minute average concentration of $SO_2$ recorded thus far by the 5-autometer network around the Paradise Plant has been 0.4 ppm. In terms of comparison, this represents at least a threefold improvement over the Johnsonville Plant, even after the stacks at that plant had been raised from 170 to 270 feet. A comparison such as this emphasizes the importance of utilizing the best available and most current information in evaluating air pollution potential and in planning air pollution control for large modern power plants.

### FREQUENCY DISTRIBUTION OF $SO_2$ CONCENTRATIONS

While determinations of the maximum ground level concentration of $SO_2$ that can be expected in the vicinity of a large power plant is essential to assessment of its air pollution potential, an almost equally important factor is the frequency of occurrence of various ground level concentrations of $SO_2$ in the area. Satisfactory methods for calculating frequencies from operational and meteorological data have not yet been devised. However, from analysis of the TVA $SO_2$ monitoring data, a certain pattern of frequency distribution has been observed which affords a means for arriving at reasonably good approximations. This has provided a means in cases of limited operational experience for estimating situations beyond the range of actual data, for comparing air pollution experience at different power plants, and for relating power plant air pollution potential to air quality standards employing frequency criteria. It has also been useful in showing the difference between pollution patterns of power plants and those of urban areas with multiple sources of pollution emitted at or near ground level.

The frequency of $SO_2$ registration at a fixed point in the vicinity of a remote power station is strikingly different from that of a single point in an urban area with multiple sources of $SO_2$ emitted at or near ground level. The frequency distribution of $SO_2$ concentrations measured by a recording instrument at a point where maximum concentrations occurred in the vicinity of one of our modern plants with 500′ stacks was compared with similar data obtained from an air pollution study by the Public Health Service in Nashville, Tennessee. For the period of record at the power plant, approximately 19 months, the highest concentration recorded was 0.6 ppm for three 30-minute periods. $SO_2$ concentrations were 0.2 ppm or above for only eighty-four 30-minute periods, or approximately 0.40 percent of the time. While the maximum $SO_2$ concentration recorded in the Nashville study was only approximately 0.3 ppm, $SO_2$ concentrations were 0.2 ppm or above slightly over 14.1 percent of the time. Estimated total $SO_2$ emissions in the urban area were approximately half the total emissions of the power plant.

The higher concentrations of pollution in urban areas tend to occur during periods of low wind speed and temperature inversion. In contrast, higher levels from large power plants tend to occur during moderate to high wind and neutral stability conditions. Since none of the TVA plants is located in a large urban area, TVA data do not provide a direct quantitative measure of the contribution of a large power plant to an urban pollution problem. However, analysis of data from a recording instrument located in a small town near one of the large TVA power plants showed that $SO_2$ in detectable amounts was present 14 percent of the time, but for over 70 percent of the time that $SO_2$ was present, wind direction was such that stack emissions from the plant could not have been carried to the instrument in town. All the readings, without regard to wind direction, were quite low.

### POLLUTION POTENTIAL OF POWER PLANTS UNDER AIR STAGNATION CONDITIONS

Air pollution control plans developed for the Kingston Steam Plant, until recently the largest plant in the TVA system, gave special attention to a potential problem likely to be associated with periods of atmospheric stagnation. The plant is located in the floor of an Appalachian valley. The local topography is characterized by parallel ridges rising from 400 to 1,000 feet above the valley floor. In 1954 arrangements were made for special forecasts for this area by the Knoxville station of the U.S. Weather Bureau during fall when air stagnation conditions are most likely to occur. Since 1960, special national forecasts of air pollution potential by the U.S. Weather Bureau Research Station at the Robert A. Taft Sanitary Engineering Center, Public Health Service, have been available to supplement local forecasts. When forecasts are for conditions that might result in buildup of pollution levels in the vicinity of the plant, control plans