METHODS USED BY THE COMMITTEE Z37 OF THE AMERICAN STANDARDS ASSOCIATION IN ESTABLISHING MAXIMAL ACCEPTABLE CONCENTRATIONS OF TOXIC DUSTS AND GASES

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The Committee Z37 of the American Standards Association was established in 1938 and charged with " the determination, establishment and promulgation of allowable concentration limits of harmful gases, vapours, fumes, dusts, and mists, and other subjects related to allowable concentration limits of such substances in the atmosphere of working places from the viewpoint of occupational disease prevention ". The Committee Z37 was directed by the Subcommittee on Plan and Scope under the chairmanship of Mr W. P. Yant to include in these standards:

(i) the descriptive, chemical, and physical identification of the substance in question;

(ii) information on the route of its absorption and its physiological and toxicological action, based on the best available information and consensus of qualified opinions;

(iii) information on the methods of sampling and determination which are satisfactory for use in conjunction with the application of the allowable limits to industrial situations, considering that in obtaining these data the available information on allowable concentrations is adequately determined by the particular method.

Data on allowable limits should be definitely related to the type of occupational exposure to which they are applicable, such as duration of exposure, physical activity, nature of response (whether acute or chronic), and the presence of other substances or conditions that would increase the response. Such data should be accompanied by a short treatise in which the basis of the data and their limitations should be given so that the user will know that the available information is meagre or ample for the conclusions made. When information is available on concentrations found in industrial situations or processes under conditions of good or poor engineering practice, these should be used as guide for the establishment of good practice.

Since the term " maximum allowable concentration " was interpreted in some instances as indicating " safe " limits or concentrations, exposure to which would exclude toxic effects on workers under any circumstances, this term was changed subsequently to " maximal acceptable concentrations " by the ASA-Z37 Editorial Subcommittee under the chairmanship of Dr H. E. Stokinger. It is now emphasized that these concentrations in themselves do

* Paper read by Professor Tauhant in the author's absence.

not represent a scale of toxicity but only such concentrations of contaminants below which ill-effects are not likely to occur except in hyper-susceptible individuals. It is also stated that, although the purpose of these standards is to minimize the health hazard, their immediate use is for guidance in establishing engineering procedures to prevent objectionable concentrations of toxic or noxious materials from being present in the air of working places, and that they should not serve as a means of diagnosis of occupational disease. It should be pointed out that these acceptable concentrations are meant to serve as standards for good practice, that design and operation of industrial processes should aim at maintaining all concentrations below the acceptable maximum, and that they should be interpreted by competent individuals with full understanding of the basis and limitations of the information from which these standards have been developed. It is emphasized that they are not intended as legal requirements and that they are applicable only to exposure to the substance in question but not to mixtures, the effect of which may be increased or decreased, so that controls should be based on the specific situation.

The maximal acceptable concentrations are based usually on data obtained by one or several of the following procedures, namely laboratory tests on animals and on human subjects as reported in the literature or as established for the purpose of the standard, and on results of environmental investigations in plants. It is, however, imperative that experimental exposure should correspond to the normal work pattern, and that this should also be taken under consideration in the application of maximal acceptable concentration values.

The establishment of these concentrations is based on the absence of organic or other tissue changes, on the absence of functional reactions which have no discernible untoward effect on the health but may cause such impairment as inco-ordination and increased proneness to accidents, and of discomfort or adverse sensory effects.

It may be assumed that, in those cases in which concentrations have been established on the basis of organic or tissue changes, repeated exposure to concentrations significantly in excess of the acceptable concentration probably would produce injury. When the level has been established on the basis of functional changes or discomfort, it is very likely that concentrations not greatly exceeding the standard would not produce materially injurious effects.

Because the preparation of these standards is very time-consuming and, in those instances where not sufficient data are available, may take years of experimental and environmental studies, their number is limited and is concerned primarily with those which are of paramount importance. But it is hoped that the number of standards will grow as time passes on.

Finally, it should be pointed out that these standards refer to what is considered a moderate climate and persons having a fairly normal diet. However, it is conceivable that under extreme climatic conditions, such as excessive cold or heat, and with deficient nourishment or excessive intake of fats or other nutrients, alcoholic beverages and drugs, the physiological functions of the human organism and its susceptibility to certain toxic substances may vary considerably, so that such maximal acceptable concentrations may not hold true for all climates or nations.