

List of acronyms and abbreviations

AFRI	acute febrile respiratory illness
AIDS	acquired immune deficiency syndrome
ASP	amnesic shellfish poisoning
BCC	basal cell carcinoma
CBO	community-based organization
CDC	Centers for Disease Control and Prevention (USA)
cfu	colony-forming unit
COGP	Code of Good Practice
CPR	cardiopulmonary resuscitation
DALY	disability adjusted life year
DSP	diarrhetic shellfish poisoning
EAP	emergency action plan or procedure
EC	European Commission
GAE	granulomatous amoebic encephalitis
GI	gastrointestinal
HACCP	hazard analysis and critical control point
HAV	hepatitis A virus
HEV	hepatitis E virus
HIA	health impact assessment
HIV	human immunodeficiency virus
IARC	International Agency for Research on Cancer
IBM	integrated basin management
ICAM	integrated coastal area management
ID ₅₀	dose of microorganisms required to infect 50% of individuals exposed
ILS	International Life Saving Federation
i.p.	intraperitoneal
LOAEL	lowest-observed-adverse-effect level
MM	malignant melanoma
MOE	Ministry of Environment
MOH	Ministry of Health
MOT	Ministry of Tourism
NGO	nongovernmental organization
NMSC	non-melanoma skin cancer
NOAEL	no-observed-adverse-effect level
NSP	neurotoxic shellfish poisoning

PAM	primary amoebic meningoencephalitis
PDF	probability density function
PFD	personal flotation device
pfu	plaque-forming unit
PSP	paralytic shellfish poisoning
QA	quality assurance
QMRA	quantitative microbial risk assessment
SCC	squamous cell carcinoma
SLRA	screening-level risk assessment
SOP	standard operating procedure
SPF	sun protection factor
TCBS	thiosulfate–citrate–bile salts–sucrose
TDI	tolerable daily intake
USLA	United States Lifesaving Association
UV	ultraviolet
UVR	ultraviolet radiation
WHO	World Health Organization
WTO	World Tourism Organization

Preface

The World Health Organization (WHO) has been concerned with health aspects of the management of water resources for many years and publishes various documents concerning the safety of the water environment and its importance for health. These include a number of normative “guidelines” documents, such as the *Guidelines for Drinking-water Quality* and the *Guidelines for Safe Use of Wastewater and Excreta in Agriculture and Aquaculture*. Documents of this type are intended to provide a basis for standard setting. They represent a consensus view among experts on the risk to health represented by various media and activities and on the effectiveness of control measures in protecting health. They are based on critical review of the available evidence. Wherever possible and appropriate, such guidelines documents also describe the principal characteristics of the monitoring and assessment of the safety of the medium under consideration as well as the principal factors affecting decisions to be made in developing strategies for the control of the health hazards concerned.

The *Guidelines for Safe Recreational Water Environments* are published in two volumes:

- *Volume 1: Coastal and Fresh Waters* provides a review and assessment of the health hazards encountered during recreational use of coastal and freshwater environments. It includes the derivation of guideline values and explains the basis for the decision to derive or not to derive them. It addresses a wide range of types of hazard, including hazards leading to drowning and injury, water quality, exposure to heat, cold and sunlight, and dangerous aquatic organisms; and provides background information on the different types of recreational water activity (swimming, surfing, etc.) to enable informed readers to interpret the Guidelines in light of local and regional circumstances. With regard to water quality, separate chapters address faecal pollution, free-living microorganisms, freshwater algae, marine algae and chemical aspects. It describes prevention and management options for responding to identified hazards.
- *Volume 2: Swimming Pools, Spas and Similar Recreational Water Environments* provides a review and assessment of the health hazards associated with recreational waters of this type; their monitoring and assessment; and activities available for their control through education of users, good design and construction, and good operation and management. It includes the derivation of guidelines including guideline values and explains the basis for the decision to derive or

not to derive them. It addresses a wide range of types of hazard, including water quality, hazards leading to drowning and injury, contamination of associated facilities and air quality.

In addition to the above volumes of the *Guidelines for Safe Recreational Water Environments*, a practical guide entitled *Monitoring Bathing Waters*,¹ has been produced. It describes the principal characteristics of and approaches to the monitoring and assessment of coastal and freshwater recreational water environments. It emphasizes the need to utilize information of diverse types and from diverse sources in order to develop a valid assessment; and the need to establish effective links between the information generated and interventions to control risk in both the short and long term. It includes comprehensive practical guidance for the design, planning and implementation of monitoring programmes and assessments; and a Code of Good Practice for the monitoring and assessment of recreational water environments, to assist countries in developing such codes for national use and to promote international harmonization. Material relating to toxic cyanobacteria, including that in chapters 7 and 8 is based upon *Toxic Cyanobacteria in Water*,² which was prepared by an international group of experts.

The development of WHO activity on 'recreational' or 'bathing' water can be traced back to two expert consultations in the 1970s.³ These meetings highlighted the breadth of possible hazards associated with recreational water use and noted that prospective volunteer studies offered the "best hope of progress" in terms of establishing links between water quality and bather health. They also suggested the grading of beaches according to bands of indicator counts and the use of sanitary assessments for beaches. These initial meetings were followed by a series of expert consultations. The meeting in Valetta, Malta held during 1989, reviewed the status of microbial guidelines for bathing waters and examined the potential protocols for epidemiological investigations. The importance of protocol design was clear at the Valetta meeting, and two principal approaches were reviewed—namely, the prospective case-control and the randomized trial. Two years later in Athens, Greece the early results of epidemiological investigations that employed both protocols were reviewed. It was decided at this meeting that both approaches were appropriate and could yield useful data for Guidelines derivation. The results of a series of major epidemiological studies in the United Kingdom were presented and critically reviewed at a meeting held in Athens, Greece in 1993.

The preparation of the *Guidelines for Safe Recreational Water Environments* Volume 1 covered a period of almost a decade and involved the participation of numerous institutions, more than 130 experts from 33 countries worldwide, and further reviewers and meetings. The work of the individuals concerned (see Acknowledgements) was central to the completion of the work and is much appreciated.

¹ Edited by J. Bartram and G. Rees, published in 2000 by E & FN Spon on behalf of WHO.

² Edited by I. Chorus and J. Bartram, published in 1999 by E & FN Spon on behalf of WHO

³ Meetings: Ostend, 1972; Bilthoven, 1974; Valetta 1989; Athens 1991; Athens 1993; Bad Elster 1996; Jersey 1997; Farnham 1998; Annapolis 1999; Farnham 2001.

In 1994, following discussions between the WHO Regional Office for Europe and WHO Headquarters, it was agreed to initiate development of guidelines concerning recreational use of the water environment, examining all possible health outcomes from both natural waters and swimming pools, including those related to water quality. This was undertaken as a collaborative initiative between WHO Headquarters and the WHO European Centre for Environment and Health, Rome, Italy. A comprehensive review of the scientific literature on sewage pollution of recreational water and health, eventually published as Prüss (1998), provided the focus for an expert consultation in Bad Elster in 1996. This meeting concluded that the epidemiological basis had been laid for evidence-based normative guidelines on faecal pollution of recreational water. The consultation also received information on new research findings quantifying the impacts of non-sewage sources of faecal bacteria on recreational water compliance with microbial water quality criteria. The implications of these findings were that many bathing waters might fail current water quality norms because of the influence of diffuse source pollution, which would not be reduced by sewage treatment alone.

At a further expert consultation hosted and co-sponsored by the States of Jersey in 1997 drafts of all chapters of the two volumes of Guidelines were reviewed, these were revised and further reviewed at a meeting the following year in Farnham, UK 1998. The Draft Guidelines for coastal and fresh waters were then submitted for international expert appraisal and received intensive review.

In 1999, an expert consultation co-sponsored by the US EPA and held in Annapolis, USA, resulted in the “Annapolis Protocol” (WHO, 1999), which suggested a new approach towards evaluation and regulation of faecal pollution of bathing waters. The Annapolis Protocol outlines a combined sanitary inspection and microbial measurement approach that is used to classify recreational waters. In addition, the protocol suggests the use of relevant information to facilitate real-time public health protection. Thus, the principal focus of regulation is expanded from retrospective numerical compliance assessment to include real-time management and public health protection. A further expert consultation to take account of the Annapolis protocol and other newly available information in the draft guidelines was held in Farnham, UK, in 2001. The Guidelines were finalized through a series of chapter-by-chapter conference calls with selected experts, in November 2002.

During the development of the Guidelines, careful consideration was given to previous assessments, in particular the work of the Mediterranean Action Plan, the Black Sea Environmental Programme, the activities undertaken by and for the European Commission, the activities undertaken by the US Environmental Protection Agency, including its “BEACH” programme and others.

In light of the importance of the subject area for health and the degree of attention it receives from the political and scientific communities and the general public, it is envisaged that new information will become available rapidly during future years. WHO would be pleased to learn of major related developments and will endeavour to ensure the continuing validity of the Guidelines through issuing addenda or further editions as appropriate.

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