Guidelines for Drinking-water Quality

THIRD EDITION
INCORPORATING THE FIRST AND SECOND
ADDENDA
Volume 1
Recommendations



Geneva 2008

WHO Library Cataloguing-in-Publication Data

Guidelines for drinking-water quality [electronic resource]: incorporating 1st and 2nd addenda, Vol.1, Recommendations. – 3rd ed.

1. Potable water – standards. 2. Water – standards. 3. Water quality – standards. 4. Guidelines. I. World Health Organization.

ISBN 978 92 4 154761 1 (WEB version) (NLM classification: WA 675)

© World Health Organization 2008

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

Contents

	Preface			XV
	Acknowledgements			
	Acronyms	and abb	reviations used in text	XX
	1. Introd	luction		1
I	1.1	Genera	General considerations and principles	
		1.1.1	Microbial aspects	3
		1.1.2	Disinfection	5
		1.1.3	Chemical aspects	6
		1.1.4	Radiological aspects	7
		1.1.5	Acceptability aspects	7
	1.2	Roles a	Roles and responsibilities in drinking-water safety management	
		1.2.1	Surveillance and quality control	8
		1.2.2	Public health authorities	10
		1.2.3	Local authorities	11
		1.2.4	Water resource management	12
		1.2.5	Drinking-water supply agencies	13
		1.2.6	Community management	14
		1.2.7	Water vendors	15
		1.2.8	Individual consumers	15
		1.2.9	Certification agencies	16
		1.2.10	Plumbing	17
	1.3	Suppor	rting documentation to the Guidelines	18
	2. The G	uideline	s: a framework for safe drinking-water	22
	2.1	Framework for safe drinking-water: requirements		
		2.1.1	Health-based targets	24
		2.1.2	System assessment and design	25
		2.1.3	Operational monitoring	26
		2.1.4	Management plans, documentation and communication	27
		2.1.5	Surveillance of drinking-water quality	28

GUIDELINES FOR DRINKING-WATER QUALITY

	2.2	Guidelines for verification			
		2.2.1	Microbial water quality	29	
		2.2.2	Chemical water quality	30	
	2.3	National drinking-water policy			
		2.3.1	Laws, regulations and standards	31	
		2.3.2	Setting national standards	32	
	2.4	Identify	ring priority drinking-water quality concerns	34	
		2.4.1	Assessing microbial priorities	35	
		2.4.2	Assessing chemical priorities	35	
3.	Health	-based t	argets	37	
	3.1	Role and purpose of health-based targets			
	3.2	Types o	of health-based targets	39	
		3.2.1	Specified technology targets	41	
		3.2.2	Performance targets	41	
		3.2.3	Water quality targets	42	
		3.2.4	Health outcome targets	43	
	3.3	Genera	l considerations in establishing health-based targets	43	
		3.3.1	Assessment of risk in the framework for safe		
			drinking-water	44	
		3.3.2	Reference level of risk	44	
		3.3.3	Disability-adjusted life-years (DALYs)	45	
4.	Water safety plans				
	4.1		assessment and design	51	
		4.1.1	New systems	52	
		4.1.2	Collecting and evaluating available data	53	
		4.1.3	Resource and source protection	56	
		4.1.4	Treatment	59	
		4.1.5	Piped distribution systems	61	
		4.1.6	Non-piped, community and household systems	64	
		4.1.7	Validation	67	
		4.1.8	Upgrade and improvement	67	
	4.2	Operat	ional monitoring and maintaining control	68	
		4.2.1	Determining system control measures	68	
		4.2.2	Selecting operational monitoring parameters	68	
		4.2.3	Establishing operational and critical limits	70	
		4.2.4	Non-piped, community and household systems	71	
	4.3	Verifica		71	
		4.3.1	Verification of microbial quality	72	
		4.3.2	Verification of chemical quality	73	
		4.3.3	Water sources	73	
		4.3.4	Piped distribution systems	74	

CONTENTS

		4.3.5	Verification for community-managed supplies	74	
		4.3.6	Quality assurance and quality control	75	
	4.4	Manag	ement procedures for piped distribution systems	76	
		4.4.1	Predictable incidents ("deviations")	77	
		4.4.2	Unforeseen events	77	
		4.4.3	Emergencies	78	
		[4.4.4]	Deleted in first addendum to third edition]		
		4.4.5	Preparing a monitoring plan	80	
		4.4.6	Supporting programmes	80	
	4.5	_	ement of community and household water supplies	81	
	4.6	Docum	nentation and communication	82	
5.	Survei	llance		84	
	5.1	Types o	of approaches	85	
		5.1.1	Audit	86	
		5.1.2	Direct assessment	87	
	5.2	Adapti	ng approaches to specific circumstances	88	
		5.2.1	Urban areas in developing countries	88	
		5.2.2	Surveillance of community drinking-water supplies	88	
		5.2.3	Surveillance of household treatment and storage systems	89	
	5.3	Adequa	acy of supply	90	
		5.3.1	Quantity (service level)	90	
			Accessibility	91	
			Affordability	92	
			Continuity	92	
	5.4	Planning and implementation			
	5.5	Report	ing and communicating	95	
		5.5.1	Interaction with community and consumers	96	
		5.5.2	Regional use of data	96	
6.	Application of the Guidelines in specific circumstances				
	6.1	_	puildings	99	
		6.1.1	Health risk assessment	100	
		6.1.2	System assessment	100	
		6.1.3	Management	101	
		6.1.4	Monitoring	101	
		6.1.5	Independent surveillance and supporting programmes	102	
		6.1.6	Drinking-water quality in health care facilities	102	
		6.1.7	Drinking-water quality in schools and day care centres	103	
	6.2	-	encies and disasters	104	
		6.2.1	Practical considerations	105	
		6.2.2	Monitoring	106	
		6.2.3	Microbial guidelines	107	

Ī

GUIDELINES FOR DRINKING-WATER QUALITY

		6.2.4	Sanitary inspections and catchment mapping	108
		6.2.5	Chemical and radiological guidelines	108
		6.2.6	Testing kits and laboratories	109
	6.3	Safe dr	inking-water for travellers	109
	6.4	Desalir	nation systems	111
	6.5	Packaged drinking-water		
		6.5.1	Safety of packaged drinking-water	113
		6.5.2	Potential health benefits of bottled drinking-water	114
		6.5.3	International standards for bottled drinking-water	114
	6.6	Food p	production and processing	115
	6.7	Aircraft and airports		
		6.7.1	Health risks	116
		6.7.2	System risk assessment	116
		6.7.3	Operational monitoring	116
		6.7.4	Management	117
		6.7.5	Surveillance	117
	6.8	Ships		117
		6.8.1	Health risks	117
		6.8.2	System risk assessment	118
		6.8.3	Operational monitoring	119
		6.8.4	Management	119
		6.8.5	Surveillance	120
	6.9	Tempo	rary water supplies	120
		6.9.1	Planning and design	120a
		6.9.2	Operation and maintenance	120b
		6.9.3	Monitoring, sanitary inspection and surveillance	120b
	6.10	Vended	l water	120b
		6.10.1	System risk assessment	120d
		6.10.2	Operational monitoring	120d
		6.10.3	Management	120e
		6.10.4	Surveillance	120e
	6.11	Rainwa	nter harvesting	120e
		6.11.1	Water quality and health risk	120e
		6.11.2	System risk assessment	120f
		6.11.3	Operational monitoring	120g
		6.11.4	Verification	120h
		6.11.5	Management	120h
		6.11.6	Surveillance	120h
	6.12	Non-p	iped water supplies	120h
7.	1			121
	7.1	Microb	oial hazards associated with drinking-water	121

GUIDELINES FOR DRINKING-WATER QUALITY

	7.1.1	Waterborne infections	121		
	7.1.2	Persistence and growth in water	124		
	7.1.3	Public health aspects	125		
7.2	Health-based target setting				
	7.2.1	Health-based targets applied to microbial hazards	126		
	7.2.2	Risk assessment approach	126		
	7.2.3	Risk-based performance target setting	131		
	7.2.4	Presenting the outcome of performance target			
		development	133		
	7.2.5	Issues in adapting risk-based performance target setting			
		to national/local circumstances	133		
	7.2.6	Health outcome targets	134		
7.3	Occurrence and treatment of pathogens				
	7.3.1	Occurrence	136		
	7.3.2	Central treatment	137		
	7.3.3	Household treatment	141		
7.4	Verific	ation of microbial safety and quality	142		
7.5	Metho	ds of detection of faecal indicator bacteria	143		
7.6	Identifying local actions in response to microbial water				
	quality	problems and emergencies	144		
	7.6.1	Boil water and water avoidance advisories	144		
	7.6.2	Actions following an incident	144c		

CONTENTS

	8. Chemical aspects			145	
		8.1	Chemic	cal hazards in drinking-water	145
		8.2	Derivat	ion of chemical guideline values	147
			8.2.1	Approaches taken	148
			8.2.2	Threshold chemicals	149
			8.2.3	Alternative approaches	152
			8.2.4	Non-threshold chemicals	154
			8.2.5	Data quality	154
			8.2.6	Provisional guideline values	155
			8.2.7	Chemicals with effects on acceptability	156
			8.2.8	Non-guideline chemicals	156
			8.2.9	Mixtures	156
I			8.2.10	Guidance values for use in emergencies	156a
		8.3	Analytical aspects		157
			8.3.1	Analytical achievability	157
			8.3.2	Analytical methods	158
		8.4	Treatme	ent	166
			8.4.1	Treatment achievability	166
			8.4.2	Chlorination	171
			8.4.3	Ozonation	172
			8.4.4	Other disinfection processes	172
			8.4.5	Filtration	173
			8.4.6	Aeration	175
			8.4.7	Chemical coagulation	175
			8.4.8	Activated carbon adsorption	176
			8.4.9	Ion exchange	177
			8.4.10	Membrane processes	178
			8.4.11	Other treatment processes	178
			8.4.12	Disinfection by-products – process control measures	179
			8.4.13	Treatment for corrosion control	180a
I			8.4.14	Household treatment	184

预览已结束,完整报告链接和二维码如下:

https://www.yunbaogao.cn/report/index/report?reportId=5_29356



