

After considering all factors, a stack height of 825 feet above grade was selected. This was based on many considerations, among which were the following:

(a) It was decided that this height represented the maximum reasonable limit to which the existing technology of stack construction could be reliably extrapolated.

(b) The combining of the flue gases from two or more units into a single stack would be beneficial from an air pollution viewpoint and was contemplated. However, the experience with stack repairs at Clifty Creek argued against such a choice. As it is, a single unit per stack represents approximately a 50 per cent extrapolation in capacity beyond the Clifty Creek stacks.

Also since regulations covering SO_2 emissions may be instituted under the Clean Air Act of 1963, it is possible that the third unit might have to have a higher stack than was selected at this time.

(c) Since only two units of the total plant development were to be built at this time, it seemed certain that there would be a period of not less than five years operation of these units before decisions were required concerning the third stack. This period of operation and observation would permit an exact evaluation of the plant's effect upon the SO_2 concentrations in the surrounding countryside.

7. SUMMARY—HIGH STACKS

It has become apparent that high stacks offer the only presently available pragmatic solution to the problem of disposing of SO_2 . Efforts to remove sulfur from the fuel before burning it have, so far, come to naught. Numerous studies seeking to remove SO_2 from the flue gas have arrived at estimated costs which make the process completely unacceptable even before the operating problems have been evaluated by actual construction and operation.

It is possible that high stacks can be accepted only as an interim solution to this problem. There is need for careful studies before and after the installation of every major power plant having high stacks in order to obtain a more extensive evaluation of the diffusion equations. This might be done along the lines that have been started by the Tennessee Valley Authority (6). Such studies might provide the designer with a degree of confidence in evaluating the disposal of SO_2 that he does not possess at the present time.

8. THE COMING ERA OF 2500-4000 MW PLANTS AND SO_2 PROBLEMS

8.1. The general solution

The era of 2500 mw-4000 mw steam electric plant is not a fact that needs to be anticipated—it is here. Mention has been made of Cardinal. Recently, an announcement was made of a new generating station to be located on the American Electric Power System in West Virginia with an initial installation of two 800 mw units and with a third unit to be installed sometime after 1971. The most likely size of this third unit will be 1050 mw. Thus, for coal burning plants, we are confronted with the need to critically examine the problem that a plant designer will be called upon to solve—to harmlessly dispose of 1250 tons of sulfur per day or 100 tons per hour when converted into oxides of sulfur, mainly SO_2 .

The authors believe that this offers no occasion for fear or dismay. The high stack properly designed can, without question, take care of every requirement—ecological, economic, and esthetic. A number of special areas in connection with the adoption of this solution warrant further, if only brief, discussion. These follow:

8.2. The multi-compartmented, integrated stack

Such stacks have many advantages from the standpoint of obtaining the maximum rise of the hot gas, the increase in the plume's ability to pierce inversions and the maintenance of reasonable exit velocity when one or more units is shut down. Offsetting these advantages, are the costs associated with the poor utilization of the stack's cross section, the cost of horizontal duct work required to reach a stack of this type and finally, the question of ability to work on and around an idle liner while the other two or three are in use. It appears likely that several years may elapse before stacks of this general type are built in the United States.