Expert Consultation for the 4th Edition of the Guidelines for Drinking-water Quality

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ACRONYMS

ADI acceptable daily intake
AFRO Regional Office for Africa (WHO)
AIDS acquired immunodeficiency syndrome
AMRO WHO Regional Office for the Americas
ATSDR Agency for Toxic Substances and Disease Registry (USA)
AWWA American Water Works Association
AWWARF American Water Works Association Research Foundation
BDCM bromodichloromethane
Bti *Bacillus thuringiensis israelensis*
CDWUU Communities Drinking Water Users Unions (Kyrgyzstan)
CEPIS Pan American Center for Sanitary Engineering and Environmental Sciences (WHO/PAHO)
CICAD Concise International Chemical Assessment Document
DALY disability adjusted life year
DBP disinfection by-product
DFID Department for International Development (United Kingdom)
DG SANCO Directorate General for Health and Consumer Affairs (European Commission)
DWI Drinking Water Inspectorate (United Kingdom)
DWQC Drinking Water Quality Committee
ECDC European Centre for Disease Prevention and Control
EHC Environmental Health Criteria monograph
EMRO Regional Office for the Eastern Mediterranean (WHO)
EOM Efficient Operation and Management
EPA Environmental Protection Agency (Denmark)
ETV environmental technology verification
EU European Union
EUREAU European union of national associations of water suppliers and wastewater services
EURO Regional Office for Europe (WHO)
FAO Food and Agriculture Organization of the United Nations
FTF Final Task Force
GDWQ *Guidelines for Drinking-water Quality* (WHO)
HACCP hazard analysis and critical control point
HIV human immunodeficiency virus
IAEA International Atomic Energy Agency
INHEM National Institute of Hygiene, Epidemiology and Microbiology (Cuba)
IPCS International Programme on Chemical Safety (WHO)
ISO International Organization for Standardization
IWA International Water Association
JECFA Joint FAO/WHO Expert Committee on Food Additives
JMP Joint Monitoring Programme for Water Supply and Sanitation (WHO/UNICEF)
JMPR Joint FAO/WHO Meeting on Pesticide Residues
LAC Latin American and Caribbean
LOAEL lowest-observed-adverse-effect level
NaDCC sodium dichloroisocyanurate
NAS National Academy of Sciences (USA)
NaTCC  sodium trichloroisocyanurate
NOAEL  no-observed-adverse-effect level
NTP   National Toxicology Program (USA)
OMN   Operation and Maintenance Network
P&C   Protection and Control
PAHO  Pan American Health Organization (WHO Regional Office for the Americas)
PBPK  physiologically based pharmacokinetic
PCS   Programme for the Promotion of Chemical Safety (WHO Headquarters, Geneva)
PES   Pesticide Evaluation Scheme (WHO Headquarters, Geneva)
PFOA  perfluorooctanoic acid
PFOS  perfluorooctanesulfonate
PIC   Prior Informed Consent
POE   point of entry
POP   persistent organic pollutant
POU   point of use
PPCP  pharmaceuticals and personal care products
PVC   polyvinyl chloride
QA/QC  quality assurance/quality control
QMRA  quantitative microbial risk assessment
REACH Registration, Evaluation, Authorisation and Restriction of Chemicals (European Union)
RIVM  National Institute of Public Health and the Environment (The Netherlands)
SEARO Regional Office for South-East Asia (WHO)
SES   Department for State Sanitary and Epidemiological Control (Kyrgyzstan)
TDI   tolerable daily intake
THMs  trihalomethanes
TPE   technology performance evaluation
UK    United Kingdom
UN    United Nations
UNC   University of North Carolina (USA)
UNEP  United Nations Environment Programme
UNICEF United Nations Children’s Fund
USA   United States of America
USEPA United States Environmental Protection Agency
WG    working group
WHO   World Health Organization
WPRO Regional Office for the Western Pacific (WHO)
WSH   Water, Sanitation and Health Programme (WHO Headquarters, Geneva)
WSP   water safety plan

This meeting had the following objectives:

1) To recommend publication of the second addendum to the Third Edition of the GDWQ.

2) To reach consensus on the approach for developing the Fourth Edition, its “theme” or “personality”, the technical work required and the associated roles and responsibilities in preparation towards its publication.

3) To update the policies and procedures by which the GDWQ are developed.

A total of 44 participants attended the meeting or participated in it via video-conferencing, including staff from WHO Headquarters, representatives of WHO Regional Offices, temporary advisers who served as “coordinators” for the process of the rolling revision (members of the Working Groups on Microbial Aspects, Chemical Aspects and Aspects of Protection and Control) and observers. A list of participants is given in Annex 1.

A one-day meeting with representatives of the WHO European Region was held. In addition, videoconferences with Regional Office staff of the other WHO Regions were held during the meeting.

The objectives of the meeting were met. The second addendum of the Third Edition was recommended for publication, and a realistic plan of work for the Fourth Edition was decided on.
1. INTRODUCTION

1.1 Background

The first WHO document dealing specifically with public 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 1984–1985, 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. Second editions of these volumes were published in 1993, 1996 and 1997, respectively. Addenda to the first and second volumes of the Second Edition were published in 1998, addressing selected chemicals only. An addendum on microbial aspects, reviewing selected microorganisms, was published in 2002.

It was recommended in 1995 that the GDWQ be subject to a rolling revision process. Through this process, microbial and chemical aspects of drinking-water are subject to periodic review, and documentation related to aspects of “protection and control” of public drinking-water quality is progressively prepared. This process was initiated at a meeting of the Coordinating Committee for the Rolling Revision of the WHO GDWQ, at which three working groups were established. The first meeting of the working groups was in 1995 to address microbial and chemical aspects, and a later meeting addressed the protection and control aspects of drinking-water quality.

The plan for the preparation of the substantive content of the updated Third Edition of the GDWQ was agreed to at a planning meeting in Berlin, Germany, in June 2000, and the Third Edition of the GDWQ, Volume 1, was published in 2004. The plan of work for the future rolling revision of the GDWQ following finalization of the Third Edition, including the publication of addenda to Volume 1 approximately every 18 months, was decided at a Final Task Force (FTF) Meeting held in Geneva, Switzerland, from 30 March to 4 April 2003. The first addendum to the Third Edition of the GDWQ was finalized at an Expert Consultation for the Rolling Revision of the GDWQ, held in Geneva, Switzerland, from 9 to 13 May 2005, and was published in 2006. The second addendum to the Third Edition was finalized at an Expert Consultation for updating the Third Edition of the GDWQ in Geneva, Switzerland, from 15 to 19 May 2006. The second addendum will be published in 2007.

An Expert Consultation for the Fourth Edition of the GDWQ was held in Berlin, Germany, from 7 to 11 May 2007.

1.2 Objectives

The objectives of the Expert Consultation for the Fourth Edition of the GDWQ were:

1) To recommend publication of the second addendum to the Third Edition of the GDWQ.

2) To reach consensus on the approach for developing the Fourth Edition, its “theme” or “personality”, the technical work required and the associated roles and responsibilities in preparation towards its publication.
3) To update the policies and procedures by which the GDWQ are developed.

1.3 Participants

A total of 44 participants attended the meeting or participated in it via video-conferencing, including staff from WHO Headquarters, representatives of WHO Regional Offices, temporary advisers who served as “ coordinators” for the process of the rolling revision (members of the Working Groups on Microbial Aspects, Chemical Aspects and Aspects of Protection and Control) and observers. A list of participants is given in Annex 1.

1.4 Organization of the Meeting

The meeting consisted of a one-day session devoted to issues of concern to the WHO European Region, videoconferences with WHO Regions, plenary sessions to discuss general issues and three technical working group sessions — the Chemical Aspects Working Group, the Microbial Aspects Working Group and the Aspects of Protection and Control (P&C) Working Group — which were held simultaneously. The agenda/timetable is attached as Annex 2.

The elected officers of the meeting were as follows:

Plenary Sessions

Chair - Dr Joseph Cotruvo, United States of America
Rapporteur - Ms Marla Sheffer, Canada

Microbial Aspects Working Group

Chair - Dr Ana Maria de Roda Husman, Netherlands
Rapporteur - Dr David Cunliffe, Australia

Chemical Aspects Working Group

Chair - Ms Michèle Giddings, Canada
Rapporteur - Ms Marla Sheffer, Canada

Aspects of Protection and Control Working Group

Chair - Dr Feroze Ahmed, Bangladesh
Rapporteur - Dr Mark Sobsey, United States of America

The first day of the meeting was devoted to issues of concern to the WHO European Region (see Section 4 and Annex 3). On the second day of the meeting, participants participated in videoconferences with four of the Regional Offices: Regional Office for the Western Pacific (WPRO), Regional Office for Africa (AFRO), Regional Office for South-East Asia (SEARO) and Pan American Health Organization (PAHO)/Regional Office for the Americas (AMRO). Items relevant to all working groups were discussed in plenary sessions on the second, third and fifth days. During the remaining sessions on the fourth and fifth days, the working groups broke up into separate and joint sessions to discuss relevant agenda
items. On the last day, a plenary session was again held to update the Committee on the plan of work for the various working groups and to wrap up the meeting.

An advisory consultation was held prior to the Expert Consultation on the Fourth Edition of the GDWQ on 5 May 2007. The purpose of this meeting was to discuss and revise a draft guidance document on how to develop national standards and regulations using WHO’s GDWQ. Further information on this advisory consultation can be found in Section 1.5.2 and Annex 4.

1.5 Opening Session

Mr Oliver Schmoll welcomed the group to the German Federal Environment Agency for the annual meeting of the Drinking Water Quality Committee (DWQC).

Mrs Karin Knufmann-Happe, German Ministry of Health, welcomed the group, especially the participants in the European Regional Perspectives meeting, on behalf of the Secretary of State, Dr Klaus Theo Schröder. She highlighted the fruitful partnership and collaboration between WHO, the Minister of Health and the Federal Environment Agency, which contributes to the development of informed policy decisions. Mrs Knufmann-Happe expressed the Ministry’s keen interest and motivation in continuing this fruitful partnership in the future.

Dr Ulrich Müller-Wegener welcomed the group on behalf of the president of the Federal Environment Agency, Professor Andreas Troge. He indicated that the Federal Environment Agency was honoured to host the meeting and expressed his wishes for a productive meeting. This year marks the 20th anniversary of collaboration between this agency (as a WHO Collaborating Centre for Research on Drinking-water Hygiene) and WHO. Dr Müller-Wegener gave a brief history of the Federal Environment Agency, which is part of the German Ministry of Environment, Natural Resources and Nuclear Safety, indicating its overall work profile and the type of work that is carried out (for drinking-water, this includes, for example, analytical methods, toxicological assessment of contaminants and testing pipe materials for contaminant release).

Mr Roger Aertgeerts of WHO, on behalf of Ms Susanne Weber-Mosdorf, Assistant Director-General of WHO, informed the group that the objective of WHO is to promote the attainment of the highest possible level of health for all people. In 2008, WHO will be celebrating the 50th anniversary of the WHO standards/guidelines for drinking-water quality. The approach presented in the Third Edition of the GDWQ is universally applicable to countries at different stages of development. Preventing or reducing waterborne disease outbreaks is one of the most important goals. The rolling revision process of the GDWQ was initiated in order to be up to date and responsive to the needs and priority health issues of all Member States. The group needs to think about how to provide practical, clear and easy-to-interpret guidance. At the last meeting, the DWQC recommended rotating meetings to the WHO regions, and this is the first of such meetings. Mr Aertgeerts thanked the members of the group for their time and expertise at this meeting. He also thanked the Federal Environment Agency on behalf of the WHO Regional Office for Europe (EURO) for being a staunch supporter of WHO efforts in this area. The German Ministry of Health was also acknowledged for its generous financial support of the Berlin expert consultation meeting.
Mr Bruce Gordon provided the background behind the first day’s meeting, noting that in the past the DWQC has had videoconferences with the regions and that this is its first opportunity to meet with drinking-water experts from a region face to face for a full day. He then briefly reviewed the history of the GDWQ, their aim and their approach. The GDWQ serve as the scientific point of departure for standard setting internationally. The rolling revision process began in 1994 in order to respond to rapidly evolving developments in water and health. Mr Gordon then briefly described the composition of the DWQC and outlined the plan of work for the DWQC at this meeting, including planning for the Fourth Edition, developing guidance for countries to develop national standards from the GDWQ and taking forward action on more than 100 items of work. He noted in closing that the GDWQ are the most downloaded document at WHO.

1.5.1 Report on the Status of the Second Addendum to the Third Edition

Ms Marla Sheffer reported that the text for the second addendum is currently out for public domain review. The review period ends at the end of May, after which time the review comments will be incorporated and the second addendum will be finalized. The second addendum will be published in both hard copy (booklet) and web form (incorporated into the Third Edition plus first addendum version that is currently on the web).

1.5.2 Report on the Advisory Consultation on Guidance on the Application of the WHO Guidelines in Establishing National Regulations and Standards for Drinking-water Quality

Dr Ingrid Chorus briefly outlined the need for and purpose of the document as well as the envisaged structure of the guidance document (i.e. questions to be addressed). Every videoconference from the WHO Regions has requested help to “translate” the GDWQ into national standards and regulations, making this a very worthwhile effort. The inherent risk in the exercise is of producing just another high-level document. The document cannot be prescriptive for all conditions, but it can use illustrative examples to highlight the approach and process to follow. This document is primarily intended to provide further guidance for developing countries. See Annex 4 for more detailed information on the advisory consultation.

The working groups made a number of recommendations. Those recommendations are as follows:

- The guidance document needs to be short so that it can be translated into a variety of languages.
- The document is to provide guidance on the degree to which guideline values can be changed when they are adapted to national standards without “getting into trouble”. It was suggested that for future background documents, perhaps the guideline values could be better characterized in terms of their inherent uncertainties (e.g. providing ranges of values that reflect these uncertainties). The document cannot discuss all possible variations for each chemical, but it can show how the numbers were derived and give examples of how the numbers can be varied. It needs to be stated explicitly that the countries have to work this out themselves. The guidance document will help decision-makers to interpret numbers, whereas the current edition of the GDWQ,
while it gives them the information that they can use to do so, is less clear in respect to their judgement opportunities.

- It was emphasized that chemical occurrence data are critical information for making national standards, and many countries lack these data. Pathogen levels in source waters, especially index microorganisms, are also useful information.

- It was noted that the regions need to know what are the most important health hazards and risks. To determine this, it is important to have clear guidance on how to prioritize the chemicals and microbes to be monitored (e.g. to explain how to select alternative reference pathogens if the ones mentioned in the GDWQ are not applicable in the region of concern).

- The document should explain terms used in the GDWQ, such as point of departure.

- The guidance document should take care in using electronic cross-references, as many developing countries do not have access to the Internet.

- The target audience needs to be clearly identified, as do the DWQC’s expectations of their knowledge and understanding of GDWQ.

It was decided that a core working group was needed to take this activity forward. Mr John Fawell, Dr David Cunliffe, Dr Ana Maria de Roda Husman, Dr Ed Ohanian, Ms Michèle Giddings, Professor Yasumoto Magara, Dr David Drury, Mr Joe Cotruvo and Dr Feroze Ahmed volunteered to be part of this core group. Mr John Fawell and Dr David Drury have agreed to draft the next iteration for consideration by the core group. PAHO will be asked to recommend some participants in this guidance document preparation, and the representatives from Lithuania (Mrs Ilona Drulyte) and Kyrgyzstan (Mrs Venera Djudemisheva) who spoke to the Committee on the first day of the meeting will be asked to join in, as they can provide good case-studies.

2. GENERAL RECOMMENDATIONS

The working groups made a number of general recommendations throughout the meeting. Those recommendations are as follows:

It was recommended that each working group member keep track (in tabular form) of what he or she has done during the course of the year with respect to any agenda items for which that member is responsible. This table would then be sent to the WHO Secretariat before the next meeting to help in the compilation of the annotated agenda.

It was recommended that the WHO Secretariat develop an internal web site specifically for all consultation items, as working group members currently find it quite difficult to locate these texts on the Water, Sanitation and Health web site.

It was recommended that all emails sent out to working group members use subject headings that direct the recipients to the correct agenda item and working group responsible.
It was recommended that all documents for review be sent to all DWQC members in the future so that they are given the opportunity to forward them to associates for peer review. To this end, it was recommended that the WHO Secretariat ensure that all DWQC members (as well as their relevant colleagues, where applicable) are included on the listserv.

It was recommended that there be a formal collaboration between the Programme for the Promotion of Chemical Safety (PCS) and the Chemical Aspects Working Group in the interests of harmonization of processes. The DWQC should increasingly be moving towards developing a Concise International Chemical Assessment Document (CICAD) or Joint FAO/WHO Meeting on Pesticide Residues (JMPR) or Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluation (or updating an Environmental Health Criteria monograph, or EHC) and a drinking-water document simultaneously. The same group should do both. This would be more efficient and more effective. The DWQC needs to identify developed countries interested in the subject area, then ask for resources for a specific process to do these two documents together. Some examples of current issues where this might work well are disinfectants and disinfection by-products, cylindrospermopsin, aluminium and pesticides.

It was recommended that the ramifications and public health implications of dealing with the essentiality of chemicals in drinking-water be explored at the FTF meeting, and also that guideline assessments and values should reflect this information (e.g. selenium). To this end, it was recommended that in the Annex 4 tables of the GDWQ, a footnote needs to be added for each essential element to note that the total intake in the domestic situation needs to be carefully reviewed and the guideline value adjusted accordingly.

It was recommended that the DWQC discuss the issue of labelling requirements (e.g. sodium levels in bottled drinking-water) in terms of provision of information to the public (this would need to be approved by the FTF meeting). There are different categories of issues of concern in this regard. Health-relevant information (which may pertain to certain subpopulations) should not be withheld by the manufacturer but should be brought to the attention of relevant medical authorities.

It was recommended that the DWQC begin to direct research to fill information gaps (e.g. exposure data that would allow the calculation of “non-default” allocation factors) by suggesting to Member States that they generate appropriate data.

3. POLICIES AND PROCEDURES MANUAL

One of the objectives of the meeting was to update the policies and procedures by which the GDWQ are developed. To fulfil this objective, the meeting discussed the manual as a direct agenda item (#1) and approved various texts that had been prepared for addition to the Policies and Procedures Manual (see Sections 1.5.3 and 9).
The most up-to-date version of the Policies and Procedures Manual was provided to all members of the Expert Consultation. The revisions made have addressed all comments and recommendations made at previous meetings. The various working groups were asked to check the revisions during their individual working sessions. Mr John Fawell agreed to keep track of any changes recommended by the Chemical Aspects Working Group, and Dr David Cunliffe agreed to do the same for the Microbial Aspects Working Group (there were no specific comments relevant to the Aspects of Protection and Control Working Group). One item (paragraph C10 in the manual) was dealt with later in the agenda (see agenda item #1).

The objective is to publish the Policies and Procedures Manual immediately following the meeting. Any additional items identified at this meeting are to be taken up for the next version of the manual and will not be included in this version. Revised/additional texts that are required for the Policies and Procedures Manual are summarized in Annex 5. It was noted that although the manual is primarily an internal document, it is publicly posted on the web for reasons of transparency.


Background: The document Policies and Procedures Used in Updating the WHO Guidelines for Drinking-water Quality describes the process through which the GDWQ are developed and revised. The purpose of both the process and document is to maintain the relevance, quality, credibility and integrity of the GDWQ, while ensuring their continuing development in response to new, or newly appreciated, information and challenges. The manual should provide more detailed guidance than the outline of process and procedures contained in the GDWQ. The manual will undergo continuous revision and updating to reflect current protocols.

Expected end-product(s): 1) The updated Policies and Procedures Manual, available on the web and periodically revised as the need arises; 2) modified text for various sections of the GDWQ, to reflect changes made to the manual

Progress to date: The Policies and Procedures Manual has been progressively developed since 2000, when a plan of work for its development was adopted by the Berlin 2000 Coordinating Committee meeting. Changes and additions are suggested and agreed to in working group meetings.

Plan of work for all WGs:
1) Stage 5 of Table 1 needs to be revised to reflect the fact that chemical background documents are not put on the web for review without the guideline values. The WGs agreed to incorporate this change in the current version of the Policies and Procedures Manual. Oliver Schmoll will make this change before finalizing the current version of the manual.
2) Text is to be added to the manual to indicate that only documents that have been recommended and/or approved by the FTF meeting can be published in advance of the next edition/addendum of the GDWQ. In other words, any item that is contentious or has been recommended by the DWQC itself for inclusion in the rolling revision may not be published in advance of the next FTF meeting.
3) Changes to paragraph C10 (Oliver Schmoll) and section F (David Cunliffe) and additional text to indicate the new collaboration between the Chemical WG and PCS in terms of document preparation (Oliver Schmoll) were discussed and agreed to.
4) The DWQC recommended that all documents be sent to all DWQC members for review in the future so that they are given the opportunity to forward them to associates for peer review. This change will be noted in the next version of the manual.

5) For future revisions, any changes to the manual suggested by WG members are to be sent to Oliver Schmoll and John Fawell.

6) The WGs agreed that the manual can be finalized once those changes that are to be made immediately have been received and incorporated.

4. REGIONAL PERSPECTIVES

The key objective of this session was for the members of the DWQC to interact with the WHO European Region and to identify themes that could be brought into the rolling revision. Mr Roger Aertgeerts indicated that the seven speakers from the WHO European Region had been asked to give their key concerns and specific needs of their regions and to note what works or does not work when they use the GDWQ. All speakers were allocated 20 minutes plus 10 minutes for discussion following their talks. Mr Aertgeerts chaired the meeting, and Ms Marla Sheffer acted as rapporteur. Hard copies of all presentations (except for one) were made available to the meeting participants. The minutes of the one-day session with representatives of the WHO European Region can be found in Annex 3.

On the second day of the meeting, participants participated in videoconferences with four of the remaining WHO Regional Offices (SEARO, WPRO, AFRO and AMRO). The Regional Office for the Eastern Mediterranean (EMRO) was unable to participate. The regions identified those issues of primary interest to them, which were addressed by working group members directly during the videoconferences and then turned over to the relevant working groups for further discussion during the course of the meeting. Annex 6 lists the regional concerns. The relevant agenda items can be searched using the index at the end of the report.

5. RECOMMENDATIONS ON THE SECOND ADDENDUM TO THE THIRD EDITION

A final DWQC decision on whether to recommend the second addendum to the Third Edition for publication will occur following the incorporation of comments received during the review period (which ends at the end of May 2007).

As a result of comments received during the review process, several items—cyanide and cyanogen chloride (see agenda item #68); nickel (see agenda item #78); dichlorvos (see agenda item #86); and dicofol (see agenda item #87) have been removed from the second addendum and moved to the Fourth Edition.

6. ITEMS AGREED TO FOR THE FOURTH EDITION

In opening remarks to introduce this session, Dr Jamie Bartram delivered a message on behalf of Ms Susanne Weber-Mosdorf, Assistant Director-General of WHO, on the importance of this work to WHO and the world. Mr Roger Aertgeerts noted that there is going to be a new European Union (EU) drinking-water directive, which will incorporate the
WSP approach. He invited the WHO DWQC to nominate representatives to work on the microbial working group and the chemical working group.

The objectives of the plenary discussion on the Fourth Edition were:

a) To review previously agreed suggestions related to the overall “personality” of the Fourth Edition, relating to major new issues to be addressed and to refining/improving specific elements of the Third Edition;
b) To decide on how to proceed on each issue and, for high-priority items of work, to develop a plan of work with a timeline and contributors;
c) To agree on an overall drafting timeline.

During discussions, meeting members recommended that items be included in the Fourth Edition of the GDWQ. The agenda items for which text (new or revised) will probably be included in the Fourth Edition are ##1A, 4, 5, 6, 7, 10, 11, 17, 21, 22, 28, 36, 38, 39, 40, 41, 47, 52, 52A, 53, 58-3, 60, 61, 63, 66, 68, 71, 74, 78, 79, 83, 84, 85, 86, 87, 90, 91, 92, 93, 98, 101, 109, 117, 119, 120, 123, 128, 136, 141, 142, 144, 146, 147, 150, 151, 156, 157, 158, 160 (see Annex 7). This text includes fact sheets and summary statements for those microbial parameters and chemical background documents, respectively, listed in Annex 8 for publication in the Fourth Edition (see Section 9 below).

In addition to agreement on individual agenda items that will contribute text to the Fourth Edition, there was a session devoted to discussing the “theme” or “personality” of the Fourth Edition (following up on suggestions made at the last meeting) and required restructuring of the various chapters. Included in these discussions were the block of suggested changes to the Fourth Edition provided by PAHO during the videoconference (see Annex 6) as well as suggested changes arising from the one-day meeting on perspectives from EURO (see Annex 3).

General points raised during discussions preceding the chapter-by-chapter review of required changes to the GDWQ included the following:

- The Third Edition proposed significant new concepts, such as preventive water management (WSPs) and microbial risk assessment. Rather than introduce new themes, the Fourth Edition should consolidate and improve explanations on these concepts, which are only a few years old.
- Overarching principles, such as clarity, transparency and reasonableness, need to be applied throughout the document.
- There is considerable confusion about health-based targets. The text in the document needs to be articulated better and made more user-friendly. Perhaps the text on health-based targets could be slimmed down, with much of it moved to the guidance document on standard setting or the P&P manual, as appropriate.
- The text needs to flow better and be more concise, more linked, consistent and not repetitive.
- There needs to be greater clarity on the roles and responsibilities of different stakeholders (i.e. separation of functions).
- There is a need for slim volumes of information (such as the guidance document on adapting the GDWQ to national standards and regulations) that can be translated in all countries into local languages.
- The uncertainties inherent in the derivation of the guideline values need to be made more apparent so that regulators are given opportunities to exercise judgements based upon local circumstances (e.g. a range of numbers).
- There needs to be more cross-referencing within the GDWQ and the whole body of supporting documents (and perhaps other electronic sources of information).
- New issues of concern that could be considered include climate change, including issues related to water scarcity and the increase in heavy rainfall events.
- Throughout the document, it must be remembered that the GDWQ apply to all sizes of systems, including household systems (with extensive cross-referencing to supporting documents on household treatment, WSPs in small communities, etc.).

A constant theme running through discussions with the various regions and within the DWQC itself was the need for more guidance on WSPs in regulation and on implementation of the Guidelines in standard setting. After considerable discussion, the DWQC agreed that the “theme” or “personality” of the Fourth Edition should be a major emphasis on practically applying the GDWQ in all regions and circumstances. To this end, it was decided that the new guidance text discussed at the advisory consultation on guidance on the application of the WHO Guidelines in establishing national regulations and standards for drinking-water quality (see Annex 4) should be integrated into the Fourth Edition, both as an individual section and woven into the text throughout the Guidelines (as well as cross-referenced to the free-standing document). The message that should be transmitted throughout the Guidelines is: “The GDWQ are applicable to you wherever you are. Something in the Guidelines will help you improve your water quality.” The task put to DWQC members was to “Find the many diamonds in the GDWQ and make them shine.”

To accomplish this, the Third Edition of the GDWQ was reviewed chapter by chapter by the DWQC members to determine what needed to be changed, added or condensed. The results of that discussion are summarized below.

Chapter 1: Introduction
- Text is needed up front in the document to very simply explain how to use the GDWQ (this is now going to be a new chapter in the book, but it definitely needs to be mentioned in the Introduction, as it is a major approach to the GDWQ). The text on how various user groups (as mentioned in the Preface) could use the Guidelines can be moved to the Introduction.
- Also needed is a flow chart for the GDWQ, possibly to be colour coded to match coloured tabs on the relevant chapter pages (or to be done similarly in black and white).
- Much of section 1.1 can be reduced/moved elsewhere.
- The existing text in section 1.2 needs to be edited.
- Section 1.3 on supporting documents needs to be improved (the descriptions of the documents need to be radically edited down).
- Key points from the above (general) discussion on the Fourth Edition can be added to the Introduction.
- The roles and responsibilities with respect to household systems need to be added (community participation, role of women).
- Networks should be referred to, and links to networks should be added as an extra resource (along with supporting documents).
Chapter 2: The Guidelines: a framework for safe drinking-water
- Section 2.3 may not be needed if there is a whole new section on setting national standards, so reduce or delete and cross-reference to the new chapter.
- Section 2.3.2 overlaps with health-based targets and guidance: delete it or move it to the health-based targets chapter (chapter 3) and develop the ideas discussed above.
- Sections 2.1.2, 2.1.3 and 2.1.4 should be made subheadings under a new section 2.1.2, Water Safety Plans.
- The old section 2.1.5 (now to become section 2.1.3) on surveillance needs to have a brief statement on certification where auditing is discussed.

Chapter 3: Health-based targets
- Change chapter 3 to the new chapter on setting national standards (to be prepared from the guidance document currently in development, with cross-references to the free-standing text).
- Move the chapter on health-based targets down to chapter 4 (and renumber all subsequent chapters). Remember that all cross-referencing of chapter sections within the GDWQ will need to be updated to match this renumbering.
- Edit chapter on health-based targets to ensure that it complements the new chapter 3 on setting national standards and that there is minimal repetition.

Chapter 4: Water safety plans
- To become chapter 5.
- Edit this chapter down because there is now a supporting guidance document on WSPs, so some of the information can be reduced with a cross-reference to the supporting document (but bear in mind that the GDWQ are supposed to be a fairly complete self-contained guide rather than a cross-referencing guide).
- Clarify definitions of verification and validation.
- Section 4.1.7 on validation needs expansion, as it is as important as verification, which has its own section (section 4.3).
- Move verification testing to the legal section in chapter 2.
- The internal controls part of chapter 5 on surveillance moves to this chapter.
- In section 4.3 on verification, more guidance on minimum verification monitoring (compliance monitoring) is needed.
- The need for suppliers to undertake internal audits/reviews of their plans needs to be addressed (perhaps section 4.6 on documentation and communication and elsewhere) (see agenda item #28).
- Highlight the different roles of players in different regimes in verification.
- Information on preparedness as part of WSPs for emergency planning to be cross-referenced to free-standing WSP manual, but GDWQ needs brief insert on prioritizing efforts in emergency situations and a sentence noting that water utilities should coordinate responses with national authorities.

Chapter 5: Surveillance
- To become chapter 6.
- Focus should be on independent oversight/validation.
- Internal controls part of verification lives in WSP chapter.
- Verification terminology needs to be changed, maybe surveillance as well (definitions may need to be clarified); therefore may need to retile chapter as well, as terminology unclear to many people.
- The DWQC is being asked to provide guidance on minimum testing.
- Figure 5.1 needs numbers of *E. coli* (order of magnitude values).
- Where discussing auditing (section 5.1.1), need to add discussion of certification to determine if water is in compliance with Guidelines: describe review of compliance, starting point from which to move ahead slowly, in phases, to certification; need to define what certification is.

Chapter 6: Application in specific circumstances
- To become chapter 7.
- Add bulk water (including tankers and long-distance pipelines, and possibly iceberg harvesting).
- Add text to current large buildings section (section 6.1) to address water management in self-contained tourist establishments, with a small self-contained water supply and one manager to supply water, manage air conditioning, swimming pools, kitchens, vending machines, etc., and with wide, possibly seasonal, variations in demand.
- Large buildings section (section 6.1) is to be revised once the large buildings supporting document, which is still in development, is published (with appropriate cross-referencing).
- Maybe add section on new water (includes desalination and indirect potable reuse), water scarcity, water conservation and sustainability, also perhaps a section on heavy rainfall and flood events.
- Add section discussing the safety and management of multiple water supplies at the household and community levels, which will address the reality of multiple sources and dual uses at the household level (see agenda item #21).

Chapter 7: Microbial aspects
- To become chapter 8.
- Needs improved flow and an introductory statement.
- Need to ensure consistency between Table 7.1, Figure 7.1 and fact sheets.
- Add section on index and indicator organisms.
- Add a cross-reference to text on validation and operational monitoring as well as surrogates of chlorine/turbidity in the WSPs chapter.
- Add text on chlorine residuals.
- Take another look at the technical content: e.g. more data needed on Ct values in typical water supplies (not 1 °C water, as is currently given) (or could provide correction factors to adjust for temperatures): this is an issue for further discussion.
- Efficacy of barriers, as well as treatment, should be emphasized; add source protection measures, treatment measures, protection against recontamination, protection of distribution systems (section 7.3.2).
- Table 7.6 needs to be broken up, to separate disinfection from coagulation, etc.
- Combining packages of processes into treatment trains and aggregating the net effect of the combined processes; text to be added on the advantage of multiple barriers, for example, in reducing variability in performance (Peter Teunis’s work).
- New text on emerging pathogens (e.g. avian influenza) and how to deal with them.
- Emerging technologies and performance verification.
- Nothing on quantitative data for quantitative microbial risk assessment, or QMRA (there is a table on ranges in concentrations of a few key pathogens, but this could be improved; database on pathogen occurrence): needs to be revisited.
- More information on practical aspects of sampling and monitoring, better tools to perform microbial analysis, indicators and pathogen detection, risk assessment, risk management, household systems.
Chapter 8: Chemical aspects
- To become chapter 9.
- More text on household treatment (point of entry, point of use). Some text has already been added as part of the second addendum; it needs to be determined what additional text is needed: possibly mention some of the alternative disinfectants that are part of the new project (see agenda item #158).
- Add emerging chemicals (like pharmaceuticals).
- Water and nutrition (selenium, zinc, etc.): need to take a broader view when performing risk assessments and deriving guidelines; also desalination, reconstituting minerals that have beneficial aspects (needs to be presented to FTF meeting, as dealing with essentiality represents a major shift in approach and is a policy decision).
- Field test kits for chemicals (performance characteristics of methods, specifications for test only, to allow for the development of new tests).
- Indicator chemicals (primarily useful for disinfection by-products, like haloacetic acids and trihalomethanes): link to prioritization of chemicals document (two different but related issues): There are limited resources and 200 guidelines, what can be done? Add text on prioritizing chemicals for monitoring purposes and cross-reference to the supporting document.
- In treatment section, add statement on removal of radionuclides from drinking-water and cross-reference to (old) chapter 9.
- Move larvicides to a separate section (i.e. take them out of section 8.5, Guideline values for individual chemicals, by source category), as they are different from the rest of the chemicals in terms of the approach used (i.e. no guideline values derived, guidance provided on basis of proportion of acceptable daily intake contributed by larvicide).

Chapter 9: Radiological aspects
- To become chapter 10.
- Add cross-reference to statement on removal of radionuclides from drinking-water in chapter 8.
- Add background behind alpha and beta screening values (International Atomic Energy Agency [IAEA] experts are going to develop a document explaining the rationale behind each number given in chapter 9 for screening levels of gross activity; Mr Bruce Gordon is to contact Mr Dider Louvat, Head of Waste Safety Section, to discuss potential cooperation on preparation of such paper to refer to in future editions of Guidelines).
- Entire chapter will be provided (by Mr Bruce Gordon) to WHO Radiological Programme for their review and any changes.

Chapter 10: Acceptability aspects
- To become chapter 11.
- No changes suggested.

Chapter 11: Microbial fact sheets
- To become chapter 12.
- Need to make chapter consistent with chapter 7 (Figure 7.1 and Table 7.1).
- Need to edit re index vs indicator organisms (to be added to chapter 7).
- New fact sheets to be developed for Fourth Edition as per individual agenda items (see Annex 8).

**Chapter 12: Chemical fact sheets**
- To become chapter 13.
- No changes suggested (except that new fact sheets are to be developed for the Fourth Edition as per individual agenda items; see Annex 8)

It had been previously agreed that actions required for the Fourth Edition that have been identified in previous meeting reports should be consolidated in one area of the meeting report to ensure that they are implemented. These items are as follows:

- The Guidelines are to be edited so that the term “achievability” is not used when what is meant is technical achievability. The term can still be used when what is meant is analytical achievability (agenda item #1A).
- The Guidelines are to be edited so that the term “risk” is used only to refer to the quantitative probability that a hazard will occur, not in the more general, qualitative sense. The term “level of risk” should no longer be used (agenda item #109).
- The Guidelines are to be edited to ensure consistency in terminology usage (agenda item #11).
- The WGs need to work through the entire document to make sure that the text reflects the current status of disinfection worldwide and gives good guidance in this area — for example, to reflect that disinfection and chlorination are not synonymous and that many other disinfectants are increasingly being used.
- It needs to be ensured that the phrases “drinking-water supply surveillance” and “surveillance of drinking-water quality” are used consistently and correctly in sections 1.2.1 and 2.1.5 and chapter 5.

In the final plenary discussion on the Fourth Edition, it was noted that WHO is aiming for September 2009 for publication of the Fourth Edition. The following summarizes the consensus arrived at in previous discussions and next steps:

- Consensus was major emphasis on practical application of the Guidelines in all regions and circumstances.
- Need to review comments from the regions to decide what can be concretely integrated into the Fourth Edition and what should be incorporated into the WSP manual and other supporting documents.
- Next step: consolidated workplan, to be sent out before September 2007. Workplan will include DWQC member tasks from now through the next meeting and the FTF meeting, all the way to publication of the Fourth Edition. The workplan will bring together timelines and different streams (comments from regions, normal rolling revision process, issues identified at last meeting, plus items identified at this meeting).
- Next year’s meeting should be a practical one, prioritizing, being realistic about what can actually be done for the Fourth Edition.
- A complete Word version of the GDWQ, once the second addendum is published, needs to be provided to all Committee members so that everyone is working on the same correct version. Health Canada volunteered to put together the master Word document.
- All files created for the Fourth Edition need to be clearly labelled with date, author, number of version, etc. Mr Bruce Gordon will put together a collaborative workspace with passwords for document sharing.

- When emails are sent to working group members with attached documents for review, the WHO Secretariat should be specific about what document(s) people are to review.

- There needs to be communication between members if changes to one chapter involve changes to a second chapter.

- After consolidation of comments, the next step is a teleconference with working group members, to identify who does what.

7. NEW ISSUES

The following issues were identified as emerging priorities by the Expert Consultation:

(a) **PFOS and PFOA**: PFOS (perfluorooctanesulfonate) has been nominated as a persistent organic pollutant (POP) under the Stockholm Convention and will likely be confirmed as a POP. One of the criteria for adding a compound to the rolling revision as outlined in the Policies and Procedures Manual is “listing of a chemical in relevant Prior Informed Consent (PIC) or Persistent Organic Pollutant (POP) listings”. The Committee therefore decided to include this item (and PFOA, which occurs with PFOS) in its plan of work with respect to drinking-water risk (see agenda item #152).

(b) **Uranium**: The GDWQ working group meeting in 2004 agreed not to add uranium to the rolling revision until new studies became available. Some new studies on blood pressure effects and on an indigenous population with high uranium exposure have recently become available. This might have been due to a secondary effect on kidney function. The Committee agreed to add uranium back onto the rolling revision (original agenda item #83) with a view to updating the background document and summary statement.

(c) **Organotins**: A substantial new assessment on organotins has been carried out by the EU, and data have been submitted by companies. Currently, the GDWQ cover only dialkyltins, as there was insufficient information available to derive a guideline value for any of the other organotins. The Committee agreed to add organotins to the plan of work (agenda item #153).

(d) **Desalination-related products (Bromide)**: The need for guideline development in several areas with respect to desalination (and other)-related products was identified. Work is already being done on boron (borate) (see agenda item #63) and on organobromine disinfection by-products (DBPs) (see (h) below and agenda item #158). The only gap relates to bromide, although bromide is of low toxicity. The Committee therefore agreed to add bromide to the rolling revision (see agenda item #154).

(e) **Active chlorine in food sanitation**: The Codex Alimentarius Commission has requested scientific advice on the assessment of the benefits and risks of the use of “active chlorine” in food production and food processing from FAO and WHO. The advice will be elaborated through the implementation of an expert meeting during
2007. The end result will be a report published by FAO and WHO. The Committee agreed to add this topic to the rolling revision (see agenda item #155). [Joe comments that it was noted as a WHO project but is it appropriate for the rolling revision?]

(f) Aluminium: A new JECFA report has been published that has withdrawn the old acceptable daily intake (ADI) for aluminium. There is therefore a need to examine the JECFA report to ensure consistency with the GDWQ background document. Aluminium has therefore been placed back on the plan of work for the Fourth Edition (see agenda item #156).

(g) Manganese: Sweden has proposed revisions to the WHO guideline value for manganese (an essential element) on the basis of long-term neurological damage from oral exposure. The Committee therefore agreed on the need to assess these data and to add manganese back onto the rolling revision (see agenda item #157).

(h) Disinfectants and disinfection by-products: Numerous disinfectant techniques have been developed that are used in a wide range of applications, from large and small public drinking-water plants to point-of-use and point-of-entry treatment devices. Although some disinfection approaches have been used for centuries, there are still questions that exist in many cases with respect to optimization of biocidal effectiveness under a range of conditions, the chemistry of formation and the toxicological significance of disinfection by-products (DBPs), interactions with other water components and the effectiveness and toxicology of disinfectant residuals. Many newer products and applications are being developed, and even more unanswered questions exist about some of those products. The Committee therefore agreed that disinfectants and DBPs as a consolidated effort should be added to the rolling revision (see agenda item #158).

(i) Water Safety Plan training pack: The DWQC agreed that it needs to provide more assistance to help countries develop capacities. As most capacity building is done by formal institutions (e.g. universities) in individual countries, there is a need to network with those institutions and provide material to those who are providing the training within the countries. As a first step, it was agreed that a WSP training pack should be prepared in consultation with training institutions and a formal process developed for disseminating it (see agenda item #159).

(j) Reference pathogens: Reference pathogens are discussed in chapter 7, but little guidance has been provided on selection of reference pathogens, including essential features and consideration of local or regional characteristics. The Microbial Aspects Working Group has identified this as an oversight that needs to be addressed in the Fourth Edition, and the DWQC agreed to add this item to the agenda (see agenda item #160).

These new agenda items will need to be presented to the FTF meeting in late 2008 or early 2009 for approval.
8. **AGENDA ITEMS CONCLUDED AND REMOVED FROM ROLLING REVISION**

Several agenda items were concluded following the last meeting and have already been removed from the rolling revision (see previous meeting report), so the agenda items in this report are not consecutively numbered.

The following agenda items have been reported on in this meeting report, either for information purposes or because the plan of work has not yet been completed. However, they will all be removed from the plan of work of the next meeting, as their plans of work will in all cases be completed shortly, in most cases once the second addendum is published:

- #1B-1 (Allocation Factors for Chemical Guideline Derivation)
- #1D (Short-term Exceedances and Guidance Values for Chemicals in Emergency Situations)
- #16 (Water Safety for Travellers)
- #19 (Temporary Water Supplies)
- #20 (Vended Water)
- #24 (Chemical Safety of Drinking-water: Assessing Priorities for Risk Management)
- #49 (Enterobacter sakazakii in Powdered Infant Formula)
- #52B (Methoprene)
- #52D (Diflubenzuron)
- #84 (Carbaryl)
- #91 (Petroleum Products)
- #103 (NDMA)
- #104 (Pirimiphos-methyl)
- #105 (Blastocystis)
- #106 (Leptospira)
- #121 (Novaluron)
- #125 (Nematodes)
- #127 (Bromate in Bottled Water)
- #130 (Pyriproxyfen)
- #131 (Nitrate/Nitrite)
- #133 (Bottled Water in Emergencies)
- #139 (Total Trihalomethanes)
- #149 (Chlorine Residuals)

9. **PLAN OF WORK FOR ROLLING REVISION**

Each item on the agenda (numbered according to the meeting report from the May 2006 Expert Consultation) was discussed by the appropriate working groups (WG(s)). A plan of work together with any progress to date were recorded in most cases. Some agenda items were concluded and will be removed from the rolling revision (see Section 8 above).

The following summarizes the meeting discussions by agenda item. Action items for individual members of the Expert Consultation are itemized in Annex 9. However, it is recommended that all WG members carefully read the plans of work recorded for all agenda items, as many tasks are directed to all WG members rather than particular individuals and thus will not be recorded in Annex 9.
It should be noted that agenda items are not consecutively numbered, as some have been concluded and removed from the plan of work.

#1A. “Achievability” for Water Treatment Chemicals/Materials

**Background:** The term “achievability” as applied to chemical constituents is used in the GDWQ to refer to both technical achievability and analytical achievability. When applied to technical achievability (i.e. treatment), this term is not appropriate in all cases. It applies only to chemicals in source water, but not, for example, to chemicals used in water treatment or from materials in contact with drinking-water, where water guideline achievability is a function of the composition of the manufactured chemical and the dosage used in the treatment process.

**Expected end-product(s):** 1) Revised text in Policies and Procedures Manual; 2) editing of GDWQ such that the term “technical achievability” is no longer used in Fourth Edition

**Progress to date:** The GDWQ WG Meeting (Geneva, 2004) agreed to discontinue the use of the term “technical achievability.” The GDWQ WG Meeting (Geneva, 2005) agreed on wording to be inserted in the Policies and Procedures Manual. The GDWQ WG meeting (Geneva, 2006) agreed to keep this item in the plan of work until the Fourth Edition is published. The Policies and Procedures Manual has been revised.

**Plan of work for Chemical and P&C WGs:**
1) This item is to be kept on the agenda until after publication of the Fourth Edition, to remind WGs that the entire Guidelines are to be edited so that the term “achievability” is not used when what is meant is technical achievability. The term can still be used to refer to analytical achievability.

#1B-1. Allocation Factors for Chemical Guideline Derivation

**Background:** The GDWQ use a variety of allocation factors (to allocate the proportion of a tolerable daily intake, or TDI, attributable to drinking-water) for deriving guideline values for chemicals. Where there is not sufficient exposure information to derive chemical-specific allocation factors, default values are used. The explanation of the process by which allocation factors are chosen (in chapter 8 of the GDWQ) needs greater clarity.

**Expected end-product(s):** 1) Revised text in chapter 8 and section 2.3.2 of Volume 1 of the GDWQ for inclusion in the first addendum to the Third Edition; 2) revised text in the Policies and Procedures Manual; 3) revised text in chapter 8 of the GDWQ for inclusion in the second addendum to the Third Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed on a plan of work, and revised text was prepared for inclusion in the Policies and Procedures Manual and the first addendum to the Third Edition. The GDWQ WG meeting (Geneva, 2005) agreed on the need for additional text, for possible inclusion in the second addendum. The GDWQ WG meeting (Geneva, 2006) agreed to revise text for the second addendum to the Third Edition. The Policies and Procedures Manual has been updated. Once the second addendum is published, this agenda item can be removed from the plan of work.
Plan of work for Chemical WG:

1) The text for the second addendum has been prepared and is currently being reviewed. Any review comments will be incorporated by John Fawell.

2) Once the second addendum is published, this agenda item will be removed from the rolling revision.

#1D. Short-term Exceedances and Guidance Values for Chemicals in Emergency Situations

Background: The Chemical Aspects WG meeting (Tokyo, 2002) recommended the development of short-term guidance values for cyanide and petroleum oils. Such guidance would be useful in planning for and responding to accidental and deliberate pollution incidents. The GDWQ FTF meeting (Geneva, 2003) reiterated that guidance on short-term exceedances of guidelines (related to both accidental and deliberate chemical pollution) is frequently sought and noted that the adverse impacts of some management options (discontinuing supply/access) preclude a simple precautionary approach. The 2003 FTF meeting identified this as a priority area for the development of guidance and GDWQ expansion. A document entitled The Use of Guidelines for Chemical Parameters in Emergency Situations had been prepared for discussion purposes. National guidance for short-term exceedances is available (e.g. United States Drinking Water Health Advisories).

Expected end-product(s): 1) New section on “Use of guidelines for chemicals in emergency situations” (in section 6.2) for inclusion in the first addendum to the Third Edition; 2) new text to describe the methodology for deriving short-term guidance values and the use of JMPR acute reference doses for pesticides (in section 8.2) for inclusion in the second addendum to the Third Edition; 3) new text for the Policies and Procedures Manual on the establishment of short-term drinking-water guidance values

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work with respect to text on boil water and water avoidance advisories, to be incorporated into the new text on emergency situations included in the first addendum. The text has been published in the first addendum. The GDWQ WG meeting (Geneva, 2006) agreed on the need for text on the establishment of short-term drinking-water guidance values for the Policies and Procedures Manual and the second addendum and decided on a plan of work. The GDWQ WG meeting (Berlin, 2007) agreed to remove the item from the agenda once the second addendum has been published.

Plan of work for Chemical WG:

1) John Fawell has prepared text on the establishment of short-term drinking-water guidance values for the second addendum. The text is currently out for review.

2) The United States Environmental Protection Agency (USEPA) has comments on the text, which it will forward to John Fawell. In addition, the WG suggested that websites for the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) and USEPA health advisories be added to the text to aid people who may want to access short-term values.

3) The WG approved the text subject to no major revisions being required as a result of the review process. The item can be removed from the agenda once the second addendum has been published.
#3. Use of GDWQ

**Background:** The GDWQ FTF meeting (Geneva, 2003) expressed the need to document the use of the GDWQ (e.g. setting health-based targets) in general. WHO has not systematically tracked the use of its GDWQ. Proactive tracking would be too time-consuming. It has been suggested that WSH might prepare, for its own purposes, a simple table in which it is recorded instances where countries have used or referred to the GDWQ in national regulatory development.

**Expected end-product(s):** Table (Word spreadsheet) recording use of GDWQ by various countries

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on the need for such a table. The GDWQ WG meeting (Geneva, 2006) reiterated this need and suggested that relevant information be collected through the Regional Offices via RegNet and that it be disseminated to WG members through a collaborative Internet workspace. The GDWQ WG meeting (Berlin, 2007) agreed to investigate various options for collecting this information, including a questionnaire sent out by the Regional Offices.

**Plan of work for all WGs:**
1) At the last meeting, Water, Sanitation and Health (WSH) was requested to ask the WHO regions to provide information relevant to the table via RegNet. This was not done. Instead, the passive accumulation of information has resulted in a table that was distributed to WG members.
2) **Tom Williams** has access to supplementary information (e.g. WSP implementation) that could flesh out the table on use of the GDWQ, and IWA could collect data in parallel.
3) The WG was asked if this is a worthwhile effort or if more detailed information was desirable. It was decided to obtain data through a questionnaire, which could be directed towards country regulators under RegNet and others as appropriate. **Jennifer Mercer** will coordinate this work through RegNet.

#4. Water Safety Plans for Buildings, Including Health-Care Facilities

**Background:** The issue of water quality in buildings was identified as a concern at the FTF meeting for the Third Edition. Although section 6.1 of the GDWQ deals with water management in large buildings, there is a lack of more substantive guidance on WSPs for both large and small buildings, particularly health-care facilities (e.g. dialysis centres, dental chairs, medical devices), for both developed and developing countries. Uses of water in health-care facilities may lead to increased risk (through proliferation in complex piping and devices), enhanced contact (wound washing, dental drains, catheter cleaning) and increased contact with vulnerable population groups (young, elderly, immunocompromised). *Pseudomonas aeruginosa* (not just from drinking-water, but from water used for cleaning machines, wound cleaning, etc.) alone has been reported as having a significant impact in hospitals and nursing homes, resulting in longer hospital stays and deaths. Those medical facilities should have sanitation guidelines to protect their patients. Concern extends to patients discharged to home care.

**Expected end-product(s):** 1) Stand-alone document on WSPs for buildings for publication (late 2007); 2) revised section 6.1, for inclusion in the Fourth Edition
Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) revised the plan of work, deciding that the substantive document needed to be completed before the GDWQ text was revised. The GDWQ WG meeting (Geneva, 2006) reiterated that section 6.1 would be revised once the draft document had been finalized, probably in time for the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) identified an author for the proposed revisions for the Fourth Edition.

Plan of work for P&C and Micro WGs:

1) A WG member needs to be identified who will provide the revised text on this topic for the 4th edition and cross-reference to the stand-alone document. The WGs will invite David Drury as the individual to prepare the revised text in section 6.1 for the 4th edition by May 2008. This revision will also need to take into account the stand-alone document on minimum standards for health-care facilities.

2) EURO expressed interest in guidance on water management in self-contained tourist establishments, with small self-contained water supplies and a single manager to supply water, manage air conditioning, swimming pools, kitchens, vending machines, etc. and with wide, possibly seasonal variations in demand. The WGs suggested that WHO Regional Office for Europe (EURO) should contact Yves Chartier regarding this issue, as the document is meant to include hotels and hotel complexes.

#5. Emergencies and Disasters

Background: Section 6.2 of the GDWQ deals with various aspects of water supply and quality in emergencies and disasters (primarily natural disasters such as earthquakes and floods) as an application of the Guidelines in specific circumstances. However, there is a need for more detailed guidance on water safety in emergencies and disasters. Other WHO documents available on emergencies and disasters include Environment and Health in Emergencies and Disasters and Public Health Response to Biological and Chemical Weapons, but do not address water substantively. AMRO has reiterated the importance of this issue to the region and stressed the need for checklists, specific guidance on actions to take in the event of an emergency or disaster, etc.

Expected end-product(s): New text for Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. A draft document was prepared for the GDWQ WG meeting (Geneva, 2005). A training package on how to ensure the provision of safe drinking-water in emergencies has also been developed. The GDWQ WG meeting (Geneva, 2006) revised the plan of work, and the GDWQ WG meeting (Berlin, 2007) recommended that the UN training package be pilot tested by a WHO Regional Office and decided on a path forward for updating text for the Fourth Edition.

Plan of work for P&C WG:

1) The WG reviewed the status of the United Nations (UN) training package prepared by Federico Properzi and concluded that it was suitable for pilot testing. The WG recommends that it be pilot tested by a WHO Regional Office. The WG identified AMRO (PAHO) as a candidate for this, based on its mature programme in this area.

2) The WG recommends that previously prepared documents be used to inform the review of section 6.3 and the WSP section of the 3rd edition of the GDWQ to update for the 4th edition. This action will be led by Joe Cotruvo.
#6. Bulk Water Shipments

**Background:** WHO has received an unofficial request from the New Zealand government for guidance concerning technologies for the management and monitoring of the safety of large volumes of water carried by ship tanker or other marine vessel.

**Expected end-product(s):** New section in chapter 6 for Fourth Edition

**Progress to date:** WHO has followed up with New Zealand and circulated their proposal. Comments have been consolidated and delivered to New Zealand, and New Zealand has agreed to prepare a text. No progress had been reported by the time of the GDWQ WG meeting (Geneva, 2006). The GDWQ WG meeting (Berlin, 2007) agreed to expand the subject area to bulk water supplies and to prepare a section for chapter 6 for the Fourth Edition.

**Plan of work for all WGs:**

1) The WGs were advised that New Zealand had not followed up on its original request for guidance on the transport of bulk volumes of water by ship or other marine vessel. The WGs noted that the subject area could be expanded to include shipments by very large pipelines (not tanker trucks, not large enough) and that iceberg harvesting could also be included. The WGs also recommended that agenda item #20, Vended water, be merged with this agenda item. This agenda item will be retitled “Bulk water supplies” for the next meeting [see Post-meeting note below].

2) **Stephen Schaub** noted that guidance in this area could be gleaned from military protocols in the USA regarding water safety.

3) The WGs agreed to prepare a section on bulk water supplies for chapter 6 for the Fourth Edition. **Stephen Schaub** agreed to look at the United States government’s (especially Department of Defense and commercial aircraft rules) approaches to bulk water shipments and transfers with an emphasis on microbiological factors and to frame an outline for these components into a form that the micro and chemical WGs could review and edit. **John Fawell** is to assist with respect to chemicals and treatment.

4) Health Canada has recommended two reviewers for the peer review stage: Tim Macaulay, Saskatchewan Health, and Kristina Taracha, First Nations and Inuit Health Branch of Health Canada. **Joe Cotruvo** has also offered to review the text. New Zealand will also be asked to comment on this.

5) Post-meeting note: WSH requests that bulk water and vended water be kept separate because of the substantial differences between the two. It is also noted that inclusion of iceberg harvesting should be postponed until there is further evidence that it occurs commercially.

#7. Vulnerable Groups

**Background:** There is increasing awareness of increased susceptibility among certain vulnerable population groups to some water-related diseases. In particular, it is increasingly recognized that immunocompromised groups (e.g. those severely immunocompromised through HIV/AIDS or immunosuppressive therapy) may be at risk from water supplies that meet normal, achievable standards of “safety.” The GDWQ FTF meeting (Geneva, 2003) recommended that guidance to address the specific concerns of such groups be included in the Fourth Edition of the GDWQ.
Expected end-product(s): 1) New section to be inserted in GDWQ (chapter 6), and possibly revised text for section 1.1, to be included in the Fourth Edition; 2) free-standing document

Progress to date: A draft document was prepared and circulated to the Chemical and Microbial WGs for comment. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward, including an expert group meeting and a public participation workshop to be held in 2008.

Plan of work for all WGs:
1) **Ana Maria de Roda Husman** presented progress to date to the WGs. An Expert Group was set up at the end of 2006, which included Rebecca Parkin, who led a workshop held in June 2001, as well as Paul Hunter, Peter Teunis and Christie Moe. A teleconference of the Expert Group was held on 18 January 2007.

2) A section in chapter 6 on vulnerable groups needs to be prepared for the Fourth Edition, and section 1.1, which refers to the need for severely immunocompromised individuals to be advised by their physicians in respect to taking additional action to ensure the safety of their drinking-water, will need to be amended, at least with a cross-reference to the new section. **Ana Maria de Roda Husman** will coordinate this work.

3) There will be an Expert Group meeting in July 2007 to discuss the draft document and comments from Guy Howard. A list of experts for peer and public review is also needed. A public participation workshop will be held at the World Water Week in Singapore in June 2008.

4) If the WG members have any comments on the document circulated in 2005, they are asked to send them to Ana Maria.

5) Ana Maria asked for suggestions for public health experts, especially from developing countries, who would like to be on the Expert Group. Paul Jagalls from South Africa and Enrico Cifuentes from Mexico are some suggestions from the Expert Group members, but advice is sought also from the WGs. **Suresh Kumar** will also provide Ana Maria with some names. Oliver Schmoll suggested that Ana Maria ask **Penny Ward** to contact the Regional Offices to ask them to suggest the names of some public health experts to participate on the Steering Committee.

6) The WGs approved that announcements for the expert workshop and for the public participation workshop are to go out by the end of 2007.

7) **Ed Ohanian** provided the WGs with the USEPA document *The Report to Congress: EPA Studies on Sensitive Subpopulations and Drinking Water Contaminants*. He will send Ana Maria some more relevant materials on USEPA studies on the relationship between immunotoxicology and life stages and sensitive populations.

#10. Levels of Protection

**Background:** The Third Edition of the GDWQ provides, for the first time, some comparisons regarding the levels of protection against microbial, chemical and radiological hazards. The GDWQ FTF meeting (Geneva, 2003) recommended that this be further developed and, to the extent possible, that information on “best estimates of risk” be included. AMRO has requested guidance on calculating disability adjusted life years (DALYs), taking into account social impact (i.e. differences between low- and high-income countries).

Expected end-product(s)s: 1) Revisions to Policies and Procedures Manual; 2) revised paragraph in chapter 3 of the GDWQ, for the second addendum; 3) guidance on calculation
and use of DALYs for inclusion in the Fourth Edition or (probably) post-Fourth Edition and/or cross-reference to an alternative source

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. A fact sheet on guidance for calculating DALYs, taking into account differences between low- and high-income countries, was prepared and reviewed by the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) decided that a conceptual discussion paper on applying the DALYs approach to chemicals should be prepared for the next meeting. The discussion paper was distributed to WG members after the 2006 meeting. The GDWQ WG meeting (Berlin, 2007) agreed to merge this agenda item with agenda item #48 on Quantitative Methods (see agenda item #48 for more information).

**Plan of work for all WGs:**
1) **John Fawell** prepared a discussion paper on Methods of Comparing Chemical and Microbiological Risks, indicating the difficulty of doing so, which was circulated to WG members following last year’s meeting. This part of this agenda item was discussed with Guy Howard in discussions on agenda item #48, Quantitative Methods. *The two agenda items will be merged for the next meeting agenda.*
2) The WGs agreed that it is appropriate to inform PCS about the type of information that the WGs need to do their assessments and calculate DALYs and ask that they try to include such information in the JMPR and JECFA reports and CICADs.
3) **John Fawell** met with PCS, and there was agreement that there was value in preparing a document on interpreting and working with PCS documents when there is a high degree of variability and uncertainty in order to set a GV. There will be another meeting with PCS, and **John Fawell** will prepare a briefing note that will be circulated to the WGs for comment.

**#11. Terminology in the GDWQ**

**Background:** The GDWQ FTF meeting (Geneva, 2003) noted that changing terminology (e.g. sanitary inspection or sanitary survey) needs to be updated via the rolling revision process. It has also been brought to WHO’s attention that the phrases “drinking-water supply surveillance” and “surveillance of drinking-water quality” are used inconsistently and/or incorrectly in sections 1.2.1 and 2.1.5 and chapter 5.

**Expected end-product(s):** 1) Glossary as a free-standing web-based product; 2) any related changes to text of Volume 1 as a result of inconsistency in terminology usage, for inclusion in Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed to a plan of work, and the GDWQ WG meeting (Geneva, 2006) revised it as a result of discussions. The GDWQ WG meeting (Berlin, 2007) decided on a path forward to the Fourth Edition. The draft glossary will be sent to WG members for review by mid-2007.

**Plan of work for all WGs:**
1) There is a need to link Michèle Giddings’ list (including IPCS or WHO definitions, even if they are not in agreement, plus AWWA definitions) with THE LEXICON. The first step is to review Michele’s list, come to a consensus on the definitions and compare the definitions with those in THE LEXICON.
2) There is a separate glossary being developed by the group working on the supporting document on large buildings; this needs to be shared with Michèle (David Drury). The definitions used in this supporting document must agree with those recommended for Michèle’s glossary.

3) **Stephen Schaub** offered to send the USEPA’s current microbiological thesaurus of terms and definitions to Michèle and to the micro WG in August 2007 with the goal of being able to enhance the overall coverage of the thesaurus based upon the WG’s recommendations. The WG will be asked to determine if there are other terms and definitions that they think are essential to have included in a revision to the thesaurus, which the USEPA plans to prepare during fiscal year 2008.

4) Volunteers are needed to harmonize the terms in the various glossaries and to review terms and definitions. **Stephen Schaub** volunteered to do this for microbial terms.

5) Roger Aertgeerts noted that even very basic terms are not defined or confusing (e.g. “control”). It is important to resolve this before the EU incorporates WSPs into its legislation.

6) **Professor Magara** noted that an ISO glossary on water-related terms will be finalized in September. A draft is available and will be provided to Michèle. However, it was also noted that the International Organization for Standardization (ISO) definitions are copyrighted and therefore cannot be used in our glossary.

7) Bruce Gordon noted that this glossary is a priority for translation.

8) Oliver Schmoll noted that it may be useful to provide other definitions as well as our own. Michèle suggested that providing synonyms for the various terms might also be useful.

9) **Michèle Giddings** will compare the definitions in her glossary with those in THE LEXICON before sending the list out for review (she will contact Anne-Marie Cavillon and Jennifer Mercer to get an update on the status of THE LEXICON). The glossary will probably be ready for review by the middle of June. It will be sent by email to all WGs for review comments. The subject heading in the email will be specified as to the agenda item (#11 Terminology in the GDWQ) and All WG(s).

**#12. Toxic Cyanobacteria in Water**

*Background:* The comprehensive book *Toxic Cyanobacteria in Water: A Guide to their Public Health Consequences, Monitoring and Management* was developed as part of the rolling revision process based on a recommendation of an expert meeting held in Geneva in 1995 and was published in 1999. The GDWQ FTF meeting (Geneva, 2003) recommended that the book be updated. In addition, at the last meeting of the Working Group on Water and Health (WHO Regional Office for Europe), it was noted that a significant number of European countries are facing increasing water stress and are building reservoirs to store water, but these often experience cyanobacterial blooms, and the resulting toxins are a major problem for the European countries, as indicated by EURO.

*Expected end-product(s):* Second edition of the supporting document *Toxic Cyanobacteria in Water*, for publication by 2009

*Progress to date:* The GDWQ WG meeting (Geneva, 2004) approved the workplan and time schedule for the updating of the book. The GDWQ WG meeting (Geneva, 2005) approved the outline of the second edition, with amendments. A detailed writing frame has been prepared, and authors have been identified. The GDWQ WG meeting (Geneva, 2006) was informed that an authors’ meeting with first drafts was targeted for autumn 2006. The
GDWQ WG meeting (Berlin, 2007) was updated on the progress to date and was advised that the document should be ready for review in mid-2008.

Plan of work for all WGs:
1) **Ingrid Chorus** indicated that an editorial meeting on the 2nd edition of this book was held in late November 2006. A first draft is being prepared by a small team; the peer review process will then be used to get input from a larger group. There have been substantial changes to the concept in the original edition. Sixty per cent of the chapter drafts have been received.
2) The original contractor has decided not to continue the work, and Ingrid is having trouble finding a solution to the problem. If Ingrid cannot get the contractor back on board, **Ana Maria de Roda Husman** has a PhD student who may be interested in the contract.
3) Ingrid and the consultant need to edit the drafts (once the remaining chapters have been received), get them back to the authors, and then send them to peer review. It is hoped that the book will be ready for WG and public domain review in 2008. This will be done at next year’s meeting or by email, if the draft is not ready close to June 2008. This is a good time to publish a new edition, because there is so much new information available on occurrence, toxicological studies and treatment.

#12-1. Fieldworker Guidance

**Background:** A member of one of the GDWQ WGs suggested, prior to the GDWQ WG meeting (Geneva, 2004), that there is a lack of guidance for field staff in undertaking surveillance or monitoring activities in the field. Documents such as Volume 3 remain largely in the offices of managers and are not routinely consulted by those staff actually undertaking the work in the field. A simple practical guide (covering microbiology as well as field analysis of arsenic, fluoride and some other key chemicals) would add significant value to the GDWQ suite of materials and would provide field staff with very useful materials.

**Expected end-product(s):** A simple practical WHO guide providing fieldworker guidance

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed in principle to the need for a guide and agreed to review a brief (e.g. two-page) outline by email. The GDWQ WG meeting (Geneva, 2005) requested that such an outline be prepared and distributed to the WGs for approval. A draft document was prepared and circulated to the WGs for review. The GDWQ WG meeting (Geneva, 2006) suggested that the draft document be made more geographically representative and reviewed. The GDWQ WG meeting (Berlin, 2007) agreed that the document could be sent for public domain review in June 2007 once it was finalized and that it could be published as a joint WHO/World Bank publication.

**Plan of work for all WGs:**
1) **Guy Howard** informed the WGs that the document had been sent out for peer review. Comments were received from six peer reviewers by the end of January 2007. Guy and co-author Jan Willem Rosenboom are working on the review comments and still have one or two issues to finalize. They hope to finalize the document by the end of June 2007, at which time it could be sent out for public domain review.
2) There is a need to agree on publishing arrangements. A joint WHO/World Bank publication is one possibility, as there is considerable interest by the World Bank in taking on water quality issues more extensively.
3) The WGs endorsed both proposals.
#16. Water Safety for Travellers

**Background:** Diarrhoea is the most common cause of ill-health for travellers; up to 80% of all travellers are affected in high-risk areas. Cases occur among people staying in resorts and hotels in all categories. It is important that travellers be aware of possible risks and take appropriate steps to minimize these. A draft summary document and a technical support document on water safety for travellers had been prepared, and parts of them had been extracted and used in section 6.3 of the Third Edition of the GDWQ. The UNESCO Encyclopedia contains a chapter on Point of Use Water Treatment for Home and Travellers that was based upon the original documents summarized in the GDWQ. The draft documents had been reviewed previously and had been used by WHO/PAHO and some other organizations.

**Expected end-product(s):** 1) Revised section 6.3, for inclusion in second addendum to the Third Edition; 2) reformatted pamphlet providing advice to travellers; 3) technical support document retained as reference document to support reformatted pamphlet

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work, which was updated by the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) agreed to include the revised section 6.3 in the second addendum. The pamphlet providing advice to travellers has been completed. The GDWQ WG meeting (Berlin, 2007) agreed to remove the agenda item from the plan of work once the second addendum was published.

**Plan of work for P&C WG:**
1) The text for section 6.3 was revised by Mark Sobsey and is currently out for public domain review. Once any public domain review comments are addressed, the text will be published as part of the second addendum.
2) This item can be removed from the agenda once the second addendum is published.

#17. Desalination

**Background:** Desalination of seawater and brines within particular WHO regions (e.g. EMRO) and globally is a large and rapidly growing process for producing new drinking-water. There is a clear public health and environmental protection argument for providing guidance on production of desalinated water for drinking-water. There are certain chemicals and microbes that are of particular importance in desalinated water. Of these, particular concern has been expressed regarding the presence of microbes due to blending of final waters that, because they were derived from raw water, may not be adequately treated in the final product. Similar concerns have been noted about particular chemicals in source water or that are not well removed by the desalination process.

**Expected end-product(s):** 1) Stand-alone guidance document with comprehensive coverage of health and environmental aspects of desalination processes and projects; 2) revised text of section 6.4 for the Fourth Edition

**Progress to date:** The Berlin Coordinating Committee meeting (2000) endorsed the need for guidance in this area. Development of guidance on desalination as a safe drinking-water source began in the rolling revision of the Second Edition of the GDWQ following a
recommendation at the Berlin meeting that a free-standing monograph also be prepared. Work was initiated by WHO/EMRO at a planning meeting in Bahrain in 2001, and the workplan was presented to the Chemical Aspects WG meeting (Tokyo, 2002). Work on the guidance document *Desalination for Safe Drinking-water Supply* was initiated by WHO/EMRO in March 2004. The Steering Committee of six experts met in May 2004, developed a workplan and identified candidates for chairs and members of five Technical Work Groups: 1) Technology, 2) Health, 3) Marine and Sanitary Microbiology, 4) Monitoring and 5) Environmental Impact Assessment. Two meetings were held. The draft will be published for comment on the WHO website, and the final guidance document should be published in English by the end of 2007. An Arabic translation will also be prepared using funding provided by the Kuwait Foundation for the Advancement of Science.

**Plan of work for P&C and Chemical WGs:**

1) **Joe Cotruvo** informed that WGs that peer review has been completed. The document (170 pages) is entitled “Desalination for Safe Water Supply: Health and Environmental Aspects of Desalination”, edited by Houssain Abouzaid and Joe. It is currently at WHO Headquarters awaiting web posting for external review (and can be sent to the WGs electronically at the same time for review).

2) Joe reviewed the contents of the document and recommendations arising from each of the five subject areas. Environmental impact assessment is included as a section, but there will also be a separate derivative joint WHO/UNEP document on the subject.

3) The document identifies candidates for inclusion in the GDWQ. The toxicology section, for example, deals with chemical contaminants associated with desalinated water, including brominated DBPs, bromate, boron/borate, plus taste/odour and trace element issues. Microbes and algal toxins in sources are also issues of concern.

4) Mark Sobsey noted that there are a billion (non-human) viruses per millilitre in seawater and suggested that there might be “new” unique microbes that we need to be concerned with. Joe explained that the extreme treatment processes used in desalination (e.g. high-temperature distillation, pretreatment) mitigate this, although blending may be a concern; however, the document does mention that blended water needs to be treated before use.

5) Section 6.4 already refers to the supporting document, but it needs to be updated from in preparation status for the Fourth Edition. No other changes to the text in section 6.4 are necessary.

#18. Ships and Aviation

**Background:** The issue of water on cruise ships and in aircraft/airports, which is covered briefly in chapter 6 of the Third Edition of the GDWQ, is of considerable international interest. The International Health Regulations are being revised. Drinking-water is addressed in the documents *Guide to Ship Sanitation* and *Guide to Hygiene and Sanitation in Aviation*, which are both in revision at present.

**Expected end-product(s):** 1) Two stand-alone documents for publication in 2007 or later; 2) additional text for the GDWQ post-Fourth Edition

**Progress to date:** The first draft of the *Guide to Ship Sanitation* was completed and reviewed in 2004, and comments have been provided to the technical editor. It should be published in 2007. Progress on the *Guide to Hygiene and Sanitation in Aviation* is much slower. It is expected that a stand-alone document will be ready in 2008.
Plan of work for P&C WG:

1) The ship water document has been completed. However, efforts are now in progress to strengthen the International Health Regulations elements. The timeline for this is projected to be late 2007. The final document will then be recirculated to the WG for review by selected WG members, including Joe Cotruvo and Stephen Schaub.

2) Mrs Lena Hope has joined WHO for an 11-month secondment from the National Sanitation Foundation (NSF), where she worked in the Drinking Water Chemicals Certification programme. She will work for WHO specifically on developing guidelines for hygiene and sanitation in aviation.

3) WHO is continuing work on the development of guidance for water and sanitation on aircraft. The airplane document WG is forming, and a workplan has been provided to the P&C WG for review. The P&C WG was advised that the USEPA has embarked on an effort to develop regulations for the airline industry in the form of a management system based on HACCP plus independent oversight. The goal is to achieve harmonization between the two efforts to the extent possible. The WHO effort will need to consider global circumstances in a variety of geographical locations and their water management practices for aircraft.

4) The WG supports the development of this guidance document and recommends broad geographic representation, especially of developing countries. As Germany is advanced in the development of a similar technical rule, its participation is recommended by the WG. The completion schedule is to finalize the drinking-water and sanitation parts of the document by the first quarter of 2008. The workplan can be consulted for further details of the completion schedule.

#19. Temporary Water Supplies

Background: The topic of temporary water supplies is only briefly mentioned in chapter 6 of the Third Edition of the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended the preparation of a text on standards and guidelines for temporary water supplies (e.g. festivals, markets), for eventual inclusion in chapter 6 of the GDWQ Volume 1. The FTF meeting also recommended that the P&C WG look at approaches for effective control of temporary water supplies for public health protection, for inclusion in the Fourth Edition.

Expected end-product(s): Additional text on temporary water supplies for inclusion in chapter 6 of GDWQ, for publication in the second addendum to Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed that text should be added to chapter 6 on temporary water supplies and adopted a plan of work. The GDWQ WG meeting (Geneva, 2005) approved the two-page text for insertion in chapter 6, with amendments. The GDWQ WG meeting (Geneva, 2006) approved the revised text for inclusion in the second addendum and agreed that this item could be removed from the agenda once the second addendum has been published.

Plan of work for all WGs:

1) The text has been reviewed and comments have been incorporated. The text will be published as part of the second addendum. This item will be removed from the agenda once the second addendum has been published.
#20. Vended Water

**Background:** The topic of vended water supplies is only briefly covered in Volume 1, chapter 1 (section 1.2.7), of the Third Edition of the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended the preparation of a text on the application of standards and guidelines to vended water (i.e. private vendors of not necessarily potable water, a widespread practice in cities in developing countries worldwide) for eventual inclusion in chapter 6 of the GDWQ Volume 1. This should include a discussion of de facto vending of non-potable water. The FTF meeting also recommended that the P&C WG look at effective approaches to support and control water vending and ensuring that this contributes to public health protection, for inclusion in the Fourth Edition. The WHO regions (e.g. WHO Regional Office for the Western Pacific (WPRO) have expressed considerable interest in this area.

**Expected end-product(s):** 1) Modification of text in chapter 1, for publication in the second addendum to the Third Edition; 2) additional text on vended water supplies to be included in chapter 6, for publication in the second addendum to the Third Edition; 3) stand-alone document on bulk water supplies, including vended water, publication date unknown (see agenda item #6)

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed that more substantive text on vended water is needed and adopted a plan of work. The GDWQ WG meeting (Geneva, 2005) was advised that work on the stand-alone document had not yet been initiated, but a draft of text for chapter 6 was almost completed. The GDWQ WG meeting (Geneva, 2006) provided substantive comments on the draft of text for chapter 6, and the revised text will be circulated for review. The GDWQ WG meeting (Berlin, 2007) agreed to merge this agenda item with the agenda item on bulk water (agenda item #6) and to develop a supporting document to address concerns in this area. This decision will be revisited at the next working group meeting.

**Plan of work for all WGs:**

1) **David Cunliffe** (with help from Guy Howard) wrote the text for the new section 6.10 in the second addendum. PAHO made some comments on vended water in the videoconference, and David will take them on board and make any necessary revisions to draft text.

2) Some members of WGs (e.g. Health Canada, Stephen Schaub) have comments on the text, which needs a bit more detail on issues such as cleanliness, handling, spigot, materials, ice machines, surveillance (and unscrupulous vendors). David will revise the draft accordingly.

3) The WGs agreed that an expanded document on vended water was needed and that it should be linked with the bulk water shipments document (see agenda item #6). David Cunliffe is to work with Stephen Schaub, who volunteered to coordinate work on the bulk water section. The ships and planes documents (see agenda item #18) will be cross-referenced as well, but there should not be too much overlap, as there are different target audiences.

4) **Stephen Schaub** will look at current outward container cleanliness regulations in the United States for vended water and will determine from contacts with the United States Food and Drug Administration how their bottled water supply requirements cover external fittings, etc., for product safety.

5) Input from developing countries is needed. **Oliver Schmoll** is to put David Cunliffe in touch with people in Jordan who can assist in this regard.
6) There is also a cross-connection with the regulators network (see agenda item #124). WHO has a list of key themes around which meetings with regulators would be organized, which include vended water (including tanker trucks), etc.

7) After publication of the second addendum, the vended water agenda item will be merged with the bulk water shipments agenda item (#6), which will be retitled Bulk Water Supplies. This agenda item will then be removed from the plan of work [see Post-meeting note below].

8) Post-meeting note: WSH is of the opinion that vended water and bulk water should be kept as separate agenda items because of the substantial differences between the two. It is noted that any discussion on vended water needs to be cross-referenced to information on bulk supply and emergency supply.

#21. Dual Water Supply Systems

Background: Dual water supplies are not addressed in the Third Edition of the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended that dual water supply systems (i.e. separate systems for domestic use and drinking-water) be considered in the rolling revision. The meeting also recommended that a comment be included in the Fourth Edition on maintaining effective separation of potable and non-potable waters and on the availability of guidance on non-potable water management. WPRO has expressed an interest in this area.

Expected end-product(s): 1) Short text on dual water supplies for Fourth Edition; 2) new section in chapter 6 addressing the safety and management of multiple water supplies at the household and community levels for inclusion in Fourth Edition of GDWQ

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed on the need to address this topic in the Fourth Edition. This item was not addressed during the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) decided that a major initiative within the Guidelines process should not be done at this time but reiterated the need for a brief mention of dual water supplies in the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) agreed that text should be prepared for chapter 6 that addresses the reality of multiple sources and dual uses at the household level.

Plan of work for P&C WG:
1) The WG decided that the way forward was to write a short text on dual water supplies for the 4th edition, recognizing the need to address the reality that many people and communities have multiple water supplies or sources that often differ in quality, some of which are unsafe. The WG recommends that the 4th edition have a section in chapter 6 addressing the safety and management of multiple water supplies at the household and community levels. The text will address the reality of multiple sources and dual uses at the household level. This effort will be led by Ingrid Chorus, with participation by Oliver Schmoll and Mark Sobsey.

#22. Rainwater Harvesting

Background: Rainwater harvesting is in use in many countries throughout the world. Rainwater collected and used on-site can supplement or replace other sources of household water. Rainwater can also be used as drinking-water if it is properly treated before use. The GDWQ FTF meeting (Geneva, 2003) identified safe rainwater harvesting as an important omission from the GDWQ and requested that a text to address it be developed as soon as
possible. The WHO regions (e.g. SEARO and WPRO) have expressed considerable interest in this area.

Expected end-product(s): 1) Additional text for chapter 6 of the GDWQ, for inclusion in the second addendum to the Third Edition; 2) additional text woven throughout the early chapters of the GDWQ, for inclusion in the Fourth Edition; 3) stand-alone document providing technical guidance on stability, storage and monitoring of rainwater and information on health concerns associated with rainwater harvesting systems.

Progress to date: As of the GDWQ WG meeting (Geneva, 2005), no progress had been made on the preparation of a separate document on rainwater harvesting. The GDWQ WG meeting (Geneva, 2006) approved the additional text for chapter 6 of the GDWQ, with amendments, for inclusion in the second addendum to the Third Edition. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward for the stand-alone document on rainwater harvesting.

Plan of work for P&C and Micro WGs:
1) Text has been prepared for chapter 6 of the second addendum and is in public domain review. Once review comments have been addressed, the text will be published as part of the second addendum.
2) Additional text on rainwater harvesting needs to be woven throughout the early chapters of the GDWQ for inclusion in the Fourth Edition. This will be prepared by Feroze Ahmed once the stand-alone document has been finalized.
3) Feroze Ahmed is now drafting the stand-alone document with a contribution from Han Heijnen. The main focus will be on the development of WSPs for rainwater harvesting systems. The expected length of the document is 75 pages. The draft document is expected by August 2007. Recommended WG reviewers include Ana Maria de Roda Husman and David Cunliffe, plus P&C WG members.

#23. Household Water Treatment

Background: Household water treatment is common in both the developed and developing world. There is now conclusive evidence that simple, acceptable, low-cost interventions at the household level are capable of dramatically improving the microbial quality of household stored water and reducing the attendant risks of diarrhoeal disease and death. A variety of physical and chemical treatment methods to improve the microbial quality of water are available, and many have been tested and implemented to varying extents in developed and developing countries. Several WHO regions (e.g. WPRO) have expressed considerable interest in this area.

The GDWQ FTF meeting (Geneva, 2003) deleted part of a table referring to household water treatment (Table 7.6, section 7.3.2) and referred it to the rolling revision. In addition, although information is provided in chapter 7 about pathogen removal performance targets required by treatment processes used for piped supplies, additional information is required on the capacity of household and point-of-use treatment devices to achieve pathogen removals from different types of source water. A supporting document on Managing Water in the Home is in draft form.

Expected end-product(s): 1) An additional table dealing with household water treatment, for inclusion in the second addendum to the Third Edition, to extend the information contained in Table 7.6; 2) text on household treatment processes to remove chemical contaminants, for
inclusion in chapter 8 of the second addendum to the Third Edition; 3) updated version of the supporting document *Managing Water in the Home*, for peer review at end of 2007; 4) assessment of capacity of devices used as a single barrier to meet required pathogen reductions, for possible inclusion in future editions of GDWQ

**Progress to date:** The need for guidance in the area of water quality changes in non-piped distribution and household management for developing countries in particular was agreed at the Berlin Coordinating Committee meeting (2000). A draft report was tabled at the joint Microbial Aspects WG and P&C WG meeting in Adelaide (2001) with extensive review and discussion, and meeting participants recommended that the comments and recommendations be addressed in improving the document. The revised document was presented and discussed at the expert consultation in Loughborough, United Kingdom (2001). The document *Managing Water in the Home* was published in 2002. The GDWQ WG meeting (Geneva, 2004) made a few recommendations on the content of the supporting document and agreed to a plan of work for dealing with household treatment in the GDWQ proper. The GDWQ WG meeting (Geneva, 2005) agreed that the plans for the identified tasks should proceed as scheduled, and the GDWQ WG meeting (Geneva, 2006) suggested a path forward. The GDWQ WG meeting (Geneva, 2007) proposed reviewers for various chapters of the *Managing Water in the Home* document.

**Plan of work for Micro and P&C WGs:**
1) The *Managing Water in the Home* document is still in progress.
2) New chapters have been added to the document. For those not previously peer-reviewed, peer reviewers are needed. For the chapter on social and behavioural aspects, the proposed peer reviewer is Margaret Bentley, University of North Carolina (UNC)-Chapel Hill. For the chapter on cost-effectiveness, proposed peer reviewers are Dale Whittington, UNC-Chapel Hill, United Kingdom cost-effectiveness group member, and internal WHO cost-effectiveness group. The chapter on health impact of household water treatment has been peer-reviewed through the Cochrane Collaboration system; no further peer review is needed. Mark Sobsey and Bruce Gordon will ensure that these peer reviews are carried out.
3) **Note:** For the next meeting, this agenda item will be headed “Supporting documents on household water treatment” and will consist of two parts: #23A, Household Water Treatment and #23B, Technology Performance Evaluation (currently agenda item #36).


**Background:** The *Chemical Safety of Drinking-water: Assessing Priorities for Risk Management* supporting document provides tools that allow users to undertake a systematic assessment of their water supply system(s) locally, regionally or nationally; to prioritize the chemicals likely to be of greatest significance; to consider how these might be controlled or eliminated; and to review or implement standards that are appropriate to specific circumstances.

**Expected end-product(s):** Supporting document for publication in 2007

**Progress to date:** The Berlin Coordinating Committee meeting (2000) recognized that the Second Edition of the GDWQ did not provide sufficient information to enable countries, especially poorer countries, to be able to prioritize and select the chemicals that should be included in routine monitoring and assessments and recommended that an application-
focused document be prepared, as outlined at that meeting. A draft protocol was reviewed at the 
external consultation in Loughborough (2001), which made suggestions for improvement, 
to be discussed at the external consultation on monitoring chemicals in drinking-water in 
Bangkok in December 2001. The Bangkok meeting (2001) decided to trial the draft document 
in a selected number of countries in the WHO Western Pacific Region to assess the 
document’s practicability. At the Chemical Aspects WG meeting (Tokyo, 2002), it was 
reported that draft texts had been developed through two meetings of experts in Bangkok and 
field trials in the regions. The text has been reviewed and will be published in 2007. The 
GDWQ WG meeting (Geneva, 2006) agreed that this item could be removed from the plan of 
work once the document has been published.

Plan of work for P&C WG:
1) This book is at the WHO printer and should be printed shortly. *This agenda item can be removed from the plan of work once the book is published.*

#27. Protecting Surface Waters for Health

**Background:** The protection of surface waters is important in regions where these are used as 
a source for drinking-water supply. Surface water protection is a first step in the management 
of a multiple-barrier approach for the protection of drinking-water. Moreover, source water 
quality determines the extent of treatment required. The need for a text on the control of 
health hazards in drinking-water from various sources, including source water, has been 
recognized by WHO since 1996.

**Expected end-product(s):** Stand-alone supporting document, publication date late 2008 or 
early 2009

**Progress to date:** At the Berlin Coordinating Committee meeting (2000), the need for 
information concerning surface water quality, and especially regarding the occurrence of 
pathogens, was noted, and the development of a corresponding text was recommended. The 
scope and purpose of the monograph, as well as its status of preparation, were presented to 
the Chemical Aspects WG meeting in Tokyo (2002). This document is in the early phases of 
completion as a draft.

Plan of work for P&C WG:
1) A two-week writing camp will be held in September 2007 to work on the book. The 
writing camp is to be attended by Ingrid Chorus, Oliver Schmoll, Dan Deere and 
another person to be named.
2) The document is to include pathogen occurrence and impact in water supply sources. 
There is a need for a source of data, preferably a database, on pathogen occurrence in 
surface water and sewage. Efforts will be made to incorporate such data into the 
document. These will be harmonized with other data sources developed for the GDWQ.
3) A draft document will be completed by December 2007. It will be peer-reviewed by May 
2008 in time to report to the P&C WG. Proposed WG peer reviewers of the pathogen 
ocurrence content of the book: Mark Sobsey, Steve Schaub, Ana Maria de Roda 
Husman.
4) The WG is to determine if the document is ready for public domain review. If it is ready, 
the document should be completed by December 2008.
#28. Water Safety Plans

**Background:** The improvement of water quality control strategies, in conjunction with improvements in excreta disposal and personal hygiene, can be expected to deliver substantial health gains in the population. The *Water Safety Plans* supporting document provides information on improved strategies for the control and monitoring of drinking-water quality.

**Expected end-product(s):** 1) Stand-alone report (“principles” document), released in 2005; 2) supporting document (“how to” document), publication date September 2007; 3) revised text in Fourth Edition to clarify definitions of verification and validation and address the need for suppliers to undertake internal review of their plans (perhaps section 4.6 on documentation and communication and elsewhere)

**Progress to date:** The potential for application of WSPs was evaluated in a series of expert review meetings in Berlin (2000), Adelaide (2001) and Loughborough (2001), and a text on WSPs and application of the hazard analysis and critical control point (HACCP)-type approach to water supply was introduced at the Chemical Aspects WG meeting (Tokyo, 2002). The WSP document has been reviewed, and comments are being incorporated. It was released in 2005 as a “principles” report, not a “how to” supporting document, in response to the immediate need for guidance in this area. The GDWQ WG meeting (Geneva, 2004) recommended that a supporting document that focused on “how to” guidance be prepared as a high priority. The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work, which was revised by the GDWQ WG meeting (Geneva, 2006). The GDWQ WG (Berlin, 2007) were advised that the manual would be published by IWA in September 2007 and agreed on a path forward for a similar manual for small water supplies.

**Plan of work for P&C and Micro WGs:**

1) The revised draft (dated 27 April 2007) of the Water Safety Plan Manual was provided to WG members. It has been sent for review. Dan Deere and Annette Davison have taken review comments into account. It will be co-published by WHO and IWA in September 2007.

2) The how-to manual focuses only on utility water supplies. Something similar is needed to cover small water supplies (which are not covered by the current Volume 3). The WGs do not recommend revising Volume 3. [Post-meeting note: WSH considers that revising Volume 3 may be necessary in order to deal with WSPs for small water supplies.]

3) David Cunliffe reported that the small systems network was developing a generic plan based on experience from around world, including Bangladesh, Canada and the UK (see also agenda item #132). Work has stalled due to staffing issues at WHO. Jennifer Mercer is shortly to arrive in Geneva and will get things moving, including working with David Cunliffe and Shamsul Gafur Mahmud of Bangladesh to put together a work plan on the WSP tool development for the small community supplies network (see agenda item #132). They will contact Venera Djudemisheva from Kyrgyzstan to inquire about their experiences in this regard. This work could augment the WSP document of Dan Deere and Annette Davison (refer to agenda item #132 on the small community network for further discussion).

4) Revised text is to be prepared for the Fourth Edition. Guy Howard is willing to contribute to the Fourth Edition and will sort out what is needed with Bruce Gordon via email or phone.
#28A. WSP Dissemination Mechanisms

**Background:** The GDWQ WG meeting (Geneva, 2005) identified the need for more structured plans and activities for “dissemination mechanisms” for WSPs. There is a need for the development of training and educational materials, such as workshop programmes, table/desktop exercises and interactive problem-solving tasks, as a way to facilitate the learning of WSPs by water suppliers. Workshops have already been conducted, such as in Iceland in 2004 and another one on risk management in July 2005 in Australia, with representation from SEARO and WPRO. Another meeting will be held in Scotland in October 2007. Other workshops will possibly be held in Marrakech, Morocco and South America.

**Expected end-product(s):** 1) Development of a web site on WSPs as a training and education tool; 2) implementation support in the form of training programmes, modules and materials

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. Lead coordinators for the four categories of activities for WSP dissemination updated the GDWQ WG meeting (Geneva, 2006) on progress in their areas. The GDWQ WG meeting (Berlin, 2007) was updated by IWA on progress regarding the WSPortal.

**Plan of work for P&C and Micro WGs:**
1) The WG was briefed by Tom Williams of IWA on progress. IWA and WHO have established a long-term agreement and funding arrangement for a workplan on implementation of WSPs. This will incorporate WSPortal enhancement.
2) It was suggested that we need to have a separate agenda item for the WSPortal.
3) It was also suggested that the agenda items on the networks should be grouped under a single agenda item (on Networks): e.g. 124A WSPortal, 124B Small Systems Network (currently #132), 124C International Network to Promote Household Water Treatment and Safe Storage (currently described in #124), 124D O&M Network (currently #34) and 132E Network of Drinking Water Regulators (currently #124). *This will be done for the next meeting.* In this regard, Jennifer Mercer and the Small Systems Network aim to produce material for training providers, draft curriculum, modules, materials and other associated tools to educate on the importance of managing and operating water supplies from a public health perspective and how to implement WSPs.

#29. Water Treatment and Pathogen Control: Process Efficiency in Achieving Safe Drinking-water

**Background:** The GDWQ FTF meeting (Geneva, 2003) noted that finalization and progressive updating of the supporting document *Water Treatment and Pathogen Control: Process Efficiency in Achieving Safe Drinking-water* would provide substantiation and support to other supporting documents dealing with the issue of system assessment. The first edition of the document was published in 2004. It was recognized that the document will require an update, because this is a dynamic and active area of continued new information. New data should go into a future revision/edition of the document.

**Expected end-product(s):** 1) Second edition of supporting document, publication date circa 2008
Progress to date: At the GDWQ meeting in Medmenham in 1998, the need for an expert review of the state of knowledge and available information on treatment efficiency and pathogen removal was identified. A draft of the text was developed by Mark LeChevallier and reviewed at the Berlin Coordinating Committee meeting (2000). The joint Microbial Aspects and P&C WG meeting in Adelaide (2001) recommended that the text in its current form be submitted for peer review and that comments from the meeting be incorporated as part of the peer review process. The GDWQ WG meeting (Geneva, 2004) strongly supported its publication. The document was published in 2004. The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work for the preparation of a second edition, and the GDWQ WG meeting (Geneva, 2006) suggested a path forward towards a revised second edition. The GDWQ WG meeting (Berlin, 2007) was advised that no progress had been made since the previous meeting.

Plan of work for P&C and Micro WGs:
1) No progress has been reported for this past year.
2) Bruce Gordon will call Mark Lechevallier about updating the book as a 2nd edition, as previously planned. He will be invited to update and revise the book. If he does not agree to do this, he will be asked to suggest another author to take up the revision of the book. For the revised edition, Peter Teunis will also be contacted for incorporation of short-term fluctuations into the book.


Background: The GDWQ FTF meeting (Geneva, 2003) was informed that the second edition of the text Water Quality Monitoring was being updated. This document is not linked to the Guidelines but is referred to for guidance on analytical quality control, sampling and laboratory aspects. The FTF meeting also noted that the need for substantive guidance on sampling and monitoring (in developing countries) had already been taken into account in this supporting document. In relation to a comment that future tasks related to the GDWQ should include providing guidance on good laboratory practice in developing countries in routine and in corecentral laboratories, it was pointed out that the Water Quality Monitoring book that is currently being prepared deals with this issue. Updating should take account of changes proposed to GDWQ Volume 3 (see agenda item #32).

Expected end-product(s): None

Progress to date: The GDWQ WG meeting (Geneva, 2006) agreed that the book is still useful in its current form except for the section on laboratories and analytical methods and agreed on a path forward to revise that text. The GDWQ WG meeting (Berlin, 2007) decided that there was no urgent need to update this book and agreed to drop this agenda item from the plan of work.

Plan of work for P&C WG:
1) Guy Howard reported that there is no progress on this agenda item because Steve Pedley reported that the original authors were not interested in updating the book and he was unsuccessful in his attempts to identify new authors. Guy feels that there is no urgent need to update this book and proposed removing the agenda item from the workplan.
2) The WGs discussed this in plenary, and it was concluded that this book was no longer needed. The Committee agreed to remove it from the agenda.
#32. Updating Volume 3 of the GDWQ

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that GDWQ Volume 3 (Surveillance and Control of Community Supplies) be updated through moderate editing in order to align it with the Third Edition (including terminology) and to better account for issues of small community supplies in middle- and upper-income countries. The update should include alternative technologies for *in situ* disinfection of household water (e.g. “bricks,” tablets). This could be linked to preparation of a Volume 4 (see agenda item #33). The updating should include a full review of technical efficacy and programme experience with approaches to disinfection of household wells. The meeting also recommended that the discussion of WSPs for small systems be expanded in an updated Volume 3. The need for substantive guidance on sampling and monitoring should be reviewed in the context of the book *Water Quality Monitoring* (see agenda item #31). WPRO supports the need for increased guidance on WSPs for small systems.

**Expected end-product(s):** Guidance document on implementing WSPs in small community supplies

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) decided that there was no major urgency to update Volume 3 and that it should be revisited in parallel with the Fourth Edition. The GDWQ WG meeting (Geneva, 2006) recommended that revision of Volume 3 be considered for 2009. The GDWQ WG meeting (Berlin, 2007) decided that there was no need to update Volume 3 but that there was an urgent need to develop a guide for implementing WSPs in small community supplies worldwide and agreed to a path forward. This decision will be revisited at the next WG meeting.

**Plan of work for P&C WG:**

1) The WG noted that the current need is to provide guidance on management of small water supplies. Because Volume 3 is on surveillance of small water supplies, the focus is different and there is no current need to update it. However, there is an urgent need to develop a guide for implementing WSPs in small community water supplies of all countries, both developed and developing. The WG recommended that the new guide complement the current Volume 3 as well as the current WSP manual. [Post-meeting note: WSH suggests that Volume 3 definitely needs updating to develop concepts developed in the Third Edition, including WSPs.]

2) The small work group for preparing this document is coordinated by David Cunliffe and Shamsul Gafur Mahmud of Bangladesh, together with Jennifer Mercer, who will take over the role of Jackie Sims on this item (see agenda items ##28 and 132 on the preparation of the WSP document for small community water supplies).

3) This new document for small supplies is to be drafted for outline of content by December 2007. For details, refer to the agenda item concerned with the network for small community water supplies (see agenda item #132).

#33. Preparation of GDWQ Volume 4

**Background:** Urban populations that include poor peri-urban and slum populations are increasing worldwide. Such populations often carry a significant burden of water-related disease. They are also frequently exposed to multiple microbial and chemical hazards through multiple routes. The GDWQ FTF meeting (Geneva, 2003) proposed that in order to better
respond to issues related to water supply in rapidly urbanizing low- and middle-income countries, the present Volume 3 (Surveillance and Control of Community Supplies) be complemented by a Volume 4 (Surveillance and Control of Water Supply in Urban Areas), which would draw on a number of pilot projects that have been implemented and documents that have been developed. The meeting also recommended that the need for substantive guidance on sampling and monitoring be taken into account in the proposed GDWQ Volume 4 on surveillance of urban drinking-water supply.

**Expected end-product(s):** Volume 4 of GDWQ on surveillance and control of water supply in urban areas of low- and middle-income countries, publication date unknown

**Progress to date:** The 1995 Coordinating Committee recommended that guidance on the theme of monitoring of drinking-water supply and quality in urban areas be developed, field tested and revised by the time of preparation of the Third Edition of the GDWQ. The 1996 P&C WG meeting agreed to pursue drafting in 1996–97, and the 1998 WG meeting reviewed plans, especially with regard to identification of pilot projects, and recommended that a small group of experts consolidate draft materials. The Berlin Coordinating Committee meeting (2000) recommended that the consolidated document be released as a free-standing publication. The Chemical Aspects WG meeting (Tokyo, 2002) was updated on the status of development of the project. Pilot projects have been implemented in Uganda, Ghana, Bangladesh and Latin America (through WHO/PAHO/CEPIS). The plan of work (encouraging implementation of further pilot projects, with their evaluation leading into drafting of a Volume 4 for pilot tests and then refinement) was endorsed at the GDWQ WG meeting (Geneva, 2004). The GDWQ WG meeting (Geneva, 2005) was advised that three documents, from Uganda, Bangladesh and CEPIS, are currently available and requested that a brief (two-page) outline of the proposed Volume 4 content be prepared and submitted for review. The GDWQ WG meeting (Geneva, 2006) agreed that the three documents should be consolidated into one draft for review. The GDWQ WG meeting (Berlin, 2007) were advised that no progress had been made but that a draft should be ready for review at the next meeting.

**Plan of work for P&C WG:**

1) **Guy Howard** reported that **Federico Properzi** has looked at consolidating the three documents into one document for review, but it will not be an easy task. Guy has committed to Federico and WHO that he will prioritize his time so that he can devote whatever is necessary to this project for Federico’s next contract (August).

2) **Guy Howard** will try to have a draft on the table for the WG to review at the next meeting. A draft structure proposed by Federico was provided to WG members.

3) The WG is to review the contents list before August and provide comments to Guy (and Federico).

**#34. Link with Operation and Maintenance Network**

**Background:** The GDWQ FTF meeting (Geneva, 2003) stressed the importance of establishing a link between the Protection and Control WG and the “operation and maintenance network” (OMN). The network was created in 1981 during a global forum formed by 300 people. The core group consists of 10–15 persons. The OMN group has produced several useful publications, and these can be downloaded from the WHO web site. The manuals have been designed to accommodate a wide variety of people. In 2000, the Institute for Public Health, Japan, took over the coordination of the OMN.
**Expected end-product(s):** Better harmonization of international activities and increased communication

**Progress to date:** A liaison who is from the P&C WG as well as from the Institute of Public Health, Japan, has been appointed. The WG and the OMN have agreed to collaborate on specific tasks, and the GDWQ WG meeting (Geneva, 2005) encouraged continued linkage and activities. The GDWQ WG meetings (Geneva, 2006; Berlin, 2007) were updated on progress in this area.

**Plan of work for P&C WG:**

1) Shoichi Kunikane reported that the network consists of a small core group of 10 members. It is still under the umbrella of WHO, but the National Institute of Public Health of Japan is taking on the role of coordinator. A proposed outline of the plan of action for OMN-EOM (the IWA Specialist Group “Efficient Operation and Management”) activities in 2007 (including an O&M workshop series, knowledge gap synthesis, advisory group services and network administration) was provided to WG members. Shoichi also has copies of the draft policies and procedures of the network if anyone is interested.

2) The O&M network is cooperating with WHO with respect to WSP applications in WPRO countries. It is also planning a workshop in China to elaborate on the WSP concept.

3) There are no plans to produce any printed material at present.

4) It was suggested in earlier discussions that the various networks be linked under one agenda item (see agenda item #28A). This will be done for the next meeting.

5) It was requested that the WHO Secretariat produce a page or two on these different networks, explaining what they do, what they produce, their leadership, etc. This will be taken forward by Jennifer Mercer.

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**#36. Technology Performance Evaluation (TPE)**

**Background:** Environmental technology verification (ETV) (more correctly called technology performance evaluation, or TPE) is an important component of strategies towards drinking-water safety and is inadequately addressed in the Third Edition of the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended that TPE/ETV be addressed. The Protection and Control WG was asked to identify where best to address TPE/ETV and decide on a plan of action.

**Expected end-product(s):** 1) Brief statements for insertion in sections 1.2.9, 2.3, 3.2.2 (with cross-reference to microbial target derivation), 4.1.7 and relevant sections of chapter 6 (e.g. safe drinking-water for travellers), and possibly a separate new section in the GDWQ on TPE/ETV, for inclusion in the Fourth Edition; 2) text on key chemical aspects of TPE/ETV, for inclusion in the Fourth Edition; 3) free-standing supporting monograph on TPE/ETV in safe household water treatment and storage; 4) free-standing supporting document on POU treatment for chemicals

**Progress to date:** The proposed actions were agreed at the GDWQ WG meeting (Geneva, 2004). The GDWQ WG meeting (Geneva, 2005) agreed to a revised plan of work. The GDWQ WG meeting (Berlin, 2007) agreed that the supporting monograph should be finalized for WG review and recommended the development of a separate document to address POU treatment for chemicals.
Plan of work for P&C WG:

1) The WG reviewed progress on the document and agreed that it should be finalized for WG review. Mark Sobsey will provide the draft to the WG by September 2007 for review. The current draft of the document is being provided to the WG and Steve Schaub now for immediate, interim review.

2) The WG recommended the development of a separate document to address POU treatment for chemicals. The document would provide descriptions of the performance of types or classes of technologies, such as membrane filters, adsorption technologies, ion exchange, coagulation-filtration, etc. for their ability to remove classes or categories of chemicals, such as organic chemicals. The document will also specifically address POU technologies for a few selected chemicals, such as arsenic and fluoride.

3) The WG agreed that NSF International should be approached to support this effort and prepare a working draft to kick-start the writing process. The process would be guided by Joe Cotruvo, Feroze Ahmed and Ingrid Chorus. The process would be initiated with an outline to be circulated to the WG. The time schedule for the chemical document effort is by May 2008.

4) Text on key chemical aspects of TPE/ETV is needed for inclusion in the Fourth Edition. Information is needed on the relative effectiveness of different treatment processes and technologies, as well as on related aspects, including affordability and use behaviours, especially for key chemicals, such as arsenic and fluoride. Joe Cotruvo and Feroze Ahmed will prepare a draft text for discussion at the next meeting.

5) Brief statements were to have been prepared for insertion in sections 1.2.9, 2.3, 3.2.2 (with cross-reference to microbial target derivation), 4.1.7 and relevant sections of chapter 6 (e.g. safe drinking-water for travellers), and possibly a separate new section in the GDWQ on TPE/ETV, for the second addendum. This was never done. Joe Cotruvo is asked to determine whether such text is still needed given 4) above.

#38. Table 7.1

Background: It has been determined from several review comments that Table 7.1 (“Waterborne pathogens and their significance in water supplies”) in the Third Edition requires review and revision to ensure that available information is fully reflected.

Expected end-product(s): 1) Revised Table 7.1, for inclusion in second addendum to Third Edition; 2) additional pathogens to be added to Table 7.1 for Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work, the timeline of which was revised by the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) agreed that revision of Table 7.1 was to be completed for the second addendum. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward towards ensuring consistency among Table 7.1, Figure 7.1 and the microbial fact sheets in chapter 11 for the Fourth Edition.

Plan of work for Micro WG:

1) The WG agreed that organisms in Table 7.1, Figure 7.1 and the microbial fact sheets in chapter 11 need to be made consistent for the Fourth Edition.

2) Figure 7.1 is to be discussed first in chapter 7 with text describing the various transmission routes. The organisms in the figure are to be reduced to examples.

3) The text is to be revised with respect to the significance (or not) of the waterborne route (e.g. Bacillus, Enterobacter).
4) The text is then to focus on pathogens (non-opportunistic), leading in to Table 7.1, which will be modified to include those organisms cited in existing or new fact sheets (e.g. Leptospira, Blastocystis, Helicobacter, Microsporidia, Isospora, Fasciola, Francisella tularensis) (see agenda item #150).

5) **David Cunliffe** will coordinate the work on this agenda item.

### #39. Short-term Fluctuations in Levels of Microbial Contaminants

**Background:** A draft paper by Peter Teunis, Annette Davison and Daniel Deere determined that short-term fluctuations of microbial contaminants in water lead to possible short-term exposures much higher than average values. The paper concluded that exposures can vary if control measures are not sufficient to handle the extreme values, but that the long-term averages would usually indicate low overall risk.

**Expected end-product(s):** Possible amendments to GDWQ, for publication in Fourth Edition; this item is also being carried forward to the agenda item on the supporting document Water Treatment and Pathogen Control: Process Efficiency in Achieving Safe Drinking-water (see agenda item #29)

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work, which was slightly revised by the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) agreed on a path forward to ensuring that the essential content of the draft document be incorporated into other documents and the Fourth Edition, which was updated by the GDWQ WG meeting (Berlin, 2007).

**Plan of work for Micro WG:**

1) The WG finds that the material in the document is a valuable contribution that can inform and support WSPs, microbial risk assessment and related activities of the GDWQ. It is recommended that the essential content of the document be incorporated into other documents on WSPs, the document on water treatment and pathogen control and the quantitative health risk assessment project forward workplan. A WSH representative will invite Peter Teunis and his co-authors to participate in these activities of developing these other documents. Also, the key information of this document will be considered in preparation of the Fourth Edition.

2) Text will be included in the new section on source water in chapter 7 dealing with short-term fluctuation (Ana Maria de Roda Husman and Steven Schaub).

### #40. Microbial Risk Assessment

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that risk assessments be prepared on E. coli O157, Cryptosporidium, Campylobacter and enteric viruses with varying levels of priority depending on the availability of sufficient data. Drafts had previously been prepared on Cryptosporidium and enteric viruses. Both were incomplete, and there was concern about the lack of data regarding enteric viruses. The Microbial Aspects WG was informed about ongoing projects that will undertake risk assessments of Norovirus infection.
Expected end-product(s): 1) Risk assessment (QMRA) on Cryptosporidium to be combined with the text on Cryptosporidium currently published as part of the microbiological addendum to the Second Edition to become a free-standing report; 2) stand-alone document on Campylobacter; 3) revised fact sheet on Cryptosporidium for Fourth Edition

Progress to date: A draft document on Cryptosporidium has been initiated by Gertjan Medema. The GDWQ WG meeting (Geneva, 2004) agreed that further risk assessments would not be undertaken at this time due to a lack of data. The GDWQ WG meeting (Geneva, 2005) determined that additional documents were needed and agreed to a plan of work. The GDWQ WG meeting (Geneva, 2006) endorsed publication of the draft document on Cryptosporidium, subject to satisfactory incorporation of review comments. The GDWQ WG meeting (Berlin, 2007) noted that the document could be published following review, revision to incorporate comments and approval by the Microbial Aspects WG via email.

Plan of work for Micro WG:
1) The draft document on Cryptosporidium was released for public consultation in 2006. The document, entitled “Risk Assessment of Cryptosporidium in Drinking-water”, was revised by Gertjan Medema and other authors to incorporate the limited review comments received. Ed Ohanian and Stephen Schaub have requested time to provide additional comments. Stephen Schaub will be sent this document by Gertjan Medema (copied to Penny Ward) and will have 2 weeks (till the end of May) to review the draft. Subject to consideration of these comments, inclusion of text on the risk assessment undertaken as part of the USEPA Long Term Enhanced Surface Water Treatment Rule and final endorsement of the WG, the DWQC recommends publication. The WG will be given the opportunity to endorse the final draft via email once these comments have been received and addressed.
2) Penny Ward is requested to add Ed Ohanian (or his replacement) to the listserve (and to the regular list of DWQC members).
3) The fact sheet on Cryptosporidium will be revised for the Fourth Edition. Gertjan Medema and Ana Maria de Roda Husman will do this.
4) Preparation of text on Campylobacter was recommended. Ana Maria de Roda Husman has contacted Dr Verikko, Peter Teunis and Jack Schijven and will also contact Marion Savill. Peter Teunis and Jack Schijven have agreed to undertake the risk assessment. Some of this is available from the WHO/IWA Waterborne Zoonosis monograph produced in 2004, and it should be consulted to avoid unnecessary duplication.
5) Post-meeting note: Stephen Schaub provided technical comments on the Cryptosporidium risk assessment at the end of May 2007 to Gertjan Medema for consideration in incorporating the comments into the risk assessment document.

#41. Legionella and the Prevention of Legionellosis

Background: The GDWQ FTF meeting (Geneva, 2003) requested that the supporting document Legionella and the Prevention of Legionellosis be finalized.

Expected end-product(s): 1) Publication of supporting document as a stand-alone document in 2006; 2) updated text in the Fourth Edition

Progress to date: Participants at the Berlin Coordinating Committee meeting (2000) expressed concern that the microbiological addendum to the Second Edition of the GDWQ did not provide sufficient information about the control of Legionella and agreed to revisit
this issue at a future meeting as a moderate priority. Participants at the joint Microbial Aspects and Protection and Control WG meeting in Adelaide (2001) confirmed the need to address Legionella in the GDWQ and endorsed pursuit of a document encompassing both risk assessment and risk management aspects and following the wider approach being developed for microbial hazards in the GDWQ. The final document, containing 11 chapters, was published in 2007. The GDWQ WG meetings (Geneva, 2006; Berlin, 2007) agreed that the GDWQ should be updated based on this document for the Fourth Edition.

**Plan of work for Micro WG:**

1) The document was published in 2007.
2) The WG noted the need to ensure consistency of the 4th edition (chapter 7) with the Legionella text. Cross-referencing is to be included. **David Cunliffe** will coordinate this work.

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**#43. Safe Piped Water: Managing Microbial Water Quality in Piped Distribution Systems**

**Background:** The GDWQ FTF meeting (Geneva, 2003) indicated that finalization and progressive updating of the supporting document Safe Piped Water would provide substantiation and support to other supporting documents dealing with the issue of system assessment.

**Expected end-product(s):** Stand-alone document, publication date unknown

**Progress to date:** At the GDWQ WG meeting in Medmenham in 1998, it was recommended that a text be developed concerning water quality changes in piped distribution and storage. At the Berlin Coordinating Committee meeting (2000), it was noted that public health-oriented monitoring of microbial water quality should be based on water consumed (i.e. collected from the tap) and not simply water in supply. The joint Microbial Aspects and P&C WG meeting in Adelaide (2001) reviewed and discussed the full first draft document. The expert consultation in Loughborough (2001) reviewed the document in light of changes since the Adelaide meeting and concluded that although the document was comprehensive, a number of alterations were still required. The document went through three cycles of peer review, including by the Microbial Aspects WG, which endorsed the document and recommended that publication proceed. This document was published in 2004. The GDWQ WG meeting (Geneva, 2006) decided to postpone a decision about updating the document until the next year’s meeting. The GDWQ WG meeting (Berlin, 2007) agreed to postpone the decision for at least one more year.

**Plan of work for Micro WG:**

1) The WG believes that the document is contemporary and should not be updated in the near future (especially given that the WSP manual will be published later this year). Instead, a decision about updating should be postponed until the next meeting or the one after that.
2) **John Fawell** reported that Dick Ainsworth, the author of the document, is approaching full retirement and is now working only occasionally, so that he is likely to be unavailable for the updating process.
3) Post-meeting note: John has approached Dick, who is unwilling to do a complete update. It is suggested that the proposal at the next WG meeting will be to delete it from the plan of work.
#46. Evaluation of the H₂S Method for Detection of Faecal Contamination of Drinking-water

**Background:** WHO receives many requests for information and comment on this microbiological test (e.g. from WPRO). It is a potentially important issue, particularly for developing countries. The purpose of the supporting document *Evaluation of the H₂S Method for Detection of Faecal Contamination of Drinking-water* is to review the basis of the hydrogen sulfide test as a measure of faecal contamination of drinking-water and the available scientific and empirical evidence for and against the test as a valid, useful and reliable measure of faecal contamination and drinking-water quality. The draft report addresses the fundamental microbiological considerations of the test, including its chemical and biochemical basis, what organisms it detects, and how it detects and quantifies them and the reported experiences with its practical application to assessing water quality. A problem is that the test is non-specific and may provide false positives for possible pathogenic microorganisms in some waters that are not suffering sanitary contamination, but rather contain reducible sulfate. That will severely limit its use by decision-makers. One general comment was that the draft was ambiguous as to the value of the test and its utility as a screening tool.

**Expected end-product(s):** 1) Stand-alone supporting document for publication in 2007 or 2008

**Progress to date:** The joint Microbial Aspects and P&C WG meeting in Adelaide (2001) supported the view that a critical review of the significance and applicability of the H₂S test should be added to the work programme of the Microbial Aspects WG and appointed a project coordinator. A draft working document on the use of the H₂S test was presented and discussed in detail at the expert consultation in Loughborough (2001), and the meeting recommended that the document be peer reviewed once suggested changes had been addressed. The document has been peer reviewed, and some revisions have been made. The GDWQ WG meeting (Geneva, 2006) was informed that the main text of the draft document on the use of the H₂S test had been completed. The GDWQ WG meeting (Geneva, 2007) was advised that the Executive Summary will be completed by the end of July 2007.

**Plan of work for Micro WG:**
1) The main text has been completed, but preparation of an Executive Summary is still outstanding (Mark Sobsey). Mark reported that he will complete the Executive Summary within the next 2 months, then submit it to internal review through the WGs for review.
2) The WG will review the draft document when it is available with a view to endorsement for public domain review.

#47. Addendum: Microbiological Agents in Drinking-water

**Background:** The microbiological addendum to the Second Edition was published in 2002. The addendum includes chapters on *Vibrio cholerae*, *Aeromonas*, enteric hepatitis viruses, protozoa and *Legionella*. The question has been raised as to whether the volume can remain current or whether the contents need to be updated and treated similarly to the chemical background documents.
Expected end-product(s): 1) Updated stand-alone documents on *Vibrio cholerae*, enteric hepatitis viruses and *Aeromonas*, to be published in 2006; 2) updated *Cryptosporidium* text (see agenda item #40); 3) separate *Legionella* text, to be published in 2006 (see agenda item #41); 4) brief summary on *Vibrio vulnificus*, for Fourth Edition

Progress to date: The Microbial Aspects WG agreed on the need to update several texts on microbiological agents and adopted a plan of work to this end. The GDWQ WG meeting (Geneva, 2005) agreed that *Cyclospora* should be dealt with by the existing fact sheet, since there is not a lot of new information, and that stand-alone documents are needed for *Giardia* and enteric hepatitis viruses. The GDWQ WG meeting (Geneva, 2006) agreed to review the draft of an updated *Aeromonas* text by the end of July 2006 and to decide whether an update of the *Giardia* text was appropriate. The GDWQ WG meeting (Berlin, 2007) agreed that the *Aeromonas* text should proceed to peer review and decided on a path forward for texts on *Giardia*, enteric viruses, *Vibrio cholerae* and *V. vulnificus*.

Plan of work for Micro WG:
1) **David Sartory** has prepared an updated version of the text on *Aeromonas*, which has been reviewed by the WG. The document should proceed to peer review. The WG is to identify additional reviewers by the end of May 2007.
2) **Huw Smith** is updating the existing *Giardia* text. **Suresh Kumar** is to contact Huw Smith to determine progress (seeking completion by October 2007).
3) **Ana Maria de Roda Husman** is to contact **Willie Grabow** about updating the enteric viruses text.
4) **WSH** has agreed to approach **Dr Nair**, the original author of the *Vibrio cholerae* text, about updating his document to become free standing. There has been no progress on this document.
5) **Mark Sobsey** has obtained agreement from **Dr James Oliver** at UNC–Charlotte to prepare a summary review of *Vibrio vulnificus*.
6) Some of this information is available from the WHO series of monographs on Emerging Pathogens, and they should be consulted to avoid unnecessary duplication.

### #48. Quantitative Methods

**Background:** The link between operational parameters and health-based guideline values in the GDWQ is not as clear as it could be. The GDWQ FTF meeting (Geneva, 2003) recommended that guidance on the application of quantitative methods in water, microbiology and health be developed in order to clarify this linkage. This includes guidance on deriving health-based targets (including, for example, DALYs) and on using numbers in WSPs (i.e. system assessment to determine whether the system can meet the targets, effect of treatment on pathogen removal, variability, failure mode analysis) in order to allow the non-specialist to understand the process and to implement the GDWQ.

Expected end-product(s): 1) Text to be included in *Water Safety Plans* supporting document; 2) appropriate text to be included in Volume 1, if not already there (no timeline for this as yet)

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) agreed that the WSP work should not be held up because there are not enough data on quantitative methods. The GDWQ WG meeting (Geneva, 2006) recommended that there be an initiative to develop simplified tools supported...
by software for both microbial and chemical risk assessment and suggested a path forward. Although it was considered to be doubtful for most chemicals, the GDWQ WG meeting (Berlin, 2007) agreed to establish a small working group to evaluate case-studies on key chemical parameters to determine whether the DALY approach could be applied.

*Plan of work for Micro WG:*

1) **John Fawell** prepared a discussion paper on Methods of Comparing Chemical and Microbiological Risks, which was circulated to WG members following last year’s meeting.

2) **Guy Howard** reported that no further progress had been made since the last meeting. After considerable discussion, it was decided that, although applicable of DALYs to chemical risks is challenging, the DALY approach is the basis for the Third Edition and we should not back away from it now. There needs to be some metric that allows comparisons to help countries to set priorities, instead of being driven by public perception, media, etc. However, if we are to continue with DALYs, risk assessments and health-based targets, we need more simplified documentation than what currently exists, with real-life examples or case-studies of people who are actually trying to apply it.

3) It was decided that a small group of people should determine what case-studies exist on a very small number of critical chemicals (like fluoride and arsenic) that have direct policy relevance, do a quality assessment, and evaluate whether there is enough evidence to move forward.

4) **Guy Howard** will work on it, as well as **John Fawell**, **Joe Cotruvo**, **Ana Maria de Roda Husman**, **Feroze Ahmed**, **Gertjan Medema** and **Oliver Schmoll**. The systematic review will be completed by the end of October, at which point the group will determine what can or cannot be done.

5) *This agenda item is to be combined with #10 on Levels of Protection for the next meeting agenda.*

**#49. Enterobacter sakazakii in Powdered Infant Formula**

*Background:* WHO hosted a Joint FAO/WHO Workshop on *Enterobacter sakazakii* and Other Microorganisms in Powdered Infant Formula in February 2004. *Enterobacter sakazakii* can gain access to infant formula through the raw material used for the formula, through contamination of the formula at the production process or through contamination of the formula as it is being reconstituted. Although water has been investigated as a potential source, current evidence indicates that this is unlikely. The group at risk (meningitis with high death rates) is especially infants less than 2 months old, particularly low-birth-weight, premature and immunocompromised infants.

*Expected end-product(s):* Fact sheet on *Enterobacter sakazakii*, for publication in the second addendum to the Third Edition

*Progress to date:* The Microbial Aspects WG (Geneva, 2004) agreed on the need to prepare a fact sheet on *Enterobacter sakazakii*. A final draft has been prepared. The GDWQ WG meeting (Geneva, 2006) agreed to send the fact sheet for public review, following which the document will be revised to take into account review comments and then will be adopted for inclusion in the second addendum. The GDWQ WG meeting (Berlin, 2007) agreed to remove the item from the agenda once the second addendum has been published.
Plan of work for Micro WG:
1) The fact sheet on Enterobacter sakazakii has been completed and endorsed by the WG. The fact sheet is posted on the web for public review. David Cunliffe will incorporate any comments received, and the final fact sheet will be included in chapter 11 of the second addendum. This item can be removed from the agenda once the second addendum has been published.

#50. Pathogen Occurrence

Background: Information on pathogen concentrations in source waters provides important input to development of WSPs, performance targets, etc. The GDWQ FTF meeting (Geneva, 2003) recommended that a database on pathogen occurrence be created. In addition, Friederike Dangendorf prepared a document entitled Occurrence of Pathogens in Surface Water. The untimely death of Dr Dangendorf was noted with regret by the GDWQ WG meeting (Geneva, 2005).

Expected end-product(s): 1) Possible publication of the document Occurrence of Pathogens in Surface Water, with possible consideration of African data, as a report; 2) possible links with pathogen database and data collection efforts of other sources and countries

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. There had not been any significant progress by the time of the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) was updated on new efforts to develop global databases on pathogens and indicators in water. The GDWQ WG meeting (Berlin, 2007) was updated on efforts to harmonize with database development efforts of other sources and countries.

Plan of work for Micro WG:
1) The USEPA has embarked on an effort to develop a database on pathogens and indicators in water to inform its water programmes for risk assessment and risk management purposes. The effort is led by Stephen Schaub. There is merit in linking to or harmonizing with this database development effort by the USEPA. Work is proceeding with discussions between USEPA and WHO. Stephen Schaub will explore whether the Office of Science and Technology of the USEPA will allow release of a recent Microbiological Fate and Transport database meta-analysis for waters that receive human faecal contamination. If so, it can be made available to the micro MW later in 2007. Discussions may continue between the USEPA and WHO regarding acquiring additional database sets to help refine and expand the usefulness of the meta-analysis comparing faecal indicators with pathogens in ambient waters, including drinking source waters.
2) It was also recommended that other efforts continue to link with the pathogen database and data collection efforts by other sources and countries. The WG encourages more progress on these efforts and initiatives that will support the data needs of the GDWQ.
3) Post-meeting note: It was suggested that this work could be streamed into the agenda item on Protecting Surface Waters for Health (see agenda item #27), which would necessarily have to examine pathogen occurrence.

#52. WHO/PES Pesticides

Background: Various vector-borne diseases, such as malaria and dengue fever, may be strongly associated with the domestic storage of drinking-water. One of the vector control
options to address the breeding of vectors in domestic drinking-water storage structures is the application of insecticide substances to drinking-water containers in different formulations (e.g. slow release). The WHO/PES endorses pesticides suitable for this purpose. It relies on WHO/PCS for toxicological assessment and on the GDWQ for overall assessment of safety in this application. These pesticides are deliberately added where there is a significant risk of disease, so that an overly conservative approach is not appropriate.

There are currently four insecticide compounds and a bacterial larvicide recommended by WHO (under WHO/PES) for addition to drinking-water as larvicides: temephos, methoprene, pyriproxyfen, novaluron and Bacillus thuringiensis israelensis (Bti). Of these, only temephos (#93) and Bti (#52A) have not been reviewed to date. Permethrin (#111) is not recommended for direct addition to drinking-water for public health purposes as part of WHO’s policy to exclude the use of any pyrethroids for larviciding of mosquito vectors of human disease. This policy is based on concern over the possible accelerated development of vector resistance to synthetic pyrethroids, which, in their application to insecticide-treated mosquito nets, are crucial in the current global anti-malaria strategy.

A scoping document on the issue of WHO/PES pesticides was prepared in 2003, which described the technical and assessment issues and approaches for reviewing these pesticides. The GDWQ FTF meeting (Geneva, 2003) recommended that background documents be prepared on WHO/PES pesticides for which no background documents existed (i.e. temephos, methoprene, novaluron, Bti — see agenda items #93, #52B, #121 and #52A, respectively) and on proposed WHO/PES pesticides (i.e. diflubenzuron and pirimiphos-methyl — see agenda items #52D and #104, respectively). In order to undertake these evaluations, it was first necessary to confirm an overall strategy with WHO/PES, WHO/PCS and JMPR and to develop a plan of work to deal with general (i.e. formulations) and active ingredients.

**Expected end-product(s):** 1) New text for Policies and Procedures Manual to explain the relationship between PES, PCS/JMPR and DWQC; 2) new text for the Policies and Procedures Manual and the GDWQ (for second addendum) on the new approach for WHO/PES pesticides; 3) jointly produced summary statements on a group of five or so pesticides for the second addendum; 4) new text for chapter 8 of the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) met with the WHO/PES and WHO/PCS groups and agreed to a revised joint plan of work. The path forward was further articulated by the GDWQ WG meeting (Geneva, 2006) following fruitful discussions with representatives of the Vector Ecology and Management Programme at WHO. The GDWQ WG meeting (Berlin, 2007) was updated on progress to date and recommended some minor text additions for the Fourth Edition.

**Plan of work for Micro and Chemical WGs:***

1) Background documents on most WHO/PES pesticides are to be made available online to support the publication of the second addendum. Summary statements are combined in a section of chapter 12 entitled Pesticides used for vector control in drinking-water sources and containers. Still outstanding are Bti (see agenda item #52A) and temephos (see agenda item #93).

2) Robert Bos prepared a briefing note on the use of pesticides in drinking-water. The paragraph on how Member States establish the institutional arrangements to approve and
control the use of these pesticides for vector control in drinking-water will be combined with the current text on pesticides used for public health purposes for the Fourth Edition. John Fawell and Marla Sheffer will do this.

3) JMPR evaluates compounds, not adjuvants/formulations. WHOPES, on the other hand, recommends the use of specific formulations only. John Fawell and Vera Ngowi are to add a statement/paragraph about formulations and the decisions that need to be made by Member States, for the Fourth Edition.

4) In the Fourth Edition, larvicides are to be moved to a separate section of chapter 8 (i.e. taken out of section 8.5 on Guideline values for individual chemicals, by source category), as they are treated differently from the other chemicals in the Guidelines.

#52A. B. thuringiensis israelensis

**Background:** Bti is a biopesticide applied to drinking-water containers in order to control the breeding of vectors that may cause a variety of diseases. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document be prepared on Bti.

**Expected end-product(s):** Background document on Bti, to be included in Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. JMPR has evaluated Bti. The GDWQ WG meeting (Geneva, 2005) agreed to initiate a background document based on the JMPR assessment. Following discussions with the WHO Vector Ecology and Management Programme, the GDWQ WG meeting (Geneva, 2006) agreed on a path forward to illuminate this complex issue. The path forward was revised by the GDWQ WG meeting (Berlin, 2007).

**Plan of work for Micro and Chemical WGs:**

1) **John Fawell** has prepared a background document based on EHC No. 217 (1999). The conclusion is that Bti is not considered to pose a hazard to humans through drinking-water; therefore, it is not considered necessary or appropriate to establish a guideline value. However, the product, through formulations, may be contaminated with microbes or microbial products, which is a separate issue requiring guidance (i.e. advice or generic recommendations on what contaminants should not be found in the product or limits for quality control if contaminants are present).

2) **Mark Sobsey** pointed out that there is a need for rigorous QA/QC on the product. Manufacturers have been careless and allowed the pure Bti culture to become contaminated during formulation with other bacteria, including coliforms such as *E. coli* or pathogenic bacteria (such as *Legionella* or mycobacteria). The manufacturer needs to start with a pure culture of Bti, the production system needs to include protection against contamination (including pasteurization of spores to eliminate contamination) and end product quality testing should be carried out. What industry has to do to ensure a good product is their problem. He added that the level of contamination that is unacceptable in a product according to how it’s used could be determined if typical application rates (based on efficacy data) were known.

3) **John Fawell** needs to review a document on Bti provided by PCS. John will provide **Mark Sobsey** with the document so that he can also review it to see if there is sufficient information regarding the amount added to water (application rates) to determine if its use will increase risk or trigger unacceptable water quality levels.

4) Mark will review the document in June.
5) The background document needs to incorporate the HACCP approach and guidance on food production safeguards. There has to be a mechanism by which the process can be controlled, with internal safeguards, quality control, independent certification as an additive in water, etc.

6) John and Mark will report progress at the next meeting (perhaps preparing a revised background document).

#52B. Methoprene

*Background:* Methoprene is a chemical pesticide applied to drinking-water containers in order to control the breeding of disease vectors. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document be prepared on methoprene.

*Expected end-product(s):* Background document on methoprene, based on the JMPR assessment, for second addendum

*Progress to date:* The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. JMPR has evaluated methoprene. The GDWQ WG meeting (Geneva, 2005) agreed to initiate preparation of a background document based on the JMPR assessment. The GDWQ WG meeting (Geneva, 2006) agreed to revise the draft background document following discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) was informed that the background document will be published as part of the second addendum.

*Plan of work for Micro and Chemical WGs:*

1) The background document on methoprene will be published in the second addendum. *This agenda item can be removed from the plan of work once the second addendum is published.*

#52D. Diflubenzuron

*Background:* Diflubenzuron is a chemical pesticide applied to drinking-water containers in order to control the breeding of disease vectors. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document on diflubenzuron be prepared based on the 2001 JMPR report. In addition, WHO has received a request for consideration of a potable water clearance for diflubenzuron for use in mosquito vector control.

*Expected end-product(s):* Background document on diflubenzuron, based on the 2001 JMPR report, for publication in the second addendum to Third Edition

*Progress to date:* The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. JMPR has evaluated diflubenzuron. The GDWQ WG meeting (Geneva, 2005) agreed to initiate preparation of a background document based on the JMPR assessment. The GDWQ WG meeting (Geneva, 2006) agreed to revise the draft background document following discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) was informed that the background document will be published as part of the second addendum.
Plan of work for Micro and Chemical WGs:
1) The background document on diflubenzuron will be published as part of the second addendum. The agenda item can be removed from the plan of work once the second addendum is published.

#53. Analytical and Technical Achievability for Microcystin

Background: Section 8.3 of the GDWQ provides information on the analytical achievability of all chemicals in the GDWQ except for microcystin. This needs to be included.

Expected end-product(s): 1) Additional text for section 8.3 (analytical) of the GDWQ, for inclusion in the second addendum of the Third Edition; 2) revised background document to include new analytical and technical achievability texts, for the Fourth Edition; 3) new section 8.4.14 on treatment for removal of cyanobacteria and cyanotoxins, for the Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) reviewed and approved the text for the second addendum and agreed to include analytical and treatment sections in the background document, which will then be marked as an update. The GDWQ WG meeting (Berlin, 2007) agreed to post the new analytical and treatment texts for the background document for public domain review.

Plan of work for Chemical WG/Analytical:
1) Yasumoto Magara and Ingrid Chorus prepared a draft on analytical methods for microcystins, and Peter Jackson prepared a draft on treatment and control measures and technical achievability. Ingrid reported that Gayle Newcombe had reviewed Peter’s text on treatment and control measures and technical achievability and suggested some revisions.
2) Ingrid Chorus was asked to revise the treatment text to take into consideration comments made by Committee members. The two texts can then be posted for public domain review. When the review period is over and review comments have been addressed, Marla Sheffer will insert both texts into the background document, which will then be marked as an update. Peter Jackson and Gayle Newcombe (CRC for Water Quality and Treatment in Adelaide) will be added as contributors on the Acknowledgements page.
3) A new section (8.4.14 Treatment for removal of cyanobacteria and cyanotoxins) has been prepared for the Fourth Edition of the GDWQ. Ingrid Chorus was asked to revise the text based on comments from Committee members (e.g. too much detail, some should be moved to background document) and then send it to WG members for approval. It has been peer reviewed by various people and will need to be sent for public domain review.
4) Ingrid Chorus and Peter Jackson are to liaise to determine whether any changes to the treatment tables in chapter 8 are needed.

#54. Materials and Chemicals

Background: The GDWQ FTF meeting (Geneva, 2003) suggested that “additive” chemicals be a focus of activity in relation both to derivation and use of guideline values and to provision of guidance on good practice in control of associated hazards. In addition, it has been suggested that section 8.4 on Treatment needs to be rechecked in terms of its
applicability to chemicals used in water treatment and chemicals arising from materials in contact with drinking-water.

**Expected end-product(s):** 1) Additional text in section 8.4 of GDWQ, for inclusion in first addendum to Third Edition; 2) additional text in section 8.5.4, for inclusion in first addendum to Third Edition; 3) addition of principles of certification, publication date unknown

**Progress to date:** The 1995 Coordinating Committee meeting identified materials and chemicals used in the production and distribution of drinking-water as one of the principal thematic areas that should be addressed by the P&C WG. The development of a monograph on this theme was adopted by the 1996 WG meeting, and work was initiated at a workshop planning meeting in 1997. The 1998 WG meeting reviewed progress and endorsed the approach taken, recommending that a consolidated draft be submitted to selected peer review in late 1998 and an expert meeting be called in early 1999, with the overall objective of peer-reviewed text being available to the next WG meeting. The Berlin Coordinating Committee meeting (2000) reviewed the draft document and recommended that it proceed to peer review. The document was under review at the time of the Chemical Aspects WG meeting in Tokyo in 2002. Text for inclusion in sections 8.4 and 8.5.4 of the first addendum to the Third Edition was prepared and incorporated. The GDWQ WG meeting (Geneva, 2005) agreed to a revised plan of work, which was further modified by the GDWQ WG meeting (Geneva, 2006) in a path forward towards the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) recommended that a uniform set of operating principles be developed through collaboration among countries/institutions with national/international standards in the area of materials and chemicals.

**Plan of work for Chemical and P&C WGs:**

It was noted that it is important that countries pay attention to the materials used to make sure that they are safe for use. Some countries have standards that other countries could follow, and international uniformity would be desirable. The Chemical WG recommended that international systems collaborate to arrive at a uniform set of operating principles. The potential role of the WG in this collaboration will be discussed at the next meeting.

**#58-2. Infant Formula**

**Background:** WHO Headquarters received a written communication suggesting that WHO should render a rough guidance for the dimensions of acceptable intakes of essential elements in infant formula for the first 6 months of life. It was noted that for certain chemicals (e.g. manganese, molybdenum), drinking-water may be a significant contributor to overall intake, particularly for formula-fed infants. Reconstitution of infant formula with drinking-water may in some cases lead to “overnutrition” — in other words, the use of drinking-water at the guideline values for various minerals may lead to an exceedance of the nutritional requirements.

**Expected end-product(s):** Not known at this time

**Progress to date:** This was one of the subjects of an Expert Workshop on Nutrition held in Rome in November 2003. The GDWQ WG meeting (Geneva, 2004) agreed that it would need input from the WHO nutrition group before deciding whether to undertake this initiative. The GDWQ WG meeting (Geneva, 2005) agreed on a revised plan of work to
begin the discussion process. The WHO nutrition group carried out useful discussions with the GDWQ WG meeting (Geneva, 2006) and agreed to establish a liaison between the two groups should the topic of infant formula become a priority. The GDWQ WG meeting (Berlin, 2007) was advised that there was no progress to report from the WHO nutrition group.

Plan of work for Chemical WG:
1) There is no progress to report from the WHO nutrition group. John Fawell has started to look at other potential sources of information so that he can prepare a short discussion paper for the next meeting. The issue is that some water may not be suitable for bottle-fed infants. Erika Seivers wrote a paper on this issue, published in the proceedings of the Rome minerals conference. John will report to the group by email if he finds any relevant information and expects to have a discussion paper ready for the next meeting.

2) It was noted that the new text in chapter 6 on vulnerable populations could include children. It was also suggested that the WG may want to add a high-risk uncertainty factor in its calculations of guideline values specifically for children (similar to what has been done for WHO/PES pesticides and bottle-fed infants).

#58-3. Hardness

Background: The term hard water is an indication of the presence of usually calcium and magnesium carbonates that reduce the lathering of soaps or precipitate soap residues onto sinks and bathtubs and reduce washing efficiency. These are negative aesthetic and economic effects that can be reduced by either central softening treatment (precipitating calcium and magnesium carbonates) or home water softening (cation exchange replacement of calcium and magnesium with sodium or sometimes potassium using ion exchange resins).

Individuals vary considerably in their needs for and consumption of calcium and magnesium. Available evidence suggests that, because of food habits, many people in most countries fail to obtain from their diets the recommended intakes for one or both of these nutrients. While the concentrations of calcium and magnesium in drinking-water vary markedly from one supply to another, mineral-rich drinking-waters may provide substantial contributions to total intakes of these nutrients for some populations or subgroups. Water treatment processes can affect mineral concentrations, significantly affecting the total intakes of calcium and magnesium for some individuals.

A large number of studies have investigated the potential health effects of drinking-water hardness. Most of these have been ecologic and have found an inverse relationship between water hardness and cardiovascular mortality. Inherent weaknesses in the ecologic study design limit the conclusions that can be drawn from these studies.

Seven case–control studies and two cohort studies of acceptable quality investigating calcium or magnesium and cardiovascular disease or mortality were identified in the literature. Of the case–control studies, one addressed the association between calcium and acute myocardial infarction and three its association with death from cardiovascular disease. Based on identified case–control and cohort studies, the studies do show a negative association (i.e. protective effect) between cardiovascular mortality and drinking-water magnesium. The studies indicated that benefits levelled off at a magnesium concentration of about 10 mg/litre. Although this association does not necessarily demonstrate causality, it is consistent with the well known effects of magnesium on cardiovascular function. There does not appear to be an
There is no evidence of an association between hardness or calcium and acute myocardial infarction or deaths from cardiovascular disease (acute myocardial infarction, stroke and hypertension).

**Expected end-product(s):** 1) Expert Committee report and monograph on health effects of calcium and magnesium in drinking-water, to be published in 2007; 2) background document and summary statement taking into account beneficial effects associated with hardness, to be published in Fourth Edition

**Progress to date:** A brief discussion paper on water hardness was prepared. The GDWQ WG meeting (Geneva, 2004) agreed that future meetings will further examine the hypotheses concerning the beneficial effects of hardness and determine whether they should be reflected in guidance for hardness or recommended compositions of calcium and magnesium in drinking-water as a contributor to reduced risks of ischaemic cardiovascular disease. The GDWQ WG meeting (Geneva, 2005) agreed that further progress on this issue would await the hardness symposium, held in April 2006. The GDWQ WG meeting (Geneva, 2006) received an update on the conclusions of the hardness symposium and agreed to move forward with a background document on hardness for the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward.

**Plan of work for Chemical WG:**

1) The report of the April 2006 Meeting of Experts has been prepared, and a monograph containing the report and supporting papers produced by the members will be published in 2007.

2) Information will be provided to John Fawell towards the preparation of a background document for the Fourth Edition. Joe Cotruvo will collaborate. No guideline will be proposed, but there will be extensive discussion on essentiality.

3) These reports were prepared as part of the development of the desalination guidance that will shortly be released on the WHO web site for external review. The desalination agenda item (#17) is related to this one (as calcium and magnesium are removed in the process), and the two subjects should be cross-referenced.

4) Attention is directed to the recommendations in the April 2006 Meeting of Experts report. WHO is encouraging water supplies (and governments) that are contemplating major treatment or source changes that would significantly alter calcium and magnesium concentrations to support before-and-after analytical epidemiological studies to add to the information base relating drinking-water composition and health outcomes. To this end, WHO is considering convening a meeting among interested countries to consider the feasibility of a multi-centre retrospective intervention study and other prospective studies on the hard water cardiovascular disease hypothesis.

5) It was noted that the United Kingdom food basket may include drinking-water minerals in future.

**#60. Arsenic**

**Background:** There is overwhelming evidence from epidemiological studies that consumption of elevated levels of arsenic through drinking-water and other sources is causally related to the development of cancer at several sites, particularly skin, bladder and lung. In several parts of the world, arsenic-induced disease, including cancer, is a significant public health problem. In the Third Edition of the GDWQ, a provisional guideline value for arsenic was set at the practical quantification limit of 0.01 mg/litre, based on concern regarding its carcinogenicity in humans. Some recent publications claim that there is not any
quantifiable bladder cancer risk from exposure to low-level arsenic in water (<50 µg/litre) and that studies reported from China, Province of Taiwan, may have been misinterpreted, leading to overestimates of the projections to low-dose exposures.

Expected end-product(s): 1) Expanded summary statement on arsenic for publication in second addendum to Third Edition; 2) updated background document for Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) revised the plan of work. The GDWQ WG meeting (Berlin, 2007) agreed that the background document on arsenic should be updated with new studies for the Fourth Edition.

Plan of work for Chemical WG:
1) John Fawell and Guy Howard prepared a current status paper on arsenic. It notes that there is emerging evidence that arsenic produces a wider range of health effects than previously considered, but the research is at too early a stage to inform changes to the Guidelines. There is an urgent need to determine the most sensitive toxic effect and the dose–response associated with that effect so that actions to deal with arsenic-contaminated water can be prioritized. The paper recommended that a watching brief be maintained until such time as an appropriate international assessment can be made. It was noted that the most important end-point in China is skin keratosis, and a guideline value or guidance regarding the level of arsenic to prevent keratosis is needed.

2) John Fawell agreed to revise the background document and expanded summary statement on arsenic for the second addendum regarding the need for dose–response data and studies to determine the level to prevent keratosis (a reversible effect).

3) Feroze Ahmed is to provide John with data from studies in Bangladesh on arsenic. The USEPA is currently evaluating non-carcinogenic data in addition to re-evaluating carcinogenic information; Ed Ohanian will provide the USEPA non-cancer arsenic data when released (within the next 6–8 months). Shoichi Kunikane will provide John with some information from China. Joe Cotruvo provided an abstract from a USEPA study that indicated no significant associations between arsenic exposure at low levels and diabetes, cancer or hypertension in the USA. John Fawell will update the background document for the next meeting with any new studies.

#61. Atrazine

Background: The GDWQ FTF meeting (Geneva, 2003) recommended that atrazine be referred to JMPR as part of the rolling revision, based on new data from the USA. An evaluation of the new data, which is not yet available, is required. JMPR has never evaluated atrazine, as it is a herbicide and unlikely to occur in food. However, it is likely to occur widely in water.

Expected end-product(s): Background document and summary statement on atrazine and other triazines, possibly for Fourth Edition of GDWQ, but probably post-Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work, the first step being to check the occurrence data to determine if there is a need for an evaluation. The GDWQ WG meeting (Geneva, 2005) agreed that atrazine is widespread in water and revised the plan of work to address the issue. The GDWQ WG meeting (Geneva, 2006) was advised that atrazine is now on JMPR’s agenda for evaluation in 2007. The GDWQ WG meeting
(Berlin, 2007) agreed that a revised background document or briefing note should be prepared for the next meeting, depending on the JMPR decision.

**Plan of work for Chemical WG:**
1) Atrazine is on JMPR’s agenda for evaluation in September 2007.
2) The USEPA’s Pesticide Office has decided to aggregate triazines (including atrazine) and some of their degradation products because their mechanisms of toxicity are the same.
3) A revised background document or briefing note on atrazine and other triazines will be prepared for the next meeting by John Fawell and Vera Ngowi, depending on the JMPR decision. *The agenda item will be renamed Triazines at this time.*
4) Concentrations of atrazine and other triazines in drinking-water in Italy were provided by Enzo Funari during the Europe Day presentations.
5) Post-meeting note: JMPR will publish its evaluation of atrazine in October 2007.

**#63. Boron**

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that boron be added to the rolling revision on the basis of new data and the assessment from the USA. The Expert Group on Guidelines for Desalination also recommended that the guideline for boron be reconsidered in the light of new thinking on the toxicity, as boron levels are quite high in seawater and boron removal is difficult.

**Expected end-product(s):** Background document and summary statement for Fourth Edition

**Progress to date:** The need to review boron in the rolling revision will be considered once new data become available. The GDWQ WG meeting (Geneva, 2006) decided to reconsider boron for the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward.

**Plan of work for Chemical WG:**
1) John Fawell produced a discussion document on boron. EHC 204 on boron (published in 1998) had not been published at the time of the last background document (and the Committee was not allowed to see the draft). The TDI was 0.4 mg/kg body weight with a data-derived uncertainty factor of 25. With a 10% allocation, the guideline value would be 1.2 mg/litre, rounded to 1 according to WHO policy on significant figures. With a 20% allocation, the guideline value would be 2.4 mg/litre, rounded to 2.
2) It is noted that although boron has not been demonstrated to be an essential element, it is a beneficial element for bone formation. As well, there have been a number of epidemiological studies that have failed to demonstrate any impact on human reproductive health.
3) The WG recommended that the background document be revised and that consideration be given to using a 20% allocation factor because boron is a beneficial element. This is likely to result in an increase of the current guideline value from 0.5 mg/litre. The guideline value will remain provisional on the basis of treatment.
4) It is noted that the European standard is 1 mg/litre based on the recommendation of the EU Scientific Committee on Toxicology, Ecotoxicology and the Environment derived from the EHC.
5) John Fawell will write a new guideline document that carefully explains the adaptation of the guideline value according to national circumstances. He will circulate the draft to
WG members for comments (peer review) and approval, then submit it for public domain review.

6) **John Fawell** is to check the Codex documents to see what they’ve done with their values, as previously their number was higher than the WHO guideline value and hence may not be protective of health.

7) The revised background document can note that where desalinated water or other bromate-containing water is to be used for irrigation, it needs to meet the requirements for the specific plants (as herbicidal effects from irrigation can affect some plants at 0.5 mg/litre) and that this should be taken into account in the design of facilities.

8) It is noted that boric acid and sodium tetraborate is on the agenda at the JECFA meeting in June 2007.

9) It is also noted that the USEPA does not plan to regulate boron in drinking-water. They calculated a health reference level of 1.4 mg/litre based on a reference dose of 0.2 mg/kg body weight per day and 20% relative source contribution from drinking-water.

#64. Bromate

**Background:** WHO Headquarters received a communication in 2004 suggesting that bromate may need to be revisited as part of the rolling revision on the basis of new data that might become available in a few years. The American Water Works Association Research Foundation (AWWARF) supported a workshop in 2005, organized by Joe Cotruvo and Dick Bull, to develop a comprehensive health research strategy on bromate in drinking-water, which was released in 2005. In addition, the GDWQ WG meeting (Geneva, 2004) recommended that the background document and summary statement on bromate be revised to indicate that sodium hypochlorite solutions may be a source of some bromate. Electrolysis of seawater to produce hypochlorite as is practised in some desalination plants is a major source of bromate in finished water. Finally, the phrase “The guideline value is provisional because of limitations in available analytical and treatment methods and uncertainties in the toxicological data” in the summary statement does not reflect precisely the text in the background document. The two need to be reviewed for consistency.

**Expected end-product(s):** 1) Revised background document and summary statement, for inclusion in first addendum to Third Edition; 2) revised background document, post-Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed that the minor revisions to the background document and summary statement would not require a peer or public domain review. The revisions were published in the first addendum. The GDWQ WG meeting (Geneva, 2005) agreed that the WG should continue to monitor new studies on bromate and keep it on the rolling revision. The GDWQ WG meetings (Geneva, 2006; Berlin, 2007) were updated on recent bromate studies.

**Plan of work for Chemical WG:**

1) **Joe Cotruvo** updated the WG about the status of new bromate studies. Current studies (not yet published) are investigating the mechanism of action at the low end of the dose–response curve, and in a year there should be some preliminary information on the shape of the dose–response curve at low doses. In addition, a PBPK study has begun, quantifying the decomposition of bromate as the chemical moves from organ to organ (particularly to estimate how much survives to the kidney, the target cancer organ). After publication of the Fourth Edition, there should be enough data to make a judgement.
2) Joe will report back on progress at the next meeting.

#66. Chromium

*Background:* The provisional guideline value of 0.05 mg/litre for chromium was retained in the Third Edition. The chromium background document is very old, and the basis for the derivation of the guideline value is unclear. The GDWQ FTF meeting (Geneva, 2003) recommended that chromium be added to the rolling revision on the basis of new National Toxicology Program (NTP) studies. A CICAD on trivalent chromium compounds is expected in 2007 based on an Agency for Toxic Substances and Disease Registry (ATSDR) report from the USA.

*Expected end-product(s):* Revised background document and summary statement, for publication in the Fourth Edition

*Progress to date:* The GDWQ WG meeting (Geneva, 2004) agreed that the need to review chromium in the rolling revision will be considered once new data become available. The GDWQ WG meeting (Geneva, 2006) recommended that the WG await the finalization of the CICAD, and perhaps the report of the NTP studies, before revising the guideline value. The GDWQ WG meeting (Berlin, 2007) decided on the path forward towards preparation of a background document for the Fourth Edition.

*Plan of work for Chemical WG:*

1) The guideline value of 50 µg/litre for total chromium in the GDWQ (provisional on the basis of uncertainties in the toxicological database) has no apparent basis. Chromium(VI) is naturally present at low levels in drinking-water and is readily reduced to chromium(III) in the gastrointestinal tract. A total chromium value is reasonable because of the rapid reduction. There are publications (e.g. Paustenbach et al.) on the reduction capacity of the gastrointestinal tract.

2) CICADs on trivalent and hexavalent chromium have been approved by the 2007 Final Review Board meeting pending revisions to the basis of the guidance values.

3) Chromium(VI) is known to be an inhalation carcinogen. A 2-year NTP drinking-water study (March 2007) on sodium dichromate dihydrate found clear evidence of carcinogenicity, with effects on the squamous epithelium in the mouth in rats at high concentrations (a concentration-dependent effect at the point of contact) and neoplasms of the small intestine in mice. However, this is a question as to the relevance of the NTP findings at the low doses potentially in drinking-water due to the oxidation–reduction chemistry in the gastrointestinal tract mentioned above.

4) The NTP study was not considered in the CICAD on chromium(VI). PCS has now been made aware of the NTP study, and the WG recommends that PCS consider the results of the study before completing the CICAD on chromium(VI).

5) John Fawell will revise the background document based on both CICADs on chromium(III) and chromium(VI), adding in the NTP study and explaining why a guideline value could not be derived from either CICAD (limitations of the key study [suitability of mouse model as basis for assessing human sensitivity to chromium(VI)], lack of consideration of NTP study, chromium(VI) studies not useful because converts to chromium(III), etc.). The guideline value will be maintained at the same value for total chromium and kept provisional. The document will require careful writing to justify the choice of the guideline value. The draft will be sent to the WG group for review.
#67. Copper

**Background:** Recent studies in rabbits have suggested a link between copper in drinking-water and Alzheimer disease. Levels in the rabbits’ drinking-water were well below the current WHO guideline of 2 mg/litre, based on acute gastrointestinal effects; however, it has not been established whether rabbits are an appropriate model. In addition, a communication received by WHO Headquarters suggested the need to review the guideline value and text on copper with regard to toxicity in the preparation of formula for bottle-fed infants.

**Expected end-product(s): None**

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to monitor studies relating to the health effects of copper and to consult with infant nutrition experts. The GDWQ WG meeting (Geneva, 2005) decided that the issue would be better dealt with by the WHO nutrition group. The GDWQ WG meeting (Geneva, 2006) met with the WHO nutrition group and requested that they follow up on progress in the infant formula area at the next meeting and review the current background document on copper. No progress had been made by the time of the GDWQ WG meeting (Berlin, 2007).

**Plan of work for Chemical WG:**

1) No progress has been made on this agenda item. First, the issue of infant formula and essentiality (agenda item #58-2) needs to be resolved.

#68. Cyanide (Cyanogen Chloride)

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that the background documents for cyanide and cyanogen chloride be updated based on the new CICAD, when available. The final draft of CICAD No. 61 on hydrogen cyanide and cyanides (human health aspects) is now available. However, the Chemical Aspects WG needed to await the development of methodology on calculating acute reference doses before preparing a revised background document, as short-term exposures may be of concern for these substances.

**Expected end-product(s):** 1) Revised text for the Policies and Procedures Manual, for the second addendum to the Third Edition; 2) revised background documents and summary statements, for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. The GDWQ WG meeting (Geneva, 2005) agreed to initiate the preparation of a background document and to develop a policy for the derivation of acute guidance values. The GDWQ WG meeting (Geneva, 2006) agreed that the background document, after revision to take into account comments provided at the meeting, will be sent for public domain comment and will be included in the second addendum. The GDWQ WG meeting (Berlin, 2007) amended the plan of work and recommended that the background document be pushed back to the Fourth Edition.

**Plan of work for Chemical WG:**

1) **John Fawell** prepared background documents on cyanide (short-term exposure) and cyanogen chloride (long-term exposure), based on the CICAD that itself was based on an ATSDR report, for the second addendum. However, the documents failed to address Ambika Bathija’s comments on the draft documents. The study recommended by the
USEPA as the basis for a guideline value is not in the CICAD but is in the original ATSDR document.

2) **Ed Ohanian** and **John** are to work together to revise the background documents on cyanide and cyanogen chloride. The revised documents will be circulated to WG members for their comments.

3) Both cyanide and cyanogen chloride have been removed from the second addendum and moved to the Fourth Edition.

#71. Fluoride

**Background:** The GDWQ FTF meeting (Geneva, 2003) noted that when the NAS report on effects on bone becomes available, the need for review of fluoride will be reconsidered.

**Expected end-product(s):** 1) Expanded summary statement for Volume 1, for second addendum of Third Edition, and revised background document to incorporate text from summary statement for second addendum (make sure wording same in two); 2) revised background document, for Fourth Edition

**Progress to date:** The NAS report was released in 2006. It does not provide major new information but suggests that high fluoride intakes may also correlate with an increased risk of bone fracture in later life. The GDWQ WG meeting (Geneva, 2004) agreed that if the background document is to be revised, it will take essentiality into account. The GDWQ WG meeting (Geneva, 2005) agreed to formally place fluoride on the rolling revision and developed a plan of work. The GDWQ WG meeting (Geneva, 2006) approved the expanded summary statement on fluoride, with amendments, for inclusion in the second addendum and suggested a path forward for preparation of a revised background document for the Fourth Edition.

**Plan of work for Chemical WG:**

1) **John Fawell** is to speak with **Poul Petersen** regarding the issue of very low fluoride (e.g. desalinated water), which results in a net loss of fluoride from bone, and the possible recommendation for a minimum fluoride level of perhaps 0.2 mg/litre for remineralizing desalinated water. The extended summary statement in the second addendum and the background document (to coincide with publication of the second addendum) may need to be revised accordingly.

2) The background document is to be revised by **John Fawell** for the Fourth Edition to include some improved discussions on the NAS document, etc., that are in the expanded summary.

#74. Iodine

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that iodine be referred to JECFA because of toxicological concerns regarding the use of iodine as a disinfectant, especially in emergency situations, and that a background document on iodine be prepared as part of the rolling revision. A CICAD on iodine, based on an ATSDR report, is currently being edited.

**Expected end-product(s):** 1) Revised background document and summary statement (taking essentiality aspects into consideration as well as updated toxicological information), for Fourth Edition; 2) Evaluation as part of an update of the EHC on disinfectants and DBPs
Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed on a plan of work, which was revised by the GDWQ WG meeting (Geneva, 2005). The first step is to review the CICAD draft, which had not been finalized by the time of the GDWQ WG meeting (Geneva, 2006), for the next meeting. The GDWQ WG meeting (Berlin, 2007) decided to assess iodine as a disinfectant as part of the update of the EHC on disinfectants and disinfection by-products.

Plan of work for Chemical WG:
1) The CICAD on iodine has been finalized and is in the editing process.
2) A briefing note on iodine has been prepared. Iodine appears to be rapidly converted to iodide on absorption. Iodine is an essential element. The intake of iodine by infants and children as well as requirements in areas where there are environmental goitrogens need separate consideration. The use of iodine as a disinfectant (both current use and future applications) is an important issue that needs to be addressed, but it will be addressed in a new agenda item on conventional and non-conventional disinfectants and DBPs (see agenda item #158).
3) This agenda item will therefore be merged with agenda item #158 and deleted from the plan of work as an individual agenda item.

#77. Molybdenum

Background: The GDWQ FTF meeting (Geneva, 2003) recommended that molybdenum be considered in the rolling revision in order to deal with the issue of infant exposure.

Expected end-product(s): None

Progress to date: The GDWQ WG meeting (Geneva, 2004) decided that it needed advice from the WHO nutrition group before deciding on a plan of work for the molybdenum and infant nutrition issue. The GDWQ WG meeting (Geneva, 2005) reiterated this decision, and the GDWQ WG meeting (Geneva, 2006) met with the WHO nutrition group to discuss the issue.

Plan of work for Chemical WG:
1) Molybdenum is an infant formula issue (see agenda item #58-2).
2) In the United Kingdom, exposure is an issue. A new study on molybdenum in drinking-water in the United Kingdom has recently been conducted, but results are not yet published. An older study indicates that levels in drinking-water in the UK are higher than previously thought. There may be a lot of supplies with water containing natural molybdenum levels above the guideline value. If this is the case, we need to have a much closer look at the guideline value to see if it is appropriate and to determine its implications in such supplies.
3) John Fawell will report back to the group at the next meeting. If anyone has data on occurrence or treatment (e.g. Japanese data from Yasumoto Magara), they are asked to send the information to John (occurrence) and Peter Jackson (treatment). David Drury suggested that the Drinking Water Inspectorate may hint to universities that they should try to get occurrence data on molybdenum.
#78. Nickel

**Background:** The GDWQ FTF meeting (Geneva, 2003) noted that a new study reports significant addition of nickel to drinking-water through household appliances such as kettles and that results from a new reproductive effects study were likely to become available soon. The meeting recommended that the WG coordinator for additives consider aspects of exposure and their control and that WHO/PCS be asked to lead the updating of the risk assessment.

**Expected end-product(s):** 1) Revised background document and summary statement for publication in the first addendum to the Third Edition; 2) addition to Policies and Procedures Manual concerning the lack of need for an uncertainty factor when using a critical study based on a sensitive human population; 3) revised background document and summary statement for publication in the Fourth Edition; 4) addition to Policies and Procedures Manual concerning how to derive an allocation factor (non-default) from the TDI using exposure data

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed that the background document and summary statement should be revised. Once revised, they will be sent for peer review and simultaneously posted on the Internet for public domain comment. The GDWQ WG meeting (Geneva, 2005) agreed that the revised background document should be published in the first addendum. The GDWQ WG meeting (Geneva, 2006) agreed to reopen this agenda item in light of comments received on the published document. The revised background document will be peer and public domain reviewed once complete. The GDWQ WG meeting (Berlin, 2007) endorsed publication of the nickel background document in the second addendum subject to satisfactory incorporation of review comments.

**Plan of work for Chemical WG:**
1) The nickel background document is currently posted for public domain review. Once any review comments received have been addressed, the document will be published as part of the second addendum.
2) Post-meeting note: After all review comments were received and reviewed, it was determined that the satisfactory revision of the nickel background document would take too much time for it to be included in the second addendum. It will therefore be revised for the Fourth Edition instead.

#79. Selenium

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that selenium be considered in the rolling revision based upon its nutrient value and probable anticancer benefits. There is a relatively narrow range between doses essential to humans and those associated with adverse effects. However, there are studies indicating anticarcinogenic effects from consumption in the 100–300+ µg/day range. The health-based guideline value of 10 µg/litre would give an intake (based on 2 litres consumption) lower than the recommended daily intakes for men and women (70 and 55 µg/day, respectively).

**Expected end-product(s):** Revised background document and summary statement for Fourth Edition
Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to a plan of work. A paper on selenium has been prepared, which will form the basis of a new background document. The guideline value may need to be revised. The GDWQ WG meeting (Geneva, 2005) agreed to a revised plan of work. The GDWQ WG meeting (Geneva, 2006) agreed that a revised background document should be prepared by the end of 2006. The GDWQ WG meeting (Berlin, 2007) agreed on the approach to be used for deriving a guideline value for selenium.

Plan of work for Chemical WG:
1) A briefing note by John Fawell was provided to WG members, as well as a treatment section prepared by Peter Jackson.
2) Selenium is an essential element that in excess amounts causes toxicity and in deficient amounts also results in adverse effects. Normally the WG would develop a guideline value for bottle-fed infants based on adverse effects. However, because selenium is both essential and toxic, the GDWQ does not have a clear policy decision on how to deal with it (the issue has yet to be addressed in the Policies and Procedures Manual). This issue needs to be raised at the next FTF meeting.
3) The WG decided to derive a guideline value of 30 µg/l, increased from the current 10 µg/l. It needs to be explained why the guideline value has been changed: the TDI has been changed from 4 µg/kg body weight to 600 µg/day (body weights unknown) based on a more recent study in humans by Yang & Zhou (1994). A 10% allocation factor is used (this needs to be explained also, as it deviates from current policy of using 20%). For infants drinking 0.75 litre of water, this would result in an intake of <25 µg/day.
4) Japan is to provide nutrition data, and John Fawell is to speak to the United Kingdom Food Standards Agency. Where selenium in water is high, selenium in food is also normally high. The background document will provide guidance for adjusting the guideline value in areas where there are high natural levels of selenium, as the total intake of selenium is important.
5) As with other essential elements, a footnote needs to be added to the Annex 4 tables noting that total intake in the particular domestic situation needs to be carefully reviewed and the guideline value adjusted accordingly.
6) John Fawell will prepare the background document on selenium for the next meeting.

#80. Trichloroacetic Acid

Background: WHO Headquarters received a communication suggesting that trichloroacetic acid may need to be revisited as part of the rolling revision on the basis of new data that might be available in 2005.

Expected end-product(s): Evaluation as part of an update of the EHC on disinfectants and DBPs

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed not to add trichloroacetic acid to the rolling revision until new data suggest the necessity to update the guideline. The GDWQ WG meeting (Geneva, 2005) agreed that new data to become available in 2006 should be assessed to determine if the data would affect the guideline value. The GDWQ WG meeting (Geneva, 2006) was updated on current activities and decided to reconsider the guideline at the next meeting. The GDWQ WG meeting (Berlin, 2007) decided to reassess trichloroacetic acid as part of the update of the EHC on disinfectants and DBPs.
Plan of work for Chemical WG:
1) The WG decided to include trichloroacetic acid in the update of the EHC on disinfectants and DBPs (see agenda item #158).
2) This agenda item will therefore be merged with agenda item #158 and deleted from the plan of work as an individual agenda item.

#82. Trihalomethanes

Background: The GDWQ FTF meeting (Geneva, 2003) recommended that the THMs document be revised as part of the rolling revision process.

Expected end-product(s): Evaluation as part of an update of the EHC on disinfectants and DBPs

Progress to date: The background document was recommended for publication by the GDWQ WG meeting (Geneva, 2004) and published as part of the first addendum. The GDWQ WG meeting (Geneva, 2005) agreed that a significant new study on bromodichloromethane (BDCM), with results expected by the end of 2005, should be assessed to determine whether there is a need to revisit the guideline. The GDWQ WG meeting (Geneva, 2006) agreed that BDCM needed to be put back on the agenda and to prepare a briefing note for the next meeting. The GDWQ WG meeting (Berlin, 2007) decided to reassess THMs as part of the update of the EHC on disinfectants and DBPs.

Plan of work for Chemical WG:
1) Nancy Chiu prepared a briefing note for the WG. In a 2-year drinking-water study in rats and mice, there was no evidence of carcinogenicity, but Nancy thinks that the doses used may have been too low to show carcinogenicity.
2) The WG decided to re-evaluate BDCM as well as the other THMs as part of the update of the EHC on disinfectants and DBPs (see agenda item #158). The agenda item will therefore be deleted from the plan of work as an individual agenda item.

#83. Uranium

Background: The current provisional guideline value for uranium is 15 µg/litre. There are a number of uncertainties surrounding the potential for health effects, which are targeted on the kidney. Clinical epidemiological studies from Finland are showing conflicting results regarding effects on kidney function, and there are also suggestions that there might be effects on bone and on blood pressure. The data are beginning to provide a basis for developing an updated guideline value based on human data.

Expected end-product(s): Updated background document and summary statement for the Fourth Edition

Progress to date: The GDWQ WG meeting (Berlin, 2007) agreed on a path forward.

Plan of work for Chemical WG:
1) A joint CICAD/GDWQ process could be initiated, but there is not that much new information. The WG concluded that it was reluctant to start this process in this instance unless a major error had been made.
2) **John Fawell** will make a modification to the background document and summary statement to indicate that the guideline value may be conservative and provide guidance. There is not enough info to redo the guideline value at this stage.

3) **Ed Ohanian** provided an abstract of a study on the effects of uranium on blood pressure. **Michèle Giddings** is to get information from Maria Limson-Zimora on native populations in Canada with high uranium exposure.

4) **John** will update the background document and summary statement once this information has been gathered.

#84. Carbaryl

**Background:** Carbaryl has not been evaluated in the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document on carbaryl be prepared based on the 2001 JMPR report.

**Expected end-product(s):** Short background document for the second addendum to the Third Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) and the GDWQ WG meeting (Geneva, 2005) agreed to review the occurrence data for carbaryl in order to determine whether it satisfies the criteria for inclusion and should be added to the rolling revision. The GDWQ WG meeting (Geneva, 2006) agreed that a short background document based on the 2001 JMPR report should be prepared for the second addendum.

**Plan of work for Chemical WG:**
1) The background document on carbaryl is posted on the web for public domain review. Once any review comments have been addressed, the document will be published as part of the second addendum.
2) *This agenda item can then be removed from the plan of work.*

#85. Cylindrospermopsin

**Background:** Cylindrospermopsin is a toxin produced by cyanobacteria, or blue-green algae, that has severe effects on the liver and other organs. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document on cylindrospermopsin be prepared. Toxicity data for cylindrospermopsin are now available, but their adequacy for the preparation of a background document is uncertain.

**Expected end-product(s):** 1) Revised text on treatment for Fourth Edition; 2) background document for publication in the Fourth Edition or later

**Progress to date:** It was agreed that cylindrospermopsin meets the criteria for deciding whether to review a chemical according to the Policies and Procedures Manual. WHO/PCS was asked to evaluate the available literature on cylindrospermopsin and to report back to WG members as to whether data are sufficient to perform a toxicological assessment. The GDWQ WG meeting (Geneva, 2006) reiterated the need for WHO/PCS to evaluate the available toxicological literature.
Plan of work for Micro and Chemical WGs:

1) A draft background document on cylindrospermopsin was provided to WG members. It was noted that there was a need to emphasize prevention of bloom formation as the preferred option to treatment.

2) The WG agreed that a joint CICAD/GDWQ process would be useful for cylindrospermopsin, as we should not be driving new reviews when there are not CICADs or other reviews already in place. The danger is that PCS independently decides to do a CICAD later and comes up with a different result. This would work, of course, only where the principal concern is water.

3) Some government needs to put out the document. It would then undergo an internal (country) review, then be submitted to the PCS CICAD process, which has a wider review process. Australia (Ian Falconer, at one time, had offered to draft a CICAD on cylindrospermopsin, and he co-authored the background document) or Germany (Ingrid Chorus) were suggested as two possibilities. Australia and Germany could liaise in the preparation of the CICAD and a drinking-water background document in tandem. Ingrid Chorus will inquire about Germany’s position and inform the WG. It might be easier for Australia to do this, as they already have a fact sheet and guideline value.

4) Note also that a new section 8.4.14 on treatment for removal of cyanobacteria and cyanotoxins has been drafted for the Fourth Edition (see agenda item #53).

#86. Dichlorvos

Background: Although the Berlin Coordinating Committee meeting (2000) suggested that dichlorvos is unlikely to occur in drinking-water and therefore should not be included in the GDWQ, the Chemical Aspects WG meeting in Tokyo (2002) recommended that it be considered as part of the rolling revision process based on the 1993 JMPR assessment.

Expected end-product(s): Short background document for the Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) and the GDWQ WG meeting (Geneva, 2005) agreed to review the occurrence data for dichlorvos in order to determine whether it satisfies the criteria for inclusion and should be added to the rolling revision. The GDWQ WG meeting (Geneva, 2006) agreed that a short background document on dichlorvos should be prepared for the second addendum. On the basis of review comments received, it was decided that this be postponed until the Fourth Edition.

Plan of work for Chemical WG:

1) The background document is posted on the web for public domain comment. Once any review comments have been addressed (and the analytical section incorporated by Marla Sheffer), the document will be published as part of the second addendum.

2) Post-meeting note: The review comments received (by 31 May 2007) were extensive, and it was decided, due to time constraints, that the required revisions could not be completed in time for the second addendum. This agenda item has therefore been pushed forward to the Fourth Edition.

#87. Dicofol

Background: Although the Berlin Coordinating Committee meeting (2000) suggested that this chemical is unlikely to occur in drinking-water and therefore should not be included in
the GDWQ, the Chemical Aspects WG meeting in Tokyo (2002) recommended that it be considered as part of the rolling revision process based on the 1992 JMPR assessment.

**Expected end-product(s):** Short background document for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to review the occurrence data for dicofol in order to determine whether it satisfies the criteria for inclusion and should be added to the rolling revision. The GDWQ WG meeting (Geneva, 2006) agreed that a short background document on dicofol should be prepared for the second addendum. On the basis of review comments received, it was decided that this should be postponed to the Fourth Edition.

**Plan of work for Chemical WG:**
1) The background document is posted on the web for public domain comment. Once any review comments have been addressed (and the analytical section incorporated by Marla Sheffer), the document will be published as part of the second addendum.
2) Post-meeting note: The review comments received (by 31 May 2007) were extensive, and it was decided, due to time constraints, that the required revisions could not be completed in time for the second addendum. This agenda item has therefore been pushed forward to the Fourth Edition.

**#90. Nitrobenzene**

**Background:** Nitrobenzene has not been evaluated in the GDWQ. The GDWQ FTF meeting (Geneva, 2003) recommended that a background document on nitrobenzene be prepared based on EHC 230, published in 2003. The coordinator of industrial sources has reviewed the EHC.

**Expected end-product(s):** Background document and summary statement for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) decided that a background document cannot be prepared, as data are inadequate to determine a NOAEL for humans for the end-point of concern (methaemoglobininaemia) and there are no data on occurrence of nitrobenzene in drinking-water. The GDWQ WG meeting (Geneva, 2005) determined that nitrobenzene does occur in drinking-water, although at low levels. The GDWQ WG meeting (Geneva, 2006) agreed to prepare a background document on nitrobenzene for inclusion in the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) agreed that the background document could undergo the review process once revisions suggested at the meeting had been taken into consideration.

**Plan of work for Chemical WG:**
1) Akihiko Hirose prepared a background document on nitrobenzene, which was based on the EHC. A briefing note based on the background document was provided to WG members for discussion.
2) It was agreed that the recommended health-based values (short- and long-term) are appropriate: 4 µg/litre long-term derived from a chronic inhalation study and 30 µg/litre short-term derived from a gavage study (using an extra uncertainty factor of 10 for use of a LOAEL instead of a NOAEL).
3) Because nitrobenzene’s occurrence in drinking-water is so infrequent, it is considered inappropriate to set a formal guideline value. Instead, health-based values will be given in the background document to provide guidance in the event of spills and where there are higher concentrations in industrial areas. The background document will also note that the odour threshold is 30–100 µg/litre.

4) A full background document is available. **Peter Jackson** will add a treatment section. The document then needs to go through two review processes and can be posted on the web once finalized (as the FTF meeting requested that nitrobenzene be evaluated). The summary statement will be prepared by **Marla Sheffer** for the Fourth Edition.

### #91. Petroleum Products

**Background:** Petroleum oils have not been evaluated by the GDWQ. The GDWQ FTF (Geneva, 2003) recommended that a background document on petroleum oils be published in the first addendum to the Third Edition.

**Expected end-product(s):** 1) Background document and summary statement for inclusion in the first addendum to the Third Edition; 2) possibly revised background document for Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) recommended publication of the background document on petroleum oils, as amended. The GDWQ WG meeting (Geneva, 2005) noted that the document has undergone peer and public domain review and will be published shortly. The GDWQ WG meeting (Geneva, 2006) noted that a slight revision to the document may be required for the second addendum, after which the item can be removed from the plan of work. There was no progress to report by the time of the GDWQ WG meeting (Berlin, 2007), so any change needed will be made for the Fourth Edition.

**Plan of work for Chemical WG:**

1) A late change made to the background document may require an additional change to the text. **Marla Sheffer** and **John Fawell** will liaise to solve this problem. John is to send Marla the email from James Hopkins requesting the change to the background document. Marla will contact him directly to ask for an explanation of the change.

2) Once the issue has been resolved, this item can be removed from the plan of work.

### #92. Sodium Dichloroisocyanurate

**Background:** Sodium dichloroisocyanurate is used as a disinfectant in water. It dissociates in water to form a number of chemical species, notably free chlorine and cyanuric acid. The GDWQ FTF meeting (Geneva, 2003) recommended that sodium dichloroisocyanurate be referred to JECFA and added to the rolling revision of the GDWQ. A guideline value for use in emergency situations would reassure those who need to use the disinfectant.

Progress to date: JECFA’s review was completed in June 2003, and a TDI has been derived from which a guideline value can be calculated. The GDWQ WG meeting (Geneva, 2005) agreed to a revised plan of work. The GDWQ WG meeting (Geneva, 2006) agreed that the background document could be sent out for review after internal peer review comments had been taken into consideration. The GDWQ WG meeting (Berlin, 2007) agreed on some amendments to the background document and decided to include sodium dichloroisocyanurate in the new (re)assessment of conventional and non-conventional disinfectants and DBPs.

Plan of work for all WGs:

1) **John Fawell** and WSH met with a range of manufacturers of sodium dichloroisocyanurate (from Europe, and USA by phone) in Geneva at the end of February to discuss the current draft background document and issues related to the provision of guidance on best use practice for different users and uses (to be decided among themselves).

2) A draft of the meeting report was provided to WG members. It recommended that 1) the GDWQ should outline minimum requirements that would set the scene for safe NaDCC use in drinking-water (e.g. minimum quality, minimum requirements to guide procurement) and 2) the rolling revision process of the GDWQ take on board the issue of safe use of NaDCC in drinking-water. Expected outputs from the rolling revision process were to i) seek to have a “certifiable” statement in the GDWQ that would specify the minimum requirements for NaDCC; ii) work towards codes of good and standardized practice for different uses and applications of chlorinated isocyanurates (including aspects of purity, quality, stability of formulation, packaging, application limits, etc.) to encourage safe use in drinking-water and to avoid potential impacts from misuse; and iii) look towards the development of usable (easy to use and understand) communications tools for use of disinfection methods in the field, such as pictorial guides.

3) NaTCC (sodium trichloroisocyanurate) is now being considered as a disinfectant by some manufacturers. It has the same breakdown product, but more chlorine for the amount of isocyanuric acid produced, so it has advantages over NaDCC.

4) It needs to be made clear in the background document that development of a guideline value does not constitute an endorsement of use of the products by WHO. A statement also needs to be included in the background document about the quality of material to be used in drinking-water (i.e. should meet some standards) and good practice for use (e.g. need to use it properly and avoid cyanurate buildup). Discussion on possible certification of NaDCC relates to the agenda item on certification of materials and chemicals (see agenda item #120).

5) The background document will be amended by **John Fawell** (for the second addendum) as noted in 4) above. It is currently out for public review, and there have been no other comments. The guideline value is based on cyanuric acid (for long-term exposure). There is also a need for revised text in sections 4.5 and 6.2 of the GDWQ for inclusion in the Fourth Edition (it was originally scheduled for the second addendum, but text was never prepared).

6) The WG agreed to include NaDCC in the new (re)assessment of conventional and non-conventional disinfectants and DBPs (see agenda item #158). This agenda item will be retained until all other end-products have been achieved.
#93. Temephos

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that temephos be referred to JMPR with high priority (as it is a WHO/PES pesticide applied to water for public health purposes) and that a background document be prepared as part of the rolling revision.

**Expected end-product(s):** Background document and summary statement on temephos for publication in the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2004) agreed to add temephos to the rolling revision and decided on a plan of work. No progress had been made on this item by the time of the GDWQ WG meeting (Geneva, 2005). The GDWQ WG meeting (Geneva, 2006) agreed to prepare a background document following discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward towards finalizing the background document.

**Plan of work for Chemical WG:**
1) JMPR has evaluated temephos, but the report is not published yet. The key study did not meet current ethical standards (paid participants), and part of the committee refused to set a number. However, the information is in the report to allow a number to be set. Angelika Tritscher has agreed that we can derive a number and finalize the background document based on the JMPR document.
2) **John Fawell** and **Vera Ngowi** will prepare the background document for the next meeting.

#98. Pesticides Assessed by JMPR

**Background:** The GDWQ FTF meeting (Geneva, 2003) recommended that several pesticides be referred to JMPR with varying levels of priority. These were pentachlorophenol (medium), alachlor (high), ametryn (high), chlorotoluron (low), cyanazine (low), diazinon (low), dichlobenil (medium), 1,2-dichloropropane (low), 1,3-dichloropropene (low), diuron (medium), MCPA (low), methoxychlor (high), metolachlor (low), molinate (high), pendimethalin (no priority set), simazine (high), dichlorprop (low), mecoprop (medium) and 2,4,5-T (medium).

**Expected end-product(s):** Short background documents and summary statements on those pesticides that have been recently evaluated by JMPR

**Progress to date:** The list of JMPR reports (published and in progress) is on the Internet. The *Inventory of IPCS and other WHO pesticide evaluations and summary of toxicological evaluations performed by the Joint Meeting on Pesticide Residues (JMPR): Evaluations through 2002* is also available in hard copy and electronically at [http://www.who.int/pcs/](http://www.who.int/pcs/). The GDWQ WG meeting (Geneva, 2005) decided to update only those background documents for pesticides in the above list with recent JMPR evaluations. The GDWQ WG meeting (Geneva, 2006) reiterated the need for occurrence data before requesting JMPR to evaluate a pesticide and asked that a brief justification be prepared for asking JMPR to evaluate simazine in 2008.
Plan of work for Chemical WG:

1) **John Fawell** explained that our approach for JMPR pesticides with occurrence data is to provide a short background document with a health-based value only (i.e. no formal guideline value). These pesticides will be listed in Annex 4 Table A4.2 (Chemicals for which guideline values have not been established) with the wording “Generally occurs in drinking-water at concentrations well below those at which toxic effects may occur”.

2) **Professor Magara** provided a “wish list” of pesticides used and detected in water in Japan. **Vera Ngowi** is to compare his list against the JMPR reports. For those with JMPR report, short guidance documents will be prepared by **John Fawell** and **Vera. Peter Jackson** will prepare brief treatment sections for each of these.

3) Post-meeting note: It was decided in subsequent discussions that no pesticides from the original list would be referred to JMPR for evaluation at this time, given a lack of credible evidence for significant use/occurrence in drinking-water. Moreover, it was emphasized that GDWQ recommendations for referrals to international risk assessment processes (e.g., JMPR/JECFA/CICAD) need to be supported by a formal communication with written justification detailing rationale for request. This will be incorporated in the Policies and Procedures Manual.

#101. Radon

*Background:* Radon is ubiquitous in ambient air at levels that vary due to the local geology. It may be present in indoor air, as it may enter through the foundation or through the water supply drawn from some groundwaters. It can then be taken up by both ingestion through drinking-water and inhalation of indoor air. The GDWQ FTF meeting (Geneva, 2003) recommended that the WHO Radiation and Environmental Health Programme prepare guidance on the inhalation of radon from drinking-water sources. The WHO Radiation and Environmental Health Programme has proposed a special project on radon in drinking-water that may impact on the guideline.

*Expected end-product(s):* 1) Additional paragraphs on treatment of radon and mitigation measures, for the second addendum to the Third Edition; 2) possibly updated guidance in section 9.5 of GDWQ, for inclusion in the Fourth Edition

*Progress to date:* The WHO Radiation and Environmental Health Programme have embarked on a project in collaboration with the USEPA, Health Canada and others. The GDWQ WG meeting (Geneva, 2004) recommended that the study focus on exposures in developing countries with different indoor inhalation conditions due to less use of showers and more highly ventilated spaces, since most water inhalation calculations have been done under North American-type conditions. No progress had been made on this by the time of the 2005 GDWQ WG meeting. The GDWQ WG meeting (Geneva, 2006) met with representatives of the Radiation and Environmental Health Programme and decided on a path forward for both the second addendum and the Fourth Edition. The GDWQ WG meeting (Berlin, 2007) agreed to make amendments to the text for the second addendum and agreed on a plan of work to address concerns of the Radiation and Environmental Health Programme regarding the recommended radon level.

*Plan of work for Chemical WG and Radiation Programme:*

1) **Marla Sheffer** is to delete “filtration” from the text in the second addendum on methods for radon removal from water.
2) The WG agreed to replace the first paragraph in section 9.5.2 with new paragraphs from the Radiation and Environmental Health Programme from WHO for the second addendum (Marla Sheffer to do).

3) The Radiation and Environmental Health Programme has suggested that the WHO recommendation appears to be taken from the old ad hoc limit rather than the one more recently proposed by the EU of 1000 Bq/l, above which remediation action is deemed justified. Justification for the EU level is needed before a decision can be reached. Emily van Deventer has taken over from Mike Repacholi in the interim. Bruce Gordon will contact her to get the rationale behind the value in order to justify such a change.

#103. NDMA

Background: N-Nitrosodimethylamine, or NDMA, can be formed during the treatment of drinking-water, especially when secondary amines from contaminated sources, including wastewater, are present and the water is chloraminated. Concentrations of NDMA in drinking-water above 40 ng/litre have been measured, although lower concentrations are more common. NDMA is clearly carcinogenic, with a strong likelihood that the mode of action for the induction of tumours involves direct interaction with genetic material.

Expected end-product(s): 1) Background document and summary statement, for publication in the second addendum to the Third Edition; 2) addition of NDMA to Table 8.25, for the second addendum to the Third Edition

Progress to date: As NDMA clearly satisfies one of the criteria for inclusion in the GDWQ as outlined in the Policies and Procedures Manual (“evidence for occurrence in drinking-water, combined with evidence of actual or potential toxicity”), the GDWQ WG meeting (Geneva, 2004) agreed that NDMA should be added to the rolling revision for consideration at the next meeting. The GDWQ WG meeting (Geneva, 2005) agreed to prepare a background document for publication in the second addendum. The GDWQ WG meeting (Geneva, 2006) was unable to decide on the approach to use in the guideline value derivation for NDMA and requested that the document be sent for review with a specific question regarding the validity of the use of an animal-to-human adjustment factor. The GDWQ WG meeting (Berlin, 2007) approved the final background document and agreed to remove the item from the agenda once the second addendum has been published.

Plan of work for Chemical WG:
1) No comments were received during the public domain review process. The background document will be published in the second addendum.
2) This item can be removed from the agenda once the second addendum has been published.

#104. Pirimiphos-methyl

Background: WHO Headquarters has received a request to consider pirimiphos-methyl as a WHO/PES larvicide for application to drinking-water containers in order to control the breeding of disease vectors.

Expected end-product(s): Background document and summary statement, based on 1992 JMPR report, for inclusion in the second addendum to the Third Edition
Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to add pirimiphos-methyl to the rolling revision and adopted a plan of work. The GDWQ WG meeting (Geneva, 2005) agreed to initiate development of a background document. The GDWQ WG meeting (Geneva, 2006) agreed that the background document should be revised to take into consideration discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) agreed to remove the agenda item from the plan of work once the second addendum has been published.

Plan of work for Micro and Chemical WGs:
1) The background document on pirimiphos-methyl is currently posted on the web for public domain review. Once any review comments are addressed, the document will be published as part of the second addendum.
2) This agenda item can be removed from the plan of work once the second addendum has been published.

#105. Blastocystis

Background: The GDWQ WG meeting (Geneva, 2004) identified Blastocystis as an omission from chapter 11 of the Third Edition of the GDWQ.

Expected end-product(s): Fact sheet for inclusion in chapter 11 of GDWQ, second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to add Blastocystis to the rolling revision and agreed on a plan of work. A fact sheet was completed and endorsed by the GDWQ WG meeting (Geneva, 2006) for public review, leading to its inclusion in the second addendum.

Plan of work for Micro WG:
1) The review process is now complete, and the fact sheet will be included in the second addendum.
2) This item can be removed from the plan of work once the second addendum has been published.

#106. Leptospira

Background: The GDWQ WG meeting (Geneva, 2004) identified Leptospira as an omission from chapter 11 of the Third Edition of the GDWQ.

Expected end-product(s): Fact sheet for inclusion in chapter 11 of GDWQ, second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2004) agreed to add Leptospira to the rolling revision and agreed on a plan of work. A fact sheet was completed and endorsed by the GDWQ WG meeting (Geneva, 2006) for public review, leading to its inclusion in the second addendum.

Plan of work for Micro WG:
1) The review process is now complete, and the fact sheet will be included in the second addendum.
2) Once the second addendum has been published, this item can be removed from the plan of work.

#109. Harmonization of Use of Term “Risk” and “Risk Levels

*Background:* The GDWQ WG meeting (Geneva, 2004) noted that the use of the terms “risk” (which means probability of an adverse effect) and “risk levels” needs to be carefully considered and harmonized in regard to microbial, chemical and radiological risks. In particular, the difference between “best estimates” of risk as opposed to “maximum potential” risks requires clarification.

*Expected end-product(s):* Revised text in chapter 8 of the GDWQ (for the second addendum) and throughout the GDWQ (for the Fourth Edition) and in the Policies and Procedures Manual

*Progress to date:* It was agreed that the term “risk” should be used to refer to the quantitative probability of an adverse effect occurring, rather than in the more general, qualitative sense, throughout the Fourth Edition, and that the term “level of risk” should no longer be used. It was also agreed that the text for the GDWQ chapters on chemicals and radiological hazards should be harmonized to state that the risk values are not intended to indicate actual cancer cases to be expected but rather are a metric for comparing relative risks among chemicals.

*Plan of work for Chemical and Micro WGs and Radiation Programme:*
1) The Fourth Edition and the Policies and Procedures Manual will be edited to ensure consistency in the use of the term “risk” and to edit out use of the term “risk level” (as “level” is redundant).

#114. Arsenic Monograph

*Background:* Arsenic in drinking-water is of significant concern in several geographic areas and is recognized as a priority issue for health.

*Expected end-product(s):* Management guidance document on arsenic

*Progress to date:* The 1998 WG meeting adopted the target of production of a monograph on arsenic in drinking-water as a high priority. Following the WG meeting, the UN Administrative Committee on Co-ordination (the body responsible for coordination among UN agencies) subcommittee on water resources adopted a closely related objective. Efforts have been made to merge these two initiatives and ensure a single multi-agency product. At the Chemical Aspects WG meeting in Tokyo (2002), it was noted that the draft monograph was available on the web site and that there were unresolved issues regarding the analytical methodology for arsenic. The monograph was not discussed at the GDWQ WG meeting (Geneva, 2004). The GDWQ WG meeting (Geneva, 2006) agreed that the monograph should be completed and that information on arsenic should be updated frequently on the web. The GDWQ WG meeting (Berlin, 2007) was informed that the monograph and arsenic sourcebook should be ready for review later in 2007.
Plan of work for Chemical WG:
1) The monograph and sourcebook are being edited by Marla Sheffer. The sourcebook is nearing completion, but there are still three chapters outstanding in the monograph. Federico Properzi has been the WHO responsible officer.
2) The monograph and sourcebook need to be reviewed by the WGs when they are complete.
3) The executive summary of the sourcebook will be printed in hard copy with a CD-ROM containing the rest of the monograph and the arsenic sourcebook.
4) It is hoped that the monograph and sourcebook will be ready for review later in 2007.
5) It is noted that once the monograph is published, WG members should send any new arsenic-related information to Federico so that the monograph can be updated in the future.

#117. Various Pesticides with Requests for Guideline Values

Background: WHO has received a communication from the India Bureau of Standards indicating interest in establishing limits for a number of pesticides not currently addressed in the GDWQ.

Expected end-products: Short guidance documents for various pesticides, for the Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed to request occurrence data on those pesticides for which no guidelines have been derived. The GDWQ WG meeting (Geneva, 2006) reiterated the need for occurrence data and asked that WSH request it from the initiating government.

Plan of work for Chemical WG:
1) The pesticides on this list for which there are currently no guidelines are alpha HCH, beta HCH, delta HCH, alpha endosulfan, beta endosulfan, endosulfan sulfate, monocrotophos, ethion, phorate and butachlor.
2) Vera Ngowi and John Fawell will determine whether JMPR has evaluated the pesticides of interest. If a JMPR evaluation is available, Vera will prepare a short guidance document based on the JMPR evaluation with a health-based value only.

#119. Beryllium

Background: WHO has received correspondence noting that although the GDWQ state that beryllium is unlikely to be present in drinking-water, geological studies over the past 5 years have shown concentrations ranging from <0.005 to 2.7 µg/litre (median 0.01 µg/litre) across Europe.

Expected end-products: Background document and summary statement, for the Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) expressed the need for occurrence data before a background document can be prepared. The GDWQ WG meeting (Berlin, 2007) decided to proceed with a background document, as beryllium occurrence data for the USA and elsewhere were identified.
**Plan of work for Chemical WG:**

1) A briefing note was provided to WG members. Beryllium does occur in water in the USA and elsewhere, so a guideline value should be derived. A guideline value of about 12 µg/litre (rounded to 10 µg/litre) can be derived based on the CICAD on beryllium.

2) **John Fawell** is to prepare a background document for the next meeting. Analytical methods and treatment methodology are to be provided by **Professor Magara** and **Peter Jackson**, respectively.

**#120. Certification of Compliance with GDWQ**

**Background:** On several occasions, WHO has been approached regarding the correct procedure for certification of a water or water system as being compliant with the GDWQ. EMRO is one region that has requested guidance in this area. Advice from WHO/Legal has been sought.

**Expected end-products:** Additional text, possibly in the Fourth Edition (section 1.2.9, Certification agencies)

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work, and the GDWQ WG meeting (Geneva, 2006) revised the plan of work. The GDWQ WG meeting (Berlin, 2007) approved the workplan prepared by contractors in Australia contingent on seeing a draft in 3 months, at which time a decision will be made as to whether to proceed.

**Plan of work for all WGs:**

1) **WHO** has appointed **Annette Davison** and **Dan Deere** to develop a set of criteria that can be used to assess GDWQ implementation. The focus will be on organized water suppliers and their regulators that wish to objectively assess the extent to which the WHO GDWQ and implied good practice measures, as appropriate, have been implemented, with particular focus on the sound application of WSPs. The approach has some parallels with a system recently developed by Annette Davison and Dan Deere for the Water Services Association of Australia called Aquality and now being used by Australian organized water supply entities to self-assess and benchmark implementation of the Australian Drinking Water Guidelines, which are largely based on the WHO GDWQ. However, the WHO project will involve a broader coverage than the Australian system, which is limited to just the “Framework”, or WSP-equivalent part of the Australian guidelines, and will cover globally relevant principles and processes for reliable safe water provision. As such, the WHO system will be internationally applicable and will complement rather than compete with any national guidelines and standards or other certified standards. The first phase will focus on utility self-assessment and benchmarking, and the second phase will explore the possibility of moving towards certification. The project has been divided into sections, as follows:

   i. **Deliverable 1:** Standard version of GDWQ. Extract and précis summary statements from the GDWQ that could collectively constitute a “standard” against which implementation could be assessed.

   ii. **Deliverable 2:** Pilot indicator set. A pilot version of the indicators.

   iii. **Deliverable 3:** Pilot scoring system. A pilot scoring system.

   iv. **Deliverable 4:** Pilot system user guide. A pilot system user guide to enable the pilot system to be used by evaluators from the WHO working group and their associates.
vii. Deliverable 7: Global reporting system. Analyse and report on what is required if WHO were to develop a global reporting and benchmarking system.

WHO does not intend to undertake certification itself or to provide a badge of certification. Rather, WHO will define criteria that could be used by certification bodies to certify water supply systems. The bodies undertaking certification could be competent certification auditors and/or health agencies, as approved in the relevant jurisdiction. Therefore, water supplies could be certified against the standard set by WHO, but the certifying entity would provide its own badge of certification. The system is analogous to HACCP or ISO systems. For example, the FAO/WHO Codex HACCP system (Rev 4, 2003) and the ISO 22000 (2005) system are made under FAO/WHO and ISO, respectively. Independent certifying agencies might certify conformity of a Food Safety Plan with these standards, but the “badge” is not from FAO/WHO or ISO.

3) Tom Williams noted that IWA has initiated a related activity and needs to join up with WHO to make sure that they are thinking along the same lines.

4) The next step is for the WGs to approve the workplan. A draft will be prepared within 3 months and then will be sent to the WGs for their review. The WGs agreed to review the draft when it is ready and then decide whether to go forward with it or not. If so, the WGs will need to put some strategic direction to the workplan.

5) There was considerable discussion on this agenda item. There was some concern about WHO becoming another certification agency like ISO, and WG members expressed a desire to resolve this issue now rather than farther down the road. Nevertheless, we need to consider the ISO and HACCP link and the issue of setting parallel certification processes. It was felt that certification should be woven into the guidance for setting national standards. It was suggested that the first step, of establishing minimum criteria for WSP implementation, is approval rather than certification, and that the certification application would come into the process farther down the line.

#121. Novaluron

Background: Novaluron, an insect growth regulator, has been evaluated by WHO/PES for use as a mosquito larvicide. In addition, the WHO specifications for novaluron TC and EC, for quality control and international trade, have been published and are available on the WHO home page on the Internet. Noting the potential use of the product in potable water for mosquito larviciding, WHO/PES recommends the assessment of the human toxicity and ecotoxicity of the compound and the establishment of a drinking-water quality guideline. WHO/PES strongly recommends that WHO recommendations and water quality guidelines for use of larvicides in potable water be linked to WHO specifications.

Expected end-products: Background document and summary statement on novaluron, for the second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed to formally add novaluron to the rolling revision. The GDWQ WG meeting (Geneva, 2006) agreed to revise the draft
background document following discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) agreed to remove the agenda item from the workplan once the second addendum has been published.

**Plan of work for Chemical WG:**
1) The background document is posted on the web for public domain review. Once any review comments have been addressed, the document and summary statement will be published as part of the second addendum.
2) **This item can be removed from the agenda once the second addendum has been published.**

### #123. Guidance on Developing National Standards and Regulations from GDWQ

**Background:** WHO has received several requests from the WHO regions (e.g. WPRO, EMRO) for guidance concerning how to develop national standards from the Guidelines. In response to this request, a document had been prepared by CEPIS (Guidelines for Drinking Water Quality Standards in Development Countries) in 2002 with a focus on Latin America and based on the Second Edition of the GDWQ.

**Expected end-products:** 1) Revised text for the Fourth Edition; 2) guidance document on how to develop national standards from the GDWQ, for publication in 2008

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work, and a path forward was agreed by the GDWQ WG meeting (Geneva, 2006). The GDWQ WG meeting (Berlin, 2007) was updated on the outcome of an advisory meeting at which it was decided to release a guidance document on developing national standards from the GDWQ to coincide with the 50th anniversary of the WHO GDWQ.

**Plan of work for all WGs:**
1) This agenda item was discussed at length at an advisory consultation that preceded the GDWQ WG meeting (Berlin, 2007). See Section 1.5.2 and Annex 4 for a full report on this meeting.

### #124. Network of Drinking-water Regulators

**Background:** WHO has been asked to develop a network of drinking-water regulators. Regulators want the ability to exchange their experiences within the regulatory community and the ability to have frank discussions with other regulators about how to respond quickly to emerging issues that demand a regulatory response.

**Expected end-products:** Pending

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed to a plan of work. The GDWQ WG meetings (Geneva, 2006; Berlin, 2007) were updated on progress made in this area.

**Plan of work for all WGs:**
1) **Bruce Gordon** showed a slide illustrating that “WHO Responses on Drinking-water Quality” consist of 1) International network on water at household level, 2) Network on
water at community level, and 3) Regulators network and O&M network as three sides of a triangle.

2) A briefing note outlining the objectives and concept of the WHO Network of Drinking-water Regulators (RegNet) was provided to WG members. WHO has started identifying regulators. They will be convening a meeting in the next few months with whatever regulators have been identified to date. Bruce Gordon asked Committee members to identify regulators (only people who set or implement regulations) in their own countries (or others, especially developing countries) to play a part in this network. Membership has to go through a policing process.

3) There needs to be more systematic interaction between what the regulators are doing and how it relates to the Guidelines. WHO has a list of key themes around which meetings would be organized, such as tanker trucks, implementing WSPs, etc.

#125. Nematodes

Background: Several WHO regions (e.g. EMRO) have inquired about nematodes in drinking-water. The Third Edition does not specifically deal with nematodes in any detail. The meeting was asked to consider this issue.

Expected end-products: Fact sheet on nematodes, for inclusion in the second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) agreed that the fact sheet should be posted for review purposes once internal review comments had been taken into consideration. The GDWQ WG meeting (Berlin, 2007) agreed that the item could be removed from the agenda once the second addendum has been published.

Plan of work for Micro WG:

1) The fact sheet has been posted for peer and public review and the review comments incorporated. The fact sheet will be published as part of the second addendum.
2) This item can be removed from the agenda once the second addendum has been published.

#127. Bromate in Bottled Water

Background: EMRO sent an inquiry in respect to guidance for high levels of bromate found in some bottled waters and waters disinfected with hypochlorite produced by electrolysis of seawater and brines.

Expected end-products: Revised text in chapter 6 of the GDWQ, second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) approved the revised text for the second addendum and agreed to remove this item from the plan of work once the second addendum has been published.
Plan of work for Chemical WG:
1) The revised text will be incorporated in the second addendum. Once the second addendum has been published, this agenda item can be removed from the plan of work.

#128. Potassium

Background: Potassium chloride water softener regeneration or mixed potassium/sodium chloride regeneration is being used as an alternative to sodium chloride water softener regeneration, as the perception is that potassium is better for health. However, some people with specific diseases or on certain medications are susceptible to hyperkalaemia, and some mention of this needs to be made. There is currently no background document or summary statement for potassium in the GDWQ.

Expected end-products: New background document and summary statement on potassium, for Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. A briefing note on potassium was prepared for discussion by the GDWQ WG meeting (Geneva, 2006). It was agreed that a background document and summary statement should be prepared for publication in the second addendum. The GDWQ WG meeting (Berlin, 2007) agreed to push back the background document to the Fourth Edition.

Plan of work for Chemical and P&C WGs:
1) A briefing note was provided to WG members. The WG was asked to decide i) whether a guideline value for potassium in drinking-water was needed and ii) whether it was appropriate to recommend under the materials and processes sections that potassium-based ion exchange water softeners should not be used for municipal water softening, that domestic systems or systems in buildings should not be plumbed into the dietetic taps, or that warnings should be provided for individuals who are potentially at risk, which could include bottle-fed infants.
2) This could possibly be addressed in the context of materials and chemicals used in water treatment if and when a guideline is developed.
3) A short guidance document is to be prepared by John Fawell for the next meeting. No guideline value will be derived (data are very limited and it would be difficult to develop a health-based value), but guidance will be provided for high-risk users.

#129. Boil Water Instructions

Background: WPRO expressed concern about inconsistent instructions regarding boil water instructions from various agencies (e.g. USEPA advises a one-minute rolling boil and three minutes at high altitudes) and requested that WHO prepare a separate fact sheet with WHO guidance on this issue.

Expected end-products: 1) Additional text on boiling in Volume 1 of the GDWQ for the first addendum to the Third Edition; 2) fact sheet providing guidance on boiling water

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) agreed that a fact sheet providing guidance on boiling should be prepared. The GDWQ WG meeting (Berlin, 2007) agreed on a path forward towards developing this fact sheet.
Plan of work for Micro and P&C WGs:
1) The WG recommended that Mark Sobsey and David Cunliffe develop a fact sheet on guidance on boiling, which includes the data on responses of waterborne pathogens to heat exposure in water, based on a compilation of the literature.
2) Members of WGs are to forward literature on thermal inactivation to David Cunliffe by 30 June 2007. The fact sheet is to be completed by December 2007.

#130. Pyriproxyfen

Background: The GDWQ WG meeting (Geneva, 2005) agreed that allocation factors of 20% rather than 10% should be used for WHO/PES pesticides, which are deliberately added to water for public health purposes. Pyriproxyfen is the only WHO/PES pesticide for which there is currently a guideline value and which uses an allocation factor of 10%.

Expected end-products: Revised background documents and summary statements, for the second addendum to the Third Edition

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) agreed to revise the draft background document following discussions with the WHO Vector Ecology and Management Programme. The GDWQ WG meeting (Berlin, 2007) agreed to remove this item from the agenda once the second addendum has been published.

Plan of work for Chemical WG:
1) Two background documents on pyriproxyfen were prepared, one for general pesticide use and one for use as a larvicide for public health purposes. Both documents are posted for public domain review and will be published as part of the second addendum once any review comments received are addressed.
2) This item will be removed from the agenda once the second addendum has been published.

#131. Nitrate/Nitrite

Background: The GDWQ WG meeting (Geneva, 2005) identified the need for an expanded summary statement with additional information on management issues related to nitrate/nitrite.

Expected end-product(s): 1) Expanded summary statement for Volume 1 for the second addendum of the Third Edition; 2) revised background document for the second addendum

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed to formally place nitrate/nitrite on the rolling revision and developed a plan of work. The GDWQ WG meeting (Geneva, 2006) approved the expanded summary statement and revised background document for the second addendum. The GDWQ WG meeting (Berlin, 2007) agreed to remove this item from the agenda once the second addendum has been published.

Plan of work for Chemical WG:
1) John Fawell has updated the background document and prepared the expended summary statement on nitrate/nitrite. Both will be published as part of the second addendum.
2) This item can be removed from the agenda once the second addendum has been published.

#132. Small Community Systems

Background: There was a meeting in Iceland in January 2005 on Small Community Systems and a follow-up meeting in Alice Springs, Australia, in July 2005. The first meeting corroborated the need for work on small community supplies and to develop an international network for sharing information on small systems on a global basis. Tools and approaches discussed in more depth at the Australia meeting, which involved SEARO and WPRO, included a decision-making tool that Australia has been working on, criteria for pilot studies, management structures, models of community engagement, identifying suitable test kits and the need for a generic framework for addressing small supplies within the overall water safety framework.

Expected end-product(s): A generic tool to support the implementation of WSPs for small communities

Progress to date: The GDWQ WG meeting (Geneva, 2005) agreed to follow progress on the issue, and the GDWQ WG meeting (Geneva, 2006) received an update report. The GDWQ WG meeting (Berlin, 2007) agreed to publish the generic tool once it has been prepared.

Plan of work for all WGs:

1) David Cunliffe reported that the third meeting had been held in Kelowna, B.C., Canada, in September 2006. The network was working on a number of tasks. A major item is the development of tools to support the implementation of WSPs for small communities (as identified by the WHO regions). A briefing note on this item was provided to WG members. The intent is to gather experience from developed and developing countries and distill it into one comprehensive document. They have gathered eight or nine tools or sets of guidance (software, written tools, pictorial tools) from several countries that deal with aspects of WSPs such as hazard identification, risk assessment, control measures, corrective actions and monitoring. A small group is hoping to move this forward. The coordinator (Jackie Sims) has moved on, and Jennifer Mercer (from Health Canada, now at WHO) will take on the coordination role. The end result will be a WSP implementation guide for small communities (see also agenda items ##28 and 32). The format has not yet been decided, but there is support for inclusion of pictorial formats. It will have generic features, but it will also be country-specific (in annex) and be accompanied by supporting documents with more details. The target audience is coordinating agencies (e.g. provinces/First Nations in Canada).

2) Michèle Giddings provided WG members with information regarding an electronic risk assessment tool being developed by Ontario (Canada) for small drinking-water inspection systems.

3) Joe Cotruvo designed a study of decentralized POU for arsenic removal in a small system, and the USEPA report is available.

4) It was noted that there needs to be a stronger link between the network and this group so that the guidance developed has credibility. It was suggested that the WG be involved in the review process. This group thinks the product is an important one, and EURO is extremely interested in participating in the review process.

5) A mechanism for maintaining impetus is needed. There is a proposal for a further meeting on the network in Edinburgh in November 2007. They need to distill the existing tools
and propose what should be in the generic tool and in the country-specific tools. This group recommends to Jennifer Mercer that the next product should be ready for review by the end of the year. The WGs can then take it forward and publish it.

6) It was agreed that the small group (co-leads are David Cunliffe and Shamsul Gafur Mahmud of Bangladesh) will assemble the features of the generic tool this year, bring it back to the Committee by the end of the year, and select members of the Committee to work with the network on the tool.

7) Post-meeting note: In the event of a decision to update GDWQ Volume 3 (i.e. putting it into the “WSP format”), this group could play a key role in reviewing the document, looking for gaps and making recommendations.

#133. Bottled Water in Emergencies

**Background:** WHO has received a comment objecting that there is no mention of the role of bottled water in emergency situations.

**Expected end-product:** Revised text in chapter 6 for the second addendum to the Third Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) decided on a plan of work. The GDWQ WG meeting (Geneva, 2006) approved the text for the second addendum and agreed that this item can be removed from the plan of work once the second addendum has been published.

**Plan of work for P&C WG:**
1) New text to address bottled water for emergencies will be published as part of the second addendum (section 6.2.1).
2) *Once the second addendum has been published, this agenda item can be removed from the plan of work.*

#135. Pharmaceuticals in Drinking-water

**Background:** Pharmaceuticals (e.g. antibiotics, endocrine disruptors) have been detected and confirmed in all components of the water cycle in Europe and were raised as a concern by EURO. Professional organizations such as EUREAU and the Rhine Water Works as well as wastewater treatment companies have also expressed concern on the topic. Even though human risk assessments have shown that low concentrations of pharmaceuticals in drinking-water have a negligible health risk, long-term exposures have not been evaluated, especially in debilitated or immunosuppressed populations. Antibiotics in the water cycle may raise a particular concern because of the theoretical potential to promote resistance in bacteria in the aquatic environment.

**Expected end-product:** Pending

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on the need to keep up to date in this area and to start gathering relevant information. The GDWQ WG meeting (Geneva, 2006) agreed to actively consider the issue. The GDWQ WG meeting (Berlin, 2007) agreed to delay the evaluation until all relevant data are available, probably early in 2008.
Plan of work for Chemical WG:

1) There has been a delay in preparing the overview until evaluations/data (Australian, United Kingdom, USA) are available, probably late 2007.

2) The USEPA (Office of Water) is currently focusing significant effort on evaluating concerns due to the occurrence of pharmaceuticals and personal care products (PPCPs) in the nation’s water. **Ed Ohanian** would appreciate receiving any occurrence or other relevant data that are available. **John Fawell** is to send him an assessment based on concentrations in European water, modelling of behaviour through wastewater treatment to drinking-water treatment under different conditions, and the evaluation of risk to health (submitted to the United Kingdom Drinking Water Inspectorate by August 2007 and finalized by the end of the year).

3) **Choon Nam Ong** indicated that Singapore is initiating studies on PPCPs. The results will not be available soon, but he will share the information with WG members whenever it is available.

4) There is also a Japanese study on the same issue. **Yasumoto Magara** will provide the results to the group (but it needs to be translated into English first).

5) There are several published studies (e.g. Schwab et al.), and others under way in the United States.

6) Australia has done some evaluation using therapeutic doses, and **David Cunliffe** will forward it to the group. **Joe Cotruvo** will provide some relevant information.

7) **Choon Nam Ong** agreed to coordinate this agenda item. All data are to be sent to him for distribution to the rest of the group. Choon Nam will update the status of the agenda item at the next meeting.

#136. Corrosion Control

**Background:** Corrosion is defined as “the deterioration of a material, usually a metal, that results from a reaction with its environment.” In drinking-water distribution systems, the material may be a metal pipe or fitting, the cement in a pipe lining, an asbestos-cement pipe or a polyvinyl chloride pipe. The corrosion of drinking-water materials can result in elevated levels of contaminants in the drinking-water supply. Water purveyors need advice on how to control corrosion from plumbing and water distribution systems and reduce exposure to such contaminants as lead and copper, which can present a health risk.

**Expected end-product:** 1) Revised text in GDWQ, for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed to postpone agreement on a plan of work until the Health Canada document has been prepared. The GDWQ WG meeting (Geneva, 2006) decided that the information on corrosion control could find a home in several supporting documents, that Volume 1 should be revised for the second addendum or the Fourth Edition and that the summary statement on lead should be revised to incorporate guidance on corrosion management. The GDWQ WG meeting (Berlin, 2007) agreed that information on corrosion control should be integrated into the supporting document on large buildings and that there was no need to revise the summary statement on lead.

**Plan of work for Chemical and P&C WGs:**

1) Corrosion control is aimed at larger buildings and so would better belong in Yves Chartier’s buildings document. **Peter Jackson** is to work on the corrosion control text for the buildings document.
2) **Peter Jackson** indicated that the lead summary statement should not be revised.
3) **Michèle Giddings** is to send WHO the Health Canada document on corrosion control.
4) There is a need to ensure that the text in the GDWQ (Fourth Edition) and that in the building document is consistent. **Peter Jackson** will update the GDWQ text for the Fourth Edition accordingly.
5) Post-meeting note: Experts from the World Plumbing Council, a nongovernmental organization in official relations with WHO, will review text (and contribute as appropriate) for the text relating to corrosion control, including in buildings.

#137. Microrisk Project

**Background:** An offer of cooperation has been received from investigators working on the Microrisk Project, which should provide information relevant to the GDWQ and WSP application. The aim of the project is to combine microbial risk assessment from catchment to consumer with a risk management approach.

**Expected end-product:** 1) Published report on the project; 2) possible incorporation of some of the report in future review of other supporting documents, such as that on Water Treatment and Pathogen Control.

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on an initial plan of work. The GDWQ WG meeting (Geneva, 2006) was updated on progress made to date. The GDWQ WG meeting (Berlin, 2007) was advised that the final report would be circulated to WG members as soon as it is available.

**Plan of work for Micro WG:**
1) The final report will be circulated to the WG when it is available. The report is with the European Commission and is expected to be released shortly. **Ana Maria de Roda Husman** is to maintain contact with **Gertjan Medema** to ensure that the report is circulated as soon as it becomes available.

#138. GDWQ Training Pack

**Background:** The WHO GDWQ training pack provides information for use in the planning and delivery of seminars, workshops and training courses in surveillance, control and improvement of water quality. The pack includes a presentation and practical exercises and is designed to cover a broad range of water-related topics so that appropriate elements can be selected in response to local circumstances and priorities. It has been mentioned that the current format of the training pack is not easy to use.

**Expected end-product:** Revised training pack.

**Progress to date:** A note has been placed on the web indicating that the existing training pack is currently being revised. The GDWQ WG meeting (Berlin, 2007) was informed that the new revised draft training pack will be available for review by the end of 2007.

**Plan of work for all WGs:**
1) The training package, prepared by Kathy Pond, Steve Pedley and **Suresh Kumar**, is in Suresh’s hands. There are four modules: i) Water and public health, ii) WHO Guidelines for Drinking-water Quality, iii) Health-based targets, and iv) WSPs. The content is there,
but there is not enough material on dissemination during the training process (i.e. how to translate the content from the package to the participants, perhaps using user-friendly workbooks).

2) There was supposed to have been a workshop in Malaysia in 2006, but Suresh was on sabbatical until January 2007. He is still keen to have a workshop. Material for a two-day workshop is to be developed within the next 6 months. He should be able to hold a workshop as a trial run in Malaysia by the end of the year or early next year. The workshop is for a general audience, to make them aware of the Guidelines.

3) The new revised draft will be available for review by the WGs in December 2007.

#139. Total Trihalomethanes

**Background:** The Second and Third Editions of the GDWQ differed, in that authorities might or might not add up the guidelines of the individual THMs to derive a guideline for total THMs, as the four THMs may or may not have basically similar mechanisms of action. It now appears that the four THMs may indeed have similar mechanisms of action.

**Expected end-product:** Revised text in THMs background document and summary statement, for the second addendum to the Third Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed on a plan of work. The GDWQ WG meeting (Geneva, 2006) agreed to amend the current text in the THMs background document for the second addendum. The GDWQ WG meeting (Berlin, 2007) agreed to remove the item from the agenda once the second addendum has been published.

**Plan of work for Chemical WG:**
1) Text has been amended for the second addendum. *This agenda item can be removed from the plan of work once the second addendum has been published.*

#141. Perchlorate

**Background:** The United States is considering setting a standard for perchlorate in drinking-water, and Japan has also started to collect information on its concentration in drinking-water, as it has found surface water to contain up to 25 µg/litre in some areas, from manufacturers, fireworks and other sources. An official request was made by Japan for WHO to develop guidance concerning perchlorate in drinking-water.

**Expected end-product:** Background document and summary statement, possibly for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2006) agreed to add perchlorate to the rolling revision. The GDWQ WG meeting (Berlin, 2007) decided on a path forward.

**Plan of work for Chemical WG:**
1) **Ed Ohanian** reported that no briefing note had been prepared, but that he will prepare one for the next meeting (based on the NAS reference dose). Japan (Yasumoto Magara) is to provide some information on occurrence to Ed. Issues of concern are body weight (protecting pregnant women, newborn, fetus) and missing relative source contribution information. A decision will be made by the USEPA by September 2007 regarding whether to establish a health advisory for perchlorate.
#142. Sodium

**Background:** Correspondence has been received noting that although the GDWQ state that no health-based guideline can be proposed for sodium because no firm conclusions can be drawn concerning the possible association between sodium in drinking-water and the occurrence of hypertension and that concentrations in excess of 200 mg/litre may give rise to an unacceptable taste, the United Kingdom, in implementing the EU Drinking Water Directive to national regulations, transposes sodium, at 200 mg/litre, from an indicator parameter to a mandatory parameter “to protect against infant hypernatraemia and those on a salt-restricted diet.” On the other hand, there are risks from hyponatraemia in warm climates and where large amounts of drinking-water are consumed and sodium intake is inadequate to compensate for sweat losses.

**Expected end-product:** Background document and summary statement, probably for Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2006) agreed on a path forward, which was revised by the GDWQ WG meeting (Berlin, 2007).

**Plan of work for Chemical WG:**
1) The WG is awaiting the requested information from WHO on the relationship between sodium and hypertension and hypernatraemia. For most people, high sodium levels in drinking-water are not an issue. They may, however, be a potential issue for people on a low-sodium diet, who may require guidance in terms of water softeners and desalination. Hyponatraemia should also be addressed.
2) A guidance document is needed, but no guideline value. This will be a similar document as for potassium, providing guidance for high-risk groups. **John Fawell** will prepare a short guidance document for the next meeting.
3) The WG raised the issue of labelling requirements (e.g. sodium levels in bottled drinking-water). This needs the approval of the FTF before the DWQC can explore this as a new issue.

#144. Avian Influenza

**Background:** A WG member has suggested that the WGs review the issue of avian influenza (H5N1) in drinking-water because of possible increased risk to water supplies caused by animal sources of the virus. WHO has published a document “Review of latest available evidence on risks to human health through potential transmission of avian influenza (H5N1) through water and sewage.” The WGs are asked to decide whether there is a need to deal with the issue in the rolling revision.

**Expected end-product:** New text in chapter 7 of the GDWQ on emerging pathogens, for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2006) agreed to add this item to the agenda as a watching brief.
Plan of work for P&C and Micro WGs:
1) The WGs concluded that this item should remain on the agenda as a watching brief. The WGs agreed not to include a major piece of text or a fact sheet at this time, but a discussion on the topic will be included in a new section in chapter 7 on emerging pathogens. This will include citation of risk assessment (Ana Maria de Roda Husman).

#146. Alachlor

Background: The risk assessment for alachlor was conducted in 1993. The guideline value for alachlor was set on a different basis from the (newer) WHO Pesticide Classification. The WGs are asked to decide whether this potential discrepancy needs to be resolved. It is also noted that one of the criteria used for deciding whether to revise the review for a constituent already considered in the GDWQ is the listing of a chemical in relevant PIC or POP listings.

Expected end-product: Possibly updated background document and summary statement for the Fourth Edition

Progress to date: The GDWQ WG meeting (Geneva, 2006) decided to add alachlor to the rolling revision and suggested a plan of work. The GDWQ WG meeting (Berlin, 2007) agreed to request occurrence data from developing countries.

Plan of work for Chemical WG:
1) The Rotterdam Convention on Prior Informed Consent (PIC) considered alachlor using newer assessments, resulting in discrepancies between it and the GDWQ background document, as the older assessments relied on for the GDWQ background document (prepared in 1993) are outdated.
2) Alachlor and methoxychlor are both high-priority chemicals, but the Committee has agreed not to ask JMPR to evaluate them unless there is good evidence that they occur in water.
3) We need to look at occurrence data and use in developing countries before deciding whether the background document needs to be updated to take the above into account. If a guideline value is required (i.e. if it occurs in drinking-water), then the science needs to be re-examined (otherwise, no guideline value is needed). Vera Ngowi and John Fawell are to forward a draft letter to Jamie Bartram, who will then send it to Lucien Manga at AFRO, requesting any occurrence data.
4) The background document and summary statement need to mention that alachlor is a PIC chemical, so PCS is asked to provide the appropriate wording. It has also been nominated as a POP under the Stockholm Convention, but a final decision has not yet been reached.

#147. Lindane

Background: The risk assessment for lindane was conducted in 2003, based on a 2002 JMPR report. Lindane is currently nominated for addition to the list of POPs under the terms of the Stockholm Convention. One of the criteria used for deciding whether to revise the review for a constituent already considered in the GDWQ is the listing of a chemical in relevant PIC or POP listings. The current risk assessment was undertaken with regard to significant long-term environmental and health effects. Lindane is also used for public health purposes.

Expected end-product: Revised summary statement and background document, for Fourth Edition, if lindane is added to the POPs list
**Progress to date:** The GDWQ WG meeting (Geneva, 2005) agreed to amend the summary statement and background document for lindane if it is added to the POPs list. The GDWQ WG meeting (Berlin, 2007) was informed that lindane’s nomination status is still pending.

**Plan of work for Chemical WG:**
1) The WG noted that lindane is being considered for the POPs list. If it is added, this will need to be noted in the background document and summary statement.
2) Listing of a chemical in POPs listing means that this WG should revise the review for a constituent already considered in the GDWQ. However, the lindane guideline is already based on the most recent JMPR assessment (2002), so no further action in this regard is necessary.
3) Lindane’s nomination status is still pending.

#149. Chlorine Residuals

**Background:** It has been brought to the Committee’s attention that there is a lack of clarity when comparing statements in different sections of the GDWQ with regard to recommended residual chlorine levels at the point of delivery: Chapter 6.2.3 states that “Minimum target concentrations for chlorine at point of delivery are 0.2 mg/litre in normal circumstances and 0.5 mg/litre in high-risk circumstances.” Table 8.27 states: “For effective disinfection, there should be a residual concentration of free chlorine of ≥0.5 mg/litre …” The 0.2 mg/litre target in normal circumstances occurs only in the “emergencies and disasters” section of the GDWQ and nowhere else. The statement in Table 8.27 is misleading, as the 0.5 mg/litre value is a target for treatment, not for the point of consumption, where the purpose of a specific value is to be able to verify that disinfection has occurred.

**Expected end-product:** Revised text for the second addendum to the Third Edition

**Progress to date:** The GDWQ WG meeting (Geneva, 2006) decided on a plan of work. The GDWQ WG meeting (Berlin, 2007) agreed to remove the item from the agenda once the second addendum has been published.

**Plan of work for Chemical WG:**
1) The text has been revised for the second addendum. This item can be removed from the agenda once the second addendum has been published.

#150. Zoonosis Fact Sheets

**Background:** Various fact sheets have been produced on waterborne zoonoses (not in the GDWQ context). It has been suggested that the range of organisms covered in chapter 11 could be reviewed as part of preparation for the Fourth Edition, particularly reviewing the need for additional fact sheets (e.g. for schistosomes and *Franciscella tularensis*). For tularemia, it is noted that there is new evidence from a waterborne outbreak in Turkey. The WG is asked to review the need for new fact sheets and, if so, agree on a plan of work.

**Expected end-product:** 1) New fact sheets on *Franciscella* and *Schistosoma* for the Fourth Edition; 2) revised text for chapter 7 for the Fourth Edition
Progress to date: The GDWQ WG meeting (Geneva, 2006) agreed that consistency between the scope of organisms mentioned in the GDWQ and those for which fact sheets have been prepared needs to be improved. The GDWQ WG meeting (Berlin, 2007) decided on a path forward to ensuring consistency and agreed to prepare new fact sheets on *Franciscella* and *Schistosoma*.

Plan of work for Micro WG:
1) Consistency between the scope of organisms listed in Table 7.1, Figure 7.1 and the fact sheets in chapter 11 will be improved in drafting of the Fourth Edition. Consistency and coverage of the current range of organisms (tularaemia, for example) will be ensured, and the table, figure and fact sheets will be cross-checked. **David Cunliffe** will coordinate.
2) The WG also identified the need to be more explicit in explaining how reference pathogens were selected in chapter 7. This will be done for the Fourth Edition. **David Cunliffe** will coordinate.
3) See agenda item #38 for a discussion on Table 7.1 and Figure 7.1.
4) New fact sheets are to be prepared on *Franciscella* (**Suresh Kumar**) and *Schistosoma* (**Takuro Endo**).
5) Data from Japan on *Pleisiomonas* were submitted to the WG to be considered for use in a new fact sheet (**Takuro Endo**).

#151. Silver

Background: One of the WHO Regional Offices suggested that the Chemical Aspects WG could provide default provisional guideline values for some of the chemicals, such as silver, that are mentioned in the GDWQ but for which no guideline is yet provided. There is considerable interest in promoting the use of silver for household POU systems. A hydrogen peroxide and silver combination has also been proposed for use in public water systems. The uses and efficacy of different forms of silver as a disinfectant need to be investigated.

Expected end-product: 1) Inclusion of silver in the update of the EHC on disinfectants and DBPs

Progress to date: The GDWQ WG meeting (Geneva, 2006) decided to add silver to the rolling revision. The GDWQ WG meeting (Berlin, 2007) agreed that silver should be included in the new project to (re)assess conventional and non-conventional disinfectants and DBPs.

Plan of work for all WGs:
1) Briefing notes from **Joe Cotruvo** on the use of forms of silver as a water disinfectant and from **John Fawell** on the toxicity of silver were provided to WG members.
2) The WG recommended that silver be included in the new project to (re)assess conventional and non-conventional disinfectants and DBPs (see agenda item #158). **This agenda item will therefore be removed from the plan of work as an individual agenda item.**

#152. PFOS and PFOA

Background: PFOS has been nominated as a persistent organic pollutant (POP) under the Stockholm Convention and will likely be confirmed in the near future. One of the criteria for adding a compound to the rolling revision as outlined in the Policies and Procedures Manual
is “listing of a chemical in relevant Prior Informed Consent (PIC) or Persistent Organic Pollutant (POP) listings”. PFOA occurs together with PFOS and therefore, although not a POP, will be included in the guideline.

**Expected end-product:** CICAD and background document, publication date unknown

**Progress to date:** The GDWQ WG meeting (Berlin, 2007) agreed on a path forward towards initiating a joint CICAD/drinking-water background document process on PFOS and PFOA.

**Plan of work for Chemical WG:**

1) The UK has just completed a toxicological evaluation of both PFOS and PFOA with recommendations for TDIs. Also, there are data being generated by the UK on levels in food. **John Fawell** will forward these studies to **Ed Ohanian**. The question is the relevance of drinking-water as a significant general source of daily exposure.

2) The WG suggested that the United Kingdom evaluation could feed in to an evaluation for a CICAD, which could be produced together with a drinking-water background document.

3) A Member State needs to have a document to start the CICAD process. **Jamie Bartram** will make a formal request to the United Kingdom government, and **John Fawell** will approach them informally.

**#153. Organotins**

**Background:** The GDWQ currently contain a guideline value only for dialkyltins, as there was insufficient information available to derive a guideline value for any other organotin compounds. New assessments have been carried out that may enable guideline values for other organotins to be derived.

**Expected end-product:** Pending

**Progress to date:** The GDWQ WG meeting (Berlin, 2007) agreed to examine the available data to determine whether there is sufficient information to derive a guideline value for organotin compounds other than dialkyltins.

**Plan of work for Chemical WG:**

1) A substantial new assessment has been carried out by the EU and is due to be published soon. Data have been submitted by companies.

2) **John Fawell** will contact his colleagues at the Joint Research Centre in Ispra and get hold of the document to see if it can be used for an organotins background document. John will contact the Japanese authors who prepared the original organotins document for the GDWQ and who will work with them to prepare a briefing note for the next meeting.

**#154. Desalination-Related Products**

**Background:** The Expert Group on Desalination recommended drinking-water guideline development for several desalination-related products: boron (borate), bromide and organobromine DBPs. Work is being carried out elsewhere for boron (agenda item #163) and organobromine DBPs (agenda item #158).

**Expected end-product:** Pending
**Progress to date:** The GDWQ WG meeting (Berlin, 2007) agreed to add bromide to the rolling revision.

**Plan of work for Chemical WG:**
1) The WG agreed to add bromide to the rolling revision.
2) Bromide has a relatively low level of toxicity, so the need for a guideline is to be determined, although it may provide some guidance for desalination operations.
3) **Joe Cotruvo** will prepare a briefing note for the next meeting.

#155. Active Chlorine in Food Sanitation

**Background:** The Codex Alimentarius Commission has requested scientific advice on the assessment of the benefits and risks of the use of “active chlorine” in food production and food processing from FAO and WHO. The advice will be elaborated through the implementation of an expert meeting during 2007. At WHO, the Departments of Food Safety, Foodborne Diseases and Zoonoses and of Public Health and the Environment are collaborating on this project, together with the FAO Departments of Agriculture and Consumer Protection, Fisheries and Aquaculture. The main goals of this project are to consider the risk of chemical residues in products (excluding environmental impact) following the use of active chlorine for disinfection purposes in food production versus the benefit of lowering the risk of microbial hazards. The efficacy of active chlorine treatment needs to be considered, taking into account different treatment scenarios, different chlorine-containing substances and different pathogens and pathogen/food combinations. These considerations need to be based on current practices, as well as taking into account proposed new practices, including the relevance and feasibility of potential alternative approaches. The main areas to be considered relate to the treatment of irrigation water (only as it relates to hydroponic production systems and production of sprouts, but not for agricultural field use), processing water, food contact surfaces, as well as direct treatment of foods, with fresh produce, fish and seafood, meat and poultry as the main food categories. The effects of various treatments on the nutritional components of foods as well as organoleptic and quality changes will be reviewed. The impact of the use of active chlorine in the different steps in the food-chain, in accordance with nationally authorized practices, in the control of microbiological hazards will be considered, as well as the level of chemical residues in or on the foods.

**Expected end-product:** Report published by WHO/FAO

**Progress to date:** The GDWQ WG meeting (Berlin, 2007) noted the project workplan.

**Plan of work for Chemical WG:**
1) **Joe Cotruvo** provided a briefing note to WG members that listed a series of assessment papers that need to be prepared on a variety of topics in this area.
2) The goal is to complete this project within a year. A small core group will collect the assessment papers prepared on a variety of topics, put them into a larger form and hold a meeting to discuss them. The first meeting of the core group will be held on 7 June 2007.
3) The product is under the WHO/FAO banner. Some individual activities that include elements of technical interest to this group would need oversight by this committee. **Joe Cotruvo** asked the Committee for submission of relevant information, for candidates to be expert contributors on certain topics or papers, and for reviewers for parts of the report.
when it is ready. Committee members are asked to contact Joe directly to express interest in this project.

#156. Aluminium

Background: A new JECFA report on aluminium has been published, in which the old ADI has been withdrawn. The DWQC needs to examine the JECFA document to ensure consistency between it and the current background document.

Expected end-product: Possibly revised background document and summary statement for the Fourth Edition

Progress to date: The GDWQ WG meeting (Berlin, 2007) agreed on a path forward to ensuring consistency between the new JECFA report and the current background document.

Plan of work for Chemical WG:
1) John Fawell is to review the JECFA report and advise the WG at the next meeting as to whether the background document needs to be revised.

#157. Manganese

Background: Manganese is an essential element with a current drinking-water guideline value. Sweden has proposed revisions to the WHO (and EU) manganese guideline value due to long-term neurological damage from oral exposure (see article “Time to Re-evaluate the Guideline Value for Manganese in Drinking Water?” in Environmental Health Perspectives by two Karolinska Institutet researchers, at: http://www.ehponline.org/members/2007/10316/10316.pdf).

Expected end-product: Possibly background document and summary statement for the Fourth Edition

Progress to date: The GDWQ WG meeting (Berlin, 2007) agreed to add manganese to the rolling revision.

Plan of work for Chemical WG:
1) John Fawell is to assess the new data to determine whether the Chemical WG should take the agenda item forward. He is to prepare a briefing note for the next meeting.
2) Post-meeting note: It has been suggested that the two Karolinska Institutet researchers (Karin Ljung and Marie Vahter) be engaged in the rolling revision process on manganese.

#158. Disinfectants and Disinfection By-products (DBPs)

Background: Numerous chemical and physical disinfection techniques have been developed that are used in a wide range of applications, from large and small public drinking-water plants to point-of-use (POU) and point-of-entry (POE) treatment devices. Although some disinfection approaches have been used for centuries, there are still questions that exist in many cases with respect to optimization of biocidal effectiveness under a range of conditions, the chemistry of formation and the toxicological significance of disinfection by-products (DBPs), interactions with other water components, and the effectiveness and toxicology of disinfectant residuals. Many newer products and applications are being developed, and even
more unanswered questions exist about some of those products. The DWQC therefore decided that there is an urgent need to carry out a comprehensive evaluation of conventional and non-conventional disinfectants and their by-products as a set. An update of the EHC on disinfectants and DBPs, which could be released as an addendum to the GDWQ and would include management text, is needed.

*Expected end-product:* 1) Amended section 8.4.4 for the Fourth Edition; 2) possibly an addendum to the GDWQ, publication date unknown

*Progress to date:* The GDWQ WG meeting (Berlin, 2007) agreed on a plan of action to take this agenda item forward.

*Plan of work for Chemical WG:*

1) The WG agreed that an overall international assessment to update the EHC on disinfectants, both conventional and non-conventional, and DBPs was urgently needed. The update would need to include an assessment and evaluation of conventional and alternative disinfectants in terms of their toxicity, effectiveness, conditions for use, management, etc. Efficacy and toxicology need to be treated together to give a clear message. Disinfectants are defined for this purpose to include physical and chemical agents for lethal removal (includes heat, but does not include filters). Examples of alternative disinfectants to be included are electrolytic chlorine, mixed oxidants, bromine, chloramines, copper species, peroxide, iodine and titanium dioxide particles.

2) *Other agenda items that will be merged with this agenda item include silver (agenda item #151), trichloroacetic acid (agenda item #80), organobromine DBPs (agenda item #154), iodine (agenda item #74), THMs (agenda item #82) and NaDCC (agenda item #92).*

3) It was suggested that the DWQC should move increasingly towards developing CICADs or updating EHCs and drinking-water documents simultaneously when development of the PCS product is water-driven, as this is a more efficient and effective use of resources.

4) The first step is to determine which developed countries might be interested in such a product and ask for the resources for a specific process to do these two (updated EHC and drinking-water document) together. A small number of countries with resources were identified: USA, Canada, United Kingdom, Australia, European Union, Japan.

5) It was pointed out that as new evidence on these chemicals is epidemiological rather than toxicological, more epidemiological experience is needed around the table to work through the new studies.

6) A small expert WG needs to be formed to work together in this area, both for the 4th edition and on addendum-related work. Peter Jackson, Joe Cotruvo and Mark Sobsey are to update section 8.4.4, Other disinfection processes, for the next meeting, for the Fourth Edition. Subheadings within this section should correspond to those to be used in the addendum that is proposed on disinfectants and DBPs.

7) It was suggested that a specification of what we are planning to do be prepared, together with a call for data on the specification as a whole (and noting that WHO will be generating a position of all of these chemicals). People submitting data would be asked to specify what piece of the specification it applies to. There are quite a few data on efficacy etc. that are not in the conventional literature, such as theses. Joe Cotruvo and Mark Sobsey will prepare the specification.
#159. Water Safety Plan Training Pack

**Background:** The DWQC needs to change its approach in order to provide more useful assistance to countries trying to develop their capacities. In particular, a training pack for WSPs is needed, together with a formal process for providing the material to people within institutions, such as universities, who are providing the training. This will enable the Committee to reach out to more people.

**Expected end-product:** Pending

**Progress to date:** The GDWQ WG meeting (Berlin, 2007) agreed to add this item to the rolling revision and decided on a path forward.

**Plan of work for Chemical WG:**

1) The training pack developed by Kathy Pond and Suresh Kumar contains a module on WSPs that introduces the concept of WSPs, but is not a training pack for WSPs. Dan Deere has delivered a training pack on WSPs already in Australia, and Oliver Schmoll’s group has also developed a training pack in English.

2) Jamie Bartram suggested that the Committee needs to change its approach to be more helpful in helping countries developing their capacities. Most capacity building is done by formal institutions in individual countries, such as universities. We need to network with those institutions and provide material to those who are providing the training within those countries themselves. Our ability to reach out in a vertical programme is very modest in terms of the enormous numbers of people who need to understand the material. If we can reach 10% of the university staff who teach in this area, we will be able to reach many more people.

3) A formal process needs to be developed to facilitate this capacity building. Suggestions on how to deliver training in a better way to reach more people included bringing together the training providers (e.g. university professors) and asking them what materials they need in order to provide this training, talking to Member States about the need for this on a wider scale, and identifying the key public health courses offered in various countries and contacting the people responsible for delivering them. As there is no existing message delivery system to the target community, it was also suggested that a workshop be conducted at academic events, such as IWA events or International Water Week events, which a significant proportion of the target community might attend, to draw their attention to the materials available and establish a network of people so that we can “train the trainer”. It was also suggested that we should communicate with authors and publishers of textbooks on environmental health science, which generally lack the WSP approach in their chapters on water. Choon Nam Ong suggested that Singapore might be interested in running a graduate course for credit as a pilot programme if this group provides the relevant training materials.

4) WG members are asked to explore what communities in their own countries (training institutions, universities) could be approached and contacted with respect to options for incorporating a training package into their programmes. The WHO Centres of Excellence could also be contacted regarding the desire to promote training material in this area. **Oliver Schmoll and Bruce Gordon** (WHO point of contact) will initiate correspondence to WG members regarding institutions in their own countries so that they can start developing an informal database of institutions.
#160. Reference Pathogens

**Background:** Reference pathogens are discussed in chapter 7 of the GDWQ, but little guidance has been provided on the criteria for selecting reference pathogens, including essential features and consideration of local or regional characteristics. The Microbial Aspects WG has identified this as an oversight that needs to be addressed in the Fourth Edition. In addition, the data provided in Tables 7.3 and 7.4 and Figures 7.2–7.4 need to be updated in light of further work (e.g. as documented in the new text on *Cryptosporidium*; see agenda item #40).

**Expected end product:** 1) Criteria for reference pathogens for inclusion in the Fourth Edition; 2) updated versions of Tables 7.3 and 7.4 and Figures 7.2–7.4 for the Fourth Edition

**Progress to date:** The GDWQ WG meeting (Berlin, 2007) agreed to develop criteria and update the existing tables and figures. A plan of work has been developed.

**Plan of work for Micro WG:**

1) Chapter 7 is to be revised to provide discussion on criteria for selecting reference pathogens, including mechanisms for varying choices based on local circumstances, to add a basis for flexibility (David Cunliffe, Stephen Schaub to provide USEPA criteria). David and Stephen will have to work up a game plan to better define the scope and approach that will be needed to select reference pathogens for criteria. It is hoped that improved analysis and additional data from continued efforts on microbial fate and transport (see agenda item #50) will help inform their determinations about unique regional and climatic factors that would be used in selection of reference pathogens.

2) The WG identified the need to obtain more region-specific information on pathogens of concern (occurrence of disease). The WHO Secretariat is to pursue regional information. See also agenda item #50 regarding organism occurrence.

3) Tables 7.3 and 7.4 and the accompanying figures will be updated (Ana Maria de Roda Husman).

10. **CLOSING SESSION**

Dr Jamie Bartram noted that an agreement was to be signed with Singapore to 2015 to look systematically at water scarcity and water resources management as they relate to water safety at all levels. The DWQC expressed its appreciation that Singapore is expressing interest in long-term support of the work of the Committee. Dr Bartram also announced that the venue of the next meeting was likely to be Singapore, to coincide with International Water Week.

Choon Nam Ong thanked WHO for inviting him to participate at this meeting and the Committee members for the stimulating discussions during the meeting. The Singapore government would like to make Singapore into an international water hub. It has worked out an 8-year workplan with WHO for the years 2007–2015. Their agreement is in four areas: 1) international collaboration and participation in WHO activities; 2) research related to water and health; 3) training and capacity building (e.g. organizing short courses for training); and 4) emergencies and disasters related to water.
International Water Week will be held in Singapore from 23 to 28 June 2008.\textsuperscript{1} Next year’s meeting will likely be held in Singapore and will be linked to International Water Week. Areas of interest include 1) water reuse (one area for a symposium/workshop as a satellite meeting), 2) the health impact of climate change (i.e. water scarcity) and 3) the official launch of Singapore’s national drinking-water standards.

There was some discussion concerning the logistics for next year’s meeting following feedback from Committee members on this year’s meeting. The opportunity to interact with and hear regional concerns from “real” people (i.e. regional scientists, practitioners, regulators), as opposed to representatives from the WHO regional offices, was greatly appreciated, so it was suggested that a similar day, perhaps arranged along a common theme, should be organized in Singapore. It was noted that the Chemical Aspects WG may need more time to cover its agenda items and suggested that WG members may need to be more prepared before next year’s meeting. The possibility of starting the meeting a day earlier was suggested, especially considering that there were large amounts of new text to consider for the Fourth Edition. It was also suggested that a computer hooked up to a screen to better enable all participants to contribute to revisions would be important for editing text for the Fourth Edition (and if support personnel could do this, that would be even better). There may be no videoconferences with other regions because IT support for the videoconferences may be difficult due to a shortage of staff during International Water Week. It was suggested that the regions be asked to prepare their points of discussion ahead of time so that the WG members can be better prepared to address and respond to them.

The need for more time at the meeting, both for individual groups and for the plenary, was emphasized, as changes made in one chapter may affect other chapters, and there is a need to improve the flow of the document. Preplanning and circulation of text ahead of time could help in this regard. It was recommended that there be a mid-term review of tasks 6 months before the meeting, and WG members need to inform the others if they know that they cannot complete their tasks in time. Large documents, in particular, need to be circulated to the groups for comment. There may even need to be monthly interactions to keep these items rolling along.

The International Water Week conference will be held before the GDWQ meeting. Committee members can come to Singapore at the end of the conference, which runs from 23 to 28 June 2008 (some members will probably be asked to present at the conference), and then stay for the next week’s meeting (till 4 July 2008).

In his closing remarks, Dr Bartram noted that the DWQC was a productive and positive group. He expressed his profound thanks to Oliver Schmoll as host and for his contributions working as a WHO staff member (and wished him the very best in his new position); to Bruce Gordon; and to Penny Ward (to be relayed to her by Bruce Gordon). He thanked all of the chairs and rapporteurs for their contributions. He extended special thanks to Choon Nam Ong for encouraging Singapore to engage with the Guidelines process and noted that Singapore’s support is alongside other that of other major supporting countries: the USA (Environmental Protection Agency), the United Kingdom (Drinking Water Inspectorate), Japan, Canada (Health Canada) and Germany. Dr Bartram especially thanked the German.

\textsuperscript{1} Note that the dates for next year’s GDWQ Expert Consultation have been moved forward to 19–23 June 2008. The Water Scarcity & Water Reuse Seminar, at which some GDWQ members may present papers, will be held on 24–25 June 2008. The Singapore International Water Week (SIWW) will begin on the 23rd (Monday).
Ministry of Health for its generous financial support of the Berlin expert consultation meeting.

Dr Bartram then invited Choon Nam Ong to formally join the Committee. His responsibilities will involve major chemical hazards in relation to emerging hazards, water scarcity in particular. He also recommended that the possibility of a role for Oliver Schmoll should be considered by the Committee. He also mentioned two individuals who have not participated much in the last two meetings and who may be appropriate to participate in different roles in the future: Guy Howard and Jorge Latorre Montero. Finally, he thanked the meeting’s hosts (Oliver Schmoll and Ingrid Chorus) and the important contributions of their support staff: Bettina Schiers, Susanne Patz and Gertrud Schlag.

Dr Bartram then closed the meeting with a wish to see everyone next year in Singapore.
ANNEX 2: Agenda and Timetable

**Expert Consultation for the 4th Edition of the Guidelines for Drinking-water Quality**

7–11 May 2007

**Draft agenda**

1. Welcome.
   Introduction of participants.
2. Objectives of the meeting.
   Election of chairperson(s) and rapporteur(s).
3. Meeting on European Regional Perspectives: Experiences and Challenges with Drinking-water Quality
4. Video links with other Regional Offices; feedback from other Regional Offices on principal concerns.
6. Review of documents and comments on work in progress.
7. Confirm plan of work.
8. Conclusions and agreement of implementation of plans.
9. Closure of meeting.
# GDWQ Meeting Timetable

**7–11 May 2007, Berlin**

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday (7 May)</th>
<th>Tuesday (8 May)</th>
<th>Wednesday (9 May)</th>
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<tr>
<td>08:30-09:00</td>
<td>Daily preparatory meeting of chairs and rapporteurs</td>
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<td>09:00-10:30</td>
<td>Confirmation of chairs / rapporteurs</td>
<td>Review of work in progress</td>
<td>Review of work in progress (70 minutes)</td>
<td>CHEM+P&amp;C WG – Room 1134 [MICRO WG to join on Bi]</td>
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<td>(session 1)</td>
<td>- Confirmation on P&amp;P manual</td>
<td>CHEM WG – Room 1041</td>
<td>GDWQ supporting mechanisms, incl. WHO Networks Household, Small Community, Regulators, O&amp;M (20 minutes)</td>
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<td>- Update on 2nd Addendum</td>
<td>P&amp;C WG – Room 1042</td>
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<td>- Follow-up on &quot;Standards Day&quot;</td>
<td>MICRO WG – Room 1134</td>
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<td>- Feedback on P&amp;P manual</td>
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<td>ALL WG – Room 1134</td>
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<td>10:30-11:00</td>
<td>Videoconference with WHO Regional Offices</td>
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<td>Meeting on European Regional Perspectives: Experiences and Challenges</td>
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<td>13:30-15:00</td>
<td>Review of work in progress</td>
<td>Strategic planning for the fourth edition (1)</td>
<td>Review of work in progress</td>
<td>Adoption on P&amp;P manual</td>
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<td>(session 3)</td>
<td>*Note: incorporate cryptosporidium document (#40)</td>
<td>ALL WG – Room 1134</td>
<td>CHEM WG – Room 1041</td>
<td>Wrap-up on the 4th Edition</td>
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<td>ALL WG – Room 1134</td>
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<td>P&amp;C+MICRO WG – Room 1134</td>
<td>Next year's meeting</td>
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<td>Conclusions and closure</td>
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<td>ALL WG – Room 1134</td>
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<td>Videoconference with Guy Howard</td>
<td>Strategic planning for the fourth edition (2)</td>
<td>Review of work in progress</td>
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<td>P&amp;C+MICRO WG – Room 1134</td>
<td>ALL WG – Room 1134</td>
<td>CHEM WG – Room 1041</td>
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<td>* Note: incorporate DALY discussion (#10)</td>
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<td>17:00-18:00</td>
<td>Reception</td>
<td>Videoconference with WHO Regional Offices (AMRO)</td>
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<td>PCS/AMR: Lesley Onyon available in Geneva at 00-4122-791-3548; Angelika Tritscher in Beijing and reachable by email (<a href="mailto:tritscher@who.int">tritscher@who.int</a>); Carolyn Vickers in office Monday and Tuesday at 00 41 22 1286 (available subsequently by mobile in emergency), Joanna Tempowski at 00 41 22 791 3571</td>
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(a) All Working Groups to discuss agenda items 12.1, 60, 120. Then Chemicals WG to begin individual discussion in Room 1041; P&C+MICRO WG to discuss 4, 5, 28, 31, 43, 48.
(b) PCS/AMR: Lesley Onyon available in Geneva at 00-4122-791-3548; Angelika Tritscher in Beijing and reachable by email (tritscher@who.int); Carolyn Vickers in office Monday and Tuesday at 00 41 22 1286 (available subsequently by mobile in emergency), Joanna Tempowski at 00 41 22 791 3571
ANNEX 3: Meeting on European Regional Perspectives: Experiences and Challenges with Drinking-water Quality

7 May 2007, Berlin, Germany

Background

In 2006, the WHO DWQC recommended that future meetings should be rotated between the various WHO regions to encourage regional engagement in the GDWQ rolling revision process, to highlight regional concerns to the Committee and to increase regional dissemination of the GDWQ. It was agreed that a dedicated one-day session would be devoted to presentation and discussion related to the region in question.

Following interest from the German Ministry of Health, it was decided to convene the 2007 GDWQ meeting in Germany at the Federal Environment Agency, Berlin, in their capacity of WHO Collaborating Centre for Research on Drinking-water Hygiene. Thus, the WHO EURO region is the first region to host such a meeting.

Objectives

The objectives of the one-day meeting were:

- to formally open the GDWQ rolling revision meeting;
- to present and discuss a cross-sectional view of key European drinking-water priorities, issues and initiatives and their potential implications for the GDWQ rolling revision process.

Participants

Mr Roger Aertgeerts, Regional Adviser on Water & Sanitation, WHO, European Centre for Environment & Health, Rome, Italy
Dr Jan Cortvriend, European Commission, Environment DG, Brussels, Belgium
Mrs Venera Djudemisheva, Rural Water Supply and Sanitation Project WB/DFID, Water Quality and Training Coordinator, Bishkek, Kyrgyzstan
Dr Ilona Drulyte, Ministry of Health, Department of Public Health Strategy, Vilinius, Lithuania
Dr David Drury, Drinking Water Inspectorate, London, United Kingdom
Dr Enzo Funari, Istituto Superiore di Sanità, Department of Environment & Primary Prevention, Rome, Italy
Dr Gertjan Medema, KIWA Water Research, Nieuwegein, The Netherlands
Professor Ulrich Müller-Wegener, Federal Environment Agency, Department for Drinking Water and Bathing Water Hygiene, Berlin, Germany
Dr Thomas Rapp, Umweltbundesamt, Bad Elster, Germany

Observers

Dr Hartmut Bartel, Federal Environment Agency, Department for Drinking Water and Bathing Water Hygiene, Berlin, Germany
Dr Hermann Dieter, Federal Environment Agency, Department for Drinking Water and Bathing Water Hygiene, Berlin, Germany
Introduction

Opening remarks are summarized in Section 1.5 of the main report. Mr Oliver Schmoll informed the group that seven experts from different countries had been invited to provide the group with their regional perspectives and concerns. The key objective is for the members of the DWQC to interact with the region and to listen for themes that could be brought into the rolling revision. Mr Aertgeerts indicated that the speakers had been asked to give their key concerns and specific needs of their regions and to indicate what works or does not work when they use the GDWQ. Each speaker was allocated 20 minutes for their speeches with 10 minutes for discussion following their talks.

Mr Roger Aertgeerts chaired the meeting, and Ms Marla Sheffer acted as rapporteur. Hard copies of all presentations (except for one) were made available to the meeting participants.
Presentations

Below are brief summaries of the presentations by invited speakers from the WHO European Region.

Roger Aertgeerts (WHO EURO)
“Europe: New solutions to old problems: Innovative thinking for the new century”

Mr Aertgeerts opened his presentation by noting that the DWQC does not know the specificities of regions or the context in which the Committee’s guidance is to be used. He briefly described the WHO European Region, its areas of priority interest (including sanitation, recreational use and tourism-related health impact assessment) and its substances of high concern (such as carcinogens, mutagens and endocrine disruptors). One important issue flagged by Mr Aertgeerts is climate change, which will result in 50% less water by 2050 in the Mediterranean. Tourism, in particular water management in tourist establishments, is also of particular concern. Waterborne diseases of interest include cholera, enterohaemorrhagic Escherichia coli (EHEC), shigellosis/dysentery, typhoid and viral hepatitis A. A task force on waterborne disease surveillance, which will develop guidelines on surveillance, outbreak detection, early warning and contingency planning, will have its first meeting in July 2007.

Mr Aertgeerts noted that the time from when a problem is recognized to publication of a WHO guideline, from a guideline to approved legislation, and from legislation to implementation is about 15 years. He suggested that information should be put out as one package, containing training materials, all supporting documents, the Guidelines, etc. He noted that the documentation is not published in all official languages of WHO, that the documents are not always freely downloadable, and that the various documents need to be cross-referenced better.

Mr Aertgeert’s recommendations for the Microbial Aspects WG were as follows:

- Microbial safety of small, especially rural, supplies and/or discontinuous supplies
- Safe storage of water
- Indicators of water safety suitable for progress
- Outbreak detection, contingency planning and reporting — diagnostic tools (genomics)
- Viral infections
- Acknowledge the European Commission’s Directorate General for Health and Consumer Affairs (DG SANCO) and the European Centre for Disease Prevention and Control (ECDC)

His recommendations for the Chemical Aspects WG included the following:

- Indicators for target setting and progress monitoring
- How to deal with historic exceedances of current guidelines
- Better link with Codex and various types of water (e.g. drinking-water, bottled water)
- Low-level long-term exposure
- Desalination mineral content
- Acknowledge regional programmes (EU REACH, or Registration, Evaluation, Authorisation and Restriction of Chemicals)

Mr Aertgeerts also suggested that the Protection and Control WG should address the following issues:

- Treatment achievability (concentration and technology)
- Climate change and health (resource management, infrastructure management and rehabilitation, tourism)

In his closing remarks, Mr Aertgeerts noted that the Guidelines need a chapter on how to realize access to safe drinking-water as a basic human right if it includes policy-makers as a target group, even if this ventures into previously unexplored areas such as pricing. He also suggested that the theme or “personality” for the Fourth Edition should be “Ensuring safe water supply under conditions of global climate change”.

In discussions following his presentation, Mr Aertgeerts emphasized that there was a lack of communication between technical guidance and implementation and that the translation of numeric guideline values to national standards takes a long time for most countries.

Jan Cortvriend (European Commission, Environment DG)

“The revision process of the EU Drinking Water Directive”

The EU Drinking Water Directive is a piece of EU legislation. Member states are obliged to translate it to national legislation and apply it and conform to it. The Drinking Water Directive is a health-based directive (1998), based on the 1992 WHO Guidelines. It is applied in 27 EU countries. There are four types of parameters to which drinking-water must conform: microbiological, chemical, radiological and organoleptic. Every third year, countries must report on drinking-water quality in their country. Drinking-water quality in the 15 original EU member states is good to very good.

Why is the Commission thinking of revising the directive if water quality is good? There are a number of reasons for this: the 1998 legal text contains a number of political compromises, a lot has happened since 1998 (e.g. new WHO Guidelines, new technical, scientific and epidemiological material has appeared, there are new sensitivities, such as fluoride and hardness), and the EU has enlarged from 15 to 27 countries since 1998, with new member states having conditions (cultural, technical, etc.) that are fundamentally different from those of the original 15 EU member states.

In 2002–2003, a stakeholder consultation (the “Drinking-Water Seminar”) was held, lasting many months and ending at the October 2003 meeting. The consultation provided the Commission with four pieces of advice that needed to be considered in future revisions of the Directive: 1) review of microbiological parameters; 2) review of chemical parameters; 3) materials in contact with drinking-water (linked to 2); and 4) philosophy of water safety plans. A cross-cutting issue through all subjects was 5) small supplies.

Since 2005, a revision of the Directive has been developed along these five lines. With respect to item #1, microbiological issues of concern include parasites, indicators and how to monitor. A group of experts met for the first time the week prior to this meeting; by
the end of the year, they are expected to deliver a matrix that contains microbial parameters, acceptable values, monitoring and sampling techniques, and so on. Similar work will be done for chemical parameters (#2). It is difficult to understand WSPs (item #4) and how to formulate requirements for a water supplier. There was a need to develop pilot projects in the field to record the characteristics of WSP application. WHO delivered a report to the European Commission in April 2007. For small water supplies (item #5), it is not possible to regulate the quality of every well in the garden of every farmer in Romania, for example.

It is hoped that a proposal for a new regulation will be achieved by the end of 2008.

The WHO GDWQ have been the main implementation document for the EU Directive. Dr Cortvriend would like to see more visibility in the rolling revision process and to receive emails on any progress. He noted that if information is needed, it is often difficult to know where to find it. He expressed his appreciation for the forthcoming guidance document to implementers and regulators and reminded the group not to forget instructions for the management of small water supplies.

In discussions following the presentation, it was noted that the European Commission is implementing the WSP approach, but that there is still a need to monitor microbiological and chemical parameters.

David Drury, Drinking Water Inspectorate, United Kingdom
“Regulatory aspects of water safety plan implementation”

There is a need for WSPs in the United Kingdom. Even though there is over 99.95% compliance with standards, there are still too many incidents, too many significant failures, a lack of communication among stakeholders, undermined consumer confidence, challenges (competition, new owners, reorganization, subcontracting) and overconfidence.

The Drinking Water Inspectorate (DWI) fully supports the WHO WSP approach, which addresses a variety of issues, including over-reliance on water treatment technology, over-reliance on end-point testing and water quality deterioration in pipes and plumbing. The DWI is encouraging all 26 water companies to implement WSPs. Dr Drury reviewed DWI experiences in implementing a WSP approach with public water companies and outlined the WSP approach with respect to two particular examples, pesticides and Cryptosporidium.

Benefits from WSP implementation include stakeholder involvement, catchment improvements, consumer involvement and education, and regulator confidence in the water supplier. The applicability of WSPs to small supplies needs to be better explained in the GDWQ. Private water supplies are regulated by local authorities.

The GDWQ form the basis of the EU Drinking Water Directive and the UK Water Quality Regulations. Dr Drury’s recommendations to the DWQC regarding the GDWQ were as follows:

- Continue to stress WSPs as the most effective means of consistently ensuring the safety of a drinking-water supply.
- Try not to pigeon-hole WSPs into a few chapters, but weave them throughout the Guidelines and widen the thinking on risk assessment versus monitoring.
- Further improve the information on derivation of the guideline values.
Gertjan Medema (KIWA Research and Consultancy, The Netherlands)

“Microrisk”: The value of quantitative microbial risk assessment in the Water Safety Plan

QMRA answers the question “How safe is safe?” Microrisk, or Microbiological Risk Assessment, is a project with a team and partners (all large systems). It is a scientific basis for managing drinking-water safety from source (catchment) to tap. The steps involved include 1) Know your catchment, 2) Know your source water quality, 3) Target your treatment and 4) Protect your distribution, all leading to safe drinking-water.

QMRA is a useful tool for WSPs. It helps determine if the health target is met, determine the significance of hazardous events in source, treatment and distribution, select effective adaptations of treatment, set critical limits, determine the effect of corrective actions and design monitoring. A WSP is the balance between consumer safety and consumer cost.

QMRA has several implications for the GDWQ:

- Quantitative data and quality assurance are needed to perform QMRA.
- The value of QMRA has been demonstrated in large systems; for small systems, it still needs to be demonstrated.
- Acceptable health targets are key: how can it be determined what health target is acceptable for tap water?

In the discussion following the presentation, it was suggested that there might be merit in microbiologists looking more systematically for ratios between indicators and pathogens, even in sewage (as well as surface water). In response to questions from the Committee, Dr Medema assured the Committee that QMRA really was a better tool than expert judgement and that there was merit in decision-making even given the uncertainties involved.

Enzo Funari, National Institute of Health, Italy

“Italian Observatory on Water and Health”

Italy does not have a specific surveillance system for water-related diseases. Italy has enforced many European directives on the quality and management of waters (drinking-water, recreational water, etc.). In general, the quality of Italian waters is good, but some problems are present at local levels.

Shortcomings of the current situation include the following:

- At a local level, monitoring is often not planned according to scientific criteria.
- At a central level, technical guidance for monitoring is not generally provided.
- There is no adequate integration between the institutional actors and experts in the area of environmental health.
- Monitoring data are often not produced within a data quality system.
- Bacterial faecal indicators have limitations in defining the microbiological quality of waters, and a more updated approach should be adopted (e.g. the WSPs of WHO and the beach profile of the new European directive on bathing waters).
- There is no adequate surveillance system for water-related diseases.
- There is no adequate, updated national information system.

The general objective of a project for a national observatory on water and health at the Centre for Disease Control (CDC) of the Ministry of Health in Italy is to improve the activities of risk assessment and surveillance of waterborne diseases through a more efficient management of information and data coming from monitoring activities. Specific objectives of the project are:

- to improve the information system of the Ministry of Health;
- to promote a system of data quality;
- to develop (or improve) the system for waterborne disease surveillance (also considering the problems posed by cyanobacteria and toxic marine algae).

Dr Funari then discussed briefly a national project in Italy on the issue of pesticides in drinking-water, involving the ranking or categorization of pesticides using sales data, physicochemical characteristics and monitoring data.

**Venera Djudemisheva, Kyrgyz State Medical Academy, Kyrgyzstan**

“Drinking-water-related health issues and surveillance in Kyrgyzstan”

Mrs Djudemisheva gave a brief review of the water supply in Kyrgyzstan and problems associated with it, including lack of funds, unsatisfactory technical conditions, lack of water treatment, adverse natural features and anthropogenic pollution of water sources. Water quality issues include contamination by residual pesticides and radioactivity, high incidence of infectious diseases (including typhoid, acute intestinal infections, dysentery and viral hepatitis), helminths and parasites, such as *Giardia*.

Actions that have been undertaken to improve the situation include the implementation of various projects for rehabilitation and building new water supply schemes by international and local aid organizations, decentralization of the rural water supply sector and handing responsibilities for the operation and maintenance of rehabilitated or newly constructed water supplies over to the Communities Drinking Water Users Unions (CDWUU) and/or Water Committees and assistance in the creation of a low-cost water quality monitoring system.

In the frame of the DFID Rural Hygiene and Sanitation Project, the CDWUU use rapid response kits for water quality monitoring, WSPs are being introduced at national and local levels and a water quality database is being developed for surveillance at the national level, introducing WSPs at national and local levels. WSPs and rapid response kits are appropriate tools for monitoring drinking-water quality at the community level, but they have no legal vigour, and the Department for State Sanitary and Epidemiological Control (SES) lacks experience in introducing WSPs.

It is concluded that the GDWQ are highly relevant in Kyrgyzstan, which seeks to implement all major recommendations of the GDWQ. There is a need for prioritization of parameters to monitor, as most of the parameters that are required to be monitored currently are unnecessary and extremely expensive. SES as well as CDWUU and other service providers do not have either the resources or the equipment to perform all of the required
tests. Kyrgyzstan needs to develop norms and approaches according to its own peculiarities and needs.

In the discussion following the presentation, it was noted that the DWQC needs to be able to communicate that the GDWQ should be applied incrementally over the long term and that the most important things need to be done first (microbiological parameters are always the top priority). Rapid response kits lack a microbiological test; for household water, there is no simple, low-cost way to do analysis, even for *E. coli*. Efforts are under way with WHO participation to develop a self-contained test device for such a purpose; if successful, it could be incorporated in their rapid response kits. There is a need to provide practical guidance and advice on key points, such as, for example, do not use water when there is a cyanobacterial bloom.

**Ilone Drulyte, State Public Health Service, Lithuania**

“Drinking water management and quality problems with small supplies in Lithuania”

In Lithuania, there are two types of drinking-water supply: individual (mainly dug wells for a family) and public supplies (in primarily urban but also rural areas). A lot of small supplies have various drinking-water quality problems. Dug wells (shallow groundwater) are often contaminated by nitrate, microorganisms, pesticides and organoleptics; monitoring is not required and is up to the individual owner. Problems in publicly supplied water (deep groundwater aquifers, also small supplies) include iron, manganese and fluoride.

The main problems of small supplies in Lithuania include the following:

- protection of catchment area and borehole
- unserviceable drills
- missing technical documentation
- lack of knowledge on the part of the owner
- staff
- monitoring
- insufficient treatment
- distribution network.

The GDWQ serves as a manual, focuses on the health of consumers irrespective of the size of the supplier or the population served, reflects the scientific history of drinking-water parameters, shares best worldwide practice and is a useful tool for risk assessment. Recommendations for revision of the GDWQ include the following:

- special attention to small supplies (recommendations for appropriate treatment, simple guidance on using the WSP approach, rapid tests and indicators);
- domestic water treatment (e.g. filtration, nitrate removal, softening, etc.).

In the discussion following the presentation, it was noted that 70% of the population in Lithuania is served by small supplies. Educating the owners of small supplies is important, but difficult to do. A problem arises when the water looks and tastes good and is not causing illness (possibly because the users are immune to disease because of previous exposure); the consumer in such a situation does not believe that there is a problem. The consumer also may think that “natural” means “good”, which is not necessarily the case. Treatment of well water
is not common, but is increasing. The GDWQ definitely need to articulate household water treatment and management better.

**Thomas Rapp, Federal Environment Agency, Germany**

“Materials in contact with drinking-water: Health aspects and regulations”

Materials in contact with drinking-water include organic materials, such as PVC (in pipes, fittings, coatings, etc.), cementitious materials (pipes in distribution system) and metallic materials (such as copper and lead in domestic pipes and fittings). Health aspects associated with these materials include health risks associated with elevated concentrations, odour/taste, and bacterial regrowth and biofilm formation. There are no guideline values for most of the material-related organic substances (and it should not be the aim of the GDWQ to derive such guideline values). Exposure to these materials depends on the design of the installation system, its age, stagnation time, consumed water volume and water composition.

There is a definite need in Germany for regulation of drinking-water parameters related to materials in contact with drinking-water. It is recommended that the following be included in the GDWQ:

- products in contact with drinking-water should be approved/certified;
- an approval/certification system is required;
- basic requirements for approval schemes.

The Guidelines should emphasize that regulatory conventions are required for an approval/certification system and for the surveillance of material-related substances.

In discussions following the presentation, it was noted that corrosivity in the system needed to be controlled. It was also questioned whether water should be compatible with materials or whether the materials chosen should be compatible with the water. It was also suggested that independent third-party organizations could be deferred to for certification.

**Summary of recommendations: Implications for the GDWQ**

Barriers to work of the DWQC: Resources (limited time and funding)

**Technical priorities for European Region:**

- Household treatment and safe storage
- Small systems (introduction of WSPs)

**Discussion:** Work on household water systems and small supplies has been started; the DWQC needs to restructure parts of the GDWQ in order to bring together all of the relevant information in one place. The separate section in the GDWQ should have cross-references to supporting information. The section should be short to facilitate translation into other languages. The GDWQ need to be linked into the two networks on small systems. As all small systems lack access to resources, there is a need for them to assess the situation and make simple choices, such as to use disinfection or filtration or both. The GDWQ are not currently user-friendly to small water supplies. A how-to booklet for small supplies and guidance on WSPs for small supplies are needed (this is being done by the WHO small systems network), but they should be linked to the GDWQ, which is more authoritative. A
list of research gaps should be compiled and sent to institutions so that research can be directed to fill the gaps.

- Large systems (WSPs, EU role, experience of operational use; QMRA: how to translate into WSPs)

Discussion: Encouraging people to implement WSPs (and to incorporate them into national standards) is not straightforward: the DWQC needs to be both prescriptive and flexible, and it needs to highlight key elements that need to be in WSPs for good practice (but the DWQC should not tell them exactly how to do WSPs). This requires much more practical guidance than is currently in the GDWQ. A lot of experience has been gained in last 3 years in this area, and the DWQC wants to consolidate and streamline that knowledge for the Fourth Edition. The WSP manual is much more practice-oriented than what is in the GDWQ at present, but the GDWQ could do better as well, perhaps with cross-referencing to tools like checklists. It is perhaps necessary to demystify WSPs, which are not really a new concept but instead merge HACCP with sanitary surveys. Validation and verification (including internal and external review/auditing) of WSPs are important and are currently not well explained in the GDWQ. There is a need to produce a complete list of the minimum elements required for a WSP. Water suppliers generally cannot see the value of WSPs, and the DWQC therefore needs to make their advantages clear and consistent.

- Low-cost water quality monitoring

Discussion: The goal is to develop a simple, low-cost, self-contained test to determine the quality of the water. In the interim, estimates of the order of magnitude of faecal contamination in water need to be obtained by analysing small volumes of water. There are rapid tests for parameters other than microbial parameters, and implementing WSPs would reduce the need for water quality testing. Harvested rainwater is assumed to be low in pathogens, but often it is not. A rapid test for microbial analysis is needed, especially in areas with typhoid outbreaks. Short-term fluctuations make it difficult to interpret the results of microbial testing. Widespread sharing of information would be useful. Sanitary inspection is of value where monitoring is not available, but low-cost testing may also be useful. Sometimes it is difficult to convince people to do something without the results of a test; sanitary inspection may be acceptable, but people may argue that “it’s always been like that”. The USA uses a tiered approach: observational, then chemical, then a more sophisticated testing approach.

- Guidance on prioritization and applying the GDWQ to local circumstances
- Establishment of health-based targets (geographic specificity)
- Guidance on legal aspects (publication of Guidelines for legislators; removing “heritage” legal requirements: values, methods, frequency)

Discussion: Dr Ingrid Chorus gave a presentation on the “standards” meeting held prior to the Expert Consultation on the Fourth Edition (see Annex 4). In discussions following her presentation, it was noted that the WHO regions want guidance on how to apply and implement the Guidelines in total, including setting health-based targets according to local circumstances. The Guidelines state that incremental improvement is encouraged, and this needs to be emphasized. In addition, the DWQC needs to admit to uncertainties and expert judgements that may be conservative.
- Guidance on certification systems (i.e. plumbing materials)

**Discussion:** This issue is on agenda (see agenda item #120 (certification systems). There is a clear need for guidance on how to determine acceptable products to be used with drinking-water.

**Information priorities for GDWQ and supporting documents:**

- Faster turn-around time on issues (including transforming data into useful information)
- Improve accessibility of information (ensure availability in a complete package, clarify on conclusions of rolling revision process)
- Translation into all WHO languages

**Discussion:** These issues will be taken into account, bearing constraints (e.g. staff, funding) in mind. It was pointed out that shorter documents can be translated by Member States into their own languages (there are only six official WHO languages).

**Fourth edition:**

- Above issues as applicable
- Climate change

**Discussion:** Research requirements should be highlighted so that they can be used by researchers, Member States and funding bodies to fill in some of the urgently needed data in order to make progress (e.g. data on exposure, real data from real treatment systems for QMRA, pathogen levels in sewage and relationship to indicator organisms). Surveillance is needed to monitor whether health-based targets have been achieved; this needs to be looked into further.

**Committee feedback:**

- Dedicate a portion of the GDWQ to household water treatment technologies and small systems
- Better linkage and interaction with WHO networks on household water treatment systems and small communities
- Need to make GDWQ more user-friendly

**Water safety plans:**

- Flow diagram, need to be more precise about what the DWQC wants to see in a WSP (minimal elements of a WSP)
- Need to give guidance on going from the high level to the practical
- GDWQ: diagrams, checklists, have the document better annotated to practical materials
- Consolidate and streamline knowledge on WSPs
- Demystify WSPs
Mr John Fawell thanked the regional participants for their contributions. The DWQC hopes to maintain contact with them to get more information and to get their opinions on documents that the Committee is preparing.
ANNEX 4: Advisory Consultation: Guidance on the Application of the WHO Guidelines in Establishing National Regulations and Standards for Drinking-water Quality

5 May 2007, Berlin, Germany

Background

Various Member States have requested guidance on how to develop national standards and regulations using WHO’s GDWQ. This is particularly important because there are a number of issues in the GDWQ that require guideline values to be adapted to local circumstances. In addition, the introduction of WSPs has raised a number of new questions as to how these will impact on drinking-water standards and regulations. While there are a number of supporting documents to the Guidelines, such as determining which chemical hazards are of greatest priority, there is a need for an advisory document that brings this together. This document is aimed at any Member State but is of particular importance for many developing nations starting out on the process of developing a legislative structure for drinking-water and therefore requires the input of both developed and developing nations.

Objective

The objective of the meeting is to discuss and revise a draft guidance document on developing national standards and regulations based on the GDWQ to ensure its effectiveness in translating the GDWQ principles in order to achieve public health gains.

Agenda

09:00-09:15 Welcome
Introduction of participants
Confirmation of agenda and officers

09:15-10:00 Objectives of the meeting
Rationale for the document
Link to rolling revision process
Expected outcomes

10:00-10:30 Introduction to the draft document
(John Fawell)

10:30-11:00 Coffee break

11:00-11:30 Roundtable discussion
Scope and purpose of document

11:30-12:00 Presentation on regulatory aspects
(David Drury)

12:00-12:30 Roundtable discussion
Structure of document

12:30-13:30 Lunch break

13:30-15:30 Roundtable discussion
Scope and contents of sections
Identification of gaps

15:30-16:00 Coffee break

16:00-16:45 Videoconference with Ricardo Torres

16:45-17:30 Next steps
Participants

Dr Feroze Ahmed, Department of Civil Engineering, BUET, Dhaka, Bangladesh
Dr Ingrid Chorus, Umweltbundesamt, Berlin, Germany
Dr Joseph Cotruvo, Joseph Cotruvo Associates/NSF International Collaborating Centre, Washington, DC, USA
Dr David Cunliffe, Department of Health, Adelaide, Australia
Dr David Drury, Drinking Water Inspectorate, London, United Kingdom
Mr John Fawell, Independent Consultant, Flackwell Heath, High Wycombe, Buckinghamshire, United Kingdom
Dr Suresh Kumar, University of Malaya, Kuala Lumpur, Malaysia
Mr Ricardo Torres Ruiz, WHO PAHO, Lima, Peru (to participate by videoconference)
Dr Mauricio Pardón, WHO PAHO, Lima, Peru (to participate by videoconference)

Secretariat

Mr Bruce Gordon, WHO HQ, Geneva, Switzerland
Mr Oliver Schmoll, Federal Environment Agency, Bad Elster, Germany
Ms Marla Sheffer, WHO Editor, Ottawa, Canada

Introduction

Mr Oliver Schmoll welcomed the group to the Umweltbundesamt (Federal Environment Agency) in Berlin. He explained the background behind the development of this guidance and informed the group that its publication was to coincide with the 50th anniversary of the GDWQ in the fall of 2008.

Mr Bruce Gordon explained that the objective of the meeting was to come up with a detailed table of contents for the final document and a plan of action or way forward. The group will present the outcomes of the meeting the week following the meeting at the GDWQ Expert Consultation on the Fourth Edition of the GDWQ.

Mr John Fawell explained that he volunteered to write a starting document for discussion purposes and suggested that the final guidance document should be no more than 20–25 pages in length. The guidance document is currently titled “Guidance on the Use of the Guidelines in Developing National Regulations and Standards for Drinking-water Quality”. He emphasized that it is not a summary of the GDWQ. Instead, it highlights certain concepts and could refer to other WHO documents to provide more details and answer other questions on particular topics. The level of detail and focus (e.g. should it be a how-to book, basic document with detailed appendices on particular topics) still need to be determined. Regardless of the final format, the guidance document should be fairly simply and clearly written.

In a roundtable discussion on the document, a variety of points were raised, including the following:

- It is important to determine the target audience, as the draft is a mix of both high-level text and a how-to document.
- The institutions involved in setting standards and regulations need to be identified.
- There is too much detail on WSPs in the current draft, but the WSP approach needs to be explained clearly in the final version.
- More boxes, bullet points, and examples would be useful (case-studies, perhaps fictional or semi-fictional compilations, appendices).
- The guidance should be simple and user-friendly.
- How to identify parameters of concern is critical, together with the variation in their guideline values with local circumstances.
- How people set numbers/targets needs to be explained.
- Good management of household systems and small systems needs to be emphasized.
- What health-based targets mean in local circumstances is difficult to understand and must be clearly explained.
- It is important to communicate the uncertainty associated with health-based targets (e.g. exceeding a standard by a factor of 3 when there is a 1000-fold uncertainty in derivation of the guideline value).
- It is important to outline a process for countries to follow to identify what is important for them in terms of establishing standards.
- A flow chart illustrating this process would be useful.
- There should not be a closed list of parameters; for example, arsenic and fluoride may be relevant in some countries but not others; countries should not be distracted by issues that are not relevant and important to them.
- The difference between standards and regulations should be clearly explained, as different countries have different understandings (for our purposes, standards are values, and regulations include standards as well as the regulatory requirements for WSPs, for example).
- Specific mathematical examples on how to apply guideline values for chemicals in specific circumstances (e.g. increased water consumption) would be useful.
- A mission statement (related to helping people use the Guidelines) and a tentative title for the guidance document are needed.
- Other questions that need to be considered include the costs of implementing the Guidelines and the existence of analytical capabilities and technical capabilities for achieving the guideline values.
- It might be useful for the document to be structured according to a series of questions.

Presentation on regulatory aspects

Dr David Drury of the Drinking Water Inspectorate for England and Wales (DWI) gave a short presentation on regulatory aspects of drinking-water guidelines from the United Kingdom DWI perspective. There were no regulations prior to 1989. England and Wales now follow the EU’s drinking-water directives. The regulations from 1989 were based on the 1980 directive and consisted of mandatory standards based on the WHO Guidelines. The 1998 drinking-water directive was also based on the WHO Guidelines. There is some flexibility in application of the guidelines. For example, departure from the standards for up to 9 years is allowed if there is no potential danger to health (although that phrase is not defined). There is a move towards WSPs. Although there has been more than 99.95% compliance with the regulations, there are over 100 serious water quality incidents per year. Emphasis on end-point monitoring has distracted attention from performance monitoring.

In discussions following his presentation, Dr Drury pointed out that the draft guidance document focuses on targets and end-point water quality, whereas the focus should be on the WSP approach from catchment to consumer in countries where it is difficult to monitor. Mr
Oliver Schmoll suggested that the WSP approach complements end-point testing approach and that the DWQC does not want to discourage countries from their monitoring efforts. Dr Ingrid Chorus opined that end-point monitoring and compliance to numbers can be misleading, distracting attention from processes, although Dr Joseph Cotruvo explained that numbers are a way of verifying that processes are working properly.

Videoconference with Mr Ricardo Torres and Dr Mauricio Pardón (PAHO/CEPIS)

Mr Bruce Gordon summarized the discussions of the morning and thanked Mr Ricardo Torres for arranging a consultation with the Latin American and Caribbean (LAC) countries. Several countries have recently drafted or are in the process of drafting drinking-water standards based on the GDWQ. Mr Torres gave a PowerPoint presentation summarizing a list of 26 comments, both general and specific, from 15 LAC countries on the guidance document.2 These comments included, for example:

- the importance of taking into consideration the budget of the countries for control and monitoring of water quality (Honduras);
- the importance of this initiative, given the difficulty of understanding the GDWQ due to the lack of analysis in its application and the absence of local initiatives to orient its use (Peru);
- the fact that some national standards do not include important chemical contaminants of concern due to the lack of adequate in-country laboratory facilities and personnel to analyse them (Belize);
- the need to recommend an initial analysis of the socioeconomic, political and institutional context (Costa Rica);
- the need for the guidance to identify, prioritize and assemble in key sections the recommendations to improve the use of the guidelines in the development of national standards and regulations (Costa Rica);
- a suggestion that the guidance provide methodological guidelines for three representative scenarios (countries with a well established drinking-water regulation, countries with a regulation in process and with implementation difficulties, and countries without a regulation) that show the possible road map that the countries should follow in order to update, strengthen or create their national drinking-water regulation (Dominican Republic);
- the need for greater participation of technical personnel from LAC countries in the development of the guidance to help visualize problems by subregions (El Salvador);
- the need for guidance on the management of uncertainties, especially with respect to the tolerable daily intakes, since people are exposed to various sources (Peru);
- the need for guidance on small supply systems (Peru);
- the need to include the circumstances that should be evaluated to establish WSPs, to facilitate the evaluation of the supply system from the source to the consumer (and the need to explain the advantage of including the WSP concept in the national standards and regulations) (Peru);
- the need for a basic glossary of terms (Peru);
- the usefulness of citing supporting documentation at the end of the guidance document (Peru, INHEM Cuba);

2 There were additionally many comments from the LAC countries on the Fourth Edition of the GDWQ. These were addressed on Day 2 of the Expert Consultation on the Fourth Edition of the GDWQ in a second videoconference with Mr Torres.
- the need for the guidance document (and related materials) to be translated into the languages of the LAC countries (Costa Rica).

Mr Torres and many of the LAC countries referred to Felipe Solsona’s document entitled “Guidelines for Drinking Water Quality Standards in Developing Countries”, which was prepared in 2002 based on the Second edition of the GDWQ and which helps the LAC countries develop their drinking-water quality standards.

Mr Gordon thanked Mr Torres on behalf of the Committee for making a very valuable contribution to the discussions on the guidance document.

In the discussion that followed Mr Torres’s presentation, it was emphasized that more examples (including real-life examples where appropriate), road maps and flow charts would improve the usefulness of the guidance document. It was also pointed out that small rural communities need the most help, as large towns often have systems that operate well. The Committee informed Mr Torres that it desperately needed to learn about the experiences of countries that have recently prepared new water quality standards based on the GDWQ, in order to inform the type of guidance and support that is needed in translating the GDWQ into national regulations. As the Committee lacks the expertise to analyse socioeconomic conditions as they relate to drinking-water, it was suggested that the draft recommend that a national commission to revise the drinking-water guidelines should review socioeconomic conditions, etc.

Dr Pardon informed the Committee that PAHO considers this guidance document to be as important as the Guidelines themselves. Most efforts have been put into producing the GDWQ, but both activities really need equal efforts. He emphasized the importance of including resources at the end of the document, such as experiences of countries that can be consulted and regulations on drinking-water quality in countries around the world. He also indicated that it was important for countries to participate in the process to ensure that they will embrace the document and that he would be happy to identify experts from the LAC countries in various areas of expertise.

The Committee requested that the regions send details of specific problems, such as fluoride and nitrate, to WHO Headquarters, so that the DWQC can consider amending the background documents to answer relevant questions. The countries should also send WHO any concerns about exceedances of guideline values by some chemicals (e.g. cadmium).

Mr Gordon closed the videoconference by indicating that the Committee would be moving forward with the region’s comments. As the Committee wants to get countries that have gone through the process on-board, getting people involved in a review of the draft would be extremely helpful. The Committee would integrate the LAC countries’ comments into the draft document and into the Fourth Edition.

It was agreed that Dr Ingrid Chorus would present the results of the one-day meeting to the Expert Consultation on the Fourth Edition. It was suggested that members of that Expert Consultation group may want to contribute to the process.

It was agreed that this was a very useful discussion and that it would have been even better to have had the discussion prior to John Fawell’s drafting of the guidance document. The Committee decided that the draft guidance needs to be completed (including peer
review) by the end of January 2008. A first draft will be prepared by August 2007 and circulated to working group members. [Post-meeting note: This deadline has been extended to the end of October or middle of November.] The revised draft will be sent for peer review when ready. It was suggested that the regions be asked during the videoconferences as part of the Expert Consultation to suggest the names of one or two people from each region to review the draft (including Mr Torres in particular). The final draft will undergo a 3-month public domain review beginning February 2008.

The outcome of the meeting is summarized below.

**Mission statement:**
To increase the impact, understanding and acceptance of the GDWQ — aspiration for quality through effective management — by explaining how the GDWQ are a “point of departure” for setting standards and developing national regulations.

**Target audience:**
Decision-makers (water and health regulators, policy-makers and their advisers) on supra-national (regional), national and sub-national levels.

**Scope and purpose:**
1. Provide guidance on developing national regulations on the basis of the GDWQ. Regulations include preventive management (WSPs) in addition to defining and prioritizing parameters for which national standards are set and the levels at which they are set, including developing existing regulations to broaden their scope in order to include this.
2. Translate the GDWQ’s high-level statements to guidance for the local process of regulatory development (the DWQC needs to collate which high-level statements should be addressed).
3. Flesh out the “point of departure” concept with guidance on assessing the national conditions that determine priorities from local circumstances (e.g. public health priorities, exposure pathways, institutional and socioeconomic conditions).
4. Support local authorities in flexibly using the values given in the GDWQ for specific parameters with an authoritative statement on the need for local assessments and priorities (health-based targets) in setting national values (this particularly needs illustrative examples, case-studies — fictional and/or real)
5. The fundamental “evolution concept” of incremental improvement over time needs to be emphasized, and how values for parameters can reflect that (with a higher value now and targeting a lower one later) (see EU directives as one example — 20-year time frames for implementation).
6. Development of awareness of the uncertainties behind the guideline values.
7. Describe processes that decision-makers would need to go through in developing standards from health-based targets, show how the preventive management framework can be embedded in national regulations, show mechanisms for flexibly using the GDWQ to develop national regulations, giving examples.
8. Describe the process by which current national drinking-water legislation can be adapted in the mid/long term.

**Note:** This document is *not* about how to do a WSP; it is on a level above that, but would link to the WSP manual.
“Personality” and style of the document:
- Simple, practical and user-friendly
- Questions-based approach
- Strong with examples, case-studies, maybe (semi-)fictional cases to highlight contrasting scenarios
- More emphasis on “how-to” guidance rather than discussion of the rationale behind the GDWQ
- Flow chart and “walking people through the process” of developing regulations

Suggested titles:
- Guidance on Applying the GDWQ to Local Circumstances
- Application of the Guidelines in a National Context

Terminology and language:
- Glossary table defining terminology used in the document (including standards and regulations)

Draft outline/structure:
What is the purpose of this guidance document? What does “scientific point of departure” mean? Open the book with some real-life problem scenarios. Why is monitoring compliance to quality standards not enough? What is the advantage of using the Framework for Safe Drinking-water?
What is the purpose of national regulations, and what should they therefore cover? How can national regulations be developed to include (i) risk assessment/process monitoring, (ii) water quality verification monitoring and (iii) surveillance? How do the WSP approach and end-point compliance complement each other in the context of national regulations? How can national regulations consider the problems and needs of small (community) water supplies?
Why is there a need for flexibility (incremental improvement)? Why is flexibility scientifically defendable (uncertainty behind guideline values)?
What are the criteria to account for local circumstances and priorities? (cost, public health, environmental, socioeconomic circumstances, etc.)? For emergencies and disasters? How can socioeconomical, political and institutional conditions be reviewed as a basis for developing national regulations?
What are health-based targets? How can they be established? How can national regulations translate health-based targets into water quality targets for microbes? For chemicals?
Who needs to be involved in developing and implementing national regulations? What institutions?
How can the DWQC monitor the success of national drinking-water policy? How well is it being implemented (verification), and how well is it meeting public health targets (validation)?
Provide examples and case-studies, including (semi-)fictional ones, to illustrate the above points.
What expert institutions can help and can be consulted (provide further references and resources, as well as a glossary of terms)?
First ideas in detail towards fleshing this out:
For “Scope and Purpose”, point 2, the group should identify:

- key high-level statements in the GDWQ that need concrete “fleshing out” and guidance
- major areas of confusion
- the subset of 1 and 2.

Our discussion centred around one of these high-level concepts, “health-based targets”:

- The group needs a clarification of the GDWQ text, explaining how public health targets for drinking-water (which can often only be estimated) can translate into targets for technology, its performance, water quality — in the face of all of the uncertainty of quantifying risk and public health impact. How can decision-makers go through the process of assessing what’s important and how it can be tackled?
- The group needs to bring this quite abstract concept down to earth by providing examples of how this has been done.
- Regulations need to ensure that technologies used are validated against targets.
- One message of the document is that specified technology targets as well as performance targets may be varied locally in relation to the contamination of the setting.
- Another message of the document is to clarify that decision-makers have the liberty to derive regulations from the GDWQ that focus on risk assessment and risk management rather than on verification monitoring (e.g. requirements for small supplies in Australia; see David Cunliffe’s example of moving away from verification monitoring).
- It will need reference to the document on prioritizing chemical risks.

Examples:
One example for the introduction: The United Kingdom is one of few countries with a good register of outbreaks. In spite of 99.95% compliance, the emphasis on end-point monitoring has distracted attention from performance monitoring. This can be used as an example to illustrate that end-point monitoring and attention to process safety have to be complementary. In practice, current regulatory frameworks are still often so focused on “compliance to numbers” that they distract attention from controlling processes.

Dissemination:
CD/video/DVD to accompany launch of guidance document (see Suresh Kumar for details).

Who is to do what:
David Drury, John Fawell, David Cunliffe as core drafting group, and all others are closely involved in “comment mode” per email, implying a high commitment of all of us to respond to those mails!

Numerous experts from the LAC countries responded to Ricardo Torres’s call for comments on the draft. Ricardo can facilitate contact for including them for contributing to — and/or reviewing — specific parts of the draft.
## ANNEX 5: Revised/Additional Text for the Policies and Procedures Manual

<table>
<thead>
<tr>
<th>Agenda item no.</th>
<th>Agenda title</th>
<th>Required text</th>
<th>Responsible person</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Policies and Procedures Manual</td>
<td>Text is to be added to the manual to indicate that only documents that have been recommended and/or approved by the FTF meeting can be published in advance of the next edition/addendum of the GDWQ.</td>
<td>Oliver Schmoll</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Text is to be added to indicate the new collaboration between the Chemical WG and PCS in terms of document preparation</td>
<td>John Fawell / Oliver Schmoll</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes to section F to refine and strengthen the basis for including organisms and the rationale for including a fact sheet or for preparing a stand-alone document</td>
<td>David Cunliffe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All documents are to be sent to all DWQC members for review in the future so that they are given the opportunity to forward them to associates for peer review.</td>
<td>Oliver Schmoll</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“reference level of risk” on p. 4 will need to be edited to “reference risk” for the Fourth Edition</td>
<td>Oliver Schmoll</td>
</tr>
</tbody>
</table>
ANNEX 6: Regional Perspectives

The following issues were raised by the WHO regions during the GDWQ WG meeting (Berlin, 2007). Those that are relevant to specific agenda items were addressed during discussions on those items. Agenda items can be searched using the index at the back of the report. In addition, several of the issues raised by the regions contributed to the plenary discussions on the nature of the Fourth Edition (see Section 6).

AFRO (Ahmed Nejjar, Gabon)³
- Ahmed Nejjar has been involved in drafting the AFRO Strategy on Water Sanitation and Health
- Sent questionnaire to 46 countries regarding the Third Edition of the GDWQ and how they use the GDWQ to set national standards; did not get feedback from many countries
- Three classes of countries: 1) use GDWQ as basis for standards, but not using all parameters (especially chemicals) because of technical problems, human resources; 2) not using the GDWQ as basis for standards; 3) trying to use all parameters in GDWQ in standards
- Indicator chemicals and DBPs are issues of interest
- Arsenic and heavy metals are problems in region
- Burkina Faso, arsenic guideline value is 10 µg/l, but arsenic measurements all >50 µg/l; want to change standard from 10 µg/l to 50 µg/l; should we stop giving water because of high arsenic concentrations? One suggested solution was to mix water from wells with low concentrations with water from wells with high concentrations to get an arsenic concentration of 25 µg/l
- Household water treatment: selling sachets for water treatment, but need proof that it works in laboratory; takes time for people to develop consistency in application of such household water treatment technologies

AMRO/PAHO/CEPIS (Ricardo Torres, Peru)
- Handout was provided summarizing the results of consultations (both general and specific comments) with 16 countries on the Fourth Edition
- Children (and other life stages) (Peru): See agenda item #7 on vulnerable populations; Ricardo Torres offered to find a public health expert to participate in Ana Maria de Roda Husman’s initiative on vulnerable populations
- WSP implementation (Costa Rica): It is recommended that WHO promotes and, as much as possible, facilitates resource mobilization so that the countries develop their own methodical and documented experiences to enrich the new editions of this material with their knowledge. If the countries do not assume control of the new guides in a critical and creative way, it will be difficult to achieve their objectives, which require harmony with various national and local situations.
- Translations (Costa Rica): The aim is to have the GDWQ and key reference documents in Spanish in the future, which should make it easier to understand and use the WHO guidance
- Participation of technical personnel of LAC countries in development of guidance (El Salvador): Ricardo Torres will suggest the names of people to participate; could be

³Note that the connection was lost during the videoconference with AFRO. The WHO Secretariat will ask AFRO to email their comments on the Guidelines to WHO.
formal nomination for people on DWQC as well as participation in drafting groups and peer review focusing on specific technical elements

- Water resource management from catchment to consumer (main idea of WSP) and then up to treatment and wastewater discharges to receptor bodies (Guatemala): Managing wastewater discharges and water scarcity/wastewater reuse are two related issues. WHO is considering the development of a wastewater safety plan as part of a WSP.

- Rainwater harvesting (Guyana): There is relevant text in the second addendum, and a free-standing document is also being prepared

- Cyanobacterial toxins (Paraguay): This is already covered in the GDWQ; we are in the process of revising the background document as well as the book on Toxic Cyanobacteria

- Guidelines for Drinking-water Safety (drinking-water quality as well as acceptability and sustainability of drinking-water supply systems) (Costa Rica): This is a suggestion to rename the GDWQ and extend them to a new approach

- Importance of GDWQ for fulfilling the Millennium Development Goals and for achieving goal 10, which surpasses what now measures the simplified indicator used by the Joint Monitoring Programme for Water Supply and Sanitation (JMP) (Costa Rica): JMP, access to improved/non-improved water sources, UNICEF developed rapid assessment of drinking-water methodology, complement current indicator set of JMP, tested in pilot countries (e.g. Nicaragua), developing guidance handbook on applying methodology; looking for external reviewers around June, if interested let Oliver Schmoll know

- Other key actors involved due to advances in decentralization and municipalization of water services in LAC countries (Costa Rica): Should be included in Guidelines

- Vended water, tankered water (Peru, Colombia): Lima, Peru, will share results of study on water quality in tankers; any other countries with experiences in this area are asked to share them as well; summary of bulk water issue will be developed for Fourth Edition (Note: Peru has already shared these documents, but in Spanish)

- Nematodes (Peru): These are of no human health risk, although they are aesthetically displeasing; can be managed with low levels of non-toxic pesticides, by professionals; they are discussed in second addendum

- Chironomids (Peru): If the problem is in relation to drinking-water storage, some pesticides covered by WHO/PES are addressed in the second addendum of the Guidelines, intended for use for controlling mosquitoes in containers; comments on the practicality of the guidance provided in second addendum on these pesticides would be appreciated

- Nitrate/nitrite (Peru): High levels (above guideline value) in water, but no adverse effects in epidemiological studies, can guideline value be reconsidered?; WHO is asked to review the guideline value and be more specific about its derivation; second addendum contains improved guidance, with an extended abstract on nitrate and nitrite that explains more about the basis of the guideline values, especially for bottle-fed infants; methaemoglobinaemia in infants appears to be associated with simultaneous exposure to microbial contaminants, and it is recommended that water not be used for bottle-fed infants when nitrate levels are above 100 mg/litre, but that it may be used when the nitrate concentration is between 50 and 100 mg/litre if the water must is known to be microbiologically safe; should talk to local health authorities for further guidance; water should be chlorinated to oxidize nitrite to nitrate
- Residual chlorine (Peru): Need more clarity on levels of residual chlorine for special systems, where there is no good O&M, such as rural systems; this was identified as an issue at the last meeting, and the second addendum addresses this, recommending a minimum residual of 0.2 mg/litre of free chlorine at the point of delivery.

**EMRO**
- no participation

**EURO**
- See report on the Meeting on European Regional Perspectives (Annex 3).

**SEARO (Han Heijnen)**
- National standards are certainly an issue; the challenge is to get national standards applied
- Privatization of supplies; can’t identify regulators
- Further support to small community water supply systems, especially with respect to water quality
- Certification: no one has asked for certification in this region; may be some interest in Thailand
- \( \text{H}_2\text{S} \) methods: UNICEF has been applying work in small community-based systems, may be an issue in relation to rainwater harvesting: Mark Sobsey reported that he will attempt to finish the supporting document as soon as possible
- Emergencies and disasters: Should do something with people dealing with communicable diseases (not always an outbreak)
- Rainwater harvesting: Han hopes to have draft of stand-alone document ready by June; writeup for current addendum is on web for comments
- Chemical safety, assessing priorities: Serious problem in SEARO, not one country that does not have a chemical safety in drinking-water issue mentioned in newspapers on a weekly basis (not just arsenic and fluoride, also mining tailings and industrial discharges): Han Heijnen will mail a list of these issues to John Fawell
- Nepal, work on TPE (ETV) with UNICEF; just started large household treatment programme, hope to do more verification in field, of great interest to countries like Nepal, Bangladesh, Sri Lanka (especially with respect to arsenic and fluoride)
- Arsenic: Don’t agree that the standard is an important arsenic issue; all concerned countries are trying to take care of the problem; suggestion in Nepal that arsenic below 100 µg/litre in combination with lead excesses in water are giving arsenicosis-related complications within a year; studies are under way
- Fluoride: Standard is an issue for fluoride, 0.5 or 1 mg/litre; in India, underestimate health consequences of exposure to fluoride, doesn’t get the investment it needs; dental fluorosis observed in Sri Lanka, skeletal fluorosis also occurs in India
- Still struggling with guideline values; message is to continue to inform and pressure relevant authorities that fluoride and arsenic are critical issues in their countries
- In north-western province of Sri Lanka, an excessive amount of kidney failure due to something in the water has been observed; don’t know what the cause is yet, maybe cyanobacterial toxins
- Seasonal variations in water abundance, quality of water important in times of water scarcity; non-piped supplies being used by many, dry up, look for less palatable supplies; safe water in water-scarce regions and household treatment-related issues
- Re standards, worthwhile to note discussion re marketing GDWQ beyond users; still stuck in professional arena, need to get senior civil servants etc. involved in processes
in setting national standards to ensure that they’re getting applied; not good enough just to talk to professionals

WPRO (Terrence Thompson)
- Guidance on applying GDWQ to to the development of national standards is still very much needed. In several countries, it remains a challenge to achieve understanding of the difference between guidelines and standards. WHO needs to continue conveying the message that numerical values may be more or less strict (such guidance should be out by January 2008; see Annex 4). Terrence Thompson expressed his interest in contributing to the development of such guidance.
- Certification: Extremely relevant, have been working with urban systems to develop pilot projects, want to know if they’ll be certified by WHO if they develop WSPs, inability to answer that question satisfactorily is a barrier to progress in the area of WSPs; will some countries provide certification for WSPs when they review and accept them?; not discussed with any regulatory authorities, may be possible in more developed countries of region.
- WSP manual: More practical how-to manual is under development, with worksheets to help water utilities develop and implement own WSP
- Water-scarce regions, climate change: Situation will be exacerbated, relevant to WPRO
- Arsenic continues to be a hot topic in some of major countries of region (e.g. China); setting national standard is the issue, use WHO 10 µg/litre or go with 50 µg/litre, which some of the neighbouring countries are using; implications for treatment costs; use up resources that could be used to extend water supply to populations that need it; standard for arsenic can be relaxed in some regions
- Fluoride also important issue to region
- Outbreaks of cyanobacterial toxins in countries of Southeast Asia [not Region], may be more widespread problem than is now realized; outbreak in Cambodia 2 months ago, would have been useful to have information on how to diagnose cyanobacterial poisoning from a medical perspective (vision problems from using water for washing face); suggests that guidance to medical personnel is needed; key issue is providing advice or information so people know when not to use the water, i.e. prevention and awareness rather than dealing with it after the event (if there are blooms, there is a good chance that toxins are present, so avoid the water); microcystin-LR attacks liver and is promoter of carcinoma; should collect blue-green algae and determine the toxin, rather than wait for an effect; Ingrid Chorus and Choon Nam Ong to provide advice to WPRO on best way forward.
- Household water treatment: Regional conference would be ideal, to learn from experiences of implementers in this area
- Sodium dichloroisocyanurate: Several products on market, which are used predominantly for emergency use, with costs and sustainability being issues in relation to use on a routine basis; Philippines is one of several countries that has been selected by a manufacturer of chlorine tablets for marketing, trying to increase sales, but so far not making the kind of progress they hoped for, so the company representative is coming in June 2007 to have meetings to promote its product more effectively; company is also looking at Indonesia and Viet Nam as other countries to promote its product in the future; some randomized control trials on household application have been conducted, but need more studies to better document uptake and exposure, determine how successful and sustainable these strategies will be on the ground.
- Fourth Edition: One challenge is to offer opportunities for non-professionals to take note of key issues related to compliance with Guidelines. Need something more approachable, more accessible than blue book.
- Translation: WPRO differs from SEARO, English not universally understood. Third Edition translated into Chinese, but lack of translations into other languages greatly compromises usefulness of Guidelines.
ANNEX 7: Revised/Additional Text for the Fourth Edition

Note that the table below includes only items specifically addressed during discussions of the various agenda items. It does not include more general recommendations made towards the content and restructuring of the Fourth Edition (for these, refer to Section 6). It also does not include microbial fact sheets in chapter 11 or summary statements for chemical compounds in chapter 12, which are listed in Annex 8.

For detailed information on the required text, the reader should refer to the Plan of work for the associated agenda item.

<table>
<thead>
<tr>
<th>Agenda item</th>
<th>Required text</th>
<th>Responsible person</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1A. “Achievability” for Water Treatment Chemicals/Materials</td>
<td>Editing of GDWQ such that the term “technical achievability” is no longer used</td>
<td>Marla Sheffer</td>
</tr>
<tr>
<td>#4. Water Safety Plans for Buildings, Including Health-Care Facilities</td>
<td>Revised section 6.1</td>
<td>David Drury</td>
</tr>
<tr>
<td>#5. Emergencies and Disasters</td>
<td>New text for section 6.3 and the WSP section</td>
<td>Joe Cotruvo</td>
</tr>
<tr>
<td>#6. Bulk Water Shipments</td>
<td>New section in chapter 6</td>
<td>Stephen Schaub, John Fawell</td>
</tr>
<tr>
<td>#7. Vulnerable Groups</td>
<td>New section to be inserted in GDWQ (chapter 6), and possibly revised text for section 1.1</td>
<td>Ana Maria de Roda Husman</td>
</tr>
<tr>
<td>#10. Levels of Protection</td>
<td>Guidance on calculation and use of DALYs (probably not until post-Fourth Edition)</td>
<td>John Fawell</td>
</tr>
<tr>
<td>#11. Terminology in the GDWQ</td>
<td>Changes to text of Volume 1 as a result of inconsistency in terminology usage</td>
<td>Michèle Giddings, Marla Sheffer</td>
</tr>
<tr>
<td>#17. Desalination</td>
<td>Revised text of section 6.4</td>
<td>Marla Sheffer</td>
</tr>
<tr>
<td>#21. Dual Water Supply Systems</td>
<td>Short text on dual water; new section in chapter 6 addressing the safety and management of multiple water supplies at the household and community levels</td>
<td>Ingrid Chorus, Oliver Schmoll, Mark Sobsey</td>
</tr>
<tr>
<td>#22. Rainwater harvesting</td>
<td>Additional text woven throughout the early chapters of the GDWQ</td>
<td>Feroze Ahmed</td>
</tr>
<tr>
<td>#28. Water Safety Plans</td>
<td>Revised text to clarify definitions of verification and validation and address the need for suppliers to undertake internal review of their plans (section 4.6 on documentation and communication and elsewhere)</td>
<td>Guy Howard, Bruce Gordon</td>
</tr>
<tr>
<td>#36. Technology Performance Evaluation (TPE)</td>
<td>Text on key chemical aspects of TPE/ETV</td>
<td>Joe Cotruvo, Feroze Ahmed</td>
</tr>
<tr>
<td></td>
<td>A separate new section in the GDWQ on TPE/ETV</td>
<td>Mark Sobsey, Bruce Gordon</td>
</tr>
<tr>
<td>#38. Table 7.1</td>
<td>Additional pathogens for Table 7.1</td>
<td>David Cunliffe</td>
</tr>
<tr>
<td>#39. Short-term Fluctuations in Levels of Microbial Contaminants</td>
<td>Text in new section on source water in chapter 7 dealing with short-term fluctuation</td>
<td>Ana Maria de Roda Husman, Stephen Schaub</td>
</tr>
<tr>
<td>#41. Legionella and the Prevention of Legionellosis</td>
<td>Ensure consistency of chapter 7 with the Legionella text</td>
<td>David Cunliffe</td>
</tr>
<tr>
<td>#52. WHO/PES Pesticides</td>
<td>New text for chapter 8 on institutional arrangements to approve and control the use of pesticides for vector control in drinking-water</td>
<td>Marla Sheffer</td>
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<tr>
<td>#53. Analytical and Technical Achievability for Microcystin</td>
<td>New section 8.4.14 on treatment for removal of cyanobacteria and cyanotoxins</td>
<td>Ingrid Chorus, Peter Jackson</td>
</tr>
<tr>
<td>Agenda Item</td>
<td>Required text</td>
<td>Responsible person</td>
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<tr>
<td>#92. Sodium Dichloroisocyanurate</td>
<td>Revised text in sections 4.5 and 6.2</td>
<td>John Fawell</td>
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<tr>
<td>#101. Radon</td>
<td>Updated guidance in section 9.5 (possibly)</td>
<td>Radiation Programme</td>
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<td>#109. Harmonization of Use of Term “Risk” and “Risk Levels”</td>
<td>Revised text throughout GDWQ</td>
<td>All authors</td>
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<tr>
<td>#120. Certification of Compliance with GDWQ</td>
<td>Additional text (section 1.2.9, Certification agencies) (possibly for Fourth Edition)</td>
<td>Bruce Gordon</td>
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<tr>
<td>#123. Guidance on Developing National Standards from GDWQ</td>
<td>Revised text / new chapter</td>
<td>John Fawell</td>
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<td>#136. Corrosion Control</td>
<td>Revised text</td>
<td>Michèle Giddings, Peter Jackson</td>
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<tr>
<td>#144. Avian Influenza</td>
<td>New text in chapter 7 on emerging pathogens</td>
<td>Ana Maria de Roda Husman</td>
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<tr>
<td>#150. Zoonosis Fact Sheets</td>
<td>Revised text for chapter 7</td>
<td>David Cunliffe</td>
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<tr>
<td>#158. Disinfectants and Disinfection By-products (DBPs)</td>
<td>Amended section 8.4.4, Other disinfection processes</td>
<td>Peter Jackson, Joe Cotruvo, Mark Sobsey</td>
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<tr>
<td>#160. Reference Pathogens</td>
<td>Criteria for reference pathogens</td>
<td>David Cunliffe, Stephen Schaub</td>
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<td></td>
<td>Updated versions of Tables 7.3 and 7.4 and Figures 7.2–7.4</td>
<td>Ana Maria de Roda Husman</td>
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### ANNEX 8: Chemical Background Documents and Microbial Fact Sheets for Inclusion in the Fourth Edition

#### Chemical Background Documents

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<td>Bti</td>
<td>John Fawell, Mark Sobsey</td>
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<td>Ingrid Chorus, Marla Sheffer</td>
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<td>58-3</td>
<td>Hardness</td>
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<td>60</td>
<td>Arsenic</td>
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<td>61</td>
<td>Atrazine (probably post-Fourth Edition)</td>
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<td>Boron</td>
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<td>66</td>
<td>Chromium</td>
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<td>68</td>
<td>Cyanide and cyanogen chloride</td>
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<td>86</td>
<td>Dichlorvos</td>
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<td>87</td>
<td>Dicofol</td>
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<td>71</td>
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<td>83</td>
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<td>85</td>
<td>Cylindrospermopsin (probably post-Fourth Edition)</td>
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<td>90</td>
<td>Nitrobenzene</td>
<td>Akihiko Hirose</td>
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<td>91</td>
<td>Petroleum products (may not be necessary)</td>
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<td>98 and 117</td>
<td>Various pesticides</td>
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<td>119</td>
<td>Beryllium</td>
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<td>128</td>
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<td>Ed Ohanian</td>
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<td>142</td>
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<td>146</td>
<td>Alachlor (possibly)</td>
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<td>147</td>
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<td>#40. Microbial Risk Assessment</td>
<td>Cryptosporidium</td>
<td>Gertjan Medema, Ana Maria de Roda Husman</td>
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<td>#47. Addendum: Microbiological Agents in Drinking-water</td>
<td>Vibrio vulnificus</td>
<td>Dr James Oliver, Mark Sobsey</td>
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<td>#150. Zoonosis Fact Sheets</td>
<td>Franciscella</td>
<td>Suresh Kumar</td>
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<td>Schistosoma</td>
<td>Takuro Endo</td>
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Action is required from DWQC members, WHO Secretariat and external experts on the following agenda items:

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<th>WG members</th>
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<tr>
<td>Dr Feroze Ahmed</td>
<td>22, 36, 48, 60</td>
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<tr>
<td>Dr Ingrid Chorus</td>
<td>12, 21, 27, 36, 53, 85</td>
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<tr>
<td>Dr Joe Cotruvo</td>
<td>5, 6, 17, 18, 36, 48, 54, 58-3, 64, 74, 135, 154, 155, 158</td>
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<td>Dr David Cunliffe</td>
<td>1, 20, 22, 28, 32, 38, 41, 129, 132, 135, 160</td>
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<td>Dr Takuro Endo</td>
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<td>Mr John Fawell</td>
<td>1, 1B-1, 1D, 6, 10, 43, 48, 52, 52A, 58-2, 58-3, 60, 61, 63, 66, 68, 71, 74, 77, 78, 79, 83, 86, 87, 91, 92, 93, 98, 117, 119, 128, 135, 142, 146, 152, 153, 156, 157</td>
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<td>Ms Michèle Giddings / Health Canada</td>
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<td>Dr Guy Howard</td>
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<td>Dr Shoichi Kunikane</td>
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<td>Professor Yasumoto Magara</td>
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<td>Dr Aiwerasia Vera Festo Ngowi</td>
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<td>Professor Mark Sobsey</td>
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<td>Dr Jamie Bartram / WSH</td>
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<td>Mr Bruce Gordon</td>
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<td>Mr Han Heijnen</td>
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<td>Ms Jennifer Mercer</td>
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<td>Ms Marla Sheffer</td>
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<td>Ms Jackie Sims</td>
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<td>Ms Penny Ward</td>
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<td>Dr Akihiko Hirose</td>
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<td>Mr Tom Williams / IWA</td>
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<th>External experts</th>
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<td>Dr Annette Davison</td>
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<td>Dr Dan Deere</td>
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<td>Dr Steve Pedley</td>
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<td>Dr Kathy Pond</td>
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