Chapter 2. Microbiological aspects

Pathogenic agents and control of waterborne disease


Standard microbiological methods


Codex Alimentarius Commission. *Codex standards for natural mineral waters and edible ices and ice mixes*. Rome, Food and Agriculture Organization of the United Nations, Codex Alimentarius
Chapter 3. Chemical aspects

Sampling and analytical methods


Risk assessment


- *Pentachlorophenol* (No. 71, 1987).
- *Chlorobenzenes other than hexachlorobenzene* (No. 128, 1991).
- *Diethylhexylphthalate* (No. 131, 1992).


Joint FAO/WHO Expert Committee on Food Additives. *Evaluation of certain food additives and


Chapter 4. Radiological aspects


**Chapter 5. Acceptability aspects**


**Chapter 6. Protection and improvement of water quality**


Annex 1. List of participants in preparatory meetings

Consultation on Revision of WHO Guidelines for Drinking-Water Quality (Rome, Italy, 17-19 October 1988)

Members

L. Albanus, Head, Toxicology Laboratory, National Food Administration, Uppsala, Sweden

J. Alexander, Toxicological Department, National Institute of Public Health, Oslo, Norway

J.A. Cotruvo, Director, Criteria and Standards Division, United States Environmental Protection Agency, Washington, DC, USA

H. de Kruijf, Laboratory for Ecotoxicology, Environmental Chemistry and Drinking-Water, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

H.H. Dieter, Director and Professor, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Rapporteur)

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

J.R. Hickman, Acting Director-General, Environmental Health Directorate, Health and Welfare Canada, Ottawa, Canada

Y. Magara, Director, Department of Sanitary Engineering, Institute of Public Health, Tokyo, Japan


G.A. Zapponi, Environmental Impact Assessment Section, Istituto Superiore di Sanità, Rome, Italy

Observers

S. Blease, Administrator, Water Protection Division, Commission of European Communities, Brussels, Belgium

B. Julin, Regulatory Affairs Manager, International Group of National Associations of Manufacturers of Agrochemical Products, Wilmington, DE, USA

A. Pelfrène, International Group of National Associations of Manufacturers of Agrochemical Products, Paris, France

N. Sarti, Division of Water and Soil, Ministry of Health, Rome, Italy

Secretariat

G. Burin, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland
M. Mercier, Manager, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

G. Ozolins, Manager, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland (Moderator)

S. Tarkowski, Director, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark


Members

U. Blumental, London School of Hygiene and Tropical Medicine, London, England

S. Cairncross, London School of Hygiene and Tropical Medicine, London, England

A.H. Havelaar, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

R.F. Packham, Marlow, England

W. Stelzer, Research Institute of Hygiene and Microbiology, Bad Elster, German Democratic Republic

H. Utkilen, Department of Sanitary Engineering and Environmental Protection, National Institute of Public Health, Oslo, Norway

R. Walter, Director, Institute for General and Community Hygiene, Dresden, German Democratic Republic

Secretariat

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

B. Lloyd, Environmental Health Unit, Robens Institute of Industrial and Environmental Health and Safety, Guildford, England

E.B. Pike, Water Research Centre, Medmenham, England

Coordination Consultation (Copenhagen, Denmark, 4-5 September 1989)

Members

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Co-Rapporteur)

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

E.S. Jensen, Senior Technical Adviser on Water Supply and Sanitation Projects, Technical Advisory Division, Danish International Development Agency, Copenhagen, Denmark

A. Minderhoud, Laboratory for Ecotoxicology, Environmental Chemistry and Drinking Water,
National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

B. Mintz, Chief, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

P.A. Nielsen, Scientific Officer, Toxicologist, Institute of Toxicology, National Food Agency, Soborg, Denmark

E. Poulsen, Chief Adviser in Toxicology, Institute of Toxicology, National Food Agency, Soborg, Denmark

B. Schultz, Water Quality Institute, Horsholm, Denmark

**Secretariat**

G. Burin, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland (Co-Rapporteur)

O. Espinoza, Regional Officer for International Water Decade, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

D. Kello, Project Officer for Toxicology and Food Safety, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

S. Tarkowski, Director, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

**Coordination Group Meeting (Geneva, Switzerland, 13-14 March 1990)**

**Members**

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

J.R. Hickman, Acting Director-General, Environmental Health Directorate, Health and Welfare Canada, Ottawa, Canada

A. Minderhoud, Laboratory for Ecotoxicology, Environmental Chemistry and Drinking Water, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

B. Mintz, Chief, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

B. Schultz, Water Quality Institute, Horsholm, Denmark

**Secretariat**

G. Burin, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

O. Espinoza, Regional Officer for International Water Decade, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark
R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

D. Kello, Project Officer for Toxicology and Food Safety, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

G. Ozolins, Manager, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

R. Plestina, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

First Review Group Meeting on Pesticides (Busto Garolfo, Italy, 25-30 June 1990)

Members

H. Abouzaid, Chief, Water Quality Control Division, National Agency for Drinking-Water, Rabat-Chellah, Morocco

H. Atta-ur-Rahman, Director, H.E.J. Research Institute of Chemistry, Karachi, Pakistan

V. Benes, Chief, Toxicology and Reference Laboratory, Institute of Hygiene and Epidemiology, Prague, Czechoslovakia

J.F. Borzelleca, Pharmacology, Toxicology, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA, USA

L. Brener, Chief, Department of Mineral Analysis, Research Laboratory, Société Lyonnaise des Eaux-Dumez, Paris, France

D. Calamari, Institute of Agricultural Entomology, Faculty of Agriculture, University of Milan, Italy

J. Du, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

J. K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Rapporteur)

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

A. Jaron, Commission of the European Communities, Brussels, Belgium

M. Maroni, Director, International Centre for Pesticide Safety, Busto Garolfo, Italy

Y. Patel, Health Effects Assessment, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

E. Poulsen, Chief Adviser in Toxicology, Institute of Toxicology, National Food Agency, Soborg, Denmark (Chairman)

J. Rueff, Department of Genetics, Faculty of Medical Science, Lisbon, Portugal

B. Schultz, Water Quality Institute, Horsholm, Denmark

J.A. Sokal, Head, Department of Toxicity Evaluation, Institute of Occupational Medicine, Lodz,
Poland

M. Takeda, Director of Environmental Chemistry, National Institute of Hygienic Science, Tokyo, Japan

E.M. den Tonkelaar, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

G. Wood, Acting Head, Criteria Section, Monitoring and Criteria Division, Environmental Health Directorate, Health and Welfare, Ottawa, Canada

Observers

S. Behrendt, BASF AG, Limburgerhof, Federal Republic of Germany
S. Hahn, BASF AG, Limburgerhof, Federal Republic of Germany
H. Kieczka, BASF AG, Limburgerhof, Federal Republic of Germany
S. Kimura, Southern Fukuoka Prefecture, Water Spread Authority, Japan Water Works Association, Tokyo, Japan
F. Sarhan, CIBA-GEIGY Ltd, Basel, Switzerland
G.E. Veenstra, Shell International Petroleum, The Hague, Netherlands

Secretariat

G. Burin, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland
D. Kello, Project Officer for Toxicology and Food Safety, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark
R. Plestina, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

First Review Group Meeting on Organics (Copenhagen, Denmark, 6-10 November 1990)

Members

C. Abernathy, Toxicologist, Health Effects Branch, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA
H.H. Dieter, Director and Professor, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin, Germany
A.M. van Dijk-Looyaard, Drinking-Water Research Scientist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands
J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Rapporteur)
J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark
E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy
K. Khanna, Pharmacologist, Health Effects Branch, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

R. van Leeuwen, Toxicologist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

U. Lund, Head, Department of Chemistry, Water Quality Institute, Horsholm, Denmark

M.E. Meek, Head, Priority Substances Section, Environmental Health Centre, Health and Welfare Canada, Ottawa, Canada

T. Ookubo, Head, Water Quality Examination Laboratory, Hachinohe Regional Water Supply Cooperation, Hachinohe, Japan

E. Sandberg, Toxicologist, National Food Administration, Uppsala, Sweden

U. Schlosser, Research Institute for Hygiene and Microbiology, Bad Elster, Germany

E.A. Simpson, Commission of the European Communities, Brussels, Belgium

J.A. Sokal, Head, Department of Toxicity Evaluation, Institute of Occupational Medicine, Lodz, Poland (Chairman)

M. Takeda, Director of Environmental Chemistry, National Institute of Hygienic Science, Tokyo, Japan

Observer

A. Carlsen, Ministry of the Environment, National Agency of Environmental Protection, Miljöstyrelsen, Copenhagen, Denmark

Secretariat

P. Bérubé, Programme Assistant, International Water Decade, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

O. Espinoza, Regional Officer for International Water Decade, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

D. Kello, Project Officer for Toxicology and Food Safety, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

D. Schutz, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

S. Tarkowski, Director, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

J. Wilbourn, Unit of Carcinogen Identification and Evaluation, International Agency for Research on Cancer, Lyon, France

First Review Group Meeting on Inorganics (Bilthoven, Netherlands, 18-22 March 1991)

Members

E.A. Bababumni, Department of Biochemistry, University of Ibadan, Ibadan, Nigeria
K.L. Bailey, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

G.E. Craun, Chief Epidemiologist, United States Environmental Protection Agency, Washington, DC, USA

A.M. van Dijk-Looyaard, Drinking-Water Research Scientist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Rapporteur)

R. van Leeuwen, Toxicologist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands (Chairman)

M.E. Meek, Head, Priority Substances Section, Environmental Health Centre, Health and Welfare Canada, Ottawa, Canada

E. Poulsen, Chief Adviser in Toxicology, Institute of Toxicology, National Food Agency, Soborg, Denmark

Y.A. Rakhmanin, Head of Laboratory, Ministry of Health of the USSR Academy of Medical Sciences, A.N. Sysin Institute of General and Communal Hygiene, Moscow, USSR

V.R. Rao, Assistant Director and Head, Department of Toxicology, The Haffkine Institute, Parel, Bombay, India

F.G.R. Reyes, Professor of Food Toxicology, Department of Food Science, State University of Campinas, Brazil

F. Sartor, Institute of Hygiene and Epidemiology, Ministry of Public Health and the Family, Brussels, Belgium

J.A. Sokal, Head, Department of Toxicity Evaluation, Institute of Occupational Medicine, Lodz, Poland

M. Takeda, Director of Environmental Chemistry, National Institute of Hygienic Science, Tokyo, Japan

Observers

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

I. Harimaya, Director of Water Quality Research, Kobe, Japan

M. Minowa, Director of Epidemiology, Institute of Public Health, Ministry of Health and Welfare, Tokyo, Japan

E.A. Simpson, Commission of the European Communities, Brussels, Belgium

J.F.M. Versteegh, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

V. Vignier, Société Lyonnaise des Eaux Dumez, International Centre for Research on Water and the Environment (CIRSEE), Le Pecq, France
**Secretariat**

B. Chen, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

**Second Review Group Meeting on Organics (Copenhagen, Denmark, 8-12 April 1991)**

**Members**

K. Bergman, Toxicologist, Medical Products Agency, Division of Pharmacology, Uppsala, Sweden

A. Carlsen, National Agency of Environmental Protection, Copenhagen, Denmark

H.H. Dieter, Director and Professor, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin, Germany

P.M. Dudermel, Pasteur Institute, Lille, France

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England *(Rapporteur)*

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

R. Hasegawa, Section Chief, Division of Toxicology, National Institute of Hygienic Science, Tokyo, Japan

K. Hughes, Chemical Health Hazard Evaluator, Environmental Health Centre, Health and Welfare Canada, Ottawa, Canada

R. van Leeuwen, Toxicologist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

U. Lund, Head, Department of Chemistry, Water Quality Institute, Horsholm, Denmark

A. Patel, Toxicologist, Water Research Centre, Medmenham, England

Y. Richard, Chief, Department of Chemical Research, Société Degrémont, Rueil-Malmaison, France

E. Sandberg, Toxicologist, National Food Administration, Uppsala, Sweden

J.A. Sokal, Head, Department of Toxicity Evaluation, Institute of Occupational Medicine, Lodz, Poland *(Chairman)*

**Secretariat**

X. Bonnefoy, Acting Regional Officer for Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Gents, Secretary, International Water Decade, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark
D. Kello, Project Officer for Toxicology and Food Safety, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

S. Tarkowski, Director, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

**Coordination Group Consultation (Geneva, Switzerland, 13-14 May 1991)**

**Members**

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

J.R. Hickman, Director-General, Environmental Health Directorate, Health and Welfare Canada, Ottawa, Canada *(Moderator)*

U. Lund, Head, Department of Chemistry, Water Quality Institute, Horsholm, Denmark

B. Mintz, Chief, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

E.B. Pike, Water Research Centre, Medmenham, England

**Secretariat**

X. Bonnefoy, Acting Regional Officer for Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark *(Co-Rapporteur)*

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland *(Co-Rapporteur)*

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Kenny, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

M. Mercier, Manager, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

G. Ozolins, Manager, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

P. Waight, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

**Review Group on Disinfectants and Disinfectant By-products (Bethesda, MD, USA, 10-14 June 1991)**

**Members**

H. Abouzaid, Chief, Water Quality Control Division, National Agency for Drinking-Water, Rabat-Chellah, Morocco

W. Almeida, Department of Preventive Medicine, State University of Campinas, Campinas, Brazil
M. Ando, National Institute of Hygienic Science, Division of Environmental Chemistry, Tokyo, Japan

R. Bull, Pharmacology/Toxicology Graduate Program, College of Pharmacy, Washington State University, Pullman, WA, USA

G. Burin, United States Environmental Protection Agency, Washington, DC, USA (Vice-Chairman)

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Co-Rapporteur)

B. Havlik, Institute of Hygiene and Epidemiology, Prague, Czechoslovakia

N. Mahabhol, Ministry of Public Health, Bangkok, Thailand

M.E. Meek, Head, Priority Substances Section, Environmental Health Centre, Health and Welfare Canada, Ottawa, Canada (Co-Rapporteur)

B. Mintz, Chief, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA (Chairman)

R. Packham, Marlow, England

J.F.M. Versteegh, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

Z. Zholdakova, Academy of Medical Sciences, A.N. Sysin Institute of General and Communal Hygiene, Moscow, USSR

Observers

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

E. Ohanian, Office of Science and Technology, United States Environmental Protection Agency, Washington, DC, USA

H. Sasaki, Water Quality Laboratory, Sapporo, Hokkaido, Japan

Secretariat

R. Cantilli, United States Environmental Protection Agency, Washington, DC, USA

N. Chiu, United States Environmental Protection Agency, Washington, DC, USA

J. Du, United States Environmental Protection Agency, Washington, DC, USA

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Orme, Office of Science and Technology, United States Environmental Protection Agency, Washington, DC, USA

Review Meeting on Pathogenic Agents and Volume 3 on Surveillance of Community Supplies (Harare, Zimbabwe, 24-28 June 1991)
Members

H. Abouzaid, Chief, Water Quality Control Division, National Agency for Drinking-Water, Rabat-Chellah, Morocco

M.T. Boot, Programme Officer, IRC International Water and Sanitation Centre, The Hague, Netherlands

J.Z. Boutros, Consultant in Food and Water Control, Khartoum, Sudan (Rapporteur)

W. Fellows, Programme Officer, Water and Environmental Sanitation, UNICEF, Harare, Zimbabwe

F.J. Gumbo, Head of Water Laboratories, Operation, Maintenance and Water Laboratories Division, Ministry of Water (MAJI), Dar-es-Salaam, United Republic of Tanzania

A.H. Havelaar, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

J. Hubley, Senior Lecturer in Health Education, Health Education Unit, Faculty of Health and Social Care, Leeds Polytechnic, Leeds, England

B. Jackson, Senior Engineering Advisor, British Development Division in East Africa, Nairobi, Kenya


S. Laver, Lecturer, Department of Community Medicine, University of Zimbabwe, Mount Pleasant, Harare, Zimbabwe

M.T. Martins, Associate Professor, Environmental Microbiology Laboratory, University of São Paulo, Brazil

P. Morgan, Advisor, Water and Sanitation, Ministry of Health, Blair Research Laboratory, Harare, Zimbabwe

S. Mtero, Principal Medical Research Officer, Ministry of Health, Blair Research Laboratory, Harare, Zimbabwe

S. Musingarabwi, Director, Environmental Health Services, Ministry of Health, Harare, Zimbabwe (Vice-Chairman)

F. Niang, Chief, Laboratory Service, Senegalese National Water Management Company, Dakar, Senegal

E.B. Pike, Water Research Centre, Medmenham, England

P.K. Ray, Director, Industrial Toxicology Research Centre, Lucknow, India

P. Taylor, Director, Training Centre for Water and Sanitation, Department of Civil Engineering, University of Zimbabwe, Harare, Zimbabwe (Chairman)

H. Utkilen, Scientist, National Institute of Public Health, Department of Environmental Medicine, Oslo, Norway
Observers

M. Ellis, Primary Health Consultant, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

D. Tolson, Aid Secretary, British High Commission, Harare, Zimbabwe

Secretariat

J. Bartram, Manager, Overseas Development, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Kenny, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

V. Larby, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

B. Lloyd, Head, Environmental Health, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

K. Wedgwood, Research Officer, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

F. Zawide, WHO Sanitary Engineer, Sub-region III, Harare, Zimbabwe

Second Review Group Meeting on Pesticides (Rennes, France, 2-6 September 1991)

Members

G. Burin, Toxicologist, United States Environmental Protection Agency, Washington, DC, USA (Co-Rapporteur)

A. Bruchet, Société Lyonnaise des Eaux Dumez, International Centre for Research on Water and the Environment (CIRSEE), Le Pecq, France

H.H. Dieter, Director and Professor, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin, Germany

P.M. Dudermel, Pasteur Institute, Lille, France

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Co-Rapporteur)

J. Forsslund, National Agency of Environmental Protection, Copenhagen, Denmark

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

R. Halperin, Chief Engineer for Environmental Health, Ministry of Health, Jerusalem, Israel

K. Hughes, Chemical Health Hazard Evaluator, Priority Substances Section, Environmental
Substances Division, Environmental Health Directorate, Environmental Health Centre, Ottawa, Canada

S. Kojima, Director of Environmental Chemistry, National Institute of Hygienic Science, Tokyo, Japan

A.M. Mahfouz, Senior Toxicologist and Pesticides Team Leader, Office of Science and Technology, United States Environmental Protection Agency, Washington, DC, USA

A. Montiel, Water Quality Control Officer, Water Management Company of Paris, Paris, France (Chairman)

E. Poulsen, Chief Adviser in Toxicology, Institute of Toxicology, National Food Agency, Soborg, Denmark

R. Seux, National School of Public Health, Rennes, France

E. Simpson, Commission of the European Communities, Brussels, Belgium

Observers

M.J. Carroll, Area Registration Manager, Monsanto Services International, Brussels, Belgium

A. Hirata, Chief, Monitoring Section, Water Quality Management, Waterworks Bureau, Tokyo Metropolitan Government, Tokyo, Japan

H.P. Nigitz, Head, Regulatory Affairs, Agrolinz Agricultural Chemicals, Linz, Austria

E. Puri, Toxicologist, CIBA-GEIGY Ltd, Basel, Switzerland

G.A. Willis, Manager, Product Safety, ICI Agrochemicals, Fernhurst, Haslemere, Surrey, England

Secretariat

X. Bonnefoy, Regional Adviser, Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Gents, Programme Secretary, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark

Second Review Group Meeting on Inorganics (Brussels, Belgium, 14-18 October 1991)

Members

Y. Aida, Senior Research Scientist, Division of Risk Assessment, National Institute of Hygienic Science, Kamiyoga, Setagayaku, Tokyo, Japan

J. Alexander, Deputy Director, Department of Environmental Medicine, National Institute of Public Health, Oslo, Norway

K.L. Bailey, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA
H.H. Dieter, Director and Professor, Toxicologist, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin, Germany

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England (Co-Rapporteur)

A. Lafontaine, Honorary Director, Institute of Hygiene and Epidemiology, Brussels, Belgium

M.E. Meek, Head, Priority Substances Section, Environmental Health Centre, Health and Welfare Canada, Ottawa, Canada

B. Naima, Director, Water Quality Laboratory, National Agency for Drinking-Water, Rabat-Chellah, Morocco

G.D. Nielsen, Department of Environmental Medicine, Odense University, Odense, Denmark

R.F. Packham, Marlow, England

Y.A. Rakhmanin, Head of Laboratory, Ministry of Health of the USSR Academy of Medical Sciences, A.N. Sysin Institute of General and Communal Hygiene, Moscow, USSR

Tharwat Saleh, Project Manager, WHO Project EFY/CWS/002, Cairo, Egypt

R. Sarin, Assistant Director, Scientist and Head, Basic Research Division, National Environmental Engineering Research Institute (NEERI), Nehru Marg, Nagpur, India

F. Sartor, Institute of Hygiene and Epidemiology, Ministry of Public Health and the Family, Brussels, Belgium (Chairman)

J.F.M. Versteegh, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

Observers

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

E.A. Simpson, Commission of the European Communities, Brussels, Belgium

V. Vignier, Société Lyonnaise des Eaux Dumez, International Centre for Research on Water and the Environment (CIRSEE), Le Pecq, France

Secretariat

X. Bonnefoy, Regional Adviser, Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland (Co-Rapporteur)

C. Martin, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

Members

O. Hydes, Drinking-Water Inspectorate, Department of the Environment, London, England

D.P. Meyerhof, Bureau of Radiation and Medical Devices, Department of National Health and Welfare, Ottawa, Canada

J.-C. Nénot, Director of Research, Institute for Nuclear Protection and Safety, Fontenay-aux-Roses, France

K.C. Pillai, Health Physics Division, Bhabha Atomic Research Centre, Bombay, India

A. Randell, Senior Officer, Food Quality and Standards Service, Food and Agriculture Organization of the United Nations, Rome, Italy

C. Robinson, National Radiological Protection Board, Chilton, Didcot, England (Co-Rapporteur)

L.B. Sztanyik, Director, “Frédéric Joliot-Curie” National Research Institute for Radio-biology and Radiohygiene, Budapest, Hungary (Chairman)

E. Wirth, Institute for Radiation Hygiene, Federal Office for Radiation Protection, Neuerberg, Germany

Secretariat

P.J. Waight, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland (Co-Rapporteur)


Members

H. Abouzaid, Chief, Water Quality Control Division, National Agency for Drinking-Water, Rabat-Chellah, Morocco

S. Clark, Chief, Drinking Water Technology Branch, Office of Groundwater and Drinking Water, United States Environmental Protection Agency, Washington, DC, USA

A.M. van Dijk-Looyaard, Drinking-Water Research Scientist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark

D. Green, Criteria Section, Environmental Health Centre, Department of National Health and Welfare, Ottawa, Canada (Co-Rapporteur)

I. Licsko, Research Centre for Water Resources Development (VITUKI), Budapest, Hungary

B. Lloyd, Head, Environmental Health, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

D.P. Meyerhof, Bureau of Radiation and Medical Devices, Department of National Health and Welfare, Ottawa, Canada

A. Montiel, Water Quality Control Officer, Water Management Company of Paris, Paris, France (Co-Rapporteur)
R.F. Packham, Marlow, England (Chairman)

R. Sarin, Assistant Director, Scientist and Head, Basic Research Division, National Environmental Engineering Research Institute (NEERI), Nehru Marg, Nagpur, India

Observers

T. Aizawa, Department of Sanitary Engineering, Institute of Public Health, Tokyo, Japan

R.A. Breach, Water Quality Manager, Severn Trent Water, Birmingham, England

O. Hydes, Drinking Water Inspectorate, Department of the Environment, London, England

M. Ichinohe, Bureau of Waterworks, Tokyo Metropolitan Government, Tokyo, Japan

E. Simpson, Commission of the European Communities, Brussels, Belgium

M. Tsuji, Ministry of Health and Welfare, Tokyo, Japan

Secretariat

X. Bonnefoy, Regional Adviser, Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

B. Crathorne, Water Research Centre, Medmenham, England

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland

E.B. Pike, Water Research Centre, Medmenham, England

WHO Consolidation Meeting on Organics and Pesticides (Medmenham, England, 30-31 January 1992)

Members

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

R. van Leeuwen, Toxicologist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands (Moderator)

U. Lund, Head, Department of Chemistry, Water Quality Institute, Horsholm, Denmark

M. Sheffer, Scientific Editor, Orleans, Canada

Secretariat

X. Bonnefoy, Regional Adviser, Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark (Co-Rapporteur)

H. Galal-Gorchev, International Programme on Chemical Safety, Division of Environmental Health, World Health Organization, Geneva, Switzerland (Co-Rapporteur)
Final Drafts Preparation Meeting for Volumes 1 and 2 (Val David, Quebec, Canada, 19-22 May 1992)

Members

K. Bentley, Director, Environmental Health, Health Advancement Division, Australian Department of Health, Housing and Community Services, Woden, Australia

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

J.R. Hickman, Director-General, Environmental Health Directorate, Department of National Health and Welfare, Ottawa, Canada (Chairman)

U. Lund, Head, Department of Chemistry, Water Quality Institute, Horsholm, Denmark

M.E. Meek, Head, Priority Substances Section, Environmental Health Centre, Department of National Health and Welfare, Ottawa, Canada

B. Mintz, Chief, Health Effects Assessment Section, Criteria and Standards Division, Office of Drinking-Water, United States Environmental Protection Agency, Washington, DC, USA

R.F. Packham, Marlow, England

E.B. Pike, Water Research Centre, Medmenham, England

M. Sheffer, Scientific Editor, Orleans, Canada

P. Toft, Health Protection Branch, Environmental Health Directorate, Department of National Health and Welfare, Ottawa, Canada

G. Wood, Health Protection Branch, Environmental Health Directorate, Department of National Health and Welfare, Ottawa, Canada

Secretariat

X. Bonnefoy, Regional Adviser, Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark (Co-Rapporteur)

H. Galal-Gorchev, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland (Co-Rapporteur)

G. Ozolins, Manager, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

Final Task Group Meeting (Geneva, Switzerland, 21-25 September 1992)

Members*

* Invited but unable to attend: Director-General of Health, Islamabad, Pakistan; F. Sartor, Institute of Hygiene and Epidemiology, Ministry of Public Health and the Family, Brussels, Belgium.

H. Abouzaid, Chief, Water Quality Control Division, National Agency for Drinking-Water, Rabat-Chellah, Morocco

M. Aguilar, Director of Basic Sanitation, Department of Environmental and Occupational Health
J. Alexander, Deputy Director, Department of Environmental Medicine, National Institute of Public Health, Oslo, Norway

V. Angjeli, Chief of Communal Hygiene Division, Research Institute of Hygiene and Epidemiology, Tirana, Albania

L. Anukam, Federal Environmental Protection Agency (FEPA), Department of Planning and Evaluation, Federal Secretariat Complex (Phase II), Ikoyi, Lagos, Nigeria

W.S. Assoy, Director, Environmental Health Service, Department of Health, Manila, Philippines

Changjie Chen, Director, Institute of Environmental Health Monitoring, Chinese Academy of Preventive Medicine, Beijing, China

M. Csanady, Department Leader, National Institute of Hygiene, Budapest, Hungary

H.H. Dieter, Director and Professor, Institute for Water, Soil and Air Hygiene of the Federal Office of Health, Berlin, Germany

F.K. El Jack, Head of Water Department, National Chemical Laboratories, Khartoum, Sudan

J. Forslund, National Agency of Environmental Protection, Copenhagen, Denmark (Vice-Chairman)

E. Funari, Department of Environmental Hygiene, Istituto Superiore di Sanità, Rome, Italy

E. Gonzalez, Chief, Department of Water Quality, Water Supply and Sewerage, San Jose, Costa Rica

F.J. Gumbo, Head of Water Laboratories, Operation, Maintenance and Water Laboratories Division, Ministry of Water (MAJI), Dar-es-Salaam, United Republic of Tanzania

B. Havlik, Head of Water Hygiene Branch, National Institute of Public Health, Prague, Czechoslovakia

H.M.S.S.D. Herath, Deputy Director General, Public Health Services, Ministry of Health, Colombo, Sri Lanka

L. Hiisvirta, Chief Engineer, Ministry of Social Affairs and Health, Helsinki, Finland

J. Kariuki, Senior Public Health Officer, Division of Environmental Health, Ministry of Health, Nairobi, Kenya

M. Kitenge, Director, Department of Local Production Control, Zaire Control Agency, Kinshasa, Zaire

F.X.R. van Leeuwen, Senior Toxicologist, National Institute of Public Health and Environmental Protection, Bilthoven, Netherlands

Y. Magara, Director, Department of Water Supply Engineering, Institute of Public Health, Tokyo, Japan

N.S. McDonald, Director, Water Branch, Department of Primary Industries and Energy, Canberra, Australia

and Basic Sanitation, Mexico City, Mexico
B. Mintz, Chief, Exposure Assessment and Environmental Fate Section, Office of Science and Technology, United States Environmental Protection Agency, Washington, DC, USA

F. Niang, Chief, Laboratory Service, Senegalese National Water Management Company, Dakar, Senegal

R.F. Packham, Marlow, England

Y.A. Rakhmanin, Academician of Russian Academy of Natural Sciences, A.N. Sysin Research Institute of Human Ecology and Environmental Health, Moscow, Russian Federation

F.G.R. Reyes, Professor of Food Toxicology, Department of Food Science, State University of Campinas, Brazil (Rapporteur)

T. Saleh, WHO Regional Support Office, Cairo, Egypt

E. Sandberg, Senior Toxicologist, National Food Administration, Uppsala, Sweden

Nantana Santatiwut, Director, Environmental Health Division, Department of Health, Ministry of Public Health, Bangkok, Thailand

R. Sarin, Scientist, National Environmental Engineering Research Institute (NEERI), Nehru Marg, Nagpur, India

C. Shaw, Senior Advisor Scientist, Public Health Services, Department of Health, Wellington, New Zealand

J.A. Sokal, Director, Institute of Occupational Medicine and Environmental Health, Sosnowiec, Poland

P. Toft, Health Protection Branch, Environmental Health Directorate, Department of National Health and Welfare, Ottawa, Canada (Chairman)

D. Tricard, Sanitary Engineer, Ministry of Health and Humanitarian Action, Department of Health, Paris, France

Observers

M.J. Crick, Radiation Safety Specialist, International Atomic Energy Agency, Vienna, Austria

A.M. van Dijk-Looyaard, Senior Scientist Drinking-Water Standards, KIWA N.V. Research and Consultancy, Nieuwegein, Netherlands

O. Hydes, Drinking Water Inspectorate, Department of the Environment, London, England

M. Rapinat, International Water Supply Association, Compagnie générale des Eaux, Paris, France

Y. Richard, Head Engineer, Société DEGREMONT-CIRSEE, Le Pecq, France

H. Rousseau, Division des Eaux de Consommation, Direction des Ecosystèmes urbains, Ministère de l'Environnement, Ste Boy, Quebec, Canada

J.E. Samdal, Norwegian Institute for Water Research (NIVA), Oslo, Norway
F. Sarhan, CIBA-GEIGY Ltd, Basel, Switzerland (representing the International Group of National Associations of Manufacturers of Agrochemical Products)

E.A. Simpson, Commission of the European Communities, Brussels, Belgium

T. Yanagisawa, Director, Technical Management Section, Management and Planning Division, Bureau of Waterworks, Tokyo, Japan

**Secretariat**

J. Bartram, Manager, Overseas Development, The Robens Institute of Health and Safety, University of Surrey, Guildford, England

X. Bonnefoy, Environmental Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

A. Enevoldsen, Environmental Health Planning/Ecology, WHO Regional Office for Europe, Copenhagen, Denmark

J.K. Fawell, Principal Toxicologist, Water Research Centre, Medmenham, England

B.H. Fenger, Water and Waste Scientist, WHO European Office for Environment and Health, Rome, Italy

H. Galal-Gorchev, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland

R. Helmer, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

J. Kenny, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

U. Lund, Water Quality Institute, Horsholm, Denmark

M. Mercier, Director, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland

H. Moller, Scientist, Unit of Carcinogen Identification and Evaluation, International Agency for Research on Cancer, Lyon, France

G. Ozolins, Manager, Prevention of Environmental Pollution, Division of Environmental Health, World Health Organization, Geneva, Switzerland

E.B. Pike, Water Research Centre, Medmenham, England

M. Sheffer, Scientific Editor, Orleans, Canada

S. Tarkowski, Director, Environment and Health, WHO Regional Office for Europe, Copenhagen, Denmark
Annex 2. Tables of guideline values

The following tables present a summary of guideline values for microorganisms and chemicals in drinking-water. Individual values should not be used directly from the tables. The guideline values must be used and interpreted in conjunction with the information contained in the text and in Volume 2, *Health criteria and other supporting information*.

**Table A2.1. Bacteriological quality of drinking-water**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Guideline value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All water intended for drinking</td>
<td></td>
</tr>
<tr>
<td><em>E. coli</em> or thermotolerant coliform bacteria</td>
<td>Must not be detectable in any 100-ml sample</td>
</tr>
<tr>
<td>Treated water entering the distribution system</td>
<td></td>
</tr>
<tr>
<td><em>E. coli</em> or thermotolerant coliform bacteria</td>
<td>Must not be detectable in any 100-ml sample</td>
</tr>
<tr>
<td>Total coliform bacteria</td>
<td>Must not be detectable in any 100-ml sample</td>
</tr>
<tr>
<td>Treated water in the distribution system</td>
<td></td>
</tr>
<tr>
<td><em>E. coli</em> or thermotolerant coliform bacteria</td>
<td>Must not be detectable in any 100-ml sample</td>
</tr>
<tr>
<td>Total coliform bacteria</td>
<td>Must not be detectable in any 100-ml sample</td>
</tr>
<tr>
<td></td>
<td>In the case of large supplies, where sufficient samples are examined, must not be present in 95% of samples taken throughout any 12-month period</td>
</tr>
</tbody>
</table>

*a* Immediate investigative action must be taken if either *E. coli* or total coliform bacteria are detected. The minimum action in the case of total coliform bacteria is repeat sampling; if these bacteria are detected in the repeat sample, the cause must be determined by immediate further investigation.

*b* Although *E. coli* is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests must be carried out. Total coliform bacteria are not acceptable indicators of the sanitary quality of rural water supplies, particularly in tropical areas where many bacteria of no sanitary significance occur in almost all untreated supplies.

*c* It is recognized that, in the great majority of rural water supplies in developing countries, faecal contamination is widespread. Under these conditions, the national surveillance agency should set medium-term targets for the progressive improvement of water supplies, as recommended in Volume 3 of *Guidelines for drinking-water quality*.
### Table A2.2. Chemicals of health significance in drinking-water

#### A. Inorganic constituents

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Guideline value (mg/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>antimony</td>
<td>0.005 (P)^a</td>
<td></td>
</tr>
<tr>
<td>arsenic</td>
<td>0.01 (P)^b</td>
<td>For excess skin cancer risk of $6 \times 10^{-4}$</td>
</tr>
<tr>
<td>barium</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>beryllium</td>
<td></td>
<td>NAD^c</td>
</tr>
<tr>
<td>boron</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>cadmium</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>chromium</td>
<td>0.05 (P)</td>
<td></td>
</tr>
<tr>
<td>copper</td>
<td>2 (P)</td>
<td>ATO^d</td>
</tr>
<tr>
<td>cyanide</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>fluoride</td>
<td>1.5</td>
<td>Climatic conditions, volume of water consumed, and intake from other sources should be considered when setting national standards</td>
</tr>
<tr>
<td>lead</td>
<td>0.01</td>
<td>It is recognized that not all water will meet the guideline value immediately; meanwhile, all other recommended measures to reduce the total exposure to lead should be implemented</td>
</tr>
<tr>
<td>manganese</td>
<td>0.5 (P)</td>
<td>ATO</td>
</tr>
<tr>
<td>mercury (total)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>molybdenum</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>nickel</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>nitrate (as NO\textsubscript{3}\textsuperscript{-})</td>
<td>50</td>
<td>The sum of the ratio of the concentration of each to its respective guideline value should not exceed 1</td>
</tr>
<tr>
<td>nitrite (as NO\textsubscript{2}\textsuperscript{-})</td>
<td>3 (P)</td>
<td>The sum of the ratio of the concentration of each to its respective guideline value should not exceed 1</td>
</tr>
<tr>
<td>selenium</td>
<td>0.01</td>
<td>NAD</td>
</tr>
<tr>
<td>uranium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### B. Organic constituents

<table>
<thead>
<tr>
<th>Chlorinated alkanes</th>
<th>Guideline value (µg/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbon tetrachloride</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>dichloromethane</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>1,1-dichloroethane</td>
<td>30&lt;sup&gt;b&lt;/sup&gt;</td>
<td>NAD</td>
</tr>
<tr>
<td>1,2-dichloroethane</td>
<td>30&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
<td>2000&lt;sup&gt;(P)&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chlorinated ethenes</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>vinyl chloride</td>
<td>5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>1,1-dichloroethene</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>1,2-dichloroethene</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>trichloroethene</td>
<td>70&lt;sup&gt;(P)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>tetrachloroethene</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aromatic hydrocarbons</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>benzene</td>
<td>10&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>toluene</td>
<td>700</td>
<td>ATO</td>
</tr>
<tr>
<td>xylene</td>
<td>500</td>
<td>ATO</td>
</tr>
<tr>
<td>ethylbenzene</td>
<td>300</td>
<td>ATO</td>
</tr>
<tr>
<td>styrene</td>
<td>20</td>
<td>ATO</td>
</tr>
<tr>
<td>benzo[a]pyrene</td>
<td>0.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chlorinated benzenes</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>monochlorobenzene</td>
<td>300</td>
<td>ATO</td>
</tr>
<tr>
<td>1,2-dichlorobenzene</td>
<td>1000</td>
<td>ATO</td>
</tr>
<tr>
<td>1,3-dichlorobenzene</td>
<td></td>
<td>NAD</td>
</tr>
<tr>
<td>1,4-dichlorobenzene</td>
<td>300</td>
<td>ATO</td>
</tr>
<tr>
<td>trichlorobenzenes (total)</td>
<td>20</td>
<td>ATO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miscellaneous</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>di(2-ethylhexyl)adipate</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>di(2-ethylhexyl)phthalate</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>acrylamide</td>
<td>0.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>epichlorohydrin</td>
<td>0.4&lt;sup&gt;(P)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>hexachlorobutadiene</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>edetic acid (EDTA)</td>
<td>200&lt;sup&gt;(P)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>nitrilotriacetic acid</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>dialkyltins</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>tributyltin oxide</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
### C. Pesticides

<table>
<thead>
<tr>
<th>Compound</th>
<th>Guideline value (µg/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>alachlor</td>
<td>20&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>aldicarb</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>aldrin/dieldrin</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>atrazine</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>bentazon</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>carbofuran</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>chlordane</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>chlorotoluron</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>DDT</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1,2-dibromo-3-chloropropene</td>
<td>1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>2,4-D</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>1,2-dichloropropene</td>
<td>20 (P)</td>
<td>NAD</td>
</tr>
<tr>
<td>1,3-dichloropropene</td>
<td>20&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>ethylene dibromide</td>
<td></td>
<td>NAD</td>
</tr>
<tr>
<td>heptachlor and heptachlor epoxide</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>hexachlorobenzene</td>
<td>1&lt;sup&gt;b&lt;/sup&gt;</td>
<td>for excess risk of 10&lt;sup&gt;-5&lt;/sup&gt;</td>
</tr>
<tr>
<td>isoproturon</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>lindane</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MCPA</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>methoxychlor</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>metolachlor</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>molinate</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>pendimethalin</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>pentachlorophenol</td>
<td>9 (P)</td>
<td></td>
</tr>
<tr>
<td>permethrin</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>propanil</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>pyridate</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>simazine</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>trifluralin</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>chlorophenoxy herbicides other than 2,4-D and MCPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4-DB</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>dichlorprop</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>fenoprop</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>MCPB</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>mecoprop</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2,4,5-T</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
**D. Disinfectants and disinfectant by-products**

<table>
<thead>
<tr>
<th>Disinfectants</th>
<th>Guideline value (mg/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>monochloramine</td>
<td>3</td>
<td>NAD</td>
</tr>
<tr>
<td>di- and trichloramine chlorine</td>
<td>5</td>
<td>ATO. For effective disinfection there should be a residual concentration of free chlorine of ≥ 0.5 mg/litre after at least 30 minutes contact time at pH &lt; 8.0</td>
</tr>
<tr>
<td>chlorine dioxide</td>
<td>NAD</td>
<td>A guideline value has not been established because of the rapid breakdown of chlorine dioxide and because the chlorite guideline value is adequately protective for potential toxicity from chlorine dioxide</td>
</tr>
<tr>
<td>iodine</td>
<td>NAD</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disinfectant by-products</th>
<th>Guideline value (µg/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>bromate</td>
<td>25 ” (P)</td>
<td>for 7 × 10⁻⁵ excess risk</td>
</tr>
<tr>
<td>chlorate</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>chlorite</td>
<td>200 (P)</td>
<td></td>
</tr>
<tr>
<td>chlorophenols</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-chlorophenol</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>2,4-dichlorophenol</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>2,4,6-trichlorophenol</td>
<td>200 b</td>
<td>for excess risk of 10⁻⁵, ATO</td>
</tr>
<tr>
<td>formaldehyde</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>MX</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>trihalomethanes</td>
<td></td>
<td>The sum of the ratio of the concentration of each to its respective guideline value should not exceed 1</td>
</tr>
<tr>
<td>bromoform</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>dibromochloromethane</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>bromodichloromethane</td>
<td>60 b</td>
<td>for excess risk of 10⁻⁵</td>
</tr>
<tr>
<td>chloroform</td>
<td>200 b</td>
<td>for excess risk of 10⁻⁵</td>
</tr>
<tr>
<td>chlorinated acetic acids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>monochloroacetic acid</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>dichloroacetic acid</td>
<td>50 (P)</td>
<td></td>
</tr>
<tr>
<td>trichloroacetic acid</td>
<td>100 (P)</td>
<td></td>
</tr>
<tr>
<td>chloral hydrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(trichloroacetaldehyde)</td>
<td>10 (P)</td>
<td></td>
</tr>
<tr>
<td>chloroacetone</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>halogenated acetonitriles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dichloroacetonitrile</td>
<td>90 (P)</td>
<td></td>
</tr>
<tr>
<td>dibromoacetonitrile</td>
<td>100 (P)</td>
<td></td>
</tr>
<tr>
<td>bromochloroacetonitrile</td>
<td>NAD</td>
<td></td>
</tr>
<tr>
<td>trichloroacetonitrile</td>
<td>1 (P)</td>
<td></td>
</tr>
<tr>
<td>cyanogen chloride</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>(as CN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>chloropicrin</td>
<td>NAD</td>
<td></td>
</tr>
</tbody>
</table>

*a (P) - Provisional guideline value. This term is used for constituents for which there is some evidence of a potential hazard but where the available information on health effects is limited; or where an uncertainty factor greater than 1000 has been used in the derivation of the*
tolerable daily intake (TDI). Provisional guideline values are also recommended: (1) for substances for which the calculated guideline value would be below the practical quantification level, or below the level that can be achieved through practical treatment methods; or (2) where disinfection is likely to result in the guideline value being exceeded.

b For substances that are considered to be carcinogenic, the guideline value is the concentration in drinking-water associated with an excess lifetime cancer risk of $10^{-5}$ (one additional cancer per 100,000 of the population ingesting drinking-water containing the substance at the guideline value for 70 years). Concentrations associated with estimated excess lifetime cancer risks of $10^{-4}$ and $10^{-6}$ can be calculated by multiplying and dividing, respectively, the guideline value by 10.

In cases in which the concentration associated with an excess lifetime cancer risk of $10^{-5}$ is not feasible as a result of inadequate analytical or treatment technology, a provisional guideline value is recommended at a practicable level and the estimated associated excess lifetime cancer risk presented.

It should be emphasized that the guideline values for carcinogenic substances have been computed from hypothetical mathematical models that cannot be verified experimentally and that the values should be interpreted differently than TDI-based values because of the lack of precision of the models. At best, these values must be regarded as rough estimates of cancer risk. However, the models used are conservative and probably err on the side of caution. Moderate short-term exposure to levels exceeding the guideline value for carcinogens does not significantly affect the risk.

c NAD - No adequate data to permit recommendation of a health-based guideline value.

d ATO - Concentrations of the substance at or below the health-based guideline value may affect the appearance, taste, or odour of the water.

Table A2.3. Chemicals not of health significance at concentrations normally found in drinking-water

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>asbestos</td>
<td>U</td>
</tr>
<tr>
<td>silver</td>
<td>U</td>
</tr>
<tr>
<td>tin</td>
<td>U</td>
</tr>
</tbody>
</table>

U - It is unnecessary to recommend a health-based guideline value for these compounds because they are not hazardous to human health at concentrations normally found in drinking-water.
Table A2.4. Radioactive constituents of drinking-water

<table>
<thead>
<tr>
<th>Screening value (Bq/litre)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>gross alpha activity</td>
<td>0.1</td>
</tr>
<tr>
<td>gross beta activity</td>
<td>1</td>
</tr>
</tbody>
</table>
Table A2.5. Substances and parameters in drinking-water that may give rise to complaints from consumers

<table>
<thead>
<tr>
<th>Levels likely to give rise to consumer complaints&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Reasons for consumer complaints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical parameters</strong></td>
<td></td>
</tr>
<tr>
<td>colour</td>
<td>15 TCU&lt;sup&gt;b&lt;/sup&gt;, appearance</td>
</tr>
<tr>
<td>taste and odour</td>
<td>should be acceptable</td>
</tr>
<tr>
<td>temperature</td>
<td>should be acceptable</td>
</tr>
<tr>
<td>turbidity</td>
<td>5 NTU&lt;sup&gt;c&lt;/sup&gt;, appearance; for effective terminal disinfection, median turbidity ≤ 1 NTU, single sample ≤ 5 NTU</td>
</tr>
<tr>
<td><strong>Inorganic constituents</strong></td>
<td></td>
</tr>
<tr>
<td>aluminium</td>
<td>0.2 mg/l, depositions, discoloration</td>
</tr>
<tr>
<td>ammonia</td>
<td>1.5 mg/l, odour and taste</td>
</tr>
<tr>
<td>chloride</td>
<td>250 mg/l, taste, corrosion</td>
</tr>
<tr>
<td>copper</td>
<td>1 mg/l, staining of laundry and sanitary ware (health-based provisional guideline value 2 mg/litre)</td>
</tr>
<tr>
<td>hardness</td>
<td>-</td>
</tr>
<tr>
<td>hydrogen sulfide</td>
<td>0.05 mg/l, odour and taste</td>
</tr>
<tr>
<td>iron</td>
<td>0.3 mg/l, staining of laundry and sanitary ware</td>
</tr>
<tr>
<td>manganese</td>
<td>0.1 mg/l, staining of laundry and sanitary ware (health-based provisional guideline value 0.5 mg/litre)</td>
</tr>
<tr>
<td>dissolved oxygen</td>
<td>-</td>
</tr>
<tr>
<td>PH</td>
<td>-</td>
</tr>
<tr>
<td>sodium</td>
<td>200 mg/l, taste</td>
</tr>
<tr>
<td>sulfate</td>
<td>250 mg/l, taste, corrosion</td>
</tr>
<tr>
<td>total dissolved solids</td>
<td>1000 mg/l, taste</td>
</tr>
<tr>
<td>zinc</td>
<td>3 mg/l, appearance, taste</td>
</tr>
<tr>
<td><strong>Organic constituents</strong></td>
<td></td>
</tr>
<tr>
<td>toluene</td>
<td>24-170 µg/l, odour, taste (health-based guideline value 700 µg/l)</td>
</tr>
<tr>
<td>xylene</td>
<td>20-1800 µg/l, odour, taste (health-based guideline value 500 µg/l)</td>
</tr>
<tr>
<td>ethylbenzene</td>
<td>2-200 µg/l, odour, taste (health-based guideline value 300 µg/l)</td>
</tr>
<tr>
<td>styrene</td>
<td>4-2600 µg/l, odour, taste (health-based guideline value 20 µg/l)</td>
</tr>
<tr>
<td>monochlorobenzene</td>
<td>10-120 µg/l, odour, taste (health-based guideline value 300 µg/l)</td>
</tr>
<tr>
<td>1,2-dichlorobenzene</td>
<td>1-10 µg/l, odour, taste (health-based guideline value 1000 µg/l)</td>
</tr>
<tr>
<td>1,4-dichlorobenzene</td>
<td>0.3-30 µg/l, odour, taste (health-based guideline value 300 µg/l)</td>
</tr>
<tr>
<td>trichlorobenzenes (total)</td>
<td>5-50 µg/l, odour, taste (health-based guideline value 20 µg/l)</td>
</tr>
<tr>
<td>synthetic detergents</td>
<td>-</td>
</tr>
<tr>
<td><strong>Disinfectants and disinfectant by-products</strong></td>
<td></td>
</tr>
<tr>
<td>chlorine</td>
<td>600-1000 µg/l, taste and odour (health-based guideline value 5 mg/l)</td>
</tr>
<tr>
<td>chlorophenols</td>
<td></td>
</tr>
<tr>
<td>2-chlorophenol</td>
<td>0.1-10 µg/l, taste, odour</td>
</tr>
<tr>
<td>2,4-dichlorophenol</td>
<td>0.3-40 µg/l, taste, odour</td>
</tr>
<tr>
<td>2,4,6-trichlorophenol</td>
<td>2-300 µg/l, taste, odour (health-based guideline value 200 µg/l)</td>
</tr>
</tbody>
</table>

<sup>a</sup> The levels indicated are not precise numbers. Problems may occur at lower or higher values according to local circumstances. A range of taste and odour threshold concentrations is given for organic constituents.

<sup>b</sup> TCU, true colour unit.

<sup>c</sup> NTU, nephelometric turbidity unit.
Announcing updated guideline values and health criteria for selected chemicals found in drinking-water

Guidelines for Drinking-water Quality
Second edition

Addendum to Volume 1: Recommendations

1998, viii + 36 pages (available in English; French and Spanish in preparation)
ISBN 92 4 154514 3
Sw.fr. 14.-/US $12.60
In developing countries: Sw.fr. 9.80
Order no. 1154404

This addendum to volume one of Guidelines for Drinking-water Quality summarizes new findings that have become available since the second edition was published in 1993, and that call for a reconsideration of selected guideline values issued at that time. In addition, guideline values for four substances are presented here for the first time. The addendum is part of WHO's ongoing effort to ensure that recommendations about the safety of chemical substances found in drinking-water are in line with the latest scientific data.

For some of the substances under review, previously established guideline values have been revised in the light of new evidence. For others, new findings confirm the continuing validity of previous recommendations. In addition, guideline values for four substances are presented here for the first time.

Updated or new evaluations are provided for seven inorganic substances (aluminium, boron, copper, nickel, nitrate, nitrite, and uranium), four organic substances (edetic acid, microcystin-LR, benzo[a]pyrene, and fluoranthene), ten pesticides (bentazone, carbofuran, cyanazine, 1,2-dibromoethane, 2,4-dichlorophenoxy-acetic acid, 1,2-dichloropropane, diquat, glyphosate, pentachlorophenol, and terbuthylazine), and a disinfectant by-product (chloroform). The guideline values recommended by WHO are not mandatory limits. Such limits should be set by national or regional authorities, using a risk-benefit approach and taking into consideration local environmental, social, economic and cultural conditions.

Guidelines for Drinking-water Quality
Second edition

Addendum to Volume 2: Health Criteria and Other Supporting Information

1998, viii + 283 pages (English)
WHO/EOS/98.1
Sw.fr. 35.-/US $31.50
In developing countries: Sw.fr. 24.50
Order no. 1930128

This companion volume reviews and interprets the extensive toxicological, epidemiological, and clinical evidence that formed the basis for the new or updated evaluations issued in the addendum to Volume 1 of the Guidelines. Covering the same 22 chemical substances, the volume communicates the scientific rationale for each individual recommendation. Well over 1,000 references to the recent literature are included.

Evaluations of chemical substances published in these Addenda supersede evaluations of the same substances previously published in the second edition of Guidelines for
Drinking-water Quality.
Guidelines for Drinking-water Quality
Second edition

“... the world’s single most important water quality document... its recommendations have already set the tone for important changes in international water quality policy...”

- Water and Environment International

Volume 1: Recommendations

1993, x + 188 pages [C, E, F, R, S]
ISBN 92 4 154460 0
Sw.fr. 46.-/US $41.40
In developing countries: Sw.fr. 32.20
Order no. 1151404

Sets out guideline values for a large number of water contaminants relevant to the quality of drinking-water. The book also provides an explanation of how the guideline values should be applied, the criteria used in selecting the various chemical, physical, microbiological, and radiological contaminants considered, a description of the approaches used to derive the guideline values, and brief summary statements supporting the values recommended or explaining why no health-based guideline value is necessary at present.

Volume 2: Health Criteria and Other Supporting Information

1996, xvi + 973 pages [E, F*, S*]
ISBN 92 4 154480 5
Sw.fr. 260.-/US $234.00
In developing countries: Sw.fr. 182.-
Order no. 1152404

Reviews and interprets the extensive toxicological, epidemiological, and clinical evidence that shaped the determination of guideline values for drinking-water quality. Organized to parallel and extend the coverage of volume 1, this second work communicates the scientific rationale for individual recommendations based on a critical review of data linking health hazards to specific exposure levels.

The book has three parts. The first, on microbiological aspects, addresses the common and widespread health risks associated with the direct or indirect contamination of drinking-water with human or animal excreta, particularly faeces. The most extensive part, which contains almost 800 pages, provides evaluations, supported by toxicological monographs, for each of 36 inorganic constituents and physical parameters, 27 industrial chemicals, 36 pesticides, four disinfectants, and some 23 disinfectant by-products. The final part explains application of the reference level of dose for radiological contaminants in drinking-water.

Volume 3: Surveillance and Control of Community Water Supplies

1997, xii + 238 pages [E, F*, S*]
ISBN 92 4 154503 8
Sw.fr. 72.-/US $64.80
In developing countries: Sw.fr. 50.40
Order no. 1153404

A comprehensive guide to all practical procedures and technical measures required to ensure the
safety of drinking-water supplies in small communities and periurban areas of developing countries. This second edition has been vastly expanded in line with broadened appreciation for the many factors that influence water quality and determine its impact on health. Revisions and additions also reflect considerable new knowledge about the specific technical and social interventions that have the greatest chance of success in situations where resources are scarce and logistic problems are formidable.

Order form

DSA. DWQ. 981

__ copies Addendum to Volume 1 (Recommendations) of Guidelines for Drinking-water Quality Sw.fr. 14.-/US $12.60 (1154404)

__ copies Addendum to Volume 2 (Health Criteria and Other Supporting Information) of Guidelines for Drinking-water Quality Sw.fr. 35.-/US $31.50 (1930128)

__ copies Volume 1: Recommendations (Guidelines for Drinking-water Quality) Sw.fr. 46.-/US $41.40 (1151404)

__ copies Volume 2: Health Criteria and Other Supporting Information (Guidelines for Drinking-water Quality) Sw.fr. 260.-/US $234.00 (1152404)

__ copies Volume 3: Surveillance and Control of Community Water Supplies (Guidelines for Drinking-water Quality) Sw.fr. 72.-/US $64.80 (1153404)

Direct fax for orders: (41 22) 791 48 57
Email: publications@who.ch

Payment enclosed
☐ Please charge to my credit card
☐ Visa ☐ American Express
☐ Eurocard/Mastercard/Access ☐ Diners Club

Card number _________________________
Expiry date ________ Date of order _______
Signature ____________________________
Name __________________________________
Address __________________________________
_______________________________________
_______________________________________

World Health Organization • Distribution and Sales • CH-1211 Geneva 27 • Switzerland • Fax: +41 22 791 48 57

Selected WHO publications of related interest

Guidelines for drinking-water quality, 2nd ed. 260.-
Volume 2: Health criteria and other supporting information 1996 (989 pages)
Volume 3: Surveillance and control of community supplies
(in press)
Our planet, our health. Report of the WHO Commission on Health and Environment. 45.-
1992 (314 pages)
The impact of development policies on health. A review of the literature. 31.-
D.E. Cooper-Weil et al.
1990 (174 pages)
Environmental health in urban development. 11.-
Technology for water supply and sanitation in developing countries. 7.-
WHO Technical Report Series, No. 742, 1987 (38 pages)

Surface water drainage for low-income communities. 16.-
1991 (93 pages)

A guide to the development of on-site sanitation. 47.-
R. Franceys et al.
1992 (245 pages)

Guidelines for the safe use of wastewater and excreta in agriculture and aquaculture. 35.-
D. Mara & S. Cairncross.
1989 (194 pages)

Further information on these and other WHO publications can be obtained from Distribution and Sales, World Health Organization, 1211 Geneva 27, Switzerland.

* Prices in developing countries are 70% of those listed here
The first edition of *Guidelines for drinking-water quality*, published in 1984-85, was widely used as a basis for setting national standards to ensure the safety of the water supply. It established guideline values for a large number of water constituents and contaminants, covering microbiological, biological, chemical, organoleptic, and radiological aspects. For this new edition, all the recommended guideline values have been reviewed and, where necessary, updated in the light of new scientific information. In addition, many drinking-water contaminants not included in the first edition are evaluated.

Volume 1 contains the guideline values themselves, together with an explanation of how they should be used, the criteria used in selecting the various contaminants considered, a description of the approaches used to derive the guideline values, and brief summary statements supporting the values recommended or explaining why no health-based guideline value is necessary at present.

It is emphasized that the guideline values recommended are not mandatory limits. Such limits should be set by national authorities, using a risk-benefit approach and taking into consideration local environmental, social, economic and cultural conditions.

Price: Sw.fr. 46.-
Price in developing countries: Sw.fr. 32.20
ISBN 92 4 154460 0