12: Water Regulation and Treatment

Ch 8: 238-245

- Regulation
  - Clean Water Act
  - Safe Drinking Water Act
  - Sources
- Treatment
  - Disinfection with chlorine
  - Wastewater Treatment

Announcements

- Exam 2 a week from Wednesday (Mar. 16)
- Lab 6 on Tuesday: Heavy Metals in Water
  - Bring in water samples?
- Lab 5 report due Monday
- Hard copies? Notebook duplicates?

Cuyahoga River Fires

Fire on June 22, 1969 prompted Legislative action

Nov. 3, 1952.

Previous Fires in 1868, 1883, 1887, 1912, 1922, 1936, 1941, 1948, and 1952

http://www.ohiohistorycentral.org

Clean Water Act Priority Pollutants

Acenaphthene
Acenaphthylene
Acrolein
Acrylonitrile
Aldrin
Alpha-endosulfan
Alpha-lindane
Anthracene
Antimony
Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Arsenic
Asbestos (friable)
Benz(a)anthracene
Benzene
Benzidine
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Benzyl butyl phthalate
Beryllium
Beta-endosulfan
Beta-lindane
Bis(2-chloro-1-methylethyl) ether
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl) ether
Bis(2-chloroisopropyl) ether
Bis(2-ethylhexyl)phthalate
Bis(chloromethyl) ether
4-bromophenyl phenyl ether
Cadmium
Camphechlor
Carbon tetrachloride
4-chlor-m-cresol
Chlordane
Chlorobenzene
Chlorodibromomethane
Chloroethane
2-chloroethyl vinyl ether
Chloroform
Chloromethane
2-chloronaphthalene
2-chlorophenol
4-chlorophenyl phenyl ether
Chromium
Chrysene
Copper
Cyanide
Ddd
Dde
Ddt
Delta-lindane
Di-n-octyl phthalate
Di-n-propylnitrosamine
Dibenz(a,h)anthracene
1,2-dibromoethane
Dibutyl phthalate
1,4-dichlorobenzene
1,2-dichlorobenzene
1,3-dichlorobenzene
3,3'-dichlorobenzidine
Dichlorobromomethane
1,2-dichloroethane
1,1-dichloroethane
1,1-dichloroethylene
Dichloromethane
2,4-dichlorophenol
1,2-dichloropropane
1,3-dichloropropene (mixed isomers)
Dieldrin
Diethyl phthalate
Dimethyl phthalate
2,4-dimethylphenol
4,6-dinitro-o-cresol
2,4-dinitrophenol
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
Endosulfan sulfate
Endrin
Endrin aldehyde
Ethylbenzene
Fluoranthene
Fluorene
Gamma-lindane
Heptachlor
Heptachlor epoxide
Hexachloro-1,3-butadiene
Hexachlorobenzene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
Lead
Mercury
Methanamine, n-methyl-n-nitroso
Methyl bromide
N-nitrosodiphenylamine
Naphthalene
Nickel
Nitrobenzene
4-nitrophenol
2-nitrophenol
Pentachlorophenol
Phenanthrene
Phenol
Pyrene
Selenium
Silver
2,3,7,8-tetrachlorodibenzo-p-dioxin (tcdd)
1,1,2,2-tetrachloroethane
Tetrachloroethylene
2,3,4,6-tetrachlorophenol
Thallium
Toluene
1,2-trans-dichloroethylene
Tribromomethane
1,2,4-trichlorobenzene
1,1,2-trichloroethane
1,1,1-trichloroethane
Trichloroethylene
2,4,6-trichlorophenol
Vinyl chloride
Zinc

SWDA Maximum Contamination Levels

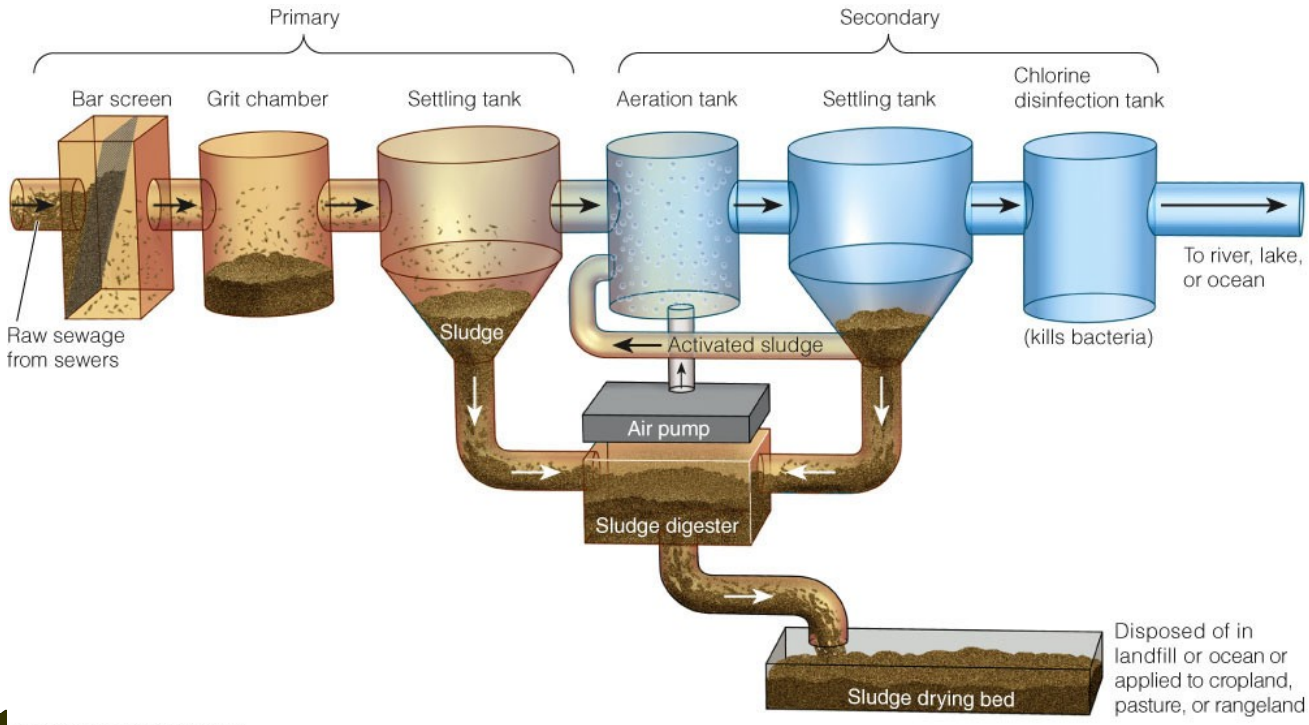
Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects from Exposure Above the MCL	Sources of Contaminant in Drinking Water
Cryptosporidium	zero	TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste
Giardia lamblia	zero	TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste
Heterotrophic plate count	n/a	TT	No health effects; HPC is an analytic method to measure the variety of bacteria that are common in water.	HPC measures a range of bacteria that are naturally present in the environment
Legionella	zero	TT	Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems
Total Coliforms (including fecal coliform and E. Coli)	zero	5.00%	Not a health threat. Used to indicate presence of potentially harmful bacteria	Naturally present, but fecal coliforms and *E. coli* only come from human and animal fecal waste.
Turbidity	n/a	TT	Turbidity is a measure of the cloudiness of watan indicator of water quality and filtration effectiveness	Soil runoff
Viruses (enteric)	zero	TT	Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste

MCL: Maximum Contaminant Level TT: Treatment Technique
MCLG: Maximum Contaminant Level Goal

SWDA Maximum Contamination Levels

Contaminant	MCLG (mg/L)	MCL or TT (mg/L)	Potential Health Effects from Exposure Above the MCL	Sources of Contaminant in Drinking Water
Antimony	0.006	0.006	Increase in blood cholesterol; decrease in blood sugar	Petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic	07	0.01	Skin damage; Increased risk of cancer	Natural erosion; glass & electronics production wastes
Asbestos (fiber >10 micrometers)	7 mill fibers per liter	7 MFL	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits
Barium	2	2	Increase in blood pressure	Drilling wastes; metal refineries; erosion of natural deposits
Beryllium	0.004	0.004	Intestinal lesions	Metal refineries; coal-burning; various industries
Cadmium	0.005	0.005	Kidney damage	Galvanized pipes; natural erosion; metal refineries; batteries and paints
Chromium (total)	0.1	0.1	Allergic dermatitis	Steel and pulp mills; erosion of natural deposits
Copper	1.3	TT8; 1.3	Gastrointestinal distress, Liver or kidney damage	Corrosion of household plumbing systems; natural erosion
Cyanide (as free cyanide)	0.2	0.2	Nerve damage or thyroid problems	steel/metal, plastic, fertilizer factories
Fluoride	4.0	4.0	Bone disease (pain and tenderness of the bones); Children may get mottled teeth	Water additives; natural erosion; fertilizer and aluminum factories
Lead	zero	TT8; 0.015	Delays in physical or mental development; Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits
Mercury (inorganic)	0.002	0.002	Kidney damage	Natural erosion; refineries, factories, landfills and croplands
Nitrate (measured as Nitrogen)	10	10	Infants below six months: shortness of breath and blue-baby syndrome, death	Fertilizer use; leaching from septic tanks, sewage; natural erosion
Nitrite (measured as Nitrogen)	1	1	Infants below six months: shortness of breath and blue-baby syndrome, death	Runoff from fertilizer use; leaching from septic tanks, sewage; natural
Selenium	0.05	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Petroleum refineries; natural erosion; discharge from mines
Thallium	0.0005	0.002	Hair loss; changes in blood; kidney, intestine, or liver problems	Discharge from electronics, glass, and drug factories

Sewage Treatment



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