Chapter 2

Historical Trends in Toxic Air Contaminants and Associated Cancer Risks in the South Coast Air Basin and Vicinity

This chapter is a brief summary of the historic trends in toxic air contaminants and associated cancer risks in the South Coast Air Quality Basin. More detailed discussions are provided in Appendix II.

2.1 Summarized Highlights

- As a result of numerous State and District regulations, concentrations of 1,3 butadiene, benzene, carbon tetrachloride, methylene chloride, perchloroethylene, trichloroethylene, hexavalent chromium, lead, and nickel have been reduced significantly in the Basin.
- These reductions in toxics exposure have resulted in 44 to 63 percent reductions in carcinogenic risk to residents of the Basin since 1990.

2.2 Discussion

From 1986 to 1987, the District conducted a Multiple Air Toxics Exposure Study (MATES) to determine the Basin-wide risks associated with major airborne carcinogens. Integration of measured ambient concentrations, population distribution, and health risk data for individual chemical species constituted a method of estimating regional inhalation exposure, risk, and number of potential excess cancer cases. Of the 20 air toxics studied, benzene emissions and hexavalent chromium appeared to have had the greatest potential impact on the Basin's population at that time. The ARB has maintained a network of six monitoring stations in Southern California since the late 1980s to measure selected gaseous organic and toxic metal compounds. Examining this rich historical data set provides perspective for the current monitoring and modeling efforts of MATES-II.

The trends in cancer risks for the six stations are shown in Figure 2-1. The methods used to prepare this figure are discussed in Appendix II. Cancer risks are itemized by the six most important TACs and three lumped categories category called "Others." Diesel particulates which are now considered carcinogenic but not measured in the past, are not included in this analysis. Cancer risks have decreased significantly at all stations since 1990. Specifically, risks have decreased by 63, 44, 56, 48, 56, and 48 percent at Burbank, Los Angeles, Long Beach, Rubidoux, Simi Valley, and Upland, respectively. The improvement is primarily from reductions in benzene and 1,3-butadiene concentrations (70 to 80 percent) and secondarily from decreases in hexavalent chromium concentrations (8 to 20 percent).

Figure 2-2 compares the cancer risks from MATES-I and MATES-II. The MATES-I measurement program took place from May 1986 to April 1987, whereas the MATES-II measurement program was conducted from April 1998 to March 1999. Three stations are common to both studies and they are Los Angeles (LA), Long Beach (LB), and Rubidoux (RU). Only pollutants common to both sampling programs are shown in Figure 2-2. In addition, cadmium and ethylene dibromide are eliminated in the comparison since their detection limits are

significantly different between the studies. The data from MATES-I are taken from Tables 4-1 and 4-2 of the MATES-1 report (SCAQMD 1988). Cancer risks since MATES-I have decreased by 76, 73, and 55 percent at Los Angeles (LA), Long Beach (LB), and Rubidoux (RU), respectively.

Figure 2-3 shows the network means for various TACs for each year along with the 90 percent confidence intervals. Statistically significant reductions in mean concentrations have occurred over the period 1990 to 1997 for 1,3 butadiene, benzene, methylene chloride, perchloroethylene, trichloroethylene, hexavalent chromium, lead, and nickel. Numerous State and District regulations, such as the Low Emissions Vehicle (LEV) Program, the Toxic Hot Spot (AB2588) Program, reformulated fuels, and Regulation XIV have contributed to these significant improvements.

Figure 2-1

Trends in Cancer Risk in the South Coast Air Basin and Vicinity

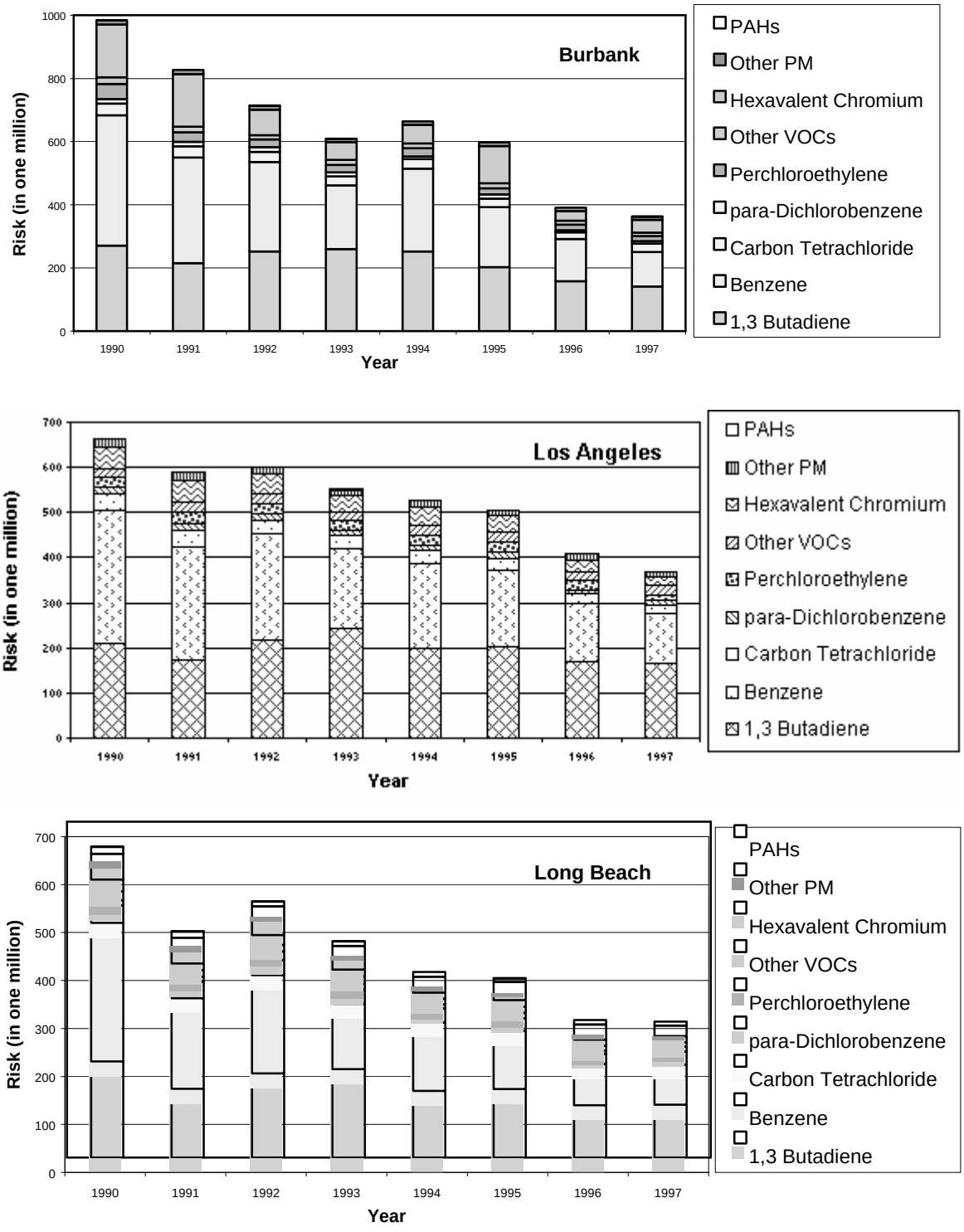
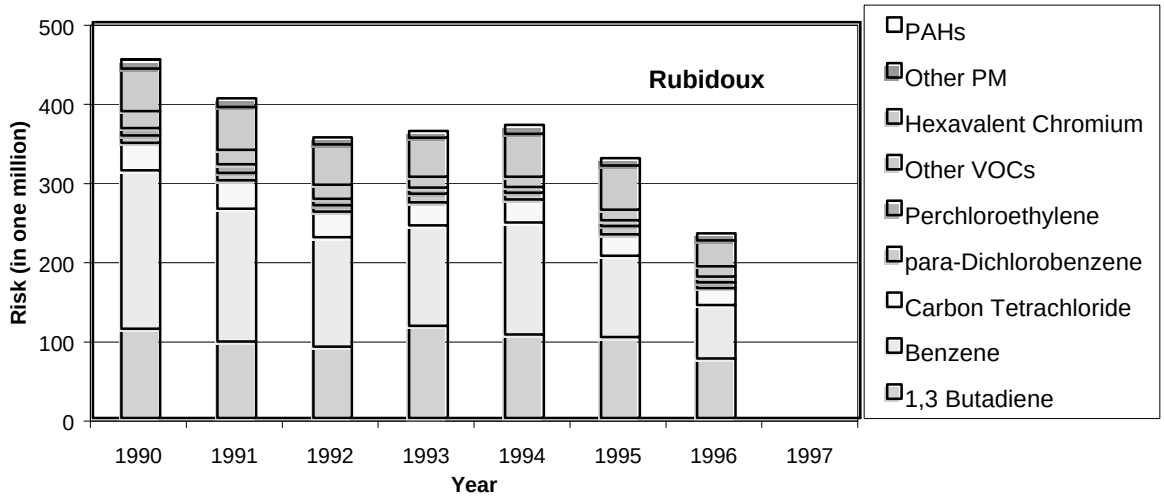
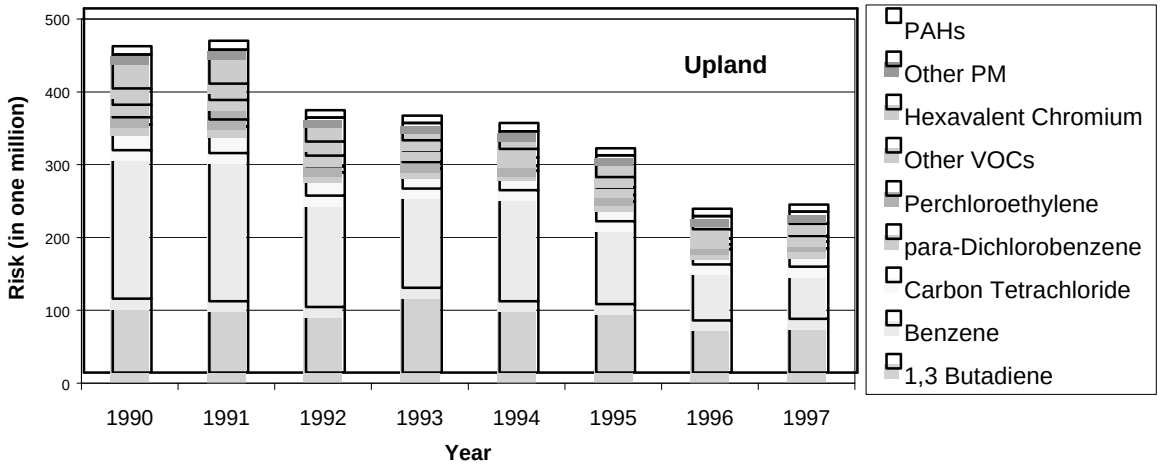


Figure 2-1 Concluded





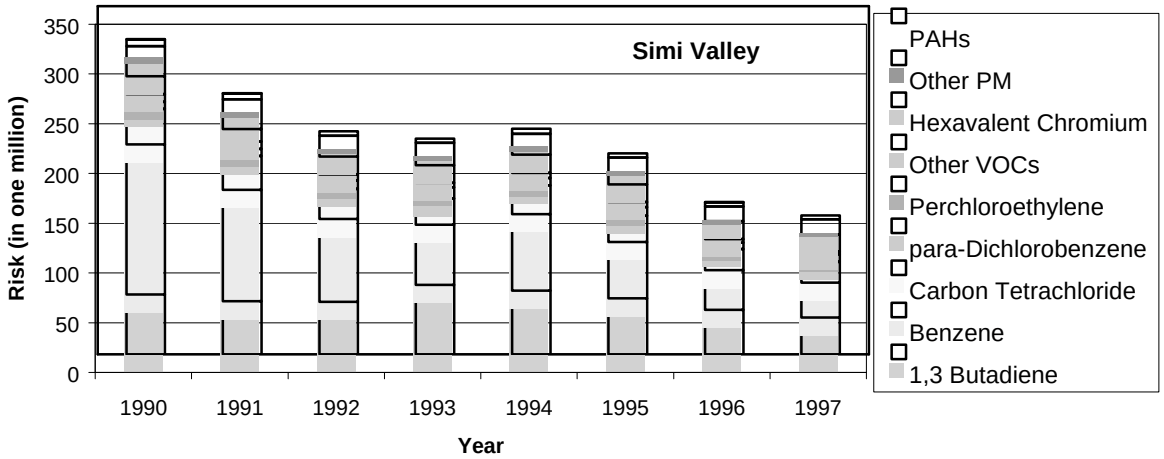


Figure 2-2

Comparison of Cancer Risks from MATES-I and MATES-II Measurements

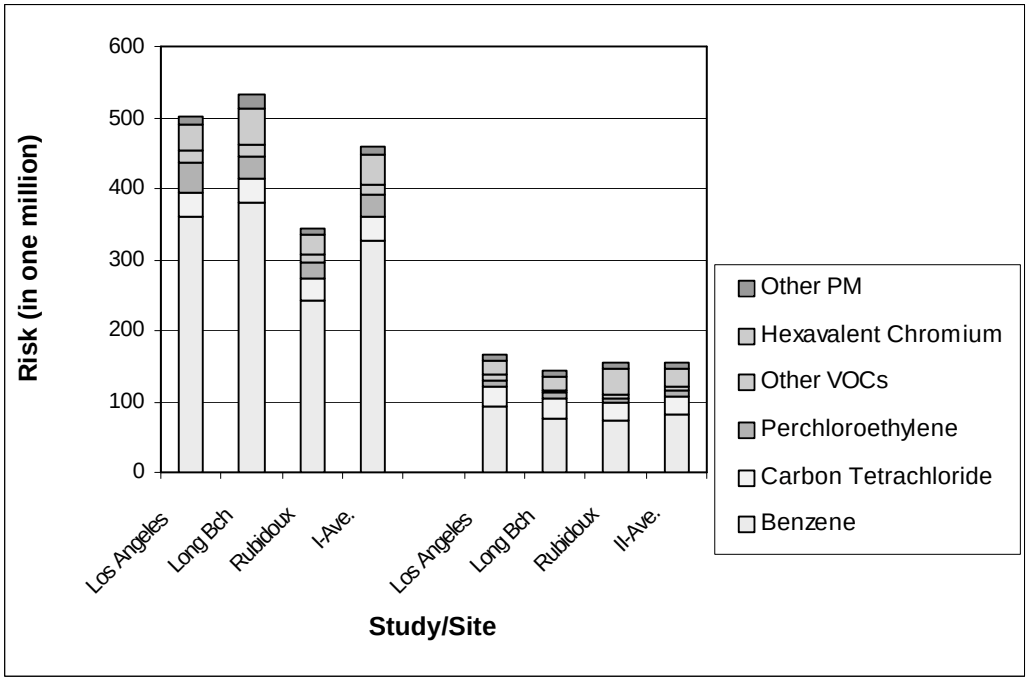


Figure 2-3

Trends in Selected Toxic Air Contaminants

Tick mark represents the mean; bars represent the 90 percent confidence interval about the mean.

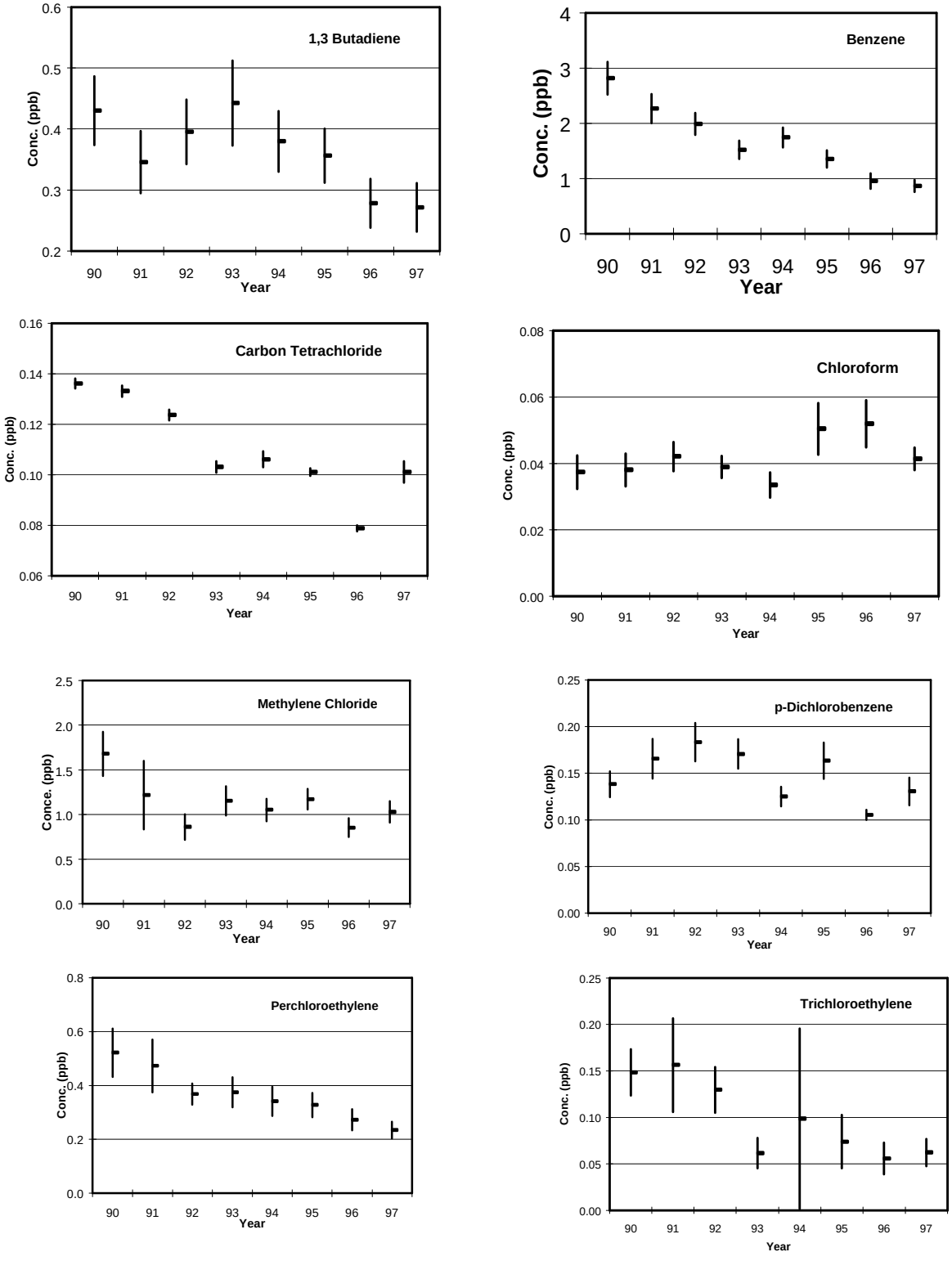


Figure 2-3 Concluded