

The foregoing tabulations, summarizing the experience of the Foundation in plant investigations and research, demonstrate the variety of undertakings and the considerable coverage in the field of industrial hygiene which has been obtained and certainly lend support to and validate the initial policy which established the technical work as a major activity in the over-all program. A simple tabulation, however, cannot tell the whole story, nor is it completely evident from this summary that the Foundation's activities provide more than could have been obtained by the individual companies within their own organizations or from other agencies. We must turn to a more detailed consideration of the work in order to bring out its full value.

Value of Industry-wide Studies

Attention is called to the fact that during 1946 the 10 projects in dust-producing industries included studies in 35 separate plants. Five of these projects were isolated studies involving single plants; the other five, including 28 plants, were multiple studies set up on an industry-wide basis or as over-all investigations for companies with several different plants. These studies were deliberately designed to bring together for critical study the experiences of as many plants as possible having common problems. Outstanding among the advantages of these industry-wide studies has been the demonstration that sound solutions of most problems are generally found in the industry—not all in one plant, necessarily, but within the total experience.

The "dangerous trades" of our fathers have all but disappeared. Modern industry demonstrates every day that potentially toxic substances can and are being used without hazard. In general, one may say that there are more workers, by far, handling such materials safely than not. The problem today is largely one of discovering the effective control measures in actual use and making them available to the whole industry.

The concept of study on an industry-wide basis is entirely in accord with the primary purpose of the Foundation and, moreover, is of particular value in that it makes the day-to-day work of the organization more valuable to the members than would be possible through independent studies alone.

Value of Quantitative Studies

Industrial hygiene is, above all, a practical field, and there is no place in it for elaborate testing procedures and methods of analysis unless they aid materially in the solution of practical problems. Field experience during this year, as in the past, has demonstrated that systematic, quantitative study is of direct value in a highly practical way. For example, it was our privilege during the year to investigate a large plant in which records of dustiness and medical records extended back for a period of twenty years. These data combined with our own investigation made it possible to provide fairly definite answers to the questions which were put to us: After this prolonged period of systematic effort to eliminate the hazard, how good is the present control; and if further improvement is needed, how can our efforts be expended most effectively? The experience of the company is outstanding proof of the practical value of quantitative study. In fact, this company was so far ahead of the parade that when they started a systematic program of dust control, its scope was seriously limited by the

lack of adequate dust-counting instruments and techniques. That was 25 years ago.

In another project, involving the systematic study of some 28 plants, over a five-year period, only three were found to have a silicosis hazard. The fact that 25 were operating with a high degree of safety demonstrates clearly that adequate protection is practical. The reasons for failure in the three were not obvious and the most effective and, therefore, least costly improvements were made only after quantitative study to determine the exact causes of failure.

Still another illustration comes from a study of heat exposure, in which fundamental analysis revealed that the major heat source was radiation rather than simple air temperature. From this it was evident that ventilation, the common method of control, was not the method of choice and would produce relatively little benefit from the money expended.

One of the most valuable items in the year's experiences was a request to investigate a new process while still in the pilot stage and to determine the probable control requirements for the final manufacturing operation so that proper plans could be made in advance. This represents the highest appreciation of the value of quantitative analysis and is a procedure highly to be recommended.

Design of Ventilating Systems and Other Control Measures

Analyses of industrial ventilation systems and other control measures during the year have shown, as in the past, that full advantage is not being taken of all of the basic engineering knowledge which is available to assist us in the design of control measures. It is particularly disturbing to find inadequate performance after the expenditure of considerable money. Thus, in a comparative study of two plants doing the same work we found the poorer results in the plant having the more expensive system of ventilation and using the higher rates of ventilation.

Plant engineers will undoubtedly agree that the design of control equipment generally takes a secondary place in the engineering organization, and they frequently complain that not enough time or money is appropriated for basic engineering analysis. Thus, they are forced to resort to empirical design data which, too often, results in inadequate performance. Too much money and effort is being spent by industry to improve working conditions without securing the desired results. The solution lies in fuller utilization of existing engineering data and the systematic development of additional basic information. In our experience, such an approach pays for itself. It is the function of the Foundation to assist in this development.

Appraisal of Dust Hazards and of Dust Control Measures

It is of great practical significance that dust continues to occupy the major place in the entire array of industrial problems with which we are concerned. The dust studies have taken us into many industries in which systematic correlations between incidence of lung damage and nature and magnitude of exposure have not been made. Thus, it has been necessary to draw heavily upon the experiences gained in a few industries for which such correlations exist in order to make the best possible appraisal of each new situation. In reviewing this work, one is impressed with the need for