## WATER CHILORINATION Environmental Impact and Health Effects

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# WATER CHLORINATION Environmental Impact and Health Effects Volume 4

Book 2 Environment, Health, and Risk

**Edited by** 

Robert L. Jolley
William A. Brungs
Joseph A. Cotruvo
Robert B. Cumming
Jack S. Mattice
Vivian A. Jacobs

Proceedings of the Fourth Conference on Water Chlorination: Environmental Impact and Health Effects Pacific Grove, California
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#### FOREWORD AND ACKNOWLEDGMENTS

All that mankind has done, thought, gained, or been: It is lying as in magic preservation in the pages of books. They are the chosen possession of men.

Thomas Carlyle, 1795-1881

This volume (Books 1 and 2) represents the permanent record of the Fourth Conference on Water Chlorination: Environmental Impact and Health Effects, held at Asilomar Conference Center, California, October 18-23, 1981. Thus, these proceedings contain the collective papers presented by scientists in environmental, engineering, biological, chemical, health, statistical, and related fields concerned with the major aspects of water chlorination and its associated effects. More than 100 scientific and technical papers were presented, almost equally divided between poster and oral presentations. Although these proceedings include most of these scientific papers, polished by the peer-review process, they cannot include the animated spirit of inquiry, scientific skepticism, and depth of discussion that permeated the conference. The quality and success of the conference is, to a great extent, attributable to the enthusiastic conference participants, both attendees and presenters. In addition, the Asilomar Conference Center provided the environmental setting and informal atmosphere that synergistically stimulated many small discussion groups and optimized personal interaction.

Each paper was critically reviewed by at least two peers. Several papers were not included in the proceedings because of this review process and, although all errors may not have been eliminated, most papers were improved through this extensive effort to ensure that the contents were factually and logically correct, clearly presented, and properly documented. However, the ultimate value of each paper must stand on its own scientific merit. We wish

to express appreciation to the following for assistance in the critical review process: James E. Attrill, Nathaniel Barr, Roger A. Bean, James Berg, John J. Beauchamp, Richard Bull, Kenneth Cantor, Russell Christman, Raymond D. Cooper, William J. Cooper, William P. Davis, George R. Douglas, Max Eisenberg, James A. Fava, Roger Fujioka, Richard K. Genung, Charles I. Gibson, Charles Haas, D. Heyward Hamilton, Michael T. Harris, A. P. Hugenholtz, J. Donald Johnson, Marty Kanarek, Sidney Katz, Robert Kawaratani, Lawrence H. Keith, Calvin E. Lamb, G. Fred Lee, Norman E. Lee, Milton Lietzke, Anthony Maciorowski, D. R. McCalla, Wayne McCulloch, Sylvia A. Murray, Roger A. Minear, John E. Mrochek, Earle R. Nestmann, Vincent Olivieri, Michael A. Pereira, Hans Plugge, Phillip R. Reed, Paul V. Roberts, Richard J. Ruane, William Rue, Robert Samworth, Gregory Seegert, James Smith, Steve Storms, Gerald W. Strandberg, Rhodes Trussell, and John Zogorski.

We also express our appreciation to L. A. Sagan, Electric Power Research Institute, for presenting an interesting and thought-provoking after-dinner address.

The Asilomar conference would not have been possible without the sponsorship of the Electric Power Research Institute, Oak Ridge National Laboratory, Tennessee Valley Authority, U.S. Department of Energy, U.S. Environmental Protection Agency, and the U.S. Nuclear Regulatory Commission. We wish to thank the Conference Committee for their guidance and for efficiently chairing the sessions. Committee members were Roger Bean and Charles Gibson, Battelle Pacific Northwest Laboratories; James Fava and Gregory Seegert, Ecological Analysts, Inc.; Robert Kawaratani, Electric Power Research Institute; George Douglas and Earle Nestmann, Environmental Health Directorate—Canada; William Cooper, Florida International University; Herman Kraybill, National Cancer Institute; Sidney Katz and Norman Lee, Oak Ridge National Laboratory; Lawrence Keith and Roger Minear, Radian Corporation; James Ruane, Tennessee Valley Authority; Nathaniel Barr, U.S. Department of Energy; Richard Bull, Kenneth Cantor, and William Davis, U.S. Environmental Protection Agency; Phillip Reed and Robert Samworth, U.S. Nuclear Regulatory Commission; and Donald Johnson, University of North Carolina-Chapel Hill.

The logistics and conference management were capably conducted by members of the Oak Ridge National Laboratory staff. We especially appreciate the assistance of Bonnie Reesor, Conference Coordinator; Debbie Brown and Betty Laughlin, Conference Secretaries; Carol Leffew, Housing and Travel Arrangements; Doris Jolley, Guest Program; and Joy Simmons, Budget Management. Vivian Jacobs was largely responsible for the quality of the conference mailings, program, and abstract booklets. We appreciate the assistance of Jill Westbrook Jolley, Willena C. Carter and Esther H. Thompson in indexing this large volume.

Those engaged in water chlorination research and management, risk-benefit analysis, and policy determination should find this volume a useful reference. We believe the ideas generated and problem areas identified in the chapters of these proceedings and in the formal and informal discussions at the conference will provide the basis for much additional needed research. We are pleased to have been a part of this creative process.

Robert L. Jolley William A. Brungs Joseph A. Cotruvo Robert B. Cumming Jack S. Mattice Vivian A. Jacobs

#### **CREDITS**

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Robert L. Jolley is an Environmental Chemist in the Advanced Technology Section, Chemical Technology Division of Oak Ridge National Laboratory. Dr. Jolley received a PhD in Ecology from the University of Tennessee at Knoxville, and a BA in Chemistry from Friends University in Wichita. His recent research areas include constituents in wastewater effluents and aqueous solutions,

environmental control technology, chlorination effects on effluents and organic constituents, investigating toxicities of chlorine-containing organic constituents, and coal liquefaction.

Dr. Jolley has written more than 100 technical publications, is Chairman of the Environmental Chemistry Division of the American Chemical Society, and a member of the American Association for the Advancement of Science, Society for Risk Analysis, and Sigma Xi. He received the 1979 Distinguished Alumni Award from Friends University for outstanding contributions to the field of science.



William A. Brungs is Deputy Director of the Environmental Research Laboratory, U.S. Environmental Protection Agency, Narragansett, Rhode Island. He was previously Director of the Office of Technical Assistance at the Environmental Research Laboratory, U.S. Environmental Protection Agency, Duluth, Minnesota. A research aquatic toxicologist, Dr. Brungs previously was Chief of the New-

town Fish Toxicology Station, Cincinnati. He received a PhD in Aquatic Ecology and Radiation Biology, MS and BS degrees from the Ohio State University.

Dr. Brungs has done research on distribution of radionuclides in aquatic ecosystems; and acute and chronic effects on fish of low dissolved oxygen, high temperature, heavy metals and pesticides. He managed a three-year study to validate a laboratory-derived water quality criterion for a natural stream to which copper had been added proportional to streamflow to study effects on fish reproduction, food habits, macroinvertebrate species and periphyton communities. He is involved in development of water quality criteria for marine aquatic life and water quality standards programs. He has assumed new responsibilities at the Narragansett site involving hazard assessment of ocean dumping of dredged materials and sewage sludge.



Joseph A. Cotruvo has been Director of the Criteria and Standards Division, Office of Drinking Water at the U.S. Environmental Protection Agency since 1976. During this time he has been Chairman of the NATO/CCMS Drinking Water Pilot Program, on an OECD advisory panel on chlorination, and a U.S. representative on the World Health Organization Drinking Water Guidelines

Committee. He is also serving on the National Sanitation Foundation's Council of Public Health Consultants. Previously, he was senior staff technical policy advisor for toxic chemicals in the Office of Planning and Management at EPA. Prior to joining EPA he served as Manager of Research and Development for ChemSamp Co. Division of Albany International Corporation. He has been a consultant in pheromone chemical development and an adjunct professor of chemistry and environmental science at George Washington University.

Dr. Cotruvo received his BS in Chemistry from the University of Toledo, and his PhD in Physical Organic Chemistry from Ohio State University. He received a National Research Council Postdoctoral Fellowship in Heterocyclic Chemistry in Bologna, Italy, where he did research on aromatic bicyclic sulfonium ions. Dr. Cotruvo has published a number of technical papers and has edited several books.



Robert B. Cumming is a mammalian geneticist in the Biology Division of the Oak Ridge National Laboratory, and holds a joint appointment as a faculty member in the University of Tennessee—Oak Ridge Graduate School of Biomedical Sciences. Dr. Cumming received his PhD in Cytogenetics from the University of Texas, and his MS and BS degrees in Biology from the University of Florida.

His current research includes environmental mutagenesis and human genetic risk, mammalian genetics and genetic regulation, and potential effects of complex environmental contaminants.

He has been an invited participant in conferences and workshops in Canada, Europe, Latin America and the United States. Author of numerous technical publications, he is a member of several professional societies. Dr. Cumming is one of the founders and the first Chairman of the recently formed Society for Risk Analysis. He is Editor-in-Chief of the society journal Risk Analysis.



Jack S. Mattice is a Project Manager in the Environmental Assessment Department, Electric Power Research Institute, Palo Alto, California. He received a PhD in Invertebrate Zoology and Ecology from Syracuse University and a BS in Biology from the State University of New York at Stony Brook. Before joining the Electric Power Research Institute, Dr. Mattice was a National Academy of Sciences

Exchange Fellow at the Department of Hydrobiology, Polish Academy of Sciences, Warsaw, and a Research Staff Member in the Aquatic Ecology Section, Environmental Sciences Division of Oak Ridge National Laboratory.

His research has included acute and chronic effects of temperature on mortality and physiology of benthic organisms, predator-prey relationships and their impacts on reservoir ecosystems, and toxicity of chlorine and its reaction products to fish and invertebrates. He has also written several review articles dealing with aspects of regulation of chlorine in power plant effluents and has just completed the Section on Toxicity of Chlorine to Freshwater Organisms for the Chlorine Criterion Document for the U.S. Environmental Protection Agency.



Vivian A. Jacobs is coordinator of the Conference Publications Office in the Publications and Visual Arts Section of the Information Division at Oak Ridge National Laboratory. She is a technical editor and assisted in editing Water Chlorination: Environmental Impact and Health Effects, Volume 3. Ms. Jacobs received a BS degree from the University of Illinois. She is a member of the Society

for Technical Communication and the American Association for the Advancement of Science. In her spare time, she serves as a member of the Board of Directors of the ORNL Federal Credit Union, the largest federal credit union in Tennessee.

This volume is dedicated to

Ida Lucille Moore and Al Cammeron Jolley,

and to

Sidney Katz

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