

megawatts, making it one of the largest plants in the world. TVA powerplants burn about 23 million tons of coal annually. Sulfur in the coal ranges from slightly less than 1 percent to more than 5 percent by weight and averages approximately 3 percent. Ash content varies between 5 and 15 percent.

As planning for the Johnsonville plant advanced, TVA recognized that stack emissions from a plant of the ultimate size contemplated at the site would present a potential air pollution problem. Collectors were available that would provide desired removal of fly ash from stack gases; hence control of particulate emissions did not appear to offer any special problems. However, this was not the case with sulfur dioxide. Because of the many uncertainties at that time in assessing the potential problem in the SO_2 emissions and in planning control measures, TVA initiated a broad-scope air pollution study program. The objectives of the program were to define the problem and investigate practical steps that might be taken if special control measures were indicated.

Principal elements of the air pollution study program are (1) monitoring of SO_2 concentrations in the vicinity of each plant, (2) collection and analysis of on-site meteorological data, (3) biological studies to determine effects of plant emissions on vegetation in special experimental gardens and in surrounding areas, (4) full-scale studies of stack gas dispersion, (5) investigations of possible means for reducing emissions through the modification of plant operations during periods when meteorological conditions are unfavorable for dispersion, and (6) research on processes for removal of SO_2 from stack gases.

Beginning with the Johnsonville plant, preoperational and post-operational air pollution studies have been conducted at each plant. Experience has been used in planning air pollution control at succeeding plants and for additions to existing plants.

Stack performance:

Data obtained from routine monitoring and from full-scale dispersion studies have been utilized in estimating stack height requirements for TVA powerplants. Postoperational monitoring data for each plant have been used to check stack performance and indicated adjustments have been made in stack height calculations for new plants. Until the recent completion of our full-scale dispersion study, principal reliance in stack height calculations was upon formulas derived empirically from monitoring data.

Planning for air pollution control at the Johnsonville plant included computing stack performance by procedures commonly used at the time. Experience after the plant was put into operation was much more favorable than was predicted on the basis of the earlier computations. Even with improvements subsequently made in methods for computing stack performance, as unit sizes and stack heights have increased, experience has continued to be more favorable than predictions based on calculations, though the margin of difference now is much less than it used to be.

A comparison of ground level concentrations of stack gases from the Johnsonville plant with those from Paradise, one of the newer large plants, provides an interesting measure of the progress that has been made in control of air pollution from powerplants by dispersion from high stacks. The original Johnsonville plant was constructed