Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda (March 2022)

The WHO Guidelines for drinking-water quality provides an authoritative basis for the setting of national regulations and standards for water safety in support of public health. The Guidelines are updated through a process of rolling revision, whereby a limited number of sections within each edition are updated as feasible, including in response to new evidence, uncertainty about best practice, or requests from stakeholders. New editions of the Guidelines usually introduce major new recommendations and are published following comprehensive review.

In the latest edition of the Guidelines, the *Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda*, the key recommendation in the Guidelines remains a "**Framework for Safe Drinking-water**" encompassing complementary functions of national regulators, water suppliers and independent surveillance agencies. The framework comprises:

- Development of drinking-water quality regulations and standards including **health-based targets**
- **Water Safety Plans**, a proactive risk management approach encompassing all steps in the water supply, to ensure the consistent delivery of a safe and acceptable drinking-water supply
- Independent **surveillance**, to ensure WSPs are effective and that health-based targets are met

The Guidelines, including its updates, are accompanied by a series of supporting publications and are referenced throughout the Guidelines. See Annex 1 for supporting publications added to the latest edition of the Guidelines.

The key updates included in this latest edition are summarized below.

Key updates

Chapter 5 Surveillance[1], Section 5.3 Adequacy of supply: updated based on the second edition of *Domestic water quantity, service level and health*. See table 5.1 in the Guidelines and the associated infographic for a summary of household water access, adequacy and level health concern. The findings from this document underscores the need to ensure that households have reliable access to a basic water supply (where basic access in the document is defined as water within 1 km or 5–30 minutes

[1] It is recognized that a more substantive update is needed to this chapter including section 5.3 on Adequacy of supply, where safe, sustainable reliable systems needs to be discussed at the outset of this section and to be clear the difference between surveillance for public health purposes and global monitoring by JMP tracking progress on SDG target 6.1. This more comprehensive update will be addressed in future revision of the Guidelines.

of total collection time), and preferably intermediate access (water being supplied reliably on-plot especially when running water is available) or higher for health gains.[2]

Chapter 6 Applications of the guidelines in specific circumstances: New section on potable reuse in Chapter 6 (now section 6.6) based on Potable reuse: Guidance for producing safe drinking-water. Also updated sections on emergencies (now section 6.8) and food production and processing (now section 6.16) citing several publications for more information.

Chemical aspects (Chapters 8, 12 and Annexes): New or updated chemical fact sheets for 14 chemicals in chapter 12 based on the chemical background documents published in 2020 and 2021. The assessments that informed the fact sheets either reaffirmed or updated the guideline values and health-based values, and in some instances, established reference values[3]. New or updated fact sheets were prepared for:

1. anatoxins (New with reference value established)
2. asbestos
3. bentazone (acute health-based value established)
4. chromium (guideline value retained but provisional status removed)
5. cylindrospermopsins (New with provisional guideline value for lifetime and short-term established)
6. iodine
7. manganese (provisional guideline value established, replacing the prior health-based value). Also in section 2.5.3 on assessing chemical priorities, it is noted that manganese can also be of concern in some areas because of the potential extent of exposure at concentrations of human health significance, considering the updated WHO guideline value.
8. microcystins (replaces cyanobacterial toxins: microcystin-LR, short-term provisional guideline value established, provisional lifetime guideline retained)
9. nickel
10. organotins (replaces dialkyltins, health-based value established for some organotins)
11. saxitoxins (new with acute guideline value established)
12. silver (reference value established)
13. tetrachloroethene (guideline value changed)
14. trichloroethene (guideline changed)

Corresponding updates were also made to the chemical summary tables (in chapter 8 and Annex 3), the section on aesthetic considerations for manganese (section 10.2), the section on factors influencing leaching of nickel in nickel-containing pipes and fittings (section A5.3.6) and the analytical achievability and treatment performance tables for cyanobacteria, cyanotoxins and manganese (Annexes 4 and 5).

[2] It is also noted in the Guidelines that "basic access" and "intermediate access" broadly align with the access levels associated with basic and safely managed services.

[3] See section 8.2 and the chemical fact sheets in the Guidelines for further explanations on these values.

Chapter 9 Radiological aspects: Updated to reflect Management of radioactivity in drinking-water. Key update was to provide further guidance to support management of radionuclides when exceeding WHO screening values and guidance levels. Other updates include:

- Guidance on when adaptation of WHO values should be considered in national regulations.
- Information on situations where the IDC could be exceeded even if screening levels are not exceeded and when such a situation should be considered.
- References to latest standardized methods, included additional analytical methods
- Additional considerations for radon monitoring and radon management in water

Chapter 11 Microbial fact sheets: Updated fact sheet on cyanobacteria (11.5) based on the second edition of Toxic cyanobacteria in water. The key update is to recommend use of an alert level framework for early-warning and to guide short-term management responses. An alert level framework primarily uses levels of cyanobacterial biomass (biovolume or chlorophyll a) to trigger responses when biomass reaches levels at which concentrations exceeding cyanotoxin alert values can no longer be excluded. See the fact sheet for a simplified scheme of the alert level framework and also a summary of cyanotoxin alert values.

Annex 1: New WHO supporting publications referenced in Annex 1 of the Guidelines

1. A guide to equitable water safety planning: Ensuring no one is left behind (2019)
2. Alternative drinking-water disinfectants: Bromine, iodine and silver (2018)
3. Arsenic primer: Guidance on the investigation and mitigation of arsenic contamination (2018). This is a UNICEF/WHO publication.
4. Chemical mixtures in source water and drinking-water (2017)
5. Climate-resilient water safety plans: Managing health risks associated with climate variability and change (2017)
6. Developing drinking-water quality regulations and standards (2018)
7. Domestic water quantity, service level and health, 2nd edition (2020)
8. Management of radioactivity in drinking-water (2018)
9. Microplastics in drinking-water (2019). Note this was not explicitly referenced in GDWQ chapters as this is still an emerging area and WHO is publishing an updated report in 2022, looking at human health implications from wider environmental exposure
10. Potable reuse: Guidance for producing safe drinking-water (2017)
11. Toxic cyanobacteria in water, 2nd edition (2021)

All chemical background documents can be accessed at https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health/chemical-hazards-in-drinking-water