

HAZARDOUS AND TOXIC MATERIALS

Safe Handling and Disposal



Edited by

Howard H. Fawcett

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Second Edition

Edited by Howard H. Fawcett, P.E.

President, Fawcett Consultations



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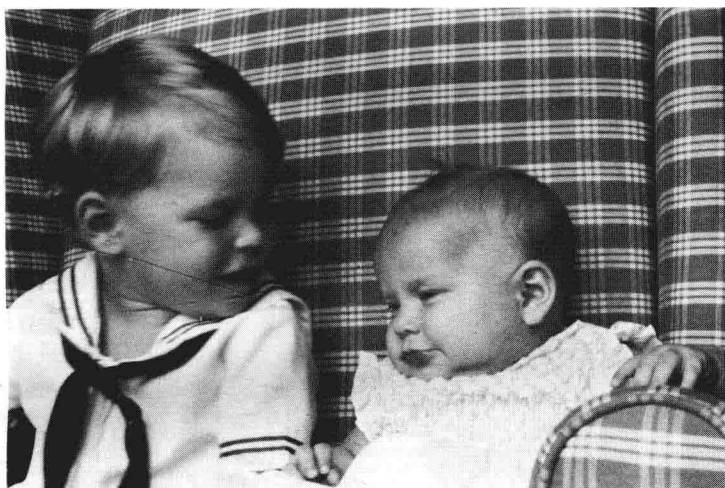
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*This book is dedicated to a bright future,
as personified by my grandchildren:
Erik Howard Fawcett (born October 22, 1984) and
Kirstin Beatrice Fawcett (born March 4, 1987)*



Contributors

Audrey Armour, Ph.D.

York University
Faculty of Environmental Studies
Lumbers Bldg., 4700 Keele St.
North York, Ontario, M3J 1P3 Canada

J. C. Astro

Deputy Head
Dangerous Goods Section
Directorate-General of Transport
Ministry of Transport and Public Works
Postbus 20901, 2500 EX The Hague
Netherlands

James M. Brown, J.D.

Professor
National Law Center
The George Washington University
Washington, DC 20052

Howard H. Fawcett, P.E.

President
Fawcett Consultations
P.O. Box 9444, Wheaton, MD 20906

Ralph W. Fawcett, M.D., Ph.D.

Medical Associate
Fawcett Consultations
P.O. Box 9444, Wheaton, MD 20906

Massod Ghassemi, Ph.D., P.E.

Director, Solid and Hazardous Waste Management Programs
URS Consultants, Inc.
Long Beach, CA 90802

Susan Goddard, M.S.

P.O. Box 1787
Alvin, TX 77512

Roy W. Hann, Jr., Ph.D., P.E.

Professor of Civil Engineering and Research Scientist
Department of Civil Engineering
Environmental Engineering Division
Texas A&M University
College Station, TX 77840

Pamela Harris, M.P.H.

Occupational Health Specialist
Browning-Ferris Industries
8119 Wood Downe Lane
Houston, TX 77040

Ronald D. Hill, P.E.

Land Pollution Control Division
Hazardous Waste Engineering Research Laboratory
U.S. Environmental Protection Agency
Cincinnati, OH 45268

D. Jack Kilian, M.D.

Corporate Medical Director
Browning Ferris Industries
Adjunct Professor of Occupational Medicine
Department of Preventive Medicine and Community Health
The University of Texas Medical Branch
Galveston, TX 77550

Henry Lau, Ph.D.

TSCA Technical Data Center, East Tower
U.S. Environmental Protection Agency
Washington, DC 20460

Edward C. Norman, Ph.D.

Vice-President
National Foam System, Inc.
150 Gordon Drive
Lionville, PA 19353

J. Van der Schaaf

SAVE Consulting Scientists
Deventerspraat Str. 37
7311 LT Apeldoorn
Netherlands

Elizabeth K. Weisburger, Ph.D.

Assistant Director for Chemical Carcinogenesis
National Cancer Institute
National Institutes of Health
Bethesda, MD 20892

Preface

The growing awareness and uneasiness of the public sector about hazardous and toxic chemicals and related materials has created a strong determination by legislators at national, state, and local levels to attempt to control these chemicals by laws and regulations. Since the publication of the first edition of this volume in August 1984, we have seen a tide of legislation and enforcement reflecting this public concern. In this volume we continue to document new developments and to provide sensible, balanced information that will be useful to the makers, users, and disposers of chemicals, which includes nearly every person on planet Earth today. This volume combines the wisdom of several experts in various fields, all presenting a positive viewpoint that hazardous and toxic chemicals and related materials can be controlled and disposed of without adverse effects on people, the environment, or future generations. If we have managed to bring a little order out of the widespread confusion, this effort will not have been in vain.

Wheaton, Md

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To the sage words of Dr. Madame Curie

Nothing in Life is to be Feared;
It is only to be Understood

we add: Happy Landings and a sunny future.

Acronyms and Abbreviations

APCA	Air Pollution Control Association (U.S.)
AAIH	American Academy of Industrial Hygiene (U.S.)
AAOM	American Academy of Occupational Medicine (U.S.)
AAOHN	American Association of Occupational Health Nurses (U.S.)
ABC	Always Be Careful (with chemicals) (universal)
ACGIH	American Conference of Governmental Industrial Hygienists (U.S.)
ACS	American Chemical Society (U.S.)
AIChE	American Institute of Chemical Engineers (U.S.)
ADI	Acceptable daily intake
AIHA	American Industrial Hygiene Association (U.S.)
AMA	American Medical Association (U.S.)
ANSI	American National Standards Institute (U.S.)
APHA	American Public Health Association (U.S.)
API	American Petroleum Institute (U.S.)
ASB	Asbestos Information Bureau (Canada)
ASSE	American Society of Safety Engineers (U.S.)
ASTM	American Society for Testing and Materials (U.S.)
AXE	Alpha Chi Sigma, Professional Chemical Fraternity (U.S.)
BNA	Bureau of National Affairs (U.S.)
BOHN	British Occupational Hygiene Society (U.K.)
BSC	British Safety Council (U.K.)
C&EN	Chemical and Engineering News (U.S.)
CATLINE	National Library of Medicine current catalogue (U.S.)

CAG	Cancer Assessment Group, U.S.E.P.A. (U.S.)
CBC	Circulating bed combustor (U.S.)
CEPP	Chemical Emergency Preparedness Program
CERT	Chemical Emergency Response* Team
CFR	Code of Federal Regulations (Laws) (U.S.)
CGA	Compressed Gas Association (U.S.)
CHEMTREC	Chemical Transportation Emergency Response Center (CMA) (800-424-9300); for Alaska & Hawaii, (202)483-7616) (U.S.)
CIA	Chemical Industry Association (U.K.)
CIIT	Chemical Industry Institute of Toxicology (U.S.)
CMA	Chemical Manufacturers Association (U.S.)
CPSC	Consumer Product Safety Commission (U.S.)
CRACK	An addictive drug, controlled substance (U.S.)
CSMA	Chemical Specialties Manufacturers Association (U.S.)
DCHAS	Division of Chemical Health and Safety, American Chemical Society (U.S.)
DOA	Department of Agriculture (U.S.)
DOD	Department of Defense (U.S.)
DOE	Department of Energy (U.S.)
DOL	Department of Labor (includes OSHA) (U.S.)
DOT	Department of Transportation (U.S.)
EPA	Environmental Protection Agency (U.S.)
FDA	Food and Drug Administration (U.S.)
FEMA	Federal Emergency Management Agency (U.S.)
FM	Factory Mutuals (insurance) (U.S.)
FNRC	Federal National Response Center (reporting of spills or releases) (800-424-8802)-(U.S.)
FR	Federal Register (publication of laws) (U.S.)
GPO	Government Printing Office (U.S.)
GRATEFUL MED	A medical computerized data base by the National Library of Medicine (U.S.)
HEW	Department of Health and Education (no longer known by that name) (U.S.)
HHS	Department of Health and Human Services (U.S.)
HIT	Hazard Information Transmission (a service of CMA) (U.S.)
HPS	Health Physics Society (U.S.)

HSELINE	Health and Safety Executive Laboratory Hazard Bulletin (U.K.)
HTH	A brand of calcium hypochlorite
HW&HM	Hazardous Waste and Hazardous Materials (Mary Ann Liebert, Inc.) (journal) (U.S.)
IARC	International Agency for Research on Cancer (France)
ICWU	International Chemical Workers Union—AFL-CIO (U.S. and Canada)
ICO	International Consultative Organization (maritime) (London)
IChE	Institution of Chemical Engineers (U.K.)
IHF	Industrial Hygiene Foundation (U.S.)
ILO	International Labour Organization (not a labor union) (Geneva, Switzerland)
IOM	Institute of Medicine, National Academy of Sciences (U.S.)
JOHM	Journal of Hazardous Materials (Elsevier, Netherlands)
LEPC	Local emergency planning commission under Title III of P.L. 99-499 (U.S.)
LORAD	Low-level radioactive (waste)
MSDS	Material Safety Data Sheet (an OSHA requirement) U.S.
NAS	National Academy of Sciences (U.S.)
NAE	National Academy of Engineering (a division of NAS) (U.S.)
NAPAP	National Acid Precipitation Assessment Program (U.S.)
NBS	National Bureau of Standards (U.S.)
NFPA	National Fire Protection Association (U.S.)
NPL	National Priority List for Superfund (SARA), EPA (U.S.)
NRC	National Research Council, NAS (U.S.)
NTIS	National Technical Information Service (U.S.)
OCAW	Oil, Chemical and Atomic Workers—AFL-CIO (U.S.)
OHM/TADS	Oil and Hazardous Materials, Technical Assistance Data System (EPA) (U.S.)
OS&H	Occupational Safety and Health (journal) (U.S.)
OSHA	Occupational Safety and Health Agency, Department of Labor (U.S.)
PACT	Powder-activated carbon technology (U.S.)

PBB	Polybrominated biphenyl
PCB	Polychlorinated biphenyl
PE	Professional Engineer; also Pollution Engineering (journal) (U.S.) *
PEL	Permissible exposure limit (OSHA) (U.S.)
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per trillion
RCRA	Resources Conservation and Recovery Act (U.S.)
RSoC	Royal Society of Chemistry (U.K.)
RTECS	Registry of Toxic Effects of Chemical Substances (U.S.)
RTK	Right-to-Know (OSHA Hazard Communication Regulation) U.S.
SARA	Superfund Amendments and Reauthorization Act, 1986 (U.S.)
SERA	State Emergency Response Authority (see Title III of P.L. 99-499, 1986) (U.S.)
SGPT	Liver enzyme test
SFM	State Fire Marshal (U.S.)
SITE	Superfund Innovative Technology Evaluation (U.S.)
SOT	Society of Toxicology (U.S.)
STEL	Short-term exposure limit (ACGIH) (U.S.)
TLV	Threshold limit value (ACGIH) (U.S.)
TSCA	Toxic Substance Control Act, P.L. 94-469 (U.S.)
TTDU	Transportable thermal destruction treatment unit
TWA	Time-weighted average (ACGIH) (U.S.)
UFFI	Urea formaldehyde foam insulation
U.L.	Underwriters Laboratories (a testing and listing organization) (U.S.)
VOC	Volatile organic compounds

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