

The addition of 1,150 megawatts now being installed at the 2-unit Paradise Plant will increase total capacity of that plant to 2,558 megawatts, making it one of the largest plants in the world. TVA power plants burn about 23 million tons of coal annually. Sulfur in the coal ranges from slightly less than 1% to more than 5% by weight and averages approximately 3%. Ash content varies between 5% and 15%.

As planning for our first major thermal plant at Johnsonville advanced in the early '50s, 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 (SO_2). Because of the many uncertainties at that time in assessing the potential problem in the SO_2 emissions and in planning control measures, TVA in 1951 initiated a broad-scope air pollution study program. The objectives of the program were to reach a better understanding of the problem and to develop practicable steps which might be taken if special control measures were indicated. From 1952 through fiscal year 1966, TVA has expended approximately \$2,700,000 on thermal power plant air pollution control studies.

Principal elements of the 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 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, pre- 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.

PRE-OPERATIONAL STUDIES

Pre-operational studies are conducted to establish baseline information for comparison with data to be obtained after the plant is put into operation and for use in planning post-operational studies. The pre-operational phase covers a period of about two years before plant operation. During this period, on-site meteorological data are collected to supplement regional meteorological data available from U.S. Weather Bureau records; biological surveys are conducted to obtain information on agriculture and forestry in the area; and, as local conditions indicate, dustfall and other air pollution data are collected. The biological surveys include sampling and chemical analysis of selected species of vegetation.

POST-OPERATIONAL STUDIES AND SURVEILLANCE

Post-operational studies include air pollution monitoring in the vicinity of the plant; analysis of data on plant generation and stack emission; analyses of meteorological data and correlation with monitoring data; biological surveys, and special dispersion studies.

For SO_2 monitoring, we have relied principally upon continuous SO_2 analyzer-recorders (Thomas autometer) to provide the desired data. The number of SO_2 recorders used at individual plants has varied from 1 to 11, depending on size of plant, topography, and other factors. Limited use has been made of the so-called sulfur candle or lead peroxide method. Extensive use has been made of mobile sampling equipment utilizing specially instrumental automobile and helicopter. Standard dustfall measurements have been made in the vicinity of the plants by use of dustfall jars. High volume air samplers have been used for measuring suspended particulates.

In planning the biological phases of the studies, TVA drew heavily on the vast amount of information available from consultants and from the technical literature on the effects of SO_2 emissions from smelters on vegetation. By means of special studies using field exposures of specially prepared experimental gardens, and studies using controlled exposure of plants to stack gases as well as to diluted pure SO_2 , relative tolerances of native species of vegetation were determined. Species identified as sensitive which occur generally in the area