1995–1996

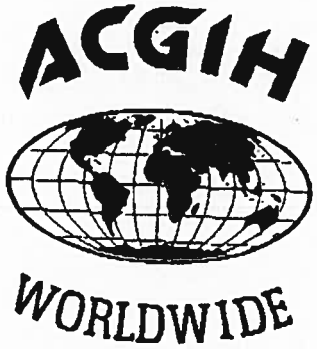
Threshold Limit Values (TLVs™)

for Chemical Substances

and Physical Agents

and

Biological Exposure Indices (BEIs™)



ACGIH℠

Carcinogenicity Designations—Proposed or Revised

Substance	Proposed	Revised From	Revised To
Ethyl acrylate		A2	A4
Ethanol	A4		
Ethyl bromide		A2	A3
Ethylene	A4		
Ethylene chlorohydrin	A4		
Ethylenediamine	A4		
Ethylene dibromide		A2	A3
Ethylene dichloride	A4		
Ethylenimine	A3		
Fenamiphos	A4		
Fensulfothion	A4		
Fenthion	A4		
Ferbam	A4		
Fibrous glass dust	A5		
Fluorides	A4		
Fonofos	A4		
Furfural	A3		
Gasoline	A3		
Glycidol	A3		
Halothane	A4		
Hexachlorobutadiene		A2	A3
Hexachlorocyclopentadiene	A4		
Hexachloroethane		A2	A3
Hexamethyl phosphoramide		A2	A3
Hydrogen peroxide	A3		
Hydroquinone	A3		
Iron oxide	A4		
Kaolin	A4		
Lindane	A3		
Malathion	A4		
Methomyl	A4		
Methoxychlor	A4		
Methyl acrylate	A4		
Methyl bromide	A4		
Methyl chloride	A4		
Methyl chloroform	A4		
Methylene chloride		A2	A3
4,4'-Methylene dianiline		A2	A3
Methyl iodide		A2	None
Methyl methacrylate	A4		
Methyl parathion	A4		
Metribuzin	A4		
Mineral or rock wool	A4		
Monocrotophos	A4		
Morpholine	A4		
Naled	A4		
Naphthalene	A4		
Nickel, elemental and soluble compounds	A1		
Nitrapyrin	A4		
p-Nitroaniline	A4		

Carcinogenicity Des

Substance
Nitrobenzene
p-Nitrochlorobenzene
4-Nitrodiphenyl
Nitrogen dioxide
1-Nitropropane
2-Nitropropane
N-Nitrosodimethylamine
Nitrous oxide
Oil mist, mineral, mildly refine
Parathion
Pentachloronitrobenzene
Pentachlorophenol
Perlite
Phenol
N-Phenyl-beta-naphthylamin
o-Phenylenediamine
m-Phenylenediamine
p-Phenylenediamine
Phenylhydrazine
Phthalic anhydride
Picloram
Propane sultone
beta-Propiolactone
Propoxur
Propylene
Propylene dichloride
Propylene imine
Propylene oxide
Pyrethrum
Resorcinol
Rhodium and compounds
Ronnel
Rotenone
Rouge
Sesone
Silica–Amorphous, Diatom
Silica–Amorphous, Fume
Silica–Amorphous, Precipi
Silica–Crystalline, Cristoba
Silica–Crystalline, Quartz
Silica–Crystalline, Tridymit
Silicon carbide
Sodium azide
Sodium bisulfite
Sodium metabisulfite
Starch
Stearates
Styrene
Sucrose
Sulfotep

Proposed or Revised Proposed	Revised From	Revised To
A4		
A2		
A4		
A4		
A4		
A4		
A4		
	A2	A3
A4		
A4		
A4		
A4		
	A2	A3
A4		
A4		
	A2	A3
A4		
	A2	A3
A3		
A3		
A4		
A3		
A4		
A4	EDB now →	A3
A4		
A1		
A4		
A3		
A3		
A3		
A4		
A3		
A1 (certain hard woods)		
A4		
	A2	A3
A4		

ADOPTED APPENDICES

APPENDIX A: Carcinogenicity

The Chemical Substances TLV Committee has been aware of the increasing public concern over chemicals or industrial processes that cause or contribute to increased risk of cancer in workers. More sophisticated methods of bioassay, as well as the use of sophisticated mathematical models that extrapolate the levels of risk among workers, have led to differing interpretations as to which chemicals or processes should be categorized as human carcinogens and what the maximum exposure levels should be. The goal of the Committee has been to synthesize the available information in a manner that will be useful to practicing industrial hygienists, without overburdening them with needless details. The categories for carcinogenicity are:

A1 — *Confirmed Human Carcinogen:* The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies of, or convincing clinical evidence in, exposed humans.

A2 — *Suspected Human Carcinogen:* The agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

A3 — *Animal Carcinogen:* The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

A4 — *Not Classifiable as a Human Carcinogen:* There are inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.

A5 — *Not Suspected as a Human Carcinogen:* The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiologic studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans. Evidence suggesting a lack of carcinogenicity in experimental animals will be considered if it is supported by other relevant data.

Substances for which no human or experimental animal carcinogenic data have been reported are assigned no carcinogenicity designation.

Exposures to carcinogens must be kept to a minimum. Workers exposed to A1 carcinogens without a TLV should be properly equipped to eliminate to the fullest extent possible all exposure to the carcino-

gen. For A1 carcinogens with a TLV and for A2 and A3 carcinogens, worker exposure by all routes should be carefully controlled to levels as low as possible below the TLV. Refer to the "Guidelines for the Classification of Occupational Carcinogens" in the Introduction to the 6th Edition of the *Documentation of the Threshold Limit Values and Biological Exposure Indices* for a more complete description and derivation of these designations.

APPENDIX B: Substances of Variable Composition

B1. *Polytetrafluoroethylene* decomposition products.* Thermal decomposition of the fluorocarbon chain in air leads to the formation of oxidized products containing carbon, fluorine, and oxygen. Because these products decompose in part by hydrolysis in alkaline solution, they can be quantitatively determined in air as fluoride to provide an index of exposure. No TLVs are recommended at this time, but air concentration should be controlled as low as possible.
(*Trade names include: Algoflon, Fluon, Teflon, Tetran)

B2. *Welding Fumes—Total Particulate (NOC[d]); TLV–TWA*, 5 mg/m³

Welding fumes cannot be classified simply. The composition and quantity of both are dependent on the alloy being welded and the process and electrodes used. Reliable analysis of fumes cannot be made without considering the nature of the welding process and system being examined; reactive metals and alloys such as aluminum and titanium are arc-welded in a protective, inert atmosphere such as argon. These arcs create relatively little fume, but they do create an intense radiation which can produce ozone. Similar processes are used to arc-weld steels, also creating a relatively low level of fumes. Ferrous alloys also are arc-welded in oxidizing environments that generate considerable fume and can produce carbon monoxide instead of ozone. Such fumes generally are composed of discrete particles of amorphous slags containing iron, manganese, silicon, and other metallic constituents depending on the alloy system involved. Chromium and nickel compounds are found in fumes when stainless steels are arc-welded. Some coated and flux-cored electrodes are formulated with fluorides and the fumes associated with them can contain significantly more fluorides than oxides. Because of the above factors, arc-welding fumes frequently must be tested for individual constituents that are likely to be present to determine whether specific TLVs are exceeded. Conclusions based on inhalable (total) concentration are generally adequate if no toxic elements are present in welding rod, metal, or metal coating and conditions are not conducive to the formation of toxic gases.

APPENDIX C: Threshold Limit Values for Mixtures

When two or more hazardous substances which act upon the same organ system are present, their combined effect, rather than that of either individually, should be given primary consideration. In the