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Water Safety Plans

Managing drinking-water quality from catchment to consumer

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List of abbreviations

ADWG	Australian Drinking Water Guidelines
BWSA	Bulk water supply agreement
CT	Concentration x time (disinfection)
DFID	Department for International Development (UK)
GCW	Gold Coast Water (Australia)
GDWQ	Guidelines for Drinking-water quality
GL	Giga litres
HACCP	Hazard Analysis and Critical Control Point
HPC	Heterotrophic Plate Count
HU	Hazen Unit
ISO	International Organization for Standardization
MAK	Makerere University (Uganda)
MW	Melbourne Water (Australia)
NHMRC	National Health and Medical Research Council (Australia)
NTU	Nephelometric turbidity unit
NWSC	National Water and Sewerage Corporation (Uganda)
O&M	Operation and maintenance
OSUL	Ondea Services Uganda Limited (Uganda)
PHAST	Participatory health and sanitation transformation
SCADA	Supervisory control and data acquisition
SOP	Standard operating procedure
USEPA	United States Environmental Protection Agency
WEDC	Water, Engineering and Development Centre (UK)
WHO	World Health Organization
WQCD	Water Quality Control Department (Uganda)
WSP	Water safety plan

Foreword

The first World Health Organization (WHO) publication dealing specifically with drinking-water quality was published in 1958 as *International Standards for Drinking-water*. It was subsequently revised in 1963 and in 1971 under the same title. In 1984-85, the first edition of the WHO *Guidelines for Drinking-water Quality* (GDWQ) was published in three volumes:

- Volume 1 – Recommendations;
- Volume 2 – Health Criteria and other Supporting Information; and
- Volume 3 – Surveillance and Control of Community Supplies.

The second editions of the three volumes of the *Guidelines* were published in 1993, 1996 and 1997, respectively. Addenda to the first and second volumes were published in 1998, addressing selected chemicals only. An addendum on microbial aspects reviewing selected microorganisms was published in 2002.

The primary aim of the GDWQ is the protection of public health. The GDWQ provide an assessment of the health risk presented by microorganisms, chemicals and radionuclides present in drinking-water. The guideline values recommended for individual constituents of water are not mandatory limits – they are intended to be used in the development of risk management strategies, including national or regional standards developed in the context of local or national environmental, social, economic and cultural conditions. Such strategies, if properly implemented, will ensure the safety of drinking-water supplies through the elimination, or reduction to an acceptable concentration, of constituents of water that are known to be hazardous to health.

It was recommended in 1995 that the GDWQ undergo a rolling revision process. Through this process, microbes and chemicals are subject to periodic review, and documentation related to aspects of protection and control of drinking-water quality is prepared progressively. This process was initiated at a meeting of the Coordinating Committee for the Rolling Revision of the GDWQ, at which three working groups (namely the Microbial Aspects working group, the Chemical Aspects working group and the Aspects of Protection and Control of drinking-water quality working group) were established.

The Coordinating Committee adopted the following:

- a plan of work for the development of the 3rd Edition of the GDWQ and their subsequent rolling revision;
- a plan of work for the development of supportive materials for implementation of the GDWQ; and
- a Procedures Manual for the conduct of the preparation of the third edition of the GDWQ and their subsequent rolling revision.

The programme of work of the Microbial Aspects working group was adopted directly by the 1995 Coordinating Committee meeting. In its first phase of work, review documents on a number of specific microbes were prepared. A future strategy for major revision of the microbial aspects of the WHO water-related guidelines, including the GDWQ, was also developed.

The Chemical Aspects working group considered a wide range of different potential chemical contaminants classified broadly in relation to the source of contamination and the route to drinking-water, in order to aid consideration of risk assessment and management options, as follows:

- naturally occurring chemicals (which include the majority of the most important chemical contaminants with regard to public health);
- chemicals from industrial sources and human dwellings;
- chemicals from agriculture; and
- chemicals used in water treatment or materials in contact with drinking-water.

The working group on Aspects of Protection and Control met in 1996 (Bad Elster, Germany) and in 1998 (Medmenham, UK). The terms of reference of the working group have been established, and five institutions assist in the coordination of the principal thematic areas of work as follows:

- resource and source protection (Federal Environmental Agency, Berlin);
- materials and chemicals used in the production and distribution of drinking-water (NSF-International);
- water treatment (WRc, UK); and
- monitoring and assessment (Robens Centre, UK; VKI, Denmark).

All of these institutions are WHO Collaborating Centres concerned with water. A plan of work has been pursued, based initially upon the recommendations of the Coordinating Committee. This has included the development of a series of documents (principally relating to good practice in achieving the safe conditions described in the GDWQ) and organization of meetings.

During the revision of the WHO *Guidelines for Drinking-water Quality* leading to the 3rd edition, the value of the Water Safety Plan (WSP) approach has repeatedly been highlighted. The potential for water safety plan application has been evaluated in a series of expert review meetings in Berlin (2000), Adelaide (2001) and Loughborough (2001). This document describes the water safety plan approach and further substantiation is provided in a set of companion volumes addressing source protection, treatment processes (at supply and household level), distribution of drinking-water and selection of parameters and analytical methods. Key supporting texts include:

- Impact of treatment on microbial water quality. Mark LeChevalier and Kwok-Kueng Au.
- Protecting groundwater for health: a guide to managing the quality of drinking-water sources. Oliver Schmoll, Guy Howard, Ingrid Chorus and John Chilton (editors).

- Protecting surface water for health: managing the quality of drinking-water sources. I. Chorus, O. Schmoll, D. Deere, S. Appleyard, P. Hunter and J. Fastner (editors)
- Assessing microbial safety of drinking-water. Improving approaches and methods. Al Dufour, Mario Snozzi, Wolfgang Koster, Jamie Bartram, Elettra Ronchi and Lorna Fewtrell (editors).
- Managing water in the home: accelerated health gains from improved water supply. Mark D. Sobsey.
- Microbiological water quality in piped distribution systems. A review of knowledge and practices. R. Ainsworth (editor).
- Heterotrophic plate counts and drinking-water safety. The significance of HPCs for water quality and human health. J. Bartram, J. Cotruvo, M. Exner, C. Fricker and A. Glasmacher (editors).
- Chemical safety of drinking-water: assessing priorities for risk management. T. Thompson, J. Fawell, S. Kunikane, D. Jackson, S. Appleyard, P. Kingston and P. Callan (editors).

This book is aimed at practitioners at all levels. It is especially relevant to water quality managers, regulators (including those people responsible for putting together guidance notes on interpretation), auditors, consultants and international organizations.