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Occupational Health Guidelines for Chemical Hazards

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Abstract

Occupational Health Guidelines for Chemical Hazards summarizes information on permissible exposure limits, chemical and physical properties, and health hazards. It provides recommendations for medical surveillance, respiratory protection, and personal protection and sanitation practices for specific chemicals that have Federal occupational safety and health regulations. These recommendations reflect good industrial hygiene and medical surveillance practices, and their implementation will assist development and maintenance of an effective occupational health program.

Acknowledgements

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Warfarin

X

Xylene
Xylidine

Y

Yttrium

Z

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Zinc Oxide Fume
Zirconium Compounds as Z

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Uranium, Insoluble Compounds
Uranium, Soluble Compounds

V

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Vanadium, Pentoxide Fume
Vinyl Chloride*
Vinyl Toluene

Preface

Under the Occupational Safety and Health Act of 1970, NIOSH and OSHA are responsible for ensuring, insofar as possible, that every working man and woman is provided with a safe and healthful working environment.

In 1974, NIOSH and OSHA jointly began to develop a series of complete occupational health standards for substances with existing permissible exposure limits. This project, the Standards Completion Program (SCP), involved several contractors and personnel from NIOSH and OSHA. The resulting substance-specific draft technical standards, with supporting documentation, contain technical information and recommendations to provide a basis for promulgation of new occupational health regulations.

Each draft technical standard was evaluated several times. Peer reviews were conducted by representatives from industry, professional associations, and the NIOSH/OSHA SCP steering committee. These reviews ensured that each document was internally consistent in format and that the technical recommendations reflected the best data available.

SCP data came from a variety of sources. These include recognized textbooks in industrial hygiene, medicine, toxicology, and analytical chemistry, and articles from technical journals. In addition, there were personal communications with representatives of industry and labor, meetings with industry associations, and interviews with individuals knowledgeable about specific industries, operations and processes, and associated occupational health problems. The information collected was organized for convenient use by the SCP Working Groups and resulted in an extensive data base, most of which has been reproduced in these guidelines. The protocol for data collection and evaluation is explained in *The Standards Completion Program Draft Technical Standards Analysis and Decision Logics*, available from the National Technical Information Service, Springfield, Virginia 22161, as publication PB-282 989.

Occupational Health Guidelines for Chemical Hazards is being published to disseminate technical information assembled under the SCP project and the recommendations resulting from that effort. This document is intended primarily for the industrial hygienist and medical surveillance personnel responsible for initiating and maintaining an occupational health program. It may also be used by others, including workers, for obtaining summary information about specific chemical substances found at the worksite. Each guideline includes data on chemical names and synonyms, permissible exposure limits, chemical and physical properties, and signs and symptoms of overexposure, as well as recommendations for environmental and medical monitoring procedures, respiratory and personal protective equipment use, control measures, and procedures for emergency treatment and conditions. These recommendations reflect good industrial hygiene and medical surveillance practices, and their implementation will assist in achieving a sound occupational health program.

Information in these guidelines has been edited and reformatted from the SCP draft technical standards and various working documents used during their development. In some instances, the original draft technical standards have been updated. This is particularly true of those substances for which NIOSH has recommended an occupational health standard under its criteria document program or for which OSHA

has completed rulemaking on a specific chemical. Each substance for which NIOSH has completed a criteria document is listed in Table 1, and identified by a notation in the Permissible Exposure Limit section of the appropriate guideline. The health hazard information in that guideline has been updated to reflect NIOSH's recommendations. For more detailed information, readers may obtain individual criteria documents from: Technical Information Branch, Division of Criteria Documentation and Standards Development, NIOSH, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Where OSHA has completed rulemaking on a chemical, the recommendations in the affected guideline reflect the regulations promulgated since 1972 (listed in Table 2). In some cases pending court action filed at later dates may alter individual regulations.

Every attempt has been made to include all known effects resulting from exposure to the chemicals included in these guidelines and to provide up-to-date recommendations for medical surveillance and industrial hygiene practices. However, information on effects is rapidly changing as a result of recent research or reviews of the literature more in depth than those in the Standards Completion Program. This is particularly true for chronic effects, especially carcinogenic effects and some chemicals have only recently been shown or considered prime candidates to be carcinogenic. To assist in identifying these chemicals several sources that have reviewed their carcinogenic potential in more depth have been consulted.

These sources of information were: OSHA's "List of Substances Which May be Candidates of Further Scientific Review and Possible Identification, Classification, and Regulation as Potential Carcinogens," the "Candidate List" published in the *Federal Register*, August 12, 1980; evidence of carcinogenic effects of chemicals, received by the Environmental Protection Agency (EPA) under section 8(e) of the Toxic Substances Control Act; the EPA's Carcinogen Assessment Group's (CAG) List of Carcinogens, July 14, 1980; and the Monographs of the International Agency for Research on Cancer (IARC), Volumes 1-23, 1972-1980. When a chemical appeared in one or more of these information sources, a "Special Note" is included in the guideline to identify the source. Since the EPA CAG list has been included as part of the OSHA "Candidate List," it can be assumed that those chemicals with a reference to the OSHA "Candidate List" are also of concern to EPA. For IARC notations, only those substances listed in the NIOSH Registry of Toxic Effects of Chemical Substances as positive for humans or animals or as suspect carcinogens are included. Where the guidelines refer to several chemicals as one designation (e.g., chromium compounds), the notation indicates that evidence of carcinogenicity exists for at least one of the substances. Where readers are aware of information that would assist in further evaluation of the toxicity of these chemicals they are urged to provide us with the data so that it may be considered for inclusion in future updates of these guidelines. In this regard, NIOSH is initiating a project to systematically review and update the guidelines published and to add new subjects to the list.

Because some SCP information requires updating before it can be published, approximately 100 subjects having OSHA regulations are not included in this volume of the guidelines. These subjects are identified by an asterisk after the chemical name in the Table of Contents. Guidelines for these are being revised and will be issued as supplements at a later date.

Although every effort is made to prepare each guideline as accurately as possible, errors can and do occur. Readers are requested to use the enclosed reader response card to notify the editor of errors so they can be corrected in future editions.

Table 1
SUMMARY OF NIOSH RECOMMENDATIONS FOR OCCUPATIONAL HEALTH STANDARDS, January 1981

Substance	Transmitted to OSHA	Current OSHA Environmental Standard	NIOSH Recommendation for Environmental Exposure Limit**	Health Effect Considered	Comments
Acetylene	July 1, 1976	2,500-ppm (10% of lower explosive limit)	No exposure in excess of 2,500-ppm (2,662 mg/cu m)	Indirect asphyxia	Employers to check for, and inform employees of contaminants such as arsine and phosphine
Acrylamide	October 21, 1976	0.3 mg/cu m, 8-hr TWA (skin)	0.3 mg/cu m TWA	Skin, eye, nervous system effects	Skin and eye contact to be prevented

*Table 1 provides a summary of the major environmental and medical recommendations found in the criteria documents published by the National Institute for Occupational Safety and Health (NIOSH). The intent of the table is to provide, in rapid-reference form, the recommendations as well as the current Federal standard and the date of transmittal to the Department of Labor of each document. In addition, the significant health effect or effects that were considered in the derivation of the recommendations is presented. Other information that may be pertinent to the substance or hazard is included under comments.

It should be noted that no attempt is made to provide all those details necessary for a complete understanding of the documents in the table. Reference to the full criteria document is recommended for those wishing to have further elements of the recommended standard such as work practices and sampling and analytic methods. These elements are also summarized in the occupational health guidelines for individual chemicals.

Copies of Criteria Documents can be obtained from:

Technical Information Branch
NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226

**NIOSH TWA recommendations based on up to a 10-hr exposure unless otherwise noted.

Table 1
SUMMARY OF NIOSH RECOMMENDATIONS FOR OCCUPATIONAL HEALTH STANDARDS, January 1981

Substance	Transmitted to OSHA	Current OSHA Environmental Standard	NIOSH Recommendation for Environmental Exposure Limit**	Health Effect Considered	Comments
Acrylonitrile	September 28, 1977	2-ppm, 8-hr TWA; 10-ppm ceiling (15-minute)(skin)	Not greater than 4-ppm by recommended method (8.7 mg/cu m)	Lung and bowel cancer	Chest x-ray re- quired. First aid and medical kits to be available during use. Hazardous liquid, skin. Federal standard promulgated October 3, 1978
Aldrin/Dieldrin (Special Hazard Review)	September 7, 1978	0.25 mg/cu m, 8-hr TWA (skin)	Lowest reliably detectable level; 0.15 mg/cu m TWA by NIOSH validated method. Skin contact to be prevented	Cancer	
Alkanes (C5-C8)	March 29, 1977	1000-ppm, 8-hr TWA, pentane; 500-ppm, 8-hr TWA, n-hexane, n-heptane, octane	350 mg/cu m TWA (approx. 120-ppm pentane; 100-ppm hexane; 85-ppm heptane; 75-ppm octane) Mixtures to be not greater than 350 mg/cu m TWA; 1800 mg/cu m ceiling singly or mixtures (15-minute)	Skin and nervous system effects	Action level defined as 200 mg/cu m for these substances
Allyl chloride	September 21, 1976	1-ppm, 8-hr TWA	1-ppm TWA (3.1 mg/cu m); 3-ppm ceiling (9.3 mg/cu m) (15-minute)	Liver, kidney, lung effects	Urine, blood, and pulmonary function test- ing required