

Water Quality - Importance and Regulatory Settings

Part C: Water quality standards

The material presented here has been prepared by Samuel Addison in April 2021, with input from Dr. Laura Richards and Prof. David Polya of the Department of Earth & Environmental Sciences, The University of Manchester, and other sources as acknowledged. The associated video recordings have been made by Samuel Addison.

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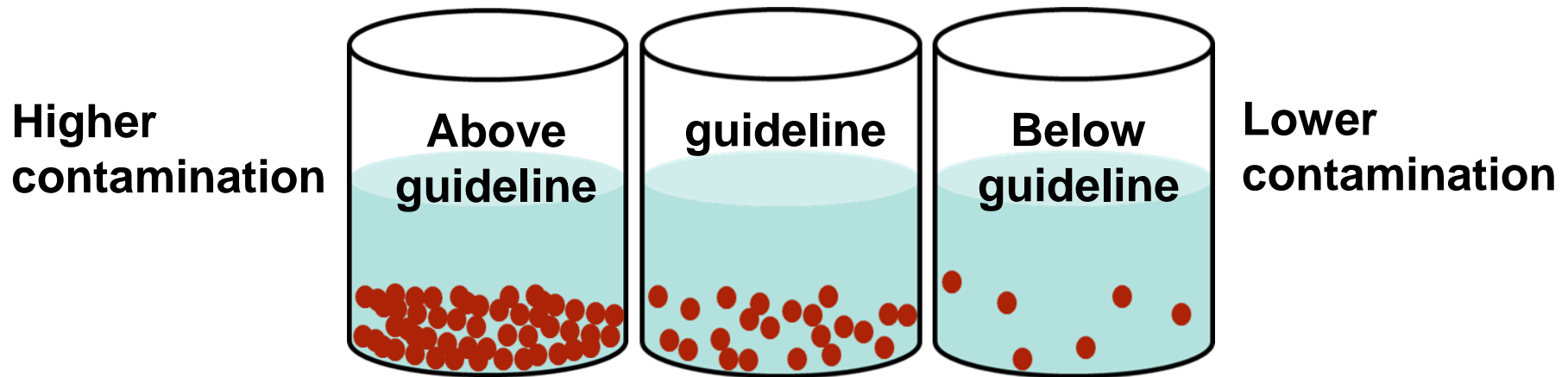
- Outline
 - Introduction
 - Objectives
 - Introduction to standards and guidelines
 - WHO guidelines and S/SE Asian countries' standards
 - Summary
 - Learning exercise
 - References & Further Information

- This lesson will be about the purpose of water quality standards, their importance and also will provide real examples.
- This lesson builds on the topics of previous mini lectures “Water quality definitions and importance” and “Water types” in this series “Water Quality - Importance and Regulatory Settings”.

- To be able to identify why water quality standards are set
- To be able to describe the requirements of standards
- To be able to discuss some of the challenges of setting standards

INTRODUCTION TO GUIDELINES AND STANDARDS

- As established in lesson “water quality and definitions”, water quality is important to human health
- Standards/guidelines are used to check the water quality is “usable” for its use e.g., drinking



- The WHO provides an international framework (guidelines) for individual countries to convert and adapt to standards
- Guidelines are general, aimed at protecting public health on a worldwide basis
- Guidelines are intended as a basis for the development of standards

- Within the area of water and guideline setting there are three distinct but related areas:
 - drinking water
 - wastewater reuse
 - recreational water
- Guidelines are therefore dependant on use

- Standards are designed to be enforced and a part of the law
- Standards are set by countries based on their current water quality situation

- Technologically viable
- Economically viable
- Easily measurable
- Fulfil the requirement for which it is meant

- Guideline values are designed not to be treated as absolute values, but rather, treated as targets
- Rather than taking one large, concentrated effort to reach the targeted standard, instead other smaller distributed efforts are sometimes endorsed

- Directly using guidelines as a national standard
- Not creating short-, medium- and long-term goals leads to 'failure'
- A lack of monitoring

CURRENT STANDARDS AND GUIDELINES

- Drinking water can be defined as the water delivered to the consumer that can be safely used for drinking, cooking or washing
- How we determine what is safe is more complex than ever before.
- As research and models (e.g. health risk assessment, economic assessments) develop, standards are constantly reviewed to be tightened or relaxed depending on the most reliable information.

- There are different aspects of water quality that guidelines need to include.
- These include
 - Microbial,
 - Chemical,
 - Radiological
 - Acceptability

- Examples of WHO priority chemicals and their guideline value

Chemical	Guideline value (mg/litre)
Arsenic	0.01
Fluoride	1.5
Nitrate	50
Selenium	0.01

Following of WHO guidelines



	Arsenic	Fluoride	Nitrate	Selenium
WHO guideline	0.01 mg/l	1.5 mg/l	50 mg/l	0.04
Number of countries setting a guideline	102 (out of 104)	102 (out of 104)	104 (out of 104)	96 (out of 104)
Number of countries setting a guideline higher than WHO	22	8	2	2
Number of countries setting a guideline the same as WHO	79	77	69	1
Number of countries setting a guideline lower than WHO	1	17	33	93

Examples of standards

	Arsenic	Fluoride	Nitrate	Selenium
WHO guideline [1]	0.01 mg/l	1.5 mg/l	50 mg/l	0.01 mg/l
China standards [2]	0.01 mg/l	1.0 mg/l	20 mg/l	0.01 mg/l
Thailand standards [3]	0.05 mg/l	0.7 mg/l	45 mg/l	0.01 mg/l
Laos standards [4]	0.01 mg/l	1.5 mg/l	50 mg/l	0.01 mg/l
Malaysia standards [5]	0.01 mg/l	1.5 mg/l	10 mg/l	0.01 mg/l

[1] World Health Organization, 2011. *Guidelines for drinking-water quality, 4th edition*. World Health Organization

[2] China GB 5749-2006 Standards for drinking-water quality

[3] Thailand Notification of the Ministry of Industry, No. 322, B.E. 2521 (1978), issued under the Industrial Products Standards Act B.E. 2511 (1968)

[4] <http://www.wepa-db.net/policies/law/laos/standards.htm#pagetop>

[5] <http://extwprlegs1.fao.org/docs/pdf/mal189903.pdf>

SUMMARY

Guidelines are set by the WHO based on microbial and chemical aspects aimed to protect human health

Guidelines can be dependant on use (e.g., drinking or irrigation)

WHO provides an international framework which informs country-specific legislation

Guidelines and standards are under constant review and as research develops, so should guidelines and standards

LEARNING EXERCISE

- Look at the WHO guidelines and look at all of the different guideline parameters that exist.
- You will be able to see how many different parameters (e.g., chemicals) that are important to water quality, and how these all change in importance in relation to our health.
 - World Health Organization, 2011. *Guidelines for drinking-water quality, 4th edition*. World Health Organization. Available at https://www.who.int/water_sanitation_health/publications/dwq-guidelines-4/en/

REFERENCES & FURTHER RESOURCES

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Drinking Water Quality Standard in Thailand http://www.wepa-db.net/policies/law/thailand/std_drinking.htm

Drinking Water Quality Standard in Laos <http://www.wepa-db.net/policies/law/laos/standards.htm#pagetop>

Drinking water quality standard in Malaysia <http://extwprlegs1.fao.org/docs/pdf/mal189903.pdf>

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