Chapter 1

Progress and Current Air Quality

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Chapter 1: Progress and Current Air Quality

1.1 INTRODUCTION

This chapter presents an overview of the progress that has been made and the current state of the San Joaquin Valley's air quality. Over the past 20 years, the hard work and financial and personal investments by industries, individuals, and agencies are producing real and tangible results that show a substantial improvement in air quality.

1.2 ADOPTED RULES

Since its forming in 1992, the San Joaquin Valley Air Pollution Control District (District) has adopted about 500 rules and rule amendments. The District was the nation's first to adopt a progressive Indirect Source Review (ISR) program, which reduces emissions from new indirect sources Valley-wide, such as commercial, industrial, and residential developments. The District was also the first in the nation to adopt a rule to control volatile organic compounds (VOC) emissions from wine production and storage. This rule contains groundbreaking compliance options that offer flexibility to operators without sacrificing emission reductions.

The District was the first in the state to regulate emissions from on-field agricultural operations. To date, through the Conservation Management Practices (CMP) rule, the District has received 6,400 CMP plans from Valley farmers that reduce particulate matter emissions from 3.2 million acres of productive agricultural land. The District was also the first major air district in the state to regulate the use of residential fireplaces. Now, other major districts in the state are using the District's regulation as the benchmark. In addition, the District leads the nation with its stringent emission limits on engines, boilers, turbines, and glass-melting furnaces. Air quality improvements evidence the success of the District's innovative rules, as discussed in the next section.

1.3 CURRENT AIR QUALITY

The two major indicators of air quality are emissions inventories and ambient air quality data. Emissions inventories are estimates indicating how much direct pollution is going into the air as a result of various activities. Ambient air quality data, which is measured by monitors, tells us how much pollution is in the air we breathe. Together, these data show progress made in improving air quality as well as the great challenge we face in meeting future standards.

1.3.1 Emissions

An emissions inventory is a tabulation of pollutant emissions into the atmosphere. The District uses comprehensive emissions inventories to develop control strategies, determine the effectiveness of permitting and control programs, provide input into ambient dispersion models, fulfill reasonable further progress requirements, and screen sources for compliance investigations. Emissions inventory data, like ambient monitoring data, are also used as indicators for trends in air pollution.

Ozone is not directly emitted into the atmosphere, but produced by a photochemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight (see Figure 1-1). Since there are no ozone emissions, there is no emissions inventory for ozone. Therefore, an effective ozone control strategy requires emissions inventories for NO_x and VOC.

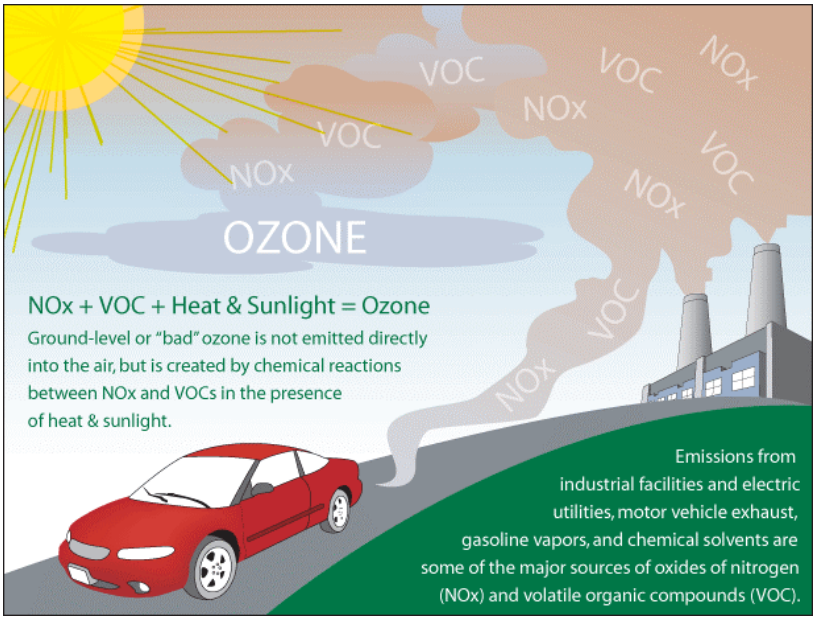


Figure 1-1 Ozone Formation

Source: AirNow, <http://airnow.gov/index.cfm?action=jump.jump_ozone>

Typically, an emissions inventory is also organized by emission source category. Source categories consist of several broad groups:

- **Mobile sources** – motorized vehicles
  - On-road sources include automobiles, motorcycles, buses, and trucks
  - Other, or off-road, sources include farm and construction equipment, lawn and garden equipment, forklifts, locomotives, boats, aircraft, and recreational vehicles.

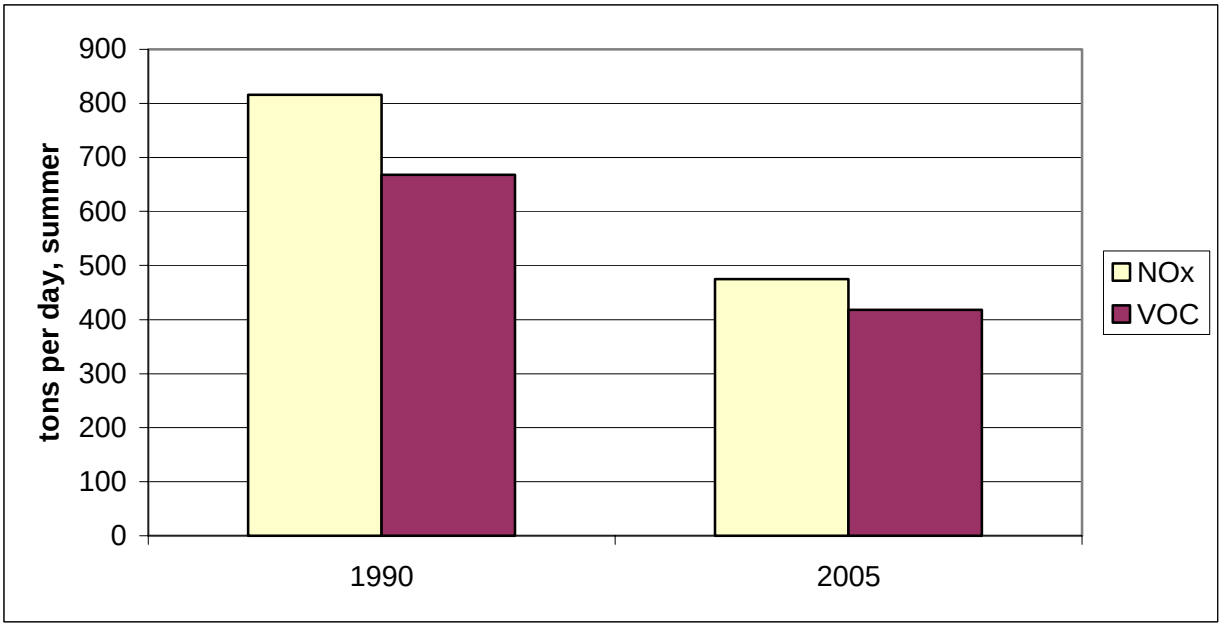
- **Stationary sources** – fixed sources of air pollution
  - Power plants, refineries, and manufacturing facilities
  - Aggregated point sources - facilities (such as gas stations and dry cleaners) that are not inventoried individually but are estimated as a group and reported as a single source category.

- **Area sources** –human activity that takes place over a wide geographic area
  - Includes consumer products, fireplaces, tilling, and unpaved road dust.

- **Natural sources** – non-anthropogenic, naturally occurring emissions
  - Geogenic sources, such as petroleum seeps
  - Biogenic sources, such as emissions from plants

The District has made significant progress in reducing ozone precursor emissions. These reductions are a result of the many rules and programs put in place by the District and the ARB. These reductions represent an impressive accomplishment, especially in light of the 37% increase in population in the San Joaquin Valley over the same time period.

Figure 1-2 Ozone Precursor Emissions Reductions (Summer Averages), 1990-2005
(2006 Almanac (base year 2005))



Appendix B contains detailed tables showing the emissions inventories for NOx and VOC (as well as total organic gases [TOG], particulate matter 10 microns or less in diameter [PM10], particulate matter 2.5 microns or less in diameter [PM2.5], total suspended particles [TSP], carbon monoxide [CO], and oxides of sulfur [SOx], which

are all included to satisfy federal requirements). This appendix also contains more information on emissions inventory maintenance. Motor vehicle conformity budgets, which are required in state implementation plans (SIPs) and are based on motor vehicle emissions inventories, will be available in Appendix C (though not in this draft because ARB has not yet released the necessary mobile source emissions model (EMFAC 2007)). Emission reduction credits (ERC) are presented in Appendix D.

1.3.2 Air Monitoring Data

The District operates an extensive air monitoring network to measure progress towards compliance with the National Ambient Air Quality Standards (NAAQS). Ozone monitoring networks are designed to monitor areas with high population densities, areas with high pollutant concentrations, areas impacted by major pollutant sources, and areas representative of background concentrations. Together, the District, the California Air Resources Board (ARB), and the National Park Service operate 22 ozone monitoring sites throughout the San Joaquin Valley, as shown in Figure 1-3. Fifteen of the 22 currently operating monitors are in locations suitable to measure representative concentrations in areas of high population density. The other seven monitors (Oildale, Parlier, Clovis, Edison, Maricopa, Merced, and Fresno-Drummond) are sited specifically in areas that experience high ozone concentrations.

Figure 1-3 Ozone Monitoring Sites within the San Joaquin Valley Air Basin

The ozone monitors yield hourly average concentrations of ozone, reported in parts per million (ppm) to three decimal places. As illustrated in Figure 1-4 and Figure 1-5, the San Joaquin Valley Air Basin has shown progress in attaining the 1-hour ozone standard, which was revoked by EPA on June 15, 2005 (a discussion of federal air quality standards can be found in Chapter 2). The District is now continuing to

implement emission control measures contained in its most recent plan for attaining the now-revoked 1-hour ozone standard (the *Extreme Ozone Attainment Demonstration Plan*, adopted October 8, 2004).

Figure 1-4 Improvement in 8-hour Ozone Levels, 1995-2005

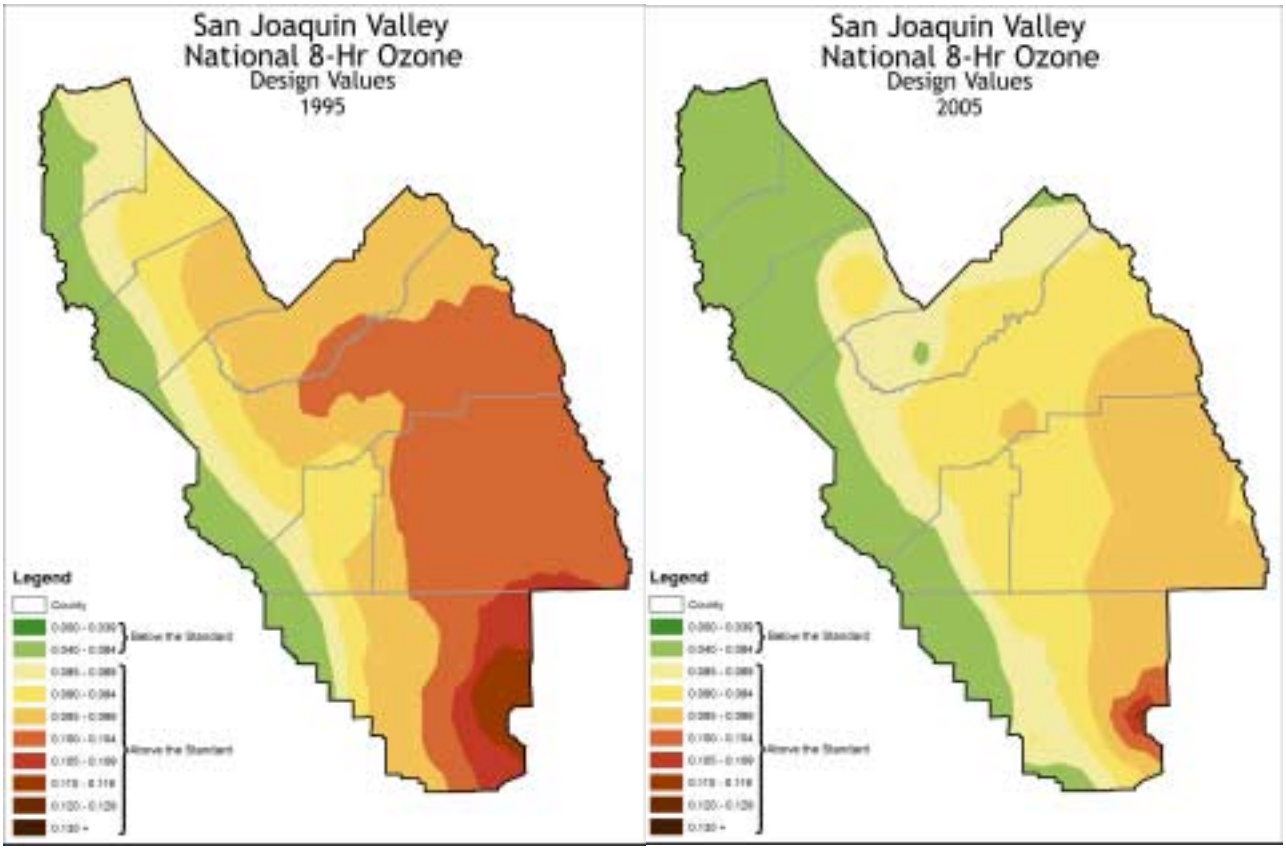
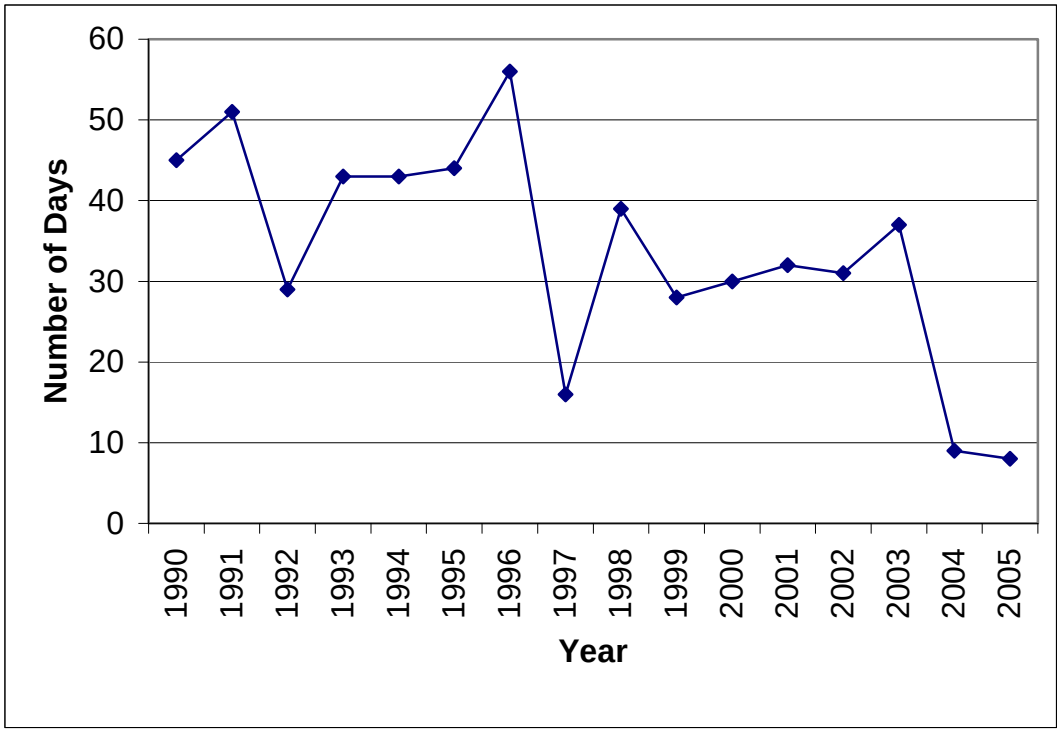


Figure 1-5 Days Over the 1-hour Ozone Standard



This plan for the 8-hour ozone standard extends the District's ozone air pollution control strategy to attain the more stringent standards. The one-hour ozone measurements collected by air quality monitors are also used to calculate 8-hour averages. At any given monitor, the highest of the 24 possible 8-hour average concentrations for a given calendar day is recorded as the 8-hour value for that day. For a given year, the fourth highest value is selected from the daily 8-hour maxima (as such, the highest three daily maximum 8-hour average ozone values each year do not count towards the attainment determination) and then averaged with corresponding values for the previous two years to determine attainment. The result is the three-year average of the annual fourth-highest daily maximum 8-hour ozone concentration, which is also called the "design value" for 8-hour ozone and is also the form of the standard. Table 1-1 illustrates a sample calculation. The 8-hour ozone NAAQS is met at a given monitor when the design value is less than or equal to 0.08 ppm rounded to the nearest hundredth (so concentrations less than 0.085 ppm are considered to be in attainment).

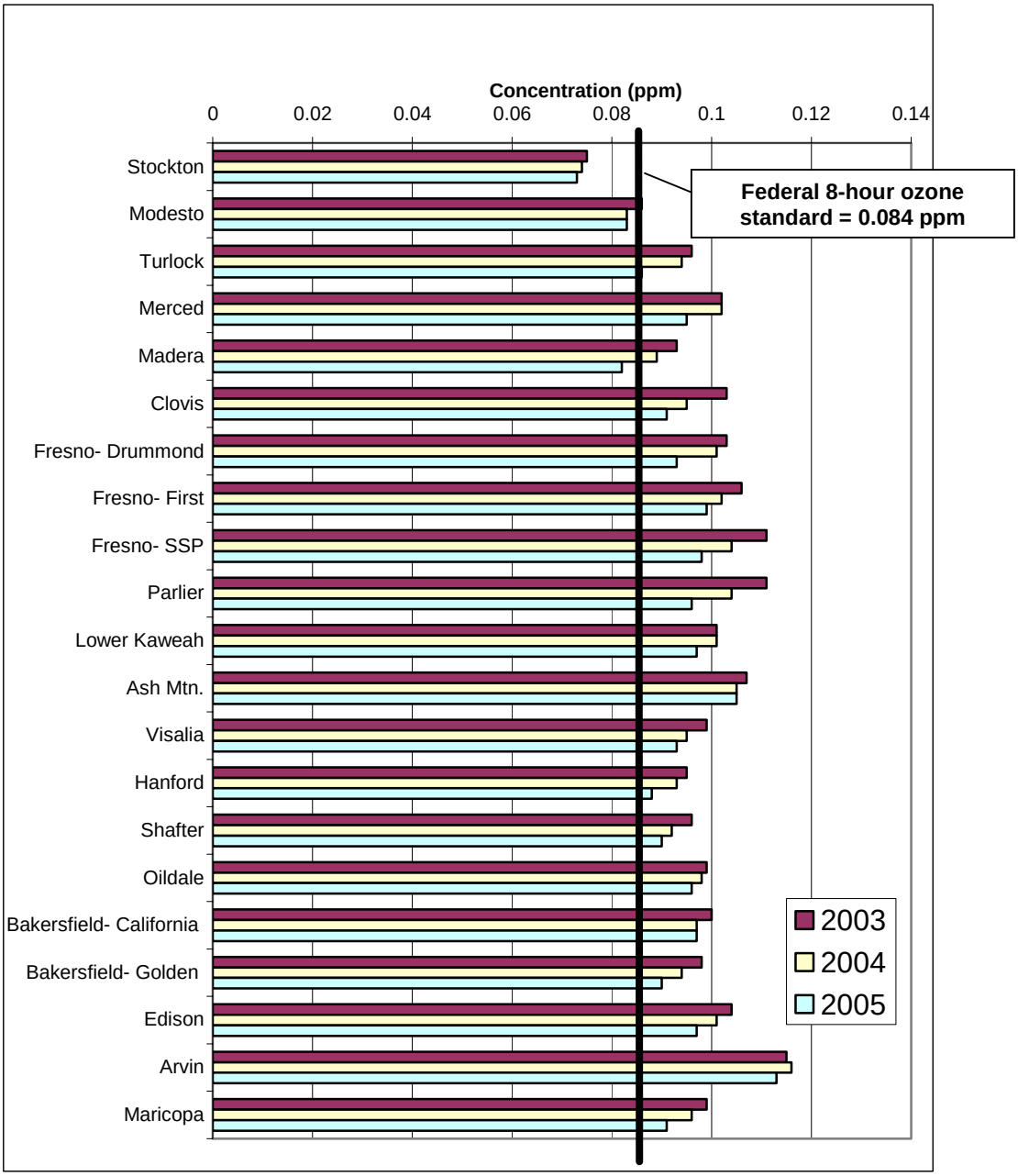
Table 1-1 Sample Design Value Calculation
(Fresno-Sierra Sky Park, 2005)

Year	Highest Daily Maximum Concentrations (ppm)			
	1st Highest	2nd Highest	3rd Highest	4th Highest
2003	0.112	0.106	0.103	**0.102**
2004	0.095	0.094	0.094	**0.091**
2005	0.103	0.102	0.102	**0.101**
			3 - Year Average:	**0.098**

Figure 1-6 shows design values by monitoring site for 2003-2005. As you can see from the figure, in spite of recent progress, the new 8-hour average standard is still exceeded by a significant amount at almost every site, and bringing all sites into attainment will represent a significant challenge.

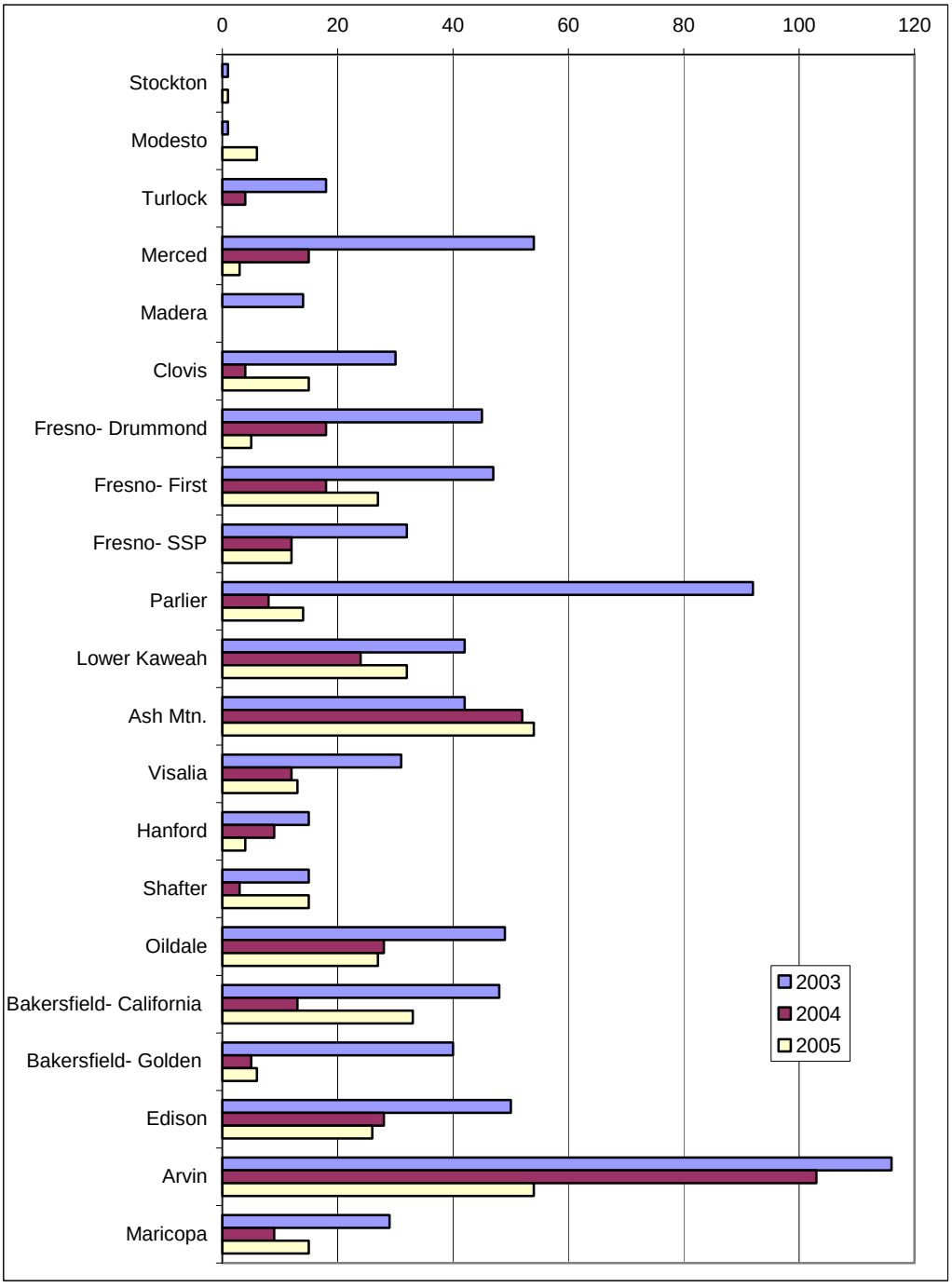
Figure 1-7 shows the number of days over the numeric value of the 8-hour standard by site for 2003, 2004, and 2005; although this is not used for attainment determinations, it shows that all sites of the Valley are experiencing fewer days over the standard than a couple of years ago, but that significant additional efforts will be needed to bring all sites into attainment. More 8-hour ozone data and analysis are available in Appendix A.

Figure 1-6 Eight-hour Ozone Design Values, 2003-2005[1]



[1] One of the District's 22 ozone monitoring sites, the Tracey-Airport site, has not been operating long enough to yield design values at this time.

Figure 1-7 Days Over the Level of the Federal 8-hour Ozone Standard



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