AVERAGING TIME AND MAXIMA FOR AIR POLLUTION CONCENTRATIONS

RICHARD E. BARLOW
UNIVERSITY OF CALIFORNIA, BERKELEY

1. Introduction

The Public Health Service, and now the Environmental Protection Agency (EPA), has operated a Continuous Air Monitoring Program (CAMP) since January 1962 (see Larsen [7]). Under CAMP, air pollutant concentrations are punched automatically into a computer tape every five minutes. Air pollutants which are being monitored include carbon monoxide, various hydrocarbons, nitric oxide, nitrogen dioxide, total oxidants (chiefly ozone), and sulfur dioxide. Monitoring stations are located in Chicago, Cincinnati, Los Angeles, New Orleans, Philadelphia, San Francisco, and Washington, D.C. Measurements are recorded in parts per million (ppm), parts per hundred million (pphm), and parts per billion (ppb), and micrograms per cubic meter ($\mu g/m^3$). For example, oxidant, a chief constituent of smog, is considered undesirable if its concentration reaches or exceeds 0.1 ppm.

In San Francisco, the Bay Area Air Pollution Control District (BAAPCD) publishes, on a monthly basis, daily average high hour oxidant values as well as daily peak oxidant values. Carbon monoxide values are similarly recorded. However, sulfur dioxide values (in ppb) and particulate values ($\mu g/m^3$) are recorded only as 24 hour averages. Averaging times vary widely because of the nature of the pollutant and the monitoring system used. For example, particulate matter is measured by the high volume sampler. In this device, air is blown through a filter which is then weighed after 24 hours. In the San Francisco Bay Area, particulate readings tend to be made (for a 24 hour period) every other day and occasionally every third day. Particulate readings are recorded at nine locations in the Bay Area and there are wide variations in the data due to location.

Table I, taken from the pamphlet "Air Pollution and the San Francisco Bay Area" provides a summary of the main air pollutants, the 1969 California state standards for these pollutants and reasons for controlling their concentrations.

For purposes of evaluating air quality, it is important to know the probability of maximum pollutant concentrations exceeding state standards which are

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