Angeles in 1947 initiated the trend in the direction of larger control area. There the control district is composed of some 30 different communities, and the idea is now expressed by many that the present Los Angeles control district is too small to be effective and should be enlarged to include an area known as the Los Angeles basin. Another example of the trend toward larger control area is Oregon where, in 1951, a state law was passed establishing a statewide air pollution program. Pennsylvania, in 1949, was one of the first states to initiate a state-wide surveillance of air pollution. This law states, in part: "General legislation operating uniformly throughout the state is necessary. . . ."

In New Jersey an air-pollution law has been enacted on a state-wide basis. In this law air pollution is defined as ". . . the presence in the outdoor atmosphere of substances in quantities which are injurious to human, plant or animal life or to property throughout the state and in such territories of the State as shall be affected thereby, and excludes all aspects of employer-employee relationships as to health and safety hazards."

The latest example of this trend is in California where it is recommended in the booklet *Clean Air for California* (prepared by the California Department of Health) in part, that the state ". . . recognize air pollution in all its facets as a matter of state concern, with its health aspects paramount."

VII. Meteorology and Topography

A. IMPORTANCE IN PLANT LOCATION

In determining the location of a new plant, consideration should be given to the climatology of the area. Important elements of the climate of the region are the temperature and precipitation. Temperature is considered with respect to its annual mean, its annual march, and its daily range. Precipitation is considered with respect to its annual mean, its annual march, its variability, and its distribution between rain and snow. Of equal importance are the velocity and direction of the prevailing winds, the humidity, degree of cloudiness, and frequency and severity of inversions.

Three main factors determine the climate of a given locality: (*1*) general atmospheric circulation, (*2*) latitude, and (*3*) physiographic nature of the terrain. In analyzing wind records, it must be understood that the average annual patterns may give a false sense of security, especially if the proposed plant is in a valley or enclosed partially by hills. Recent wind-tunnel tests have indicated that the height and shapes of surrounding buildings have an important effect on wind patterns. Therefore these factors also must be taken into consideration in the design of a plant.

Before and after construction of a plant, a competent industrial hygienist or air-pollution engineer should be employed to make periodic tests to determine if the collecting devices are operating efficiently, to observe the effects of the pollutants on the surrounding neighborhood, to maintain proper public relations

with the control officials in the area, and to maintain proper public relations with the community.

B. EFFECT ON AIR POLLUTANTS

The role of meteorology in air pollution is based on the diffusion mechanism. Elaborate diffusion equations have been developed for idealized conditions of single sources of constant shape, location, and strength. Although these equations cannot be used directly in the complex problem posed by the large industrial area, they indicate generally which meteorological factors are important in the dispersal of contaminants in the air.

These equations indicate that the concentration of pollution is inversely related to the mean surface wind speed and directly related to the stability of the atmosphere. To elaborate, the greater the lapse rate, the more vigorous is the turbulence; the more vigorous the turbulence, the more rapid the diffusion. Hence high pollution is associated with small lapse rates (that is, stable air), and low pollution with large lapse rates (that is, unstable air).

Some other features of the influence of meteorology upon air pollution that are not so directly related to diffusion are: influence of changing wind direction, the synoptic weather situations characteristic of high pollution and low pollution, the effect of cold frontal passages, and the influence of rainfall.

The degree of concentration or dilution of contaminants depends on the amount dispersed and on meteorologic factors, particularly turbulence, wind speed, and direction. Turbulence is dependent on the vertical temperature variation, temperature lapse rate, as well as the wind speed and the terrain of the ground and surface structures. Atmospheric stability for an extended period of time (4–5 days) has been characteristic of each of the recorded air-pollution disasters. Under these meteorologic conditions the atmospheric contaminants increase in concentration. In Los Angeles the highest concentrations of air contaminants are to be found during periods of low temperature inversion and low wind speed.

The turbulence or diffusivity of the air undergoes daily cyclic variations. During the daylight hours, and particularly around mid-afternoon, when winds, on the average, are strongest and temperatures decrease rapidly with height, the ability of the air to accept and effectively diffuse pollution is at a maximum. This cycle is so pronounced that the results are evident to all in the form of early morning smog over most cities. In general, industry's pattern of activities makes good use of the daily variation in the diffusivity of the air, but techniques of delayed emissions or rescheduling of operations might harness this cycle even more effectively.

In most parts of the country, with clear skies and average daytime wind speeds, a nighttime temperature inversion will develop, culminating in relatively stagnant air and an increase of pollution. Usually a few hours of sunlight will suffice to "burn off" the inversion and decrease the pollution. However, there