

38—Industrial Toxicology

the occupational environment. Approximately 500 startup standards for the most common hazardous substances have been published in the various amendments to Part 1910 of Title 29—"Occupational Safety and Health Standards," *Federal Register*, Volume 36, No. 157, pages 15,101 through 15,104, Aug. 13, 1971.

NIOSH Criteria Documents

Development of criteria documents, which are used as a basis for preparing new standards for substances or for recommending more complete standards, is a continuing NIOSH activity under OSHA Act.

These criteria documents are publications that are prepared from a critical evaluation of all published medical, biological, engineering, chemical, and trade information and data for the purpose of establishing the concentration of a substance in the occupational environment that has been found to cause no harmful—"toxic"—effects in people working for eight hours per day, five days per week, for a normal work life.

In order to assure that the standards promulgated reflect the best information available at the time of preparation, all individuals with publicly available information should respond to notices published in the *Federal Register*.

In assuring that the most valid information is used, an advocate-adversary approach is utilized. That is, care is taken to call in expert critics who have specific experience in handling and controlling the hazards of a substance, and who not only represent widely divergent views to the proposed document, but also represent organized labor, industry, government, scientific associations, and universities.

The resulting criteria document thereby provides a valid detailed support for the standard recommended by NIOSH. The Secretary of HEW, after review, then submits the criteria document with the recommended standard to the Secretary of DOL who has responsibilities for promulgating the final standard.

The U.S. Occupational Standard (USOS) includes, within the limits of technical feasibility, the concentration of the substance that has been determined to provide a safe, healthful work environment for all persons, the

methods for collecting, sampling, and analyzing for the substance, the engineering controls necessary for maintaining a safe environment, appropriate equipment and clothing for the safe handling of the substance, emergency procedures in the event of an accident, medical surveillance procedures necessary for the prevention of illness or injury from inadvertent over-exposure, the use of signs and labels to identify the hazardous substances.

Hygienic Air Quality Standards

It is from a variety of sources—including animal experiments, laboratory studies on humans, plus field and in-plant investigations of exposures—that the two prevailing concepts for expressing safe concentrations (threshold limit value and acceptable concentration) have been taken, see Table 38-C.

The concept that there are concentrations of air contaminants to which nearly all workers may be repeatedly exposed without discomfort or ill effect is fundamental to the practice of industrial hygiene.

The following levels of air contamination are used as guides in the evaluation of health hazards.

Threshold limit values

The American Conference of Governmental Industrial Hygienists (ACGIH) adopts a list of threshold limit values (TLV) each year for more than 450 substances. The 1973 Catalog of Toxic Substances is included as Table 38-E.

These TLV's are expressed as parts of vapor or gas per million parts of air by volume (ppm) at 25°C and 760 mm Hg pressure or as approximate milligrams of particulate per cubic meter of air (mg/cu m). Mineral dusts are expressed as millions of particles per cubic foot (mppcf) based on impinger samples counted by light-field techniques. (The index of exposure to asbestos and quartz can also be calculated on a mass per unit volume basis, that is, mg/cu m.)

The preface of this TLV list states that nearly all workers may be repeatedly exposed to the level in this list without adverse effect. Certain values in this list preceded by a capital "C" should not be exceeded. The basis for the TLV's may be reasonable freedom from