CHAPTER 8

FUTURE AIR QUALITY - DESERT NONATTAINMENT AREAS

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INTRODUCTION

The 1990 federal Clean Air Act revised the planning requirements for many areas that have not attained NAAQS. The District has jurisdiction over the South Coast Air Basin and the desert portion of Riverside County in the Salton Sea Air Basin (see Figure 1-1). The Coachella Valley, located in the desert portion of Riverside County, exceeds the federal ozone and PM10 standards and is classified as a "severe-17" ozone nonattainment area and serious nonattainment area for PM10.

The federal Clean Air Act requires that the Coachella Valley:

- identify specific emission reduction goals;
- demonstrate reasonable further progress in VOC emission reductions;
- demonstrate attainment of the federal ozone standard by November 15, 2007; and
- provide contingency measures or actions in the event of a failure to attain or to meet interim milestones.

This 2003 AQMP revision addresses these requirements and satisfies the State Implementation Plan requirements under Title I of the CAA.

In June 2002, the District Governing Board adopted the latest the Coachella Valley PM10 attainment plan, known as the 2002 CVSIP. A revision to the 2002 CVSIP, known as the 2003 CVSIP, is being prepared separately to incorporate the latest mobile source emissions model results and planning assumptions.

STATEMENT OF PROBLEM

There are a number of circumstances that are unique to the Coachella Valley that make it difficult to develop a local control strategy that satisfies CAA requirements. For example, with little in the way of local emissions, and with the significant growth projected, it is difficult to satisfy the reasonable further progress requirements of the CAA. There is strong evidence that pollutant transport from the South Coast Air Basin to the Coachella Valley is the primary cause of its ozone nonattainment status. As a result, the District believes that aggressive control of the South Coast Air Basin emissions is an effective strategy to substantially improve air quality in the Coachella Valley. Each of these issues is addressed in further detail below.

Regulatory Requirements

State Implementation Plan requirements under Title I of the CAA depend on the severity of the nonattainment problem. For the Coachella Valley, the CAA requirements for moderate through severe areas must be addressed. Thus, the area is subject to the reasonable further progress requirements of the CAA, as discussed in Chapter 6 for the South Coast Air Basin; these requirements are intended to ensure that each ozone nonattainment area provide for sufficient VOC emission reductions to attain the ozone national ambient air quality standard. These requirements are more difficult to meet for areas with low existing emissions and significant population growth, since the VOC reductions are relative to the 1990 emissions and activity levels. For example, the CAA requires three percent VOC emission reductions beginning in 1997. If an area experiences population growth such that VOC emissions increase by 15 percent over 1990 levels, then the area must develop regulations that achieve VOC reductions of at least 18 percent (i.e., the three percent rate-of-progress requirement plus the 15 percent increase from population growth). The expected population growth for the Coachella Valley is significant; thus the rate-of-progress requirements of the CAA cannot be met unless further local controls are implemented.

The CAA also requires that "severe-17" ozone nonattainment areas, such as the Coachella Valley, demonstrate attainment of the federal ozone air quality standard by November 15, 2007 using a photochemical grid model and modeling techniques. The South Coast Air Basin modeling domain, as shown in Figure 8-1, was expanded to include the Coachella Valley so that this CAA requirement could be addressed. It is clear from available data that federal ozone standard exceedances in the Coachella Valley largely result from pollutant transport from the upwind South Coast Air Basin. Photochemical grid modeling for the 1997 AQMP, using the U.S. EPA-approved Urban Airshed Model, shows that attainment of the ozone standard is possible with the proposed control strategy described in the 1997 AQMP for the South Coast Air Basin, and control of locally generated emissions via state and federal regulations. This 2003 Plan carries forward the 1997 AQMP and 1999 AQMP Amendment control approach for the Coachella Valley.

Population Growth

The Coachella Valley is a rapidly growing area, as shown in Table 8-1. By 2020, the population in the Coachella Valley is projected to more than double. It is clearly more challenging to meet the rate-of-progress requirements of the CAA in such rapidly growing areas.

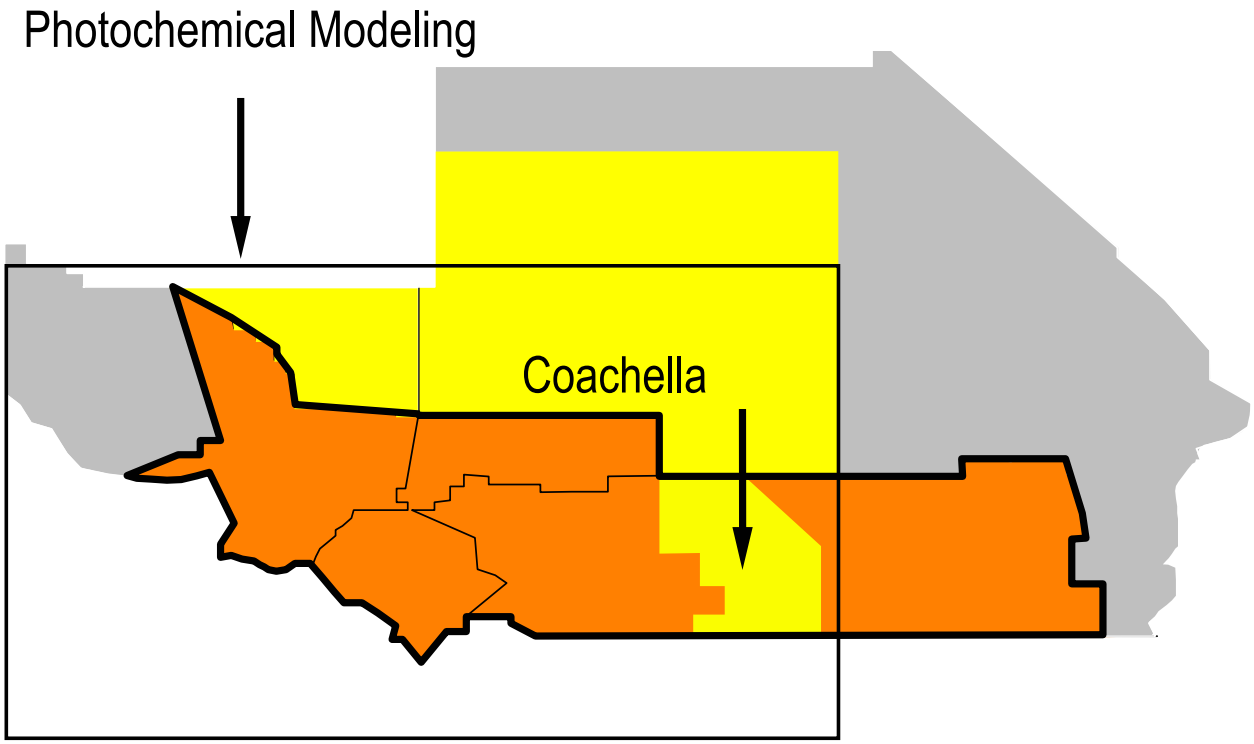

FIGURE 8-1

Modeling Domain

[Note: A New District (Antelope Valley Air Pollution Control District) was formed in September 1996 and was effective on July 1, 1997.]

TABLE 8-1

Historical Population and Population Forecasts

Area	1980	1990	2000	2010	2020
South Coast Air Basin	~10,500,000	13,022,000	14,798,000	16,653,000	18,200,000
Coachella Valley	139,000	267,000	297,458	371,074	449,828

Pollutant Transport

The pollutant transport pathway from the South Coast Air Basin to the Salton Sea Air Basin is through the Banning Pass to the Coachella Valley.[1] The transport pathway to the Coachella Valley has been an intensely studied phenomenon. An experiment to study this transport pathway concluded that the South Coast Air Basin was the source of the observed high oxidant levels in the Coachella Valley.[2] Transport from Anaheim to Palm Springs was directly identified with an inert sulfur hexafluoride tracer release[3]. The most comprehensive study to date of transport from the South Coast Air Basin to the Salton Sea air basin confirmed the transport pathways to the Coachella Valley.[4]

Ozone pollutant transport to the Coachella Valley can be demonstrated by examining ozone exceedance frequencies as a function of distance from the source areas. Figure 8-2 shows the frequency of exceedances of the federal one-hour ozone standard by hour for the period 1997 through 2002. The Coachella Valley transport route is represented in Figure 8-2, starting at Pico Rivera near the source region and passing through Fontana and Banning and finally through Banning Pass to Palm Springs in the Coachella Valley. Note that near the source region exceedances occur most frequently at mid-day (noon to 1:00 p.m.) during the peak of incoming solar radiation and therefore the peak of ozone production. As one goes downwind of the source region, exceedances occur later and later in the day as the ozone cloud is transported downwind. For example, at Palm Springs exceedances occur most frequently at 6:00 p.m. If this peak were locally generated, it would be occurring near mid-day and not in the late afternoon or early evening.

Ozone is transported these long distances at fairly high concentrations for two reasons. Control of VOCs in the South Coast Air Basin has caused the location of the daily maximum ozone to move eastward; thus more pollutants which have not reacted are carried to greater distances. The VOC control program in the South Coast Air Basin has reduced VOC emissions to the extent that photochemical reaction rates of formation of ozone have also slowed. Greater amounts of emissions (although, overall, these emissions are lower) are transported downwind as a result. In addition, ozone formed in the South Coast Air Basin could remain above the standards during transport in the downwind areas since there are fewer oxides of nitrogen sources to react with ozone during the nighttime hours.

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1 R.W. Keith. 1980. A Climatological Air Quality Profile: California's South Coast Air Basin. Staff Report, South Coast Air Quality Management District.

2 E.K. Kauper. 1971. Coachella Valley Air Quality Study. Final Report, Pollution Res. & Control Corp., Riverside County Contract & U.S. Public Health Service Grant No. 69-A-0610 RI.

3 P.J. Drivas and F.H. Shair . 1974. A Tracer Study of Pollutant Transport in the Los Angeles Area. Atmos. Environ. 8: 1155-1163.

4 T.B. Smith et al. 1983. The Impact of Transport from the South Coast Air Basin on Ozone Levels in the Southeast Desert Air Basin. CARB Research Library Report No. ARB-R-83-183. ARB Contract to MRI/Caltech.

Table 8-2 compares the 1997 emission inventories of the South Coast Air Basin with those for the Coachella Valley. The South Coast Air Basin emissions, upwind of the Coachella Valley, overwhelm the locally-generated emissions. Depending on the pollutant, emissions in the South Coast Air Basin are five (for PM10) to 50 (for SOx) times greater than emissions in the Coachella Valley. It is clear that improved air quality in the Coachella Valley depends on reduced emissions in the South Coast Air Basin. This is illustrated by the trends in ozone air quality described in the following section.

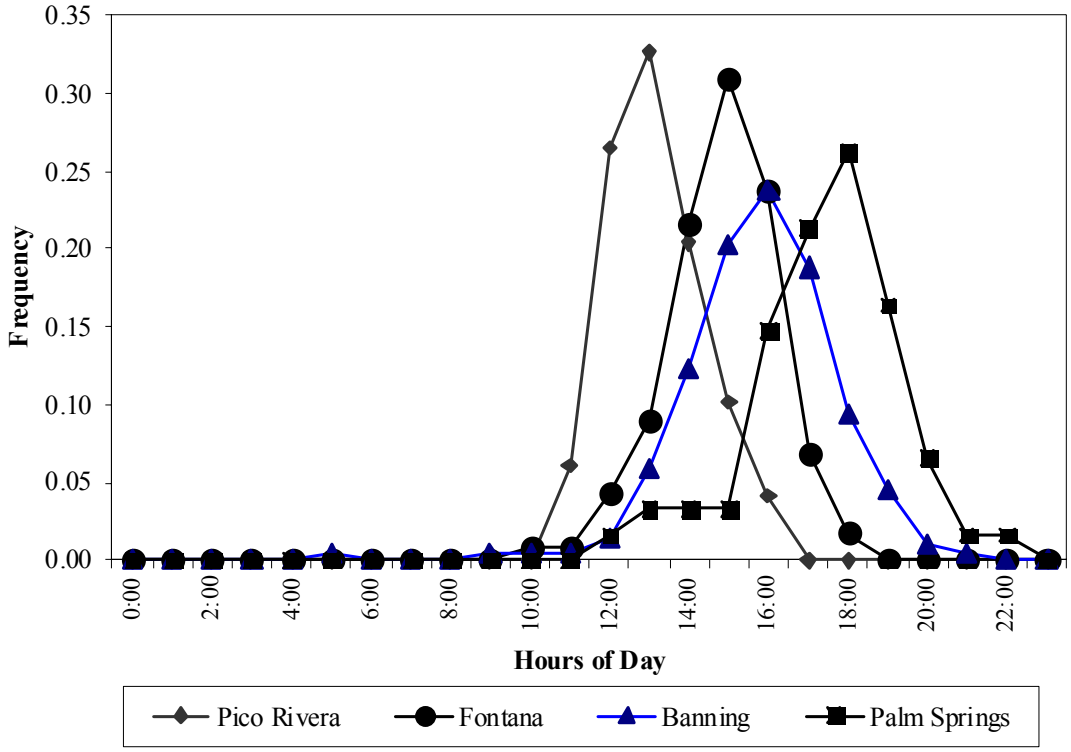

FIGURE 8-2

Frequency of Federal Ozone Exceedances Along the Coachella Valley Transport Route, 1997-2002

TABLE 8-2

Comparison of 1997 Annual Average Emissions

	Emission Rate (tons/day)		
Area	**VOC**	**NOx**	**PM10**
South Coast Air Basin	1121	1281	281
Coachella Valley	24	35	37

Trends in Ozone Air Quality

The ozone air quality trends for stations along the Coachella Valley transport route since 1980 are shown in Figure 8-3. The statistic used here to illustrate trends is the average of the 30 highest daily maximum one-hour ozone concentrations in each year, referred to as the "Top 30 Mean." This statistic has been identified and recommended by the CARB[5] as a good trend indicator. Over this time period, population growth in the Coachella Valley was much greater than that in the South Coast Air Basin, as shown in Table 8-2. Since emissions are directly related to population for many source categories, emissions growth was also greater in the Coachella Valley relative to the South Coast Air Basin. However, the downward trend in the Top 30 Means at Palm Springs parallels the trend of the upwind stations, which are in the South Coast Air Basin. This observation confirms the conclusion that ozone air quality in the Coachella Valley is largely due to transport from the upwind source region of the South Coast Air Basin and that attainment in the valley is only possible with emission reductions in the Basin.

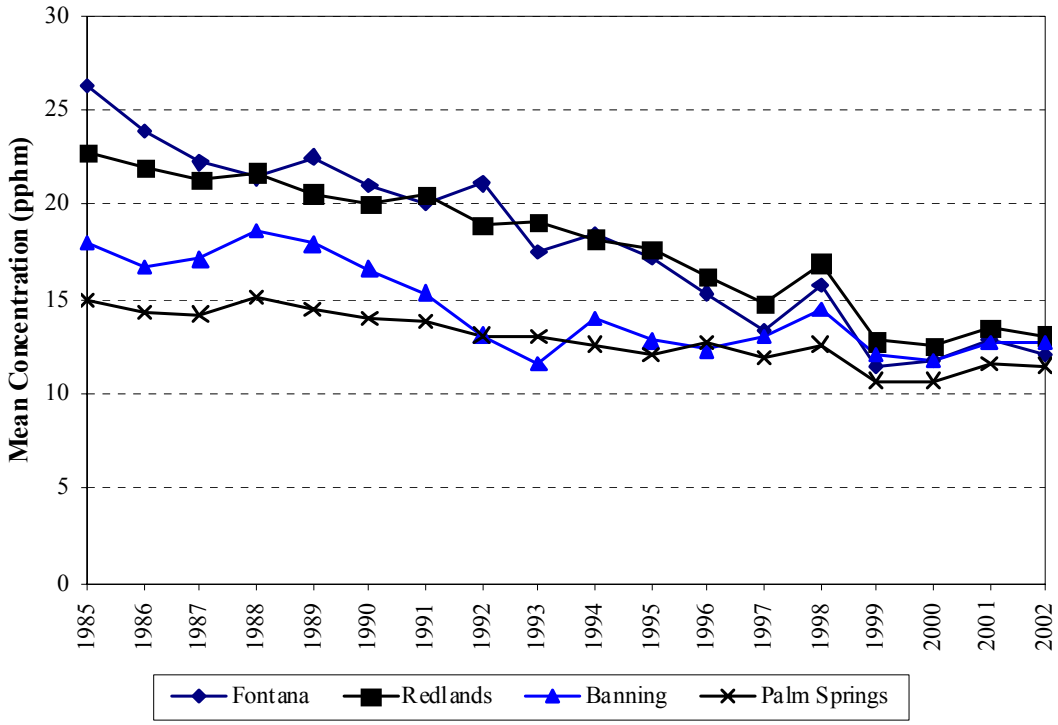

FIGURE 8-3
Mean of the Top 30 Daily Peak Ozone Concentrations - Coachella Valley Transport Route

Figure 8-4 illustrates just how effective the District's control strategy has been in reducing the number of federal one-hour ozone exceedances in the Coachella Valley

[5] CARB. 1992. Ozone Air Quality Trends (1981-1990).

since 1980. The number of exceedance days by month in 1985, 1990, 1995, and 2002 for Palm Springs are shown in Figures 8-4. Both the number of days per month exceeding the standard and the number of months in which exceedances are observed have dropped dramatically since 1985. In 1985, Palm Springs experienced exceedances in six months of the year. By 2002, the number of months with exceedances had dropped to only one month (2 days in August).

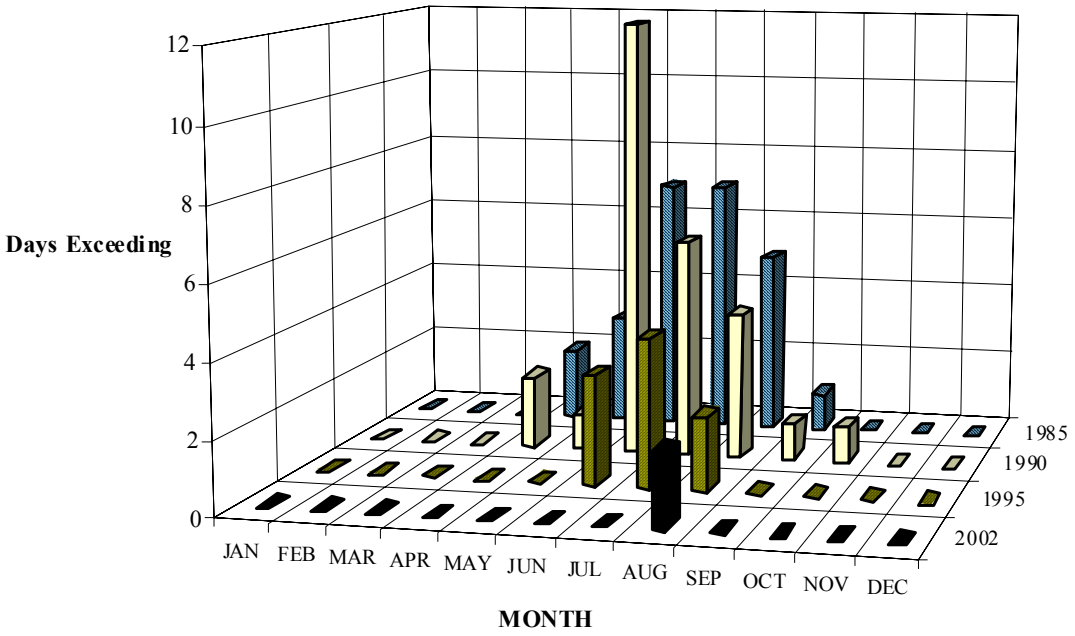

FIGURE 8-4

Federal Ozone Exceedance Days by Month and Year at Palm Springs

ATTAINMENT DEMONSTRATION

Air quality modeling is an integral part of the planning process to achieve clean air. The CAA requires that ozone nonattainment areas designated as serious and above be required to use a regional photochemical model to demonstrate attainment. To meet this requirement, UAM, is used in the attainment demonstration for Coachella Valley. The UAM modeling system is described in Chapter 5 and Appendix V. UAM was run for the August 3-7, 1997 and August 26-28, 1987 meteorological episodes to project future air quality. Performance evaluations for the August 1997 meteorological episode are discussed in Appendix V.

Future-year air quality projections in the Coachella Valleys are presented in detail in Appendix V; the results for 2007 are summarized in the following discussion. In 2007,

some region wide controls are projected to be implemented to reduce emissions beyond the baseline tonnage. As a consequence, the controlled 2007 simulations for the August 1997 meteorological episode are slightly lower than the baseline emissions. ("Baseline" assumes no further control beyond existing rules and regulations and "controlled" assumes implementation of the proposed control strategy described in Chapters 4 and 7). The results of the UAM simulation using the controlled emissions for 2007 project a maximum one-hour concentration of 0.122 ppm for the August 1997 episode and 0.094 ppm for the August 1987 episode. Both analyses support that the federal one-hour standard will be attained in the Coachella Valley.

POST-1996 VOC RATE-OF-PROGRESS REQUIREMENTS

The reasonable further progress requirements in the CAA are intended to ensure that each ozone nonattainment area provide for sufficient precursor emission reductions to attain the ozone NAAQS. More specifically, Section 182(c)(2) requires that each serious and above ozone nonattainment area achieve actual VOC emission reductions of at least three percent per year averaged over each consecutive three-year period beginning six years after enactment of the Act until the area's attainment date, November 15, 2007. This is called the "post-1996 rate-of-progress" requirement of the CAA.

According to Section 182(c)(2)(C), actual NOx emission reductions which occur after 1990 can be used to meet post-1996 VOC emission reduction requirements provided the NOx reductions satisfy the following criteria. First, the control strategy used to demonstrate attainment must consist of both VOC and NOx control measures. More specifically, the mix of VOC and NOx emission reductions used to satisfy the post-1996 rate-of-progress requirements of the CAA must be consistent with the controlled VOC and NOx emission levels used in the modeling demonstration. And lastly, the combined annual VOC and NOx reductions must average three percent per year. As discussed below, since the baseline VOC emissions are below the overall target levels there is no need for NOx substitution.

As mentioned a number of times in this chapter, poor ozone air quality in the Coachella Valley is primarily due to transport of ozone and its precursors from the upwind source region of the South Coast Air Basin and attainment in Coachella Valley is only possible with substantial emission reductions in the Basin. With this in mind, the proposed control strategy consists of two components: 1) an aggressive control strategy for VOC and NOx emission sources in the South Coast Air Basin; and 2) control of locally generated emissions via proposed control measures implemented by state and federal actions.

The District's approach to satisfying the post-1996 rate-of-progress requirement is presented in Tables 8-3 and 8-4 and Figure 8-5. Figure 8-5 depicts the VOC emission target levels and the projected uncontrolled baseline for 2005 and 2007. Controlled emission levels are not shown since the VOC emission reductions from existing District and CARB rules, included in the projected baseline, are sufficient to meet the CAA rate-of-progress requirements. The projected emission reductions beyond the target levels can be used as contingency in the event of a milestone failure.

TABLE 8-3

Percent VOC and NOx Reductions from the 1990 Baseline for the Coachella Valley Post-1996 Rate-of-Progress Requirements

Milestone Year	VOC	NOx	CAA*
2005	42.0	0.0	42.0
2007	48.0	0.0	48.0 or attainment

* The percent VOC and NOx reductions must equal the CAA percent reduction requirements listed here.

TABLE 8-4

Summary of Rate-of-Progress Calculations for the Coachella Valley - VOC

ROW	CALCULATION STEP [a]	2005	2007
1	1990 ROP Base Year [b]	35.2	35.2
2	FMVCP/RVP [c] Reductions	8.6	8.6
3	Adjusted 1990 Base Year [d]	26.6	26.6
4	Required Reduction (%) [e]	42.0	48.0
5	Emission Reductions [f]	11.2	12.8
6	RACT Corrections	0.0	0.0
7	I/M Corrections	0.0	0.0
8	Target Level [g]	15.4	13.8
9	Projected Baseline [h]	12.7	12.0

[a] Units are in tons per day unless otherwise noted.
[b] Contains only anthropogenic emissions.
[c] FMVCP/RVP = Federal Motor Vehicle Control Program/Reid Vapor Pressure
[d] (Row 1) – (Row 2)
[e] 24% VOC reduction by 1999 and 3% per year (total VOC and NOx reductions) thereafter from the adjusted 1990 baseline year.
[f] [(Row 3) x (Row 4)]/100
[g] (Row 3) – (Row 5) – (Row 6) – (Row 7)
[h] Projected baseline emissions taking into account existing rules and projected growth. It includes emission reduction credits.

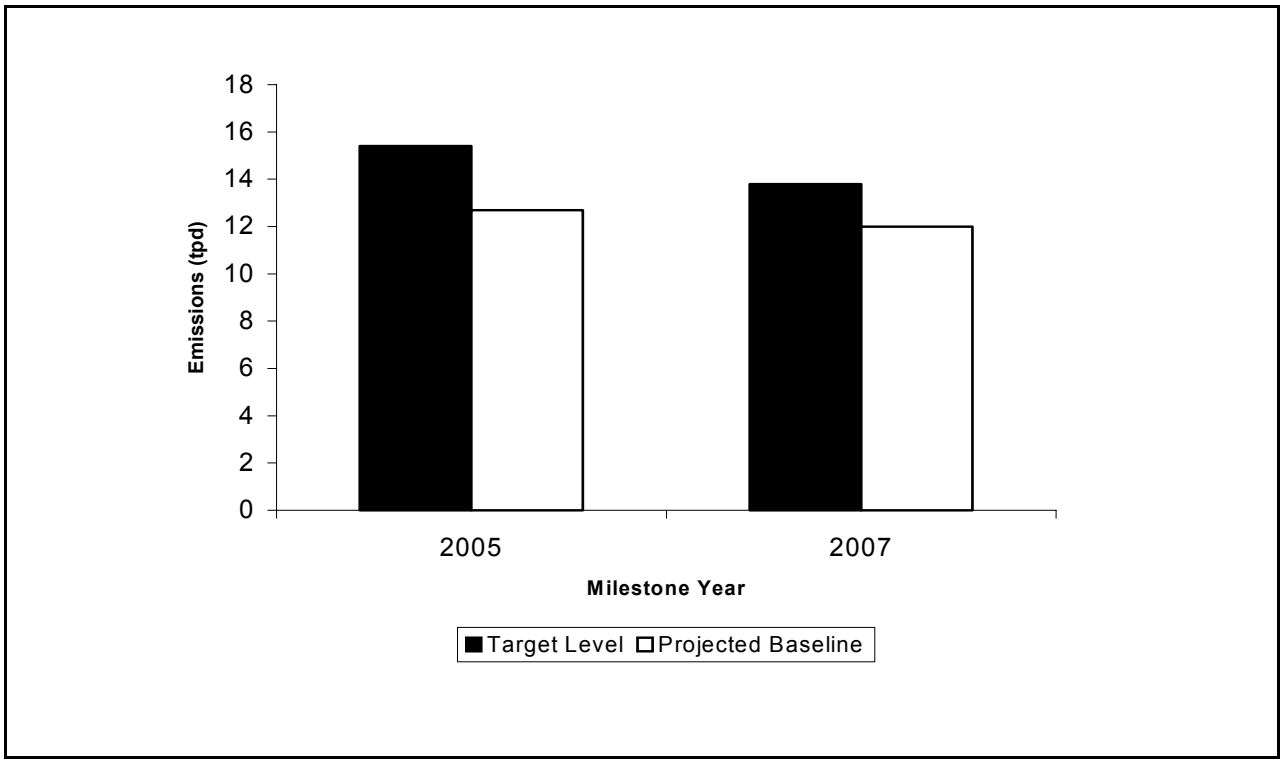

FIGURE 8-5

Coachella Valley Post-1996 Rate-of-Progress Requirements - VOC

SUMMARY OF COACHELLA VALLEY PM10 PLAN

Introduction

The Coachella Valley is currently designated nonattainment for PM10. Unlike the Basin, where PM10 exceedances are due primarily to PM10 precursor pollutants, the Coachella Valley's elevated PM10 levels are strongly tied to local fugitive dust problems. Accordingly, instead of relying on District rulemaking to achieve attainment, previous planning documents have proposed local control to meet the area's air quality objectives. This approach allows local Coachella Valley governments, industry, and citizens to take an active part in improving the Valley's air quality. As a result of this approach, various local dust control programs and two District "backstop" rules have been developed. These programs have resulted in significant improvements in the Valley's air quality.

Background

Under the 1990 federal CAA, the Coachella Valley was originally designated as a "moderate" PM10 nonattainment area. In response to CAA requirements for "moderate"

areas, the District developed the "State Implementation Plan for PM10 in the Coachella Valley" (1990 CVSIP) which was adopted by the Governing Board in November 1990. The 1990 CVSIP proposed implementation of reasonably available control measures (RACM) for fugitive dust sources no later than December 10, 1993. The CAA specifies that any area which cannot attain the standards by December 1994 would subsequently be reclassified as a "serious" nonattainment area. In January 1993, the U.S. EPA completed its initial redesignation process, and included the Coachella Valley among five nationwide areas redesignated as "serious," effective February 8, 1993. The District adopted the 1994 Coachella Valley PM10 SIP revision (1994 CVSIP) in July 1994 to meet the serious non-attainment area requirements.

U.S. EPA guidance states that a determination of compliance with the NAAQS must be based on three complete, consecutive calendar years of quality-assured air quality monitoring data[6]. Air quality is monitored at two locations in the Coachella Valley and results indicate that there were no PM10 exceedances in 1993 or 1994. In 1995, the 24-hour standard was exceeded once during a high-wind day (gusts exceeded 50 mph throughout the day) and this led to an exceedance of the annual average standard. The U.S. EPA had recently developed a natural events policy[7] that permitted, under certain circumstances, the exclusion of air quality data attributable to uncontrollable natural events (e.g., volcanic activity, wildland fires, and high-wind events). With the exclusion of air quality data for that day, the Coachella Valley experienced three consecutive years without an exceedance of the PM10 standards and, consequently, was eligible for redesignation to attainment. Based on the supporting meteorological data regarding the one high-wind event in 1995, the District prepared and approved a maintenance plan for the Coachella Valley, the 1996 Coachella Valley Redesignation Request and Maintenance Plan (1996 CV Plan).

2002 CVSIP

After years of demonstrating attainment of the PM10 standards, PM10 levels in 1999 through 2001 did not demonstrate attainment of the annual average PM10 NAAQS. (Coachella Valley has attained the 24-hour PM10 standard since 1993.) When it became apparent that the Coachella Valley would not be able to continue to demonstrate attainment of the PM10 NAAQS by the 2001 attainment deadline, District staff, in conjunction with local Coachella Valley jurisdictions, agencies, and stakeholders, quickly prepared the 2002 CVSIP, which includes control program enhancements that meet the Most Stringent Measure (MSM) requirements and a request for extension of the PM10 attainment date. Local assistance with 2002 CVSIP preparation was also provided by the

[6] U.S. EPA, *Memorandum to Division Directors, Subject: Procedures for Processing Requests to Redesignate Areas to Attainment,* Office of Air Quality Planning and Standards, Research Triangle Park, page 2, September 4, 1992.

[7] U.S. EPA, Memorandum from Mary Nichols, Assistant Administrator, Subject: Areas Affected by PM10 Natural Events, May 30, 1996.

Coachella Valley Air Quality Ad Hoc Task Force. The 2002 CVSIP was adopted by the AQMD Governing Board on June 21, 2002. It was adopted by CVAG's Executive Committee on June 25, 2002. After comment by U.S. EPA, the AQMD Governing Board adopted on September 12, 2002 the 2002 CVSIP Addendum, which detailed the 2003 milestone year target and emission budgets. U.S. EPA approved the 2002 CVSIP on April 18, 2003. AQMD and CVAG staff are currently working on implementing the 2002 CVSIP.

2003 CVSIP

At the time of the 2002 CVSIP, CARB had not completed its update of its motor vehicle emissions model. As part of the June 21, 2002 adopting resolution, the AQMD Governing Board directed the Executive Officer to update the 2002 CVSIP, including emissions budgets in 2003, using the latest approved motor vehicle emissions model and planning assumptions. It also requested that the U.S. EPA approve the emissions budgets based on the 2002 CVSIP for use only until the U.S. EPA finds adequate the revised budgets for the same years submitted as part of the 2003 revision to the 2002 CVSIP.

The 2003 CVSIP will update the 2002 CVSIP emissions inventories, transportation mobile source budgets, and attainment demonstration with the latest approved motor vehicle emissions model and planning assumptions. Other elements of the 2002 CVSIP remain the same, e.g., the Most Stringent Measures analysis, the Coachella Valley control and contingency measures, and the Natural Event Action Plan.

CONCLUSIONS

The Coachella Valley is designated as a "severe-17" ozone nonattainment area and as such must demonstrate reasonable further progress and attainment according to federal Clean Air Act requirements. The District's proposed control strategy includes two components: a strategy for the South Coast Air Basin as described in Chapter 4 and control of locally generated emissions in the Coachella Valley via regulations at the state and federal level. Photochemical grid modeling demonstrates that the federal one-hour ozone standard will be met by November 15, 2007 for the Coachella Valley, as required by the CAA. The 2002 CVSIP was submitted with a request to U.S. EPA to extend the PM10 attainment deadline to 2006 and a control strategy to ensure attainment by that deadline. District staff expects that that plan and extension request will be officially approved by U.S. EPA shortly. A 2003 revision to the 2002 CVSIP, which is being prepared as a separate document and is expected to be available Spring 2003, will update the emissions inventory, transportation emission budgets, and attainment demonstration to reflect, among other things, the latest CARB-approved mobile source emission model results and latest planning assumptions.