

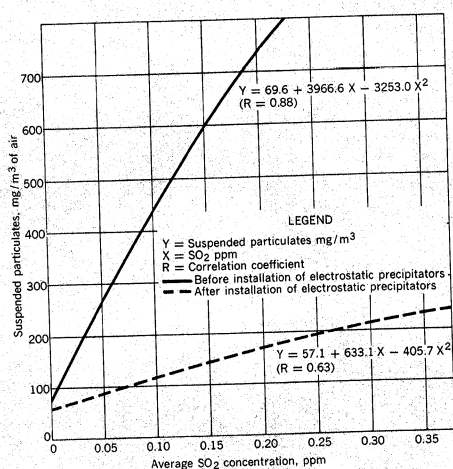
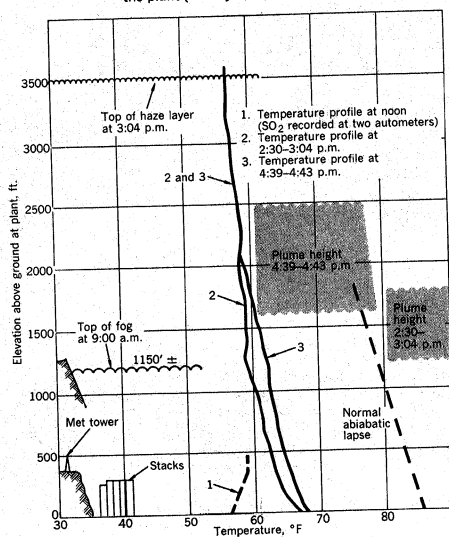


Fig. 15. Graph showing relationship between suspended particulates and SO_2 concentration before and after installation of electrostatic precipitators.

Fig. 17. Profile plot from aerial observations and temperature soundings at Kingston steam-electric plant (TVA system) on November 10, 1964.



on the grounded cylinders by the appropriate adjustment of the rate of gas flow. In the second chamber—consisting of alternately charged, loosely packed and parallel plates—satisfactory precipitation can be attained by applying a lower potential than that required in the charging chamber, since there is no need for a corona discharge.

The corona discharge is usually produced by making the center wire the cathode, because precipitation efficiency is greater under such an operating condition. Less ozone is produced, however, by reversing the polarity, and a positively charged wire is employed in the cleaning of air if the presence of ozone is objectionable.

The high-voltage direct current is generally produced by either mercury vapor or vacuum tube rectifiers. The power requirements vary from 2-5 kWh per million cubic feet of polluted gas being treated, and the variation will be a function of the quantity, size, and physical properties of the particulates that are being removed.

Figure 15 is a cutaway view of an Opzel plate precipitator, manufactured by Research-Cottrell, Inc.

Effect of precipitators on suspended particulates in an ambient atmosphere. Electrostatic precipitators were installed to supplement mechanical ash collectors at one of the TVA plants after a special investigation was conducted to determine the relationships between SO_2 concentrations and suspended particulates in the vicinity of the plant where maximum ground level concentrations of stack emissions occurred. Data were analyzed with the results shown in Fig. 16. From the two derived equations indicated on the graph, TVA estimated that the electrostatic precipitators reduced the suspended particulates by 85 percent in the ambient atmosphere at ground level during those periods when SO_2 was present.

The TVA believes that an additional—although unproved—possible benefit from the electrostatic precipitators is a reduction in the maximum ground level SO_2 concentrations in the vicinity of steam plant emissions. This is predicated on data indicating that the maximum recorded SO_2 concentration during the four years of precipitator operation is about 25 percent less than that recorded prior to precipitator operation.

Power plant pollution potential under air stagnation (temperature inversion) conditions. Air pollution control plans developed for the Kingston plant, until recently the largest steam-electric station in the TVA system, gave special attention to the SO_2 problem associated with periods of atmospheric stagnation.

This plant is located on the floor of an Appalachian valley. The local terrain has parallel ridge features that vary from 400 to 1000 feet above the plant grade level.

During the period from November 9-11, 1964, a temperature inversion occurred in the Kingston plant area. The U.S. Weather Bureau, by prearrangement, alerted the TVA beforehand, and precautionary air pollution control measures and monitoring were initiated.

Sulfur dioxide autometers were checked at regular intervals, and mobile sampling was conducted during the 3-day period by specially equipped helicopters and cars.

The frequency and concentration of SO_2 recorded at ground level were no higher than during normal atmospheric conditions. The absence of an SO_2 buildup was attributed to penetration of the low-level inversion by the hot, high-velocity stack gases and dispersion of the smoke plume from the area by light and steady winds. Figure 17 indicates the time and temperature conditions aloft,