

The Occupational Environment: *Its Evaluation, Control, and Management*

Second Edition

Salvatore R. DiNardi, Editor

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Fairfax, Virginia



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Foreword

I am pleased that the American Industrial Hygiene Association (AIHA) has published this new, updated edition of *The Industrial Environment — its Evaluation and Control*, first published by NIOSH in 1973. Once again, this book will serve as a primary and comprehensive reference for occupational and environmental health students and professionals.

From the events of the past few years, we in the occupational safety and health community are challenged by having to respond to threats that were largely unanticipated, even unimaginable, 30 years ago when the first edition of this book appeared. We struggle to eliminate a host of traditional occupational safety and health hazards and to address new, elusive problems in today's changing workplace, while tackling emerging hazards arising from terrorism, emergency response, and outbreaks of new diseases such as SARS, which may pose a job-related health risk in some occupational settings. By the same token, we are better able to meet these challenges thanks to the hard work that industrial hygienists and others have invested since the early 1970s, and the new tools, methodologies,

and know-how that have come to us as dividends of that great investment. This new edition entitled *The Occupational Environment: Its Evaluation, Control, and Management* will assist industrial hygiene professionals to address today's critical issues by including expanded information on air contaminants, indoor air quality, dermal exposure assessment, ionizing radiation, and laboratory health and safety controls.

NIOSH would like to acknowledge the contributions of the many experts and the work of the American Industrial Hygiene Association in developing this new edition. Their efforts will help to ensure emerging occupational and environmental health specialists achieve the highest level of skill and use innovative solutions to address old and new industrial hygiene problems.

John Howard, M.D.
Director, National Institute for
Occupational Safety and Health
June 2003

Preface

I continue to be grateful to have the honor and pleasure to be the editor of this great project. Planning for the second edition began shortly after the publication of the first edition. Many of the users of the first edition provided insightful and constructively critical comments to AIHA headquarters staff. These comments were all considered seriously, and many were adopted to improve the second edition.

The first thing that you will notice is that the second edition is physically different from the first. This was in direct response to comments from end users about the ergonomic design of the book. The change from the original NIOSH title *“The Industrial Environment: Its Evaluation and Control”* to *“The Occupational Environment: Its Evaluation and Control”* reflected the evolution of the profession. This acknowledged that the industrial hygiene profession evolved to occupational hygiene. The title for this, the second edition, has been expanded to

“The Occupational Environment: Its Evaluation, Control, and Management” to continue to track the changing nature of the occupational hygiene profession.

The attentive reader will also notice some changes in the list of chapters. Several chapters were expanded, eliminated, reassigned to different sections, or reordered within sections. All of these changes were in response to end users’ or peer reviewers’ comments.

In summary, this is your book; I am only the agent that enables you to have a current, updated reference to use and to consult.

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Acknowledgments

The authors have once again done an outstanding job in writing and revising this textbook. Working together, the authors and AIHA staff have created an invaluable resource for the profession.

About two-thirds of the way through the production of this edition, the two key staffers acknowledged in the first edition as “the mother and ongoing force behind this book” and the second as “the glue that kept this project together,” left the Association. This was a personal and professional loss to me. The project was taken over by Barbara Taylor who has guided this project through to its publication. It was a formidable assignment to undertake, but she kept the project on schedule while continuing the outstanding level of work that was established in the first edition. Elizabeth Simon, the technical editor, performed a Herculean task to make this reference flow smoothly. She is the only person who has read every word in this book — twice! My hat goes off to her. Jim Myers, Katie Robert, and the AIHA Creative Services team have done a marvelous job of making this book “look good” and correcting its ergonomic problem. The unsung heroes in this project are the individual peer reviewers and technical committees acknowledged in the appendix.

I want to thank Stephen H. Gehlbach, dean of the University of Massachusetts, Amherst, for giving me the professional space to work on this project. Particular acknowledgement must also be given to my colleagues at the United States Naval Submarine Medical Research Laboratory, Submarine Atmosphere Health Assessment Program, namely, Captain Raymond Woolrich, Dr. David Slavin, and Mr. David Burnside, who provided an opportunity for me to apply my occupational hygiene skills to a real world situation and kept me on target. Finally, I will be forever grateful to Joan M. Culley, the love of my life, for her unwavering support that enabled me to complete this project.

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July 2003

*A special thank you to the late
Jeffrey S. Lee, PhD, CIH, and
Vernon E. Rose, Dr PH, CIH, whose vision
and efforts resulted in this publication.*

About the Editor



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In 1970, Dr. DiNardi started his academic career in Public Health at the University of Massachusetts in Amherst. He is Professor and Chair of the Environmental Health Science Department and Director of the Industrial Hygiene Program. He teaches Principles of Industrial Ventilation, Principles of Occupational Health, Human Exposure Assessment Modeling, Fundamentals of Indoor Air Quality, Industrial Hygiene Laboratory, and the Science of Terrorism Readiness. He is the principal scientific consultant for the United States Naval Submarine Medical Research Laboratory, (Groton, Connecticut) Submarine Atmospheric Health Assessment Program, US Navy trained to recognize and evaluate chemical, biological, radiological, nuclear, and environmental (CBRNE) agents.

Dr. DiNardi designs and implements indoor air quality surveys to recognize, evaluate, and control the sources of building related illness in the nonindustrial workplace. Dr. DiNardi has hands-on experience with indoor air quality problems especially epidemics of building related illness. He has completed indoor air quality surveys in more than ten million square feet of industrial/commercial spaces throughout the northeast. He provides solutions to these epidemics as well as training and advice on

the subject for workers, supervisors, and managers in many Fortune 500 companies, smaller companies, and health care institutions.

Active in professional education, Dr. DiNardi also offers corporations, the United States government, and universities continuing education programs based on his university courses. He is a ventilation design or indoor air quality training consultant for many major corporations. He is also a continuing education consultant in ventilation design, exposure assessment modeling, basic industrial hygiene, and indoor air quality for the U.S. Navy and several universities.

Dr. DiNardi is certified in the comprehensive practice of industrial hygiene and is a Diplomate of the American Board of Industrial Hygiene. Dr. DiNardi holds a PhD in Physical Chemistry from the University of Massachusetts at Amherst.

Dr. DiNardi has published more than 40 articles in journals of environmental health, industrial hygiene, and chemistry. John Wiley publishes DiNardi's book, *Calculation Methods for Industrial Hygiene*. He is the Editor of the American Industrial Hygiene Association's best-selling reference *The Occupational Environment — Its Evaluation and Control*. He is co-author of *A Glossary of Occupational Hygiene Terms*, also published by the American Industrial Hygiene Association.

One of Dr. DiNardi's goals is to find effective ways of protecting and enhancing the public health through the education of both practicing professionals and concerned citizens. He works closely with continuing education programs nationally to provide practical, current, and lively courses. He develops innovative ways of meeting the educational needs of people whose activities have a direct impact on the health of individuals, industries, communities, governments, and society. Alpha Sigma Lambda, the national continuing education honor society, acknowledged Dr. DiNardi's service and commitment to continuing education by awarding him honorary membership. He is a member of Delta Omega Honorary Public Health Society, Rho Chapter. Since the publication of the first edition of *The Occupational Environment*, he has received several awards and certificates of appreciation from AIHA. In 2001, he received the American Industrial Hygiene Association's Distinguished Service Award.

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