the standard in safety

Understanding Water Quality Standards & Norms

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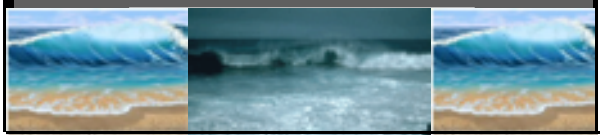
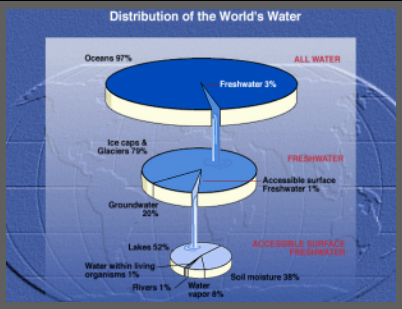
the standard in safety

Water
The Mother of Life



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



t is in the Water?

H_2O

What do we want to drink?

H_2O

WATER WATER EVERY WHERE…BUT!

SEWER LINE CONTAMINATION

Safe water = Health &
child survival

- **Water = Sustainable Human, Social , Economical Development**

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**

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).**

International standards

- ..\..\..\..\Water Standards\Drinking water standards_Florida.pdf
- ..\..\..\..\Water Standards\USEPA Standards.doc
- ..\..\..\..\Water Standards\WHO VS EU.doc

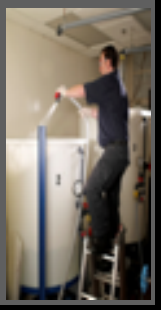
Indian Standard for drinking water IS:10500:1991

- ..\..\..\..\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/ASI 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

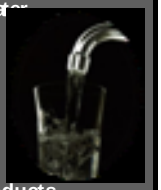
- Coagulation and Flocculation Chemicals
- Corrosion and Scale Control / pH adjustment
- Disinfection and Oxidation Chemicals
- Miscellaneous Treatment Applications
- Miscellaneous Water Supply Products

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.aerugenosa, 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
- Fitration 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