

Analyte Reference Guide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Acrylamide	zero	TT8	0.0005 mg/L	Nervous system or blood problems. Probable cause of cancer	Added to water during Sewage / wastewater increased risk of cancer treatment	Limit use in water treatment plants
OC	Alachlor	zero	0.002	0.02	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops such as corn, soybeans, sugar cane and wheat	Granular activated carbon
OC	Aldicarb		0.003	0.01 mg/L	Immune system effects, neurological syndromes.	Frequently found contaminant esp. in sandy soil	Granular activated carbon
OC	Aldicarb Sulfone		0.003		Immune system effects, neurological syndromes.	Frequently found contaminant esp. in sandy soil	Granular activated carbon
OC	Aldicarb Sulfoxide		0.004		Immune system effects, neurological syndromes.	Frequently found contaminant esp. in sandy soil	Granular activated carbon
R	Alpha particles	zero	15 picocuries per Liter (pCi/L)		Affects skeletal tissue, bone sarcomas, head sarcomas; probable cause of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	Ion Exchange or Reverse Osmosis
IOC	Aluminum		0.2 ⁹	0.2	Implicated in neurodegenerative disease.	Naturally occurring as a consequence of leaching from soil and rock. Aluminum salts used as coagulants in water treatment.	Reverse Osmosis or Distillation
IOC	Antimony	0.006	0.006	0.02	Increase in blood cholesterol; decrease in blood sugar. Carcinogen. Irritation to eyes & skin tissue.	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder, iron & steel mfg as a hardening alloy and textile mills. Trace contaminant from leaching of certain types of carbon.	Reverse Osmosis or Distillation
IOC	Arsenic	0	0.010	0.010	Malignant tumors of skin and lungs. May cause problems with the nervous system.	Erosion of natural deposits; runoff from orchards, runoff from glass, electronics production waste, wood treatment compounds, pharmaceutical manufacturing, and paint & ink formulation.	Reverse Osmosis, Distillation, activated Alumina, other absorptive media
IOC	Asbestos (fibers >10 micrometers)	7 MFL	7 million fibers per Liter (MFL)		Increased risk of developing benign intestinal polyps	Cement pipe, fireproofing materials, insulation; erosion of natural mineral deposits	Micron Filters



Disinfectant



Inorganic Chemical



Organic Chemical



Disinfection Byproduct



Microorganism



Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Atrazine	0.003	0.003	0.1	Affects reproductive system, liver, heart & kidneys; probably cause of cancer	Runoff from herbicide used on row crops such as corn, soybeans, sugar cane and wheat	Granular Activated Carbon
IOC	Barium	2	2	0.7	Increase in blood pressure; affects nervous & circulatory systems	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	Ion Exchange, Reverse Osmosis, Distillation
OC	Benzene	zero	0.005	0.01	Anemia; decrease in blood platelets; Leukemia	Used as a solvent in mfg pharmaceuticals, plastics, pesticides & paints; leaching from gas storage tanks and landfills. Environmental exposure during transportation or in storage; sometimes present in sources which are naturally carbonated	Granular Activated Carbon and/or Aeration
OC	Benzo(a)pyrene (PAHs)	zero	0.0002	0.0007	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	Granular Activated Carbon
IOC	Beryllium	0.004	0.004		Intestinal lesions; effects skin and lung tissues; carcinogen	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries	Reverse Osmosis, Distillation
R	Beta particles and photon emitters	zero	4 millirems per year		Affects skeletal tissue, bone sarcomas, head sarcomas; probable cause of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	Ion Exchange, Carbon Filtration
DBP	Bromate	zero	0.010	0.01	Increased risk of cancer	Byproduct of drinking water disinfection using ozonation.	Control use of Ozone in water treatment
IOC	Cadmium	0.005	0.005	0.003	Kidney disorders, bronchitis, anemia	Used in textile mills and timber product processing; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	Reverse Osmosis or Distillation
OC	Carbofuran	0.04	0.04	0.007	Affects nervous & reproductive systems, liver & kidneys. Caused leukemia & anemia; probable cause of cancer	Leaching of soil fumigant used on rice, alfalfa, corn, potatoes & cotton	Granular Activated Carbon
OC	Carbon Tetrachloride	zero	0.005	0.004	Affects nervous system; liver problems; increased risk of cancer	Used as a cleaning agent & in mfg of refrigerants, fumigants, propellants, resins, paint & ink formulation. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
D	Chloramines (as Cl₂)	MRDLG=4 ₁	MRDL=4.0 ₁		Eye/nose irritation; stomach discomfort, anemia	Water additive used to control Microbes	Carbon Filtration and Reverse Osmosis
OC	Chlordane	zero	0.002	0.0002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	Granular Activated Carbon

D

Disinfectant

IOC

Inorganic Chemical

OC

Organic Chemical

DBP

Disinfection Byproduct

M

Microorganism

R

Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
IOC	Chloride		250 ⁹		Unknown for Chloride alone. Effect depends on the cation present.	Widely distributed in nature as salts of sodium (NaCl), Potassium (KCl) and Calcium (CaCl ₂) Leached from rocks into soil and water by weathering. Urban run-off containing de-icing salts	Reverse Osmosis or Distillation
D	Chlorine (as Cl₂)	MRDLG=4 ₁	MRDL=4.0 ¹		Eye/nose irritation; stomach discomfort	Water additive used to control microbes. Carbon breakthrough of disinfectant used by municipal sources.	Granular Activated Carbon
D	Chlorine Dioxide (as ClO₂)	MRDLG=0.8 ¹	MRDL=0.8 ¹		Anemia; infants & young children: nervous system effects	Water additive used to control microbes. Carbon breakthrough of disinfectant used by municipal sources.	Granular Activated Carbon
DBP	Chlorite	0.8	1.0	0.7	Anemia; infants & young children: nervous system effects	Byproduct of drinking water disinfection. By-product from chlorine dioxide treatment.	Granular Activated Carbon
OC	Chlorobenzene	0.1	0.1		Liver or kidney problems	Discharge from chemical and Agricultural chemical factories. Environmental exposure either in plant, during transportation or in storage;	Granular Activated Carbon
IOC	Chromium (total)	0.1	0.1	0.05 mg/L	Liver & kidney disorders; affects skin & digestive system	Discharge from steel and pulp mills; erosion of natural deposits; used in leather & tanning & iron & steel mfg.	Reverse Osmosis or Distillation
IOC	Copper	1.3	TT ⁷ ; Action Level = 1.3	2.0 mg/L	Short term exposure: Gastrointestinal distress. Long term exposure: Liver or kidney damage. People with Wilson's Disease should consult their personal doctor if the amount of copper in their water exceeds the action level	Corrosion of household plumbing systems; erosion of natural deposits. Trace contaminant from contact with copper plumbing and or brass fittings or other components.	Control Corrosion by chemical feed to adjust pH levels. Reverse Osmosis and Distillation
M	Cryptosporidium	zero	TT ³		Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	Ultrafiltration, Ultraviolet Light, Ozonation
IOC	Cyanide (as free cyanide)	0.2	0.2	0.07	Nerve system; endocrine system; thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories; leather tanning & finishing	Granular Activated Carbon plus Packed Tower Aeration
OC	2,4-D	0.07	0.07	0.03	Kidney, liver, or adrenal gland problems	Runoff from herbicide used on row crops such as corn, soybeans, sugar cane, and wheat.	Granular Activated Carbon
OC	Dalapon	0.2	0.2		Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Runoff from herbicide used on Row crops such as corn, soybeans, sugar cane, and wheat.	Granular Activated Carbon
OC	1,2-Dibromo-3-chloropropane (DBCP)	zero	0.0002	0.001	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards. Discontinued in 1977	Granular Activated Carbon and/or Aeration



Disinfectant



Inorganic Chemical



Organic Chemical



Disinfection Byproduct



Microorganism



Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	o-Dichlorobenzene	0.6	0.6	1.0	Liver, kidney, lungs; circulatory system problems	Discharge from industrial chemical factories; mfg of fumigants, insecticides, waxes, resins, rubber & asphalt. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	p-Dichlorobenzene	0.075	0.075	0.3	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories; used in moth repellent, germicides, pesticides and soil fumigants. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	1,2-Dichloroethane	zero	0.005	0.030	Increased risk of cancer; damage to kidneys & liver	Discharge from industrial chemical factories; mfg. of gasoline, paint, varnish, metal degreasing and insecticide fumigants. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	1,1-Dichloroethylene	0.007	0.007	0.03	Liver & kidney problems	Discharge from industrial chemical factories; mfg. of dyes, plastics, perfumes, paints and adhesives. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	cis-1,2-Dichloroethylene	0.07	0.07	0.05	Affects liver & nervous circulatory problems	Discharge from industrial chemical factories; used as an industrial solvent in mfg. of dyes, perfumes and lacquers. Environmental exposure either in plant, during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	trans-1,2-Dichloroethylene	0.1	0.1	0.05	Affects liver nervous circulatory problems	Discharge from industrial chemical factories; used as an industrial solvent in mfg. of dyes, perfumes, lacquers and rubber. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	Dichloromethane	zero	0.005	0.02	Liver problems; increased risk of cancer	Discharge from drug & chemical factories; photographic film, textile and leather coatings, foam products, paint removers, solvent degreasing aerosol sprays, fumigants, and plastic mfg. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	1,2-Dichloropropane	zero	0.005	0.04	Affects lungs, liver & kidneys	Discharge from industrial chemical factories, insecticidal fumigants, dry cleaning fluids, and mfg. of waxes and petroleum products. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration

D

Disinfectant

IOC

Inorganic Chemical

OC

Organic Chemical

DBP

Disinfection Byproduct

M

Microorganism

R

Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Di(2-ethylhexyl) adipate	0.4	0.4	0.08	Weight loss, live problems, or possible reproductive difficulties; probable cause of cancer	Discharge from chemical factories; used in plasticizer and polymer production and lubricants	Granular Activated Carbon
OC	Di(2-ethylhexyl) phthalate	zero	0.006	0.008	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories; plasticizer in resins and elastomers.	Granular Activated Carbon
OC	Dinoseb	0.007	0.007		Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	Granular Activated Carbon
OC	Dioxin (2,3,7,8-TCDD)	zero	0.00000003		Reproductive difficulties; mutagen; carcinogen	Emissions from waste incineration and other combustion; discharge from chemical factories	Granular Activated Carbon
OC	Diquat	0.02	0.02	0.01	Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Runoff from herbicide used on corn, soybeans, sugar cane and wheat.	Granular Activated Carbon
OC	Endothall	0.1	0.1		Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Runoff from herbicide used for corn, soybeans, sugar cane and wheat.	Granular Activated Carbon
OC	Endrin	0.002	0.002	0.0006	Affects nervous & reproductive systems, liver & kidneys; probable cause of cancer	Residue of banned insecticide for cotton, corn, potatoes & alfalfa	Granular Activated Carbon
OC	Epichlorohydrin	zero	TT ⁸	0.0004	Increased cancer risk; and over a long period of time, stomach problems; affects liver, kidney & lungs	Discharge from industrial chemical factories; epoxy resins and coatings; an impurity of some water treatment chemicals	Control levels used in water treatment
OC	Ethylbenzene	0.7	0.7	0.3	Affects nervous system, liver & kidneys	Discharge from petroleum Refineries; mfg of insecticides, asphalt, gasoline, and insecticides. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	Ethylene dibromide	zero	0.00005	0.0004	Problems with liver, stomach, reproductive system, or kidneys; increased risk of cancer	Discharge from petroleum refineries; used as gasoline additive and soil fumigant. Environmental exposure during transportation or in storage	Granular Activated Carbon
IOC	Fluoride	4.0	4.0	1.5 mg/L	Bone disease (pain and tenderness of the bones); Children may get mottled teeth	Water additive which promotes strong teeth; erosion of natural deposits; discharge from fertilizer and aluminum factories	Distillation, Reverses Osmosis, Activated Alumina and Bone Char Carbon Filtration.
M	Giardia lamblia	zero	TT3		Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	Ultrafiltration, Ultraviolet Light, Ozonation
OC	Glyphosate	0.7	0.7	0.9	Affects nervous & reproductive systems, heart, liver & kidneys; probable cause of cancer	Runoff from herbicide used for corn, soybeans, sugar cane and wheat.	Granular Activated Carbon
DBP	Haloacetic acids (HAA5)	n/a ⁶	0.060		Increased risk of cancer	Byproduct of drinking water disinfection (chlorine). Carbon breakthrough of disinfection by-product from chlorination	Granular Activated Carbon, Reverse Osmosis

D

Disinfectant

IOC

Inorganic Chemical

OC

Organic Chemical

DBP

Disinfection Byproduct

M

Microorganism

R

Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Heptachlor	zero	0.0004	.00003 mg/L	Affects nervous & reproductive systems, liver & kidneys; probable cause of cancer	Residue of banned insecticides for corn, potatoes, cotton & alfalfa	Granular Activated Carbon
OC	Heptachlor epoxide	zero	0.0002	0.00003	Affects nervous & reproductive systems, liver & kidneys; probable cause of cancer	Insecticides for cotton, potatoes, corn and alfalfa and as a fumigant. Heptachlor epoxide converts to epoxide by soil & water organisms	Granular Activated Carbon
M	Heterotrophic plate count (HPC)	n/a	TT ³		HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment	Chlorination, Ozonation or Ultraviolet Light
OC	Hexachlorobenzene	zero	0.001	0.001	Liver or kidney problems; digestive system; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories; fungicide and wood preservative.	Granular Activated Carbon
OC	Hexachloro-cyclopentadiene	0.05	0.05		Lungs and digestive problems; skin irritant	Pesticides, fungicides, dyes & resins	Granular Activated Carbon
IOC	Iron		0.3 ⁹	0.3	Toxic doses yield: depression, rapid and shallow respiration, respiratory failure and cardiac arrest.	Naturally occurring. Igneous and sandstone rocks. High concentrations noted where iron salts are used in water treatment and where cast iron, galvanized steel and iron pipes distribute water	Ion Exchange, Oxidation and Filtration, or Distillation
IOC	Lead	zero	TT ⁷ ; Action Level = 0.015	0.01	Infants and children: Delays in physical or mental development; children could show slight deficits in attention span and learning abilities; Adults: Kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits; used in explosives mfg, textile mills, paint & ink formation, rubber processing	Control Corrosion by chemical feed to adjust pH levels. Reverse Osmosis and Distillation
M	Legionella	zero	TT ³		Legionnaire's Disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	Chlorination, Ultraviolet Light or Ozonation
OC	Lindane	0.0002	0.0002	0.002	Affects nervous & reproductive systems, liver & kidneys; probable cause of cancer	Runoff from insecticide used on cattle, lumber, gardens, corn, cotton & alfalfa	Granular Activated Carbon
IOC	Manganese		0.05 ⁹	0.4	Neurological effects, infertility, muscle pain, decreased emotion and change in activity level.	Naturally occurring. metamorphic and sedimentary rocks. Industrial pollution from the manufacture of steel, iron and other alloys.	Ion exchange, oxidation and filtration, distillation
IOC	Mercury (inorganic)	0.002	0.002	0.006	Affects kidneys and nervous system	Erosion of natural deposits; discharge from refineries and factories; used in timber product & rubber processing	Reverse Osmosis and Distillation
OC	Methoxychlor	0.04	0.04	0.02 mg/L	Affects nervous & reproductive systems, liver & kidneys; probable cause of cancer	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	Granular Activated Carbon



Disinfectant



Inorganic Chemical



Organic Chemical



Disinfection Byproduct



Microorganism



Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Methyl Ethyl Keytone (MEK)				Can result in acetone like odor when present at extremely high levels. Not classifiable for carcinogenicity according to EPA due to lack of available data.	a solvent in processes involving gums, resins, cellulose acetate, and cellulose nitrate; used in synthetic rubber industry, production of paraffin wax and household products such as lacquer, varnishes, paint removers, and glues.	Granular Activated Carbon
OC	Methyl tertiary butyl ether (MTBE)				**Currently being evaluated by EPA**	Fuel oxygenate added to gasoline; leaking storage tanks, pipelines and emissions	Granular Activated Carbon
OC	Monochlorobenzene		0.1	0.3	Affects nervous and reproductive systems. Affects liver, kidney, spleen and bone marrow. Headaches, dizziness and sleepiness	Runoff of pesticides, degreasing agents, and an intermediate of other halogenated organic compounds.	Granular Activated Carbon
OC	Naphthalene					Moth repellent; carbamate insecticide; production of phthalic anhydride; surface active agents, resins, as a dye intermediate, and as a synthetic tanning agent	Granular Activated Carbon
IOC	Nitrate (measured as Nitrogen)	10	10	50 mg/L	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	Distillation, Reverse Osmosis and Ion exchange with nitrate selective resin
IOC	Nitrite (measured as Nitrogen)	1	1	3 mg/L	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	Distillation, Reverse Osmosis and Ion exchange with nitrate selective resin
IOC	Total Nitrate+Nitrite		10		Na – See above	Na – See above	Distillation, Reverse Osmosis and Ion exchange with nitrate selective resin
OC	Oxamyl (Vydate)	0.2	0.2		Affects nervous & reproductive systems, heart, liver & kidneys; probable cause of cancer	Runoff from insecticide used on apples, potatoes, and tomatoes; also used as a wood preservative	Granular Activated Carbon
OC	Pentachlorophenol	zero	0.001	0.009 mg/L	Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Principally used as a wood preservative; used as a fungicide, insecticide. Once common now restricted pesticide no longer generally available to the public.	Granular Activated Carbon
OC	Picloram	0.5	0.5		Affects nervous & reproductive systems, heart, liver & kidneys; probable cause of cancer	Herbicide runoff from use on corn, soybeans, sugar cane and wheat	Granular Activated Carbon



Disinfectant



Inorganic Chemical



Organic Chemical



Disinfection Byproduct



Microorganism



Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
OC	Polychlorinated biphenyls (PCBs)	zero	0.0005		Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals; used in electrical transformers	Granular Activated Carbon
R	Radium 226 and Radium 228	zero	5 pCi/L		Affects skeletal tissue, bone sarcomas, head sarcomas; probable cause of cancer	Erosion of natural deposits & radioactive waste	Ion Exchange
IOC	Selenium	0.05	0.05	0.04	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; discharge from mines; found as a trace element in feeds. Used in textile mills, timber processing, porcelain enameling, pharmaceutical mfg. and foundries.	Reverse Osmosis or distillation
IOC	Silver		0.1 ⁹	0.1	Increased pigmentation or silver coloration of the eyes and skin.	Occurs in soil as immobile chloride or sulfide. Sulfide oxidized to sulfate becomes an aquatic contaminant.	Reverse Osmosis or distillation
OC	Simazine	0.004	0.004	0.002 mg/L	Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Herbicide runoff from use on corn, soybeans, sugar cane and wheat.	Granular Activated Carbon
OC	Styrene	0.1	0.1	0.02 mg/L	Liver, kidney & nervous system problems	Leaching from landfills; used in mfg of plastics, resins and foams. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
OC	1,1,2,2-Tetrachloroethane					Commercial production has been stopped in the U.S. Previously was manufactured as a solvent, to clean and degrease metals, in paints, and pesticides.	Granular Activated Carbon
OC	Tetrachloroethylene (aka PCE)	zero	0.005	0.04	Affects nervous system; increased risk of cancer	Discharge dry cleaners and textile processing; used as degreasing agent for metals, in mfg of rubber coatings, waxes, paints, adhesives, glues, sealants, polishes, and inks. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
IOC	Thallium	0.0005	0.002		Hair loss; changes in blood; kidney, intestine, or liver problems	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories; pesticides	Activated Alumina, Ion Exchange, Reverse Osmosis, or Distillation
OC	Toluene	1	1	0.7 mg/L	Affects nervous system, kidney, & liver; Irritant to respiratory system	Discharge from petroleum factories; used in gasoline, paints, thinners, lacquers and adhesives. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration

D

Disinfectant

IOC

Inorganic Chemical

OC

Organic Chemical

DBP

Disinfection Byproduct

M

Microorganism

R

Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
M	Total Coliform (including fecal coliform and <i>E. coli</i>)	zero	5.0% ⁴		Affect digestive tract; it is used to indicate whether potentially harmful bacteria may be present	Coliforms are naturally present in the environment as well as feces; fecal coliforms and <i>E. coli</i> only come from human and animal fecal waste.	Chlorination, Ozonation or Ultraviolet Light
DBP	Total Trihalomethanes (TTHMs)	n/a ⁶	0.080	1.0	Affects liver, kidney & central nervous system; increased risk of cancer	Byproduct of drinking water disinfection (chlorine). Carbon breakthrough of disinfectant by-product from chlorination	Granular Activated Carbon
OC	Toxaphene	zero	0.003		Kidney, liver & thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle.	Granular Activated Carbon
OC	2,4,5-TP (Silvex)	0.05	0.05		Affects nervous & reproductive systems, liver, heart & kidneys; probable cause of cancer	Residue of banned herbicide; also used as a wood preservative	Granular Activated Carbon
OC	1,2,4-Trichlorobenzene	0.07	0.07		Digestive system & lungs	Discharge from textile finishing Factories; insecticides, lubricants, and transformer liquid. Environmental exposure during transportation or in storage	Granular Activated Carbon
OC	1,1,1-Trichloroethane	0.20	0.2	2.0	Liver, nervous system, or circulatory problems	Discharge from metal degreasing sites and other factories and used in mfg. of pesticides, plastics and metals. Environmental exposure during transportation or in storage	Granular Activated Carbon
OC	1,1,2-Trichloroethane	0.003	0.005		Liver, kidney, or immune system problems	Discharge from industrial chemical factories & solvent used in oils, fats, waxes, resins, and rubber processing. Environmental exposure during transportation or in storage	Granular Activated Carbon
OC	Trichloroethylene	zero	0.005	0.02	Irritant of body tissue. Affects nervous system; increased risk of cancer	Discharge from metal degreasing sites and other factories; used in dry cleaning, as a degreasing agent, and in mfg. of rubber, paints, adhesives and resins, oils, and fumigants. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
R	Tritium	Gross Beta > 8pCi/L	NA				Ion Exchange
M	Turbidity	n/a	TT ³		Interferes with disinfection; these organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.	Erosion, runoff and discharges. It is a measure of the cloudiness of water; used to indicate water quality & filtration effectiveness (whether disease-causing organisms are present). Higher levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites & some bacteria	Reverse Osmosis, Distillation or cartridge filtration

D

Disinfectant

IOC

Inorganic Chemical

OC

Organic Chemical

DBP

Disinfection Byproduct

M

Microorganism

R

Radionuclide

Legend	Contaminant	Public Health Goal	EPA MCL (mg/L)	World Health Organization (mg/L)	Potential Health effects from exposure above the MCL	Common sources of contaminate in drinking water	Recommended Treatment Technologies
R-	Uranium	zero	30 ug/L as of 12/08/03	0.03	Affects skeletal tissue, bone sarcomas, head sarcomas; probable cause of cancer	Erosion of natural deposits & radioactive waste	Ion Exchange
OC	Vinyl chloride	zero	0.002	0.0003	Increased risk of cancer; affects nervous system	Leaching from PVC pipes; discharge from plastic factories	Granular Activated Carbon and/or Aeration
M	Viruses (enteric)	zero	TT ³		Gastrointestinal illness (e.g., diarrhea, vomiting, cramps)	Human and animal fecal waste	Chlorination, Ozonation or Ultraviolet Light, Nanofiltration
OC	Xylenes (total)	10	10	0.5	Affects nervous system, kidneys, lungs, liver & mucous membranes	Discharge from petroleum factories; discharge from chemical factories. Environmental exposure during transportation or in storage	Granular Activated Carbon and/or Aeration
IOC	Zinc		5 ⁹	5.0	Affects prostate, bone, muscle, and liver	Occurs in all igneous rocks. Leaching from piping and fittings.	Reverse Osmosis or Distillation

NOTES

¹ Definitions

- **Food and Drug Administration Standard of Quality (FDA SOQ)**— The highest level of a contaminant that is allowed in bottled water as established by the Food and Drug Administration.
- **International Bottled Water Association Standard of Quality (IBWA SOQ)**—The highest level of a contaminant in that is allowed in bottled water as established by the IBWA Model Code.
- **FDA SOQ**— The highest level of a contaminant that is allowed in bottled water as established by the Food and Drug Administration.
- **Maximum Contaminant Level Goal (MCLG)**—The level of a contaminant in drinking water as established by the EPA below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.
- **Maximum Contaminant Level (MCL)**—The highest level of a contaminant that is allowed in drinking water as established by the EPA. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- **Maximum Residual Disinfectant Level Goal (MRDLG)**—The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **Maximum Residual Disinfectant Level (MRDL)**—The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **Treatment Technique (TT)**—A required process intended to reduce the level of a contaminant in drinking water.

² Units are in milligrams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).

³ EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water, and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:

- *Cryptosporidium* (as of 1/1/02 for systems serving >10,000 and 1/14/05 for systems serving <10,000) 99% removal.
- *Giardia lamblia*: 99.9% removal/inactivation
- Viruses: 99.99% removal/inactivation
- *Legionella*: No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated, *Legionella* will also be controlled.



Disinfectant



Inorganic Chemical



Organic Chemical



Disinfection Byproduct



Microorganism



Radionuclide

- Turbidity: At no time can turbidity (cloudiness of water) go above 5 nephelometric turbidity units (NTU); systems that filter must ensure that the turbidity go no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples in any month. As of January 1, 2002, for systems servicing >10,000, and January 14, 2005, for systems servicing <10,000, turbidity may never exceed 1 NTU, and must not exceed 0.3 NTU in 95% of daily samples in any month.
- HPC: No more than 500 bacterial colonies per milliliter
- Long Term 1 Enhanced Surface Water Treatment (Effective Date: January 14, 2005); Surface water systems or (GWUDI) systems serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (e.g. turbidity standards, individual filter monitoring, *Cryptosporidium* removal requirements, updated watershed control requirements for unfiltered systems).
- Filter Backwash Recycling: The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.

⁴ No more than 5.0% samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or *E. coli* if two consecutive TC-positive samples, and one is also positive for *E. coli* fecal coliforms, system has an acute MCL violation.

⁵ Fecal coliform and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems.

⁶ Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants:

- Haloacetic acids: dichloroacetic acid (zero); trichloroacetic acid (0.3 mg/L)
- Trihalomethanes: bromodichloromethane (zero); bromoform (zero); dibromochloromethane (0.06 mg/L)

⁷ Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.

⁸ Each water system must certify, in writing, to the state (using third-party or manufacturers certification) that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide = 0.05% dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01 % dosed at 20 mg/L (or equivalent).

⁹ Secondary Maximum contaminant level.. SMCL's are guidelines established by the USEPA for use in evaluating aesthetic, non-health-related properties in water. SMCL's are not enforceable.

REFERENCES:

This guide was adapted from the EPA's Analyte Reference Guide



Disinfectant



Inorganic Chemical



Organic Chemical



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Radionuclide