 2021 Maximum 24-hour Average Design Value.

GREENHOUSE GASES

There is broad scientific consensus that the increased concentrations of greenhouse gases (GHGs) in the atmosphere will lead to global climate change in this century. The industrial revolution and the increased consumption of fossil fuels (e.g., gasoline, diesel, wood, coal, etc.) have contributed to substantial increase in atmospheric levels of greenhouse gases primarily carbon dioxide, methane, nitrous oxide, and hydrofluorocarbons. These gases trap the sun's heat in the atmosphere, like a blanket, causing the atmospheric temperatures to rise. Over time, the increased temperature will result in climate change effects such as raising sea levels, altering precipitation patterns, and changing water supplies and crop yields. Global warming could also adversely affect human health, harm wildlife, and damage fragile ecosystems. Higher atmospheric temperatures would also result in more emissions, increased smog levels, and the associated health impacts.

In June 2005, Governor Schwarzenegger signed Executive Order #S-3-05 which established the following greenhouse gas targets:

By 2010, Reduce to 2000 Emission Levels
By 2020, Reduce to 1990 Emission Levels
By 2050, Reduce to 80% Below 1990 Levels

These targets were recently codified into the state law through AB32. The emission levels in California were estimated to be 426 million metric tons CO2 equivalent for 1990, 473 million metric tons CO2 equivalent for 2000, 532 million metric tons CO2 equivalent for 2010, and 600 million metric tons CO2 equivalent for 2020. The AB32's goals for emission reductions were estimated to be approximately 59 and 174 million tons CO_2 equivalent by 2010 and 2020, respectively.

Achieving the AB32's target would require significant development and implementation of energy efficiency technologies and extensive shifting of energy production to renewable sources. In addition to reducing GHG emissions, such strategies would concurrently reduce emissions of criteria pollutants associated with fossil fuel combustion.

The Final 2007 AQMP proposes to quantify the concurrent emission reductions associated with Statewide GHG programs targeted at stationary and mobile sources in the Basin working with various state agencies. Emission reductions from these programs will be applied toward the long-term reduction targets proposed in the Final 2007 AQMP for meeting the federal ozone standard by 2021 (or 2024). Any GHC impacts from the control strategies contained in the Final AQMP will be assessed in the Plan's CEQA document.

The District will continue to collaborate with various local and state State agencies in implementing the proposed GHG strategies and quantifying the concurrent combustion emission reductions.