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Understanding Water Quality Standards & Norms

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Water The Mother of Life



THIS DROP IS OUR LIFE



The life of our planet
The life of animals
The life of plants
No life without water

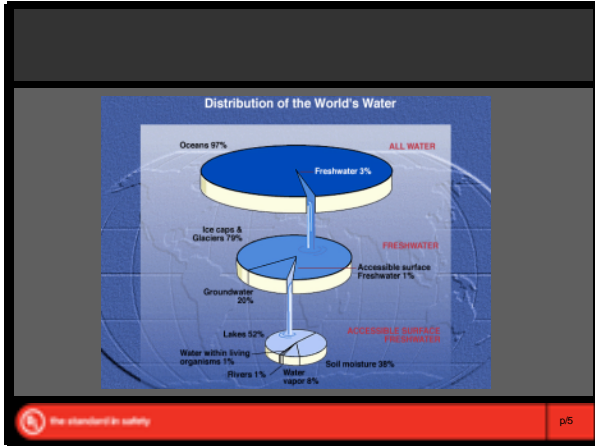
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Agenda



- Availability of fresh water
- Constituents in water
- Contamination of drinking water
- Evolution of drinking water standards/guidelines
- Evolution of water purifier standards
- Way forward for water standards in India

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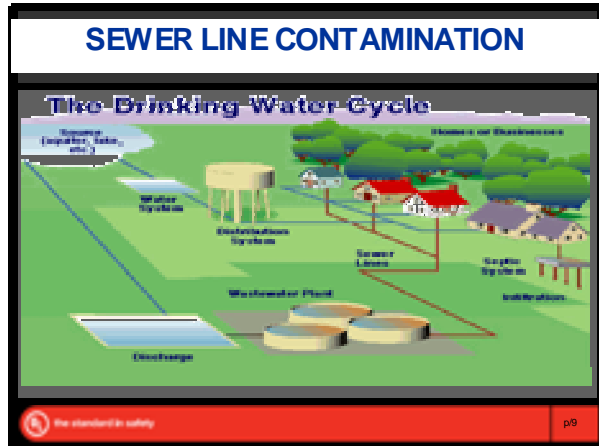
What is in the Water?

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What do we want to drink?

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- Water = Sustainable Human, Social, Economical Development

Safe water = Health & child survival

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Definition

Safe Drinking Water

- Source < 1 km from its place of use.
- 20 liters/ capita / day
- Meets WHO / National quality standards for microbial, chemical and physical characteristics

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How Standards Are Set

- EPA regulators develop Primary Standards for drinking water contaminants based on three criteria:
 - Adverse health effects
 - It is detectable in drinking water
 - It is known to occur in drinking water
- **Acceptable Daily Intake (ADI)**
- **Maximum Contaminant Level Goal (MCLG)**
- **Maximum Contaminant Level (MCL)**.

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International standards

- [..\..\..\Water Standards\Drinking water standards_Florida.pdf](#)
- [..\..\..\Water Standards\USEPA Standards.doc](#)
- [..\..\..\Water Standards\WHO VS EU.doc](#)

Indian Standard for drinking water IS:10500:1991

- [..\..\..\Water Standards\10500 standards.pdf](#)
- [..\..\..\Water Standards\BIS_10500_Draft.pdf](#)

Standards for Drinking water purifiers

Drinking Water Treatment Units

- Drinking water treatment units – aesthetic effects (non health) - NSF/ANSI 42
- Drinking water treatment units – health effects - NSF/ANSI 53
- UV microbiological water treatment systems - NSF/ANSI 55
- R.O drinking water treatment systems – - NSF/ANSI 58
- Residential Water softeners - NSF/ANSI 44
- Water treatment chemicals - NSF/ANSI 60
- Water treatment components - NSF/ANSI 61



US Water Standards: NSF/ANSI 42, 53, 55, 58

Drinking Water Treatment Units

- Carbon Filters
- Pitchers
- Under the sink filters
- Refrigerator filters
- Faucet-mounted filters
- Reverse osmosis
- UV systems
- Water Softeners



Products generally sold to

US Water Standards: NSF/ANSI 60

Drinking Water Treatment Chemicals

- Coagulation and Flocculation Chemicals
- Corrosion and Scale Control / pH adjustment
- Disinfection and Oxidation Chemicals
- Miscellaneous Treatment Applications
- Miscellaneous Water Supply Products



Products generally sold to public and private water utilities

US Water Standards: NSF/ANSI 61

Intended for use with Potable/Drinking Water

- Pipe & Related Products
- Barrier Materials
- Joining & Sealing Materials
- Process Media
- Mechanical Devices
- Mechanical Plumbing Devices



Examples of exempted & non-covered products

- Shower Heads & Bath Tub Fixtures
- Beverage Machines such as Coffee Makers and BW Dispensers
- Fire Hydrants

Evolution of Microbiological Standards for Drinking water purifiers

USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers

- Effort started in 1984 by USEPA and US Army Engineers
- 17 people participated
- Released in 1987, but modified slightly later
- Applied to many different types of devices including UV systems, Filtration Units, and Disinfection systems or Combinations as well as similar Devices

Guide Standard and Protocol (contd)

- **Three units tested simultaneously.**
- **Required performance against all three types of microbial contaminants, Bacteria, Virus, and Protozoan cysts**
- **Selected Organisms for testing were for Bacteria- *Klebsiella terrigena*, for virus - Poliovirus & Rotavirus, and for protozoa - *Giardia* cysts (Later changed to *Cryptosporidium*)**

Guide Standard & Protocol (Contd)

- **Minimum Log Reductions required:**
 - Bacteria 6 logs
 - Virus 4 logs
 - Protozoa 3 logs
- **Test Duration – 10 to 12 days with specific operating schemes**
- **Test water – General test water followed by a challenge water specific for each type of device**

Guide Standard & Protocol (Contd)

- **Challenge waters generally have the following:**
 - Total Organic Carbon > 10 mg/l
 - Turbidity > 30 NTU
 - Temperature ~ 4 deg C
 - TDS ~ 1500 ppm
- **Acceptance requires**
 - 90% of sample pairs must meet the log reductions
 - Other 10% must meet 5 log, 3 log and 2.5 log reductions for bacteria, virus, and cysts

Other Standards or Protocols

- NSF P231 simply adopted from EPA Guide
- NSF Std 55 has specific protocols for UV units/systems. Requires 40 mJ/sqcm for effective inactivation of viruses*. Requires the use of an UV sensor for indicating the need for bulb change or service.
- California Guidelines of 2004 – variation of the EPA Guide but altered for each technology by the DPH of California ahead of the testing.
 - For example for mechanical filtration 6 log reduction of E.Coli, 4 log of MS2 virus, and 3.3 log of cysts. No need for high turbidity water because of the plugging problems.

Standards in other Countries

- Israel
- Japan
- Mexico
- Australia/ New Zealand
- Brazil
- Venezuela

Australia & New Zealand

- Passed in 1995
- Adopted totally from USEPA Guide standard & Protocol
- Only international standard outside USA that has requirements for virus and cyst reduction.
- Thus the only standard that is meant for use in unsafe water supplies

ISRAEL

- Standard 1505 , Parts I & II
- For use in Safe Waters only
- No virus or cyst reduction requirements
- Four different bacteria are indicated for tests E.coli, E.aerogenes, P.aeruginosa, S. facalis
- All are required to be reduced by 7 logs in the tests
- Filter systems, UV units as well as RO units can be tested in this standard.

Mexico

- Only for use in safe waters
- No virus or cyst requirements
- 4 log reduction of E.coli and 1.3 log reduction of aerobic bacteria (HPC)
- Test itself is only 10 min long with 3 samples to be taken

Venezuela

- Passed in 1998
- E coli & P. aeruginosa reduction as per claims
- No cyst or virus reduction requirements
- For use in safe waters only
- Filtration systems, ozonation devices, and purifiers with ceramic elements are covered

India

- We do not have any microbiological standards for water purifier testing
- We have BIS standard for UV purifiers (IS 14724:1999)
- RO purifier standard and microbiological purifier standards are in the process of development by BIS