on which TLV's are based, are discussed in the preface to and Appendix C of Table 40-B

The TLVs in some cases have the notation "skin" following the name of the substance If skin absorption, mainly from liquid contamination, cannot be made negligible, a reduction in the TLV should be made to maintain the total body absorption of the harmful material at a safe level

Maximal acceptable concentrations

The American Standards Association (ASA) publishes the Z37 series of maximal acceptable concentrations (MAC) for a number of substances MACs are expressed in ppm and in mg/cu m or milligrams per liter (mg/L) Up until about 1955, the definition of MAC was essentially identical to the TLV of the American Conference of Governmental Industrial Hygienists Since that time the Z37 Committee of the American Standards Association has reviewed and revised earlier standards and their definition of MAC (Table 40-C)

The maximal acceptable concentrations are *peak* concentrations, not averages, and should not be exceeded during a normal workday Any variation in concentration should be below the recommended level

The meaning of MAC is discussed in the preface to Table 40-C

Application of the values

Many individuals refer to published TLV's and MAC's for a black-and-white value to be used in a specific situation and overlook the important qualifications of these values set forth by the organizations establishing them

The preface to the annual list of TLV's (Table 40-B) and the introduction to each of the American Standard Z37 Series of MAC's (Table 40-C) provide the complete explanation of the concepts on which these values are based To intelligently judge which of the two concepts should be applied in a specific situation requires knowledge of the type of injury that would result from dangerous exposure

Adverse toxic effects may be broken down into four major classifications (1) acute toxicity, (2) chronic toxicity, (3) narcosis, and (4) discomfort

The time-weighted average concentration (TLV) would be the appropriate guide where *acute systemic* or *chronic toxic effects* would result from overexposure When protection against *narcosis* is required, the concentrations should never exceed some peak value as given by the MAC To minimize *discomfort*, the instantaneous or peak concentrations are of interest

Both the ASA and the ACGIH, in defining their respective values, point out that an understanding of the criteria on which the values are established is necessary in deciding how to use the value

The ASA, for instance, lists a MAC of 25 ppm for carbon tetrachloride, but notes that fluctuation should be around 10 ppm, which notation introduces the time-weighted concepts on which TLV's are based

On the other hand, the ACGIH has designated certain "ceiling" values not to be exceeded even for short periods of time and thus have to some extent adopted the maximum limit concept on which MAC's are based

It should be remembered that TLV's and MAC's are, even though applied as intended, relative values The concentration that just approaches the threshold limit value is just as hazardous as the one that slightly exceeds it There is no magic line that can be drawn to provide complete safety

In general, it is desirable to maintain air contamination at the *lowest possible level* Probably the greatest misuse of both TLV's and MAC's is the practice of comparing toxic substances by a ratio of their respective MAC or TLV These values cannot be used as relative indexes of toxicity

It should also be remembered that neither the TLV nor MAC should be considered the sole criteria of *suspected* occupational disease The ASA specifically states that its MAC values are intended to serve as standards of good practice and as engineering guides, and are not intended as legal requirements The same thought is implied in the preface to ACGIH values

It is highly advisable that the documented justification for the threshold limit value be consulted for detailed information concerning mode of action and effect of exposure to a particular material Such information is given in the references listed at the end of this chapter, particularly the ACGIH's

(Text continues on page 40-13)