HANDBOOK OF CHEMICAL INDUSTRY LABELING

Charles J. O'Connor
Sidney I. Lirtzman

HANDBOOK OF CHEMICAL INDUSTRY LABELING

Edited by

Charles J. O'Connor
Labeling and Hazard Analysis Consultant
Greens Farms, Connecticut

Sidney I. Lirtzman
Baruch College
City University of New York
New York, New York

np NOYES PUBLICATIONS
Park Ridge, New Jersey, USA

Library of Congress Catalog Card Number: 83-22108
ISBN 0-8155-0965-0

Published in the United States of America by
Noyes Publications
Mill Road, Park Ridge, New Jersey 07656

10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging in Publication Data

Main entry under title:

Handbook of chemical industry labeling.

Includes bibliographies and index.
1. Chemicals--Labeling--Law and legislation--United States. 2. Products liability--Chemical products--United States. 3. Chemicals--Labeling--United States.
I. O'Connor, Charles J.
KF3958.H36 1984 344.73'0424 83-22108
ISBN 0-8155-0965-0 347.304424

Preface

This handbook presents for the first time, in a single volume, a concise treatment of a long neglected subject—*Chemical Industry Labeling*. The necessity for such a volume has long existed and has been highlighted in recent months by news of newly legislated worker and public "Right to Know" obligations in Connecticut, California, New York, New Jersey, and Philadelphia as well as the recently published Federal OSHA Hazard Communication Standard.

The need for informative labeling in the workplace, transportation, distribution and disposal operations has been formally recognized in various city, state and Federal statutes and regulations. Society at large has demanded increased information on chemical products for many years; organized labor has long been in the forefront for an improved hazard label communication program; and the chemical industry published the first label guide for its members in 1938, and has updated its guide to precautionary labeling periodically, culminating in 1976 as the *American National Standard (Z129.1) for the Precautionary Labeling of Hazardous Industrial Chemicals*.

It was the need to serve these three major populations—labor, industry, and the public—that led to publication of this handbook. It is designed to provide an in-depth review of, and act as a source for the major elements of a *Hazard Label Communication Program*.

Today, labeling is defined as all written, printed and graphic material that accompanies or may accompany a product. In some cases it may include advertising and material data sheets. It is sometimes referred to as product communication, or product information.

Typically, a label provides information on what the product is, what it does, how to use it, how *not* to use it, and how to dispose of it, what to do if a fire occurs, or a spill or leak, and first aid when appropriate.

A chemical label should include the name of the chemical in sufficient detail to permit (1) medical treatment in case of an accident and (2) appropriate and effective emergency response in case of fire, spill or leak. Medical instructions should be written by an occupational health physician. An additional prudent

step would be to review such instructions with the National Poison Control Center in Pittsburgh.

This Center run by Richard Moriarity is probably the best single source of information for the emergency treatment of consumer and occupational chemical exposure. Operated by physicians, nurses and pharmacists 24 hours a day, every single day of the year, it is available instantly by phone. The Center will accept trade secret data on a confidential basis to be used only in case of a medical emergency. The true chemical identity of one's product will only be released to a physician who is treating a medical emergency. The cost for this service is very modest.

For the purpose of emergency response to a major spill, a fire or a leak, at the minimum the Department of Transportation (DOT) nomenclature should be followed; for those chemicals that meet the requirements of any one or more DOT classes a UN or NA number must also be assigned. Chemtrec, a 24 hour, every day, all year emergency response center, is available for emergencies by phone. Chemtrec will accept product information that would be useful in responding to fire, leak or spill emergency situations. This Center, run by the Chemical Manufacturers Association (CMA) as a public service is probably the best single source of emergency response information. The Chemtrec phone number with an appropriate statement should appear on the label. A closely related service is *The Emergency Response Guide* published by DOT. *The Emergency Response Guide*, produced by the applied Physics Laboratories of John Hopkins University and reviewed by an industrial chemical advisory group, was published by DOT in 1980. It is currently undergoing revision and a new edition should be available soon.

This DOT pamphlet is intended to accompany every transport vehicle that moves hazardous chemicals, be available in every fire house, on every fire truck, in every ambulance, police car, police department and emergency response center in the nation.

The Guide lists by proper shipping name and also by UN/NA number all chemical commodities regulated by DOT with cross-reference to specific instructions on what to do in case of fire, spill or leak. It is the best single, printed source of emergency response information available today.

There are a number of different ways of supplying sufficient information about a product, so that users, transporters and workers can be assured of adequate information in case of accidental exposure. There is evidence from the social sciences that simplified identification coupled with expert instruction is superior to reliance on chemical nomenclature to convey hazard information.

When one has selected some combination of chemical nomenclature, generic name, and first aid and emergency response instruction, one should next consider the selection of a signal word and a set of hazard statements. Historically, "Danger", "Warning", "Caution" have served as the three indicators of potential hazard. "Danger" indicates the highest level, "Caution" the lowest and "Warning" is intermediate. In many standards, these words are further defined in terms of LC_{50}, LD_{50}, flash point, skin corrosion and physical properties such as explosivity and radioactivity. Studies have shown that workers perceive a significant difference between "Danger", and "Warning" or "Caution". However, little if any difference is perceived between "Warning" and

"Caution." This seems to indicate that employers should instruct workers in the meaning of these terms.

The selection of a signal word for certain chronic effects, i.e. cancer, teratology and mutation is a controversial subject. When the chemical also possesses acute hazards, this fact may determine one's choice. If, for example, following the ANSI Appendix, the product is extremely flammable *and* a carcinogen, the signal word "Danger" is selected based on the flammability hazard.

The controversy centers about the fact that many practitioners feel the signal word "Danger" should be reserved for those hazards which are immediate and life-threatening. The probability of human harm is virtually certain with overexposure to acutely hazardous chemicals, but highly uncertain with overexposure to chemicals that possess chronic hazards. This concept is referred to as "Labeling Under Uncertainty".

This probabilistic property as applied to carcinogens, is further defined as follows: (1) known human carcinogen, (2) known animal and probably human carcinogen, (3) known animal carcinogen and (4) known mutagens. Much of our knowledge seems to indicate that some mutagens are probably carcinogens. Anthony Garro discusses this relationship in Part II. Some feel that action should be taken on this information and others prefer to at least obtain mammalian data before including any statement on a label.

An appendix to the CMA label proposal establishes a selection system which appears reasonable for most long-linked chronic hazards, i.e., cancer, mutagens and teratogens.

Although some effects as nephrotoxicity and hepatotoxicity are often treated as chronic effects, at times the onset of symptoms may be rapid, and when this is true, such effects should be handled as part of acute toxicity.

Statement of hazards should be simple, direct, and concise, but the stress should be on "simple". The use of what have become standard phrases is encouraged. A list of these phrases is contained in the LAPI/ANSI Guide discussed by Jay Young in Part IV.

This book is organized into four parts: Label Communication; Science and Labels; Product Liability, Regulations and Labels; and Industry Standards and Practice.

Part I is devoted to the perceptual and graphic elements of hazard label communication and the underlying science base which supports their practical use. In Chapter 1 of this section Sidney Lirtzman reports on a radical and revolutionary Hazard Label Communication Research Program conducted by O'Connor and Lirtzman, and the conclusions to which their research has led.

The research program utilized specially modified infra-red eye scan equipment. The basic equipment was provided by the Applied Science Laboratories as a working grant to the research team. Norma Skolnik, in the second chapter, provided a review and suggested program for utilizing both manual and machine based data services, as a source of label information. Harry Fund, in the last chapter of Part I deals with the graphic and production arts required to print and manufacture labels, placards and tags.

In Part II Adria Casey, Donald MacKellar, Anthony Garro and Richard Moriarity discuss the applied science that underlies much of labeling. Anthony Garro of Mt. Sinai School of Medicine and Donald MacKellar of Toxigenics,

Inc. explore the biological basis for chronic and acute toxicity, while Adria Casey explicates physical and chemical test parameters; and classification based on physical, chemical and biological data.

Labeling, Product Liability and Government Regulations form the major elements of Part III. David Zoll of the Chemical Manufacturers Association leads off with a discussion of product liability, the "prudent man" and case law. James Toupin of Covington & Burling follows with a chapter on trade secrets, patents and trademarks. Steven Jellinek discusses the label requirement for the sale and use of pesticides under FIFRA. TSCA and RCRA labeling regulations with specific case examples are explored by Robert Sussman and Jennifer Machlin. Robert Sussman also covers consumer product labeling in his chapter on the Consumer Product Safety Commission. John Gillick of the law firm of Kirby, Gillick, Schwartz and Tuohey reviews labeling in transportation. He details DOT label and placard regulations for air, water, road and rail movements for packages as well as for bulk containers. Flo Ryer, former Director of Health Standards for the Occupational Safety and Health Administration (OSHA), details the label requirements of OSHA's Health Standards and reviews OSHA's latest label standard proposal.

This controversial standard has been in development for more than eight years. OSHA's latest draft includes provisions for container and reactor labels, area placarding, a material safety data sheet in the workplace, worker training and a provision for maintaining trade secrets. Overall this standard is performanced-based, apparently permitting many existing systems to meet OSHA requirements.

In Part IV, the last section, Jay Young and Charles O'Connor discuss current and proposed industry standards. The Chemical Manufacturers Association (CMA) sponsored *ANSI Guide to Precautionary Labeling of Hazardous Chemicals* and the National Fire Protection Association's (NFPA) *Identification of Fire Hazards of Materials* are the two oldest standards. The ANSI Standard owes its beginnings to the original Labels and Precautionary Information Committee (LAPI) Guide published by CMA in 1938, while the NFPA System was first explicated in 1952.

Jay Young outlines the basic requirement of the CMA sponsored ANSI Standard and the specific elements required to compose an appropriate "Hazard Label". He brings special insight to this task, having served as the CMA executive responsible for the labeling activities of the association.

The two systems are complementary. NFPA uses a color keyed symbol system with high recognition value. This permits an observer to quickly assess the hazardous nature of a tank or area. ANSI, relying primarily upon text to convey its message, is better suited for container labeling. Intelligent application of both systems significantly improves label hazard communication. The current use and development of material safety data sheets are also discussed as a part of a hazard communication program.

An example of such a combined system is offered by the NIOSH Identification System for Occupationally Hazardous Materials. This identification system uses color-keyed symbols with numerical "degree of hazard" indicators for placards. The system adds precautionary text and hazard statements for la-

bels, and requires the availability of a material safety data sheet in the workplace.

The authors also include a discussion of the current ASTM Z 535.2 proposal for Safety Signs. This system combines three elements: color, shape, and signal words to create three distinctive levels of hazard alert signs. ASTM uses the traditional signal words: "Danger", "Warning," "Caution". These words are not independent elements, but are always combined with specific colors and specific shapes.

"Danger" always appears with a combination of white, red and black on an oval shape; "Warning" is used with a combination of orange and black on a truncated diamond; and "Caution" always appears on a rounded-corner rectangle, colored yellow and black.

Jay Young and Charles O'Connor present the National Paint and Coatings Association (NCPA) Label Guide and in-plant Hazardous Materials Identification System (HMIS). HMIS is a complete hazard communication system. It utilizes labels, tags, wallet cards, wall posters, employee handouts, placards, symbols for personal protection, an audio visual program, and a rating system for health, reactivity, and flammability. This system will accommodate both acute and chronic health effects. As in the NFPA System, blue, red and yellow are used to highlight health, flammability, and reactivity. Rating or ranking for each hazard class runs from one (1) to five (5), with five (5) the most hazardous. The HMIS Manual also includes a glossary, information on how to assign hazard ratings, industrial hygiene, and raw material sheets. NPCA, under the guidance of Larry Thomas, Executive Director, has produced an integrated workable and highly valuable system.

I would like to express my thanks to Corrine Hessel for her help in preparing and reviewing the manuscript in development and through the galleys. This book would have been impossible without her professional help.

I hope that this handbook will provide a comprehensive library source, and be useful for the health, safety, and legal decisions which must be made by chemical manufacturers, attorneys, safety equipment producers, toxicologists, industrial safety engineers, waste disposal operators, health care professionals, and the many others who may have contact with or interest in the Chemical Industry due to their own or third party exposure.

Greens Farms, Connecticut
December, 1983

Charles J. O'Connor

Contributors

Adria C. Casey
Stauffer Chemical Company
Westport, CT

Harry Fund
Labelmaster
Chicago, IL

Anthony J. Garro
The City College of New York and
the Mount Sinai School of
Medicine
New York, New York

John E. Gillick
Kirby, Gillick, Schwartz and
Tuohey, P.C.
Washington, D.C.

Steven D. Jellinek
Jellinek Associates, Inc.
Washington, D.C.

Sidney I. Lirtzman
Graduate School and University
Center and Baruch College
City University of New York
New York, NY

Jennifer Machlin
Orrick, Herrington and Sutcliffe
San Francisco, CA

Donald G. MacKellar
Toxigenics, Inc.
Decatur, IL

Richard Moriarty
National Poison Center
Children's Hospital
Pittsburgh, PA

Charles J. O'Connor
Labeling and Hazard Analysis
Consultant
Greens Farms, CT

Flo H. Ryer
U.S. Environmental Protection
Agency
Washington, D.C.

Norma Skolnik
International Playtex, Inc.
Paramus, N.J.

Robert M. Sussman
Covington and Burling
Washington, DC

James Toupin
Covington and Burling
Washington, DC

Jay A. Young
Consultant
Silver Spring, MD

David F. Zoll
Chemical Manufacturers Association
Washington, D.C.

Contents