

OCCUPATIONAL,
INDUSTRIAL, and
ENVIRONMENTAL
Toxicology

SECOND EDITION

Michael I. Greenberg, MD, MPH
Editor-In-Chief

Richard J. Hamilton, MD
Scott D. Phillips, MD
Gayla J. McCluskey, CIH

 Mosby

Contents

Foreword vii

Preface ix

Acknowledgments xi

Contributors xiii

**1 A Brief History of Occupational, Industrial,
and Environmental Toxicology 2**

Michael I. Greenberg and Scott D. Phillips

Occupational Toxicology

2 Artists and Artisans 8

Richard Shih, Michael R. Zaragoza, Angela R. Babin, and
Paul F. Kolecki

3 Athletes 18

Edwin K. Kuffner

4 Aviation Personnel 36

Richard J. Hamilton

5 Carpenters and Woodworkers 46

Lada Kokan

**6 Commercial Fishing and Related
Industries 58**

Anthony Morocco

7 Concrete Workers and Masons 68

Frank LoVecchio

8 Divers 76

Raymond Iannacone and James Caruso

9 Doctors, Nurses, and Dentists 88

Jeanmarie Perrone

**10 Domestic and Building Maintenance
Workers 96**

Christine M. Stork

11 Dry Cleaners 104

Paul M. Wax and Daniel E. Brooks

12 Electricians 118

Howard Lu, Richard D. Shih, and Art Calise

13 Electroplaters 126

Polyxeni Koutkia and Richard Y. Wang

14 Exterminators 142

Sheldon L. Wagner

15 Farmers and Farm Personnel 154

Rick L. Langley and William J. Meggs

18 Firefighters 162

Richard D. Gerkin and Jefferey L. Burgess

17 Florists and Groundskeepers 174

Lewis Nelson

18 Food Preparation Personnel 184

Mary Ann Howland

19 Hairdressers and Cosmetologists 190

Suzanne Doyon

20 Jewelers 198

Susan M. Lizarralde, Barry Wake, Valerie Thompson,
and Richard S. Weisman

- 21 Longshoremen, Stevedores, and Dockworkers 216**
Rafael De La Hoz and Jaime Szeinuk
- 22 Mechanics 222**
Jeffrey M. Cox and Richard Y. Wang
- 23 Military Personnel 232**
David Sonntag, Warren Jederberg, Grace LeMasters, Susan Reutman, and Kenneth Still
- 24 Military Personnel Part II—
Biologic Threats 244**
James M. Madsen
- 25 Military Personnel Part III—
Chemical Threats 258**
Gennady E. Platoff, Steven I. Baskin, and James M. Madsen
- 26 Morticians 274**
Anthony Suruda
- 27 Painters and Furniture Refinishers 284**
Peter E. Gordon and William K. Chiang
- 28 Child Laborers 292**
Kevin C. Osterhoudt and Jeffrey C. Gershel
- 29 Plumbers and Pipefitters 302**
Jacqueline Moline and Scott Levy
- 30 Police and Law Enforcement
Personnel 312**
Michael I. Greenberg
- 31 Printers 326**
Oliver L. Hung
- 32 Roofers and Roadbuilders 334**
Jeffrey R. Brubacher
- 33 Sandblasters 344**
Mark C. Muetterties, Liese O'Halloran Schwarz, and Richard Y. Wang
- 34 Seafarers 356**
Lawrence S. Betts and Brian C. Betts
- 35 Sanitation and Sewer Workers 366**
Jeffrey R. Brubacher
- 36 Shoemakers 378**
Robert S. Hoffman
- 37 Smelters and Metal Reclaimers 388**
Francis J. De Roos
- 38 Welders and Joiners 398**
Amy J. Behrman
- 39 Veterinarians, Zookeepers, and Other
Animal Handlers 406**
Robert H. Poppenga and Susan E. Farrell
- 40 Occupational Exposure Limits 418**
Gayla J. McCluskey

Industrial Toxicology

- 41 Commercial Aircraft Manufacturing 426**
J. Michael Muhm and Thomas P. O'Keeffe
- 42 Automobile Manufacturing Industry 454**
Frank E. Mirer
- 43 Furniture Manufacturing 462**
Stephen W. Munday
- 44 Beryllium-Related Industries 468**
John Martyny, Lisa A. Maier, and Lee S. Newman
- 45 Chemical Manufacturing 482**
Michael Holland
- 46 Mining Industry 498**
David G. Greenberg, Thomas A. Hethmon, and Jeffrey L. Burgess
- 47 Petroleum Industry 518**
Wayne R. Snodgrass
- 48 Pharmaceutical Manufacturing 526**
Michael I. Greenberg and David C. Lee
- 49 Pulp and Paper Industry 532**
Roy Purssell
- 50 Railroad Industry 542**
Michael I. Greenberg
- 51 Semiconductor Manufacturing 550**
Peter H. Wald and Michael E. Williams
- 52 Ship- and Boatbuilding, Ship Repair,
and Ship Breaking Industries 564**
Robert G. Hendrickson
- 53 Textile Manufacturing Industry 574**
Michael I. Greenberg
- 54 Plastics Industry 584**
Scott D. Phillips

Environmental Toxicology

- 55 Risk Communication 600**
Ronald E. Gots
- 56 The Indoor Environment 612**
Franklin D. Aldrich
- 57 Outdoor Air Pollution 622**
Stephen R. McDow and David J. Tollerud
- 58 Water Pollution 636**
Hernan F. Gomez and Scott D. Phillips
- 59 Asbestos 650**
John P. Holland and Dorsett D. Smith
- 60 Chemical Carcinogenesis 670**
Scott D. Phillips, Michael I. Greenberg, and Michael T. Parra

- 61 Noise Pollution 682**
David Koh and Swee-Cheng Foo
- 62 Ionizing Radiation 702**
Rudi H. Nussbaum and Wolfgang Köhnlein
- 63 Nonionizing Radiation 716**
Scott D. Phillips
- 64 Occupationally-Related Snakebite 722**
Surajit Suntorntam
- 65 Residential Radon 734**
Mark J. Upfal and Christine Cole Johnson
- 66 Clandestine Drug Laboratories 746**
Jefferey L. Burgess and David Chandler
- Appendix 1 767**
- Appendix 2 805**
- Index 811**