

FACT SHEET: DRINKING WATER STANDARDS, TYPICAL CONSTITUENT/ CONTAMINANT SOURCES, AND POSSIBLE HEALTH EFFECTS

The U.S. Environmental Protection Agency and the California Department of Public Health (CDPH) prescribe regulations that limit the amount of certain constituents/contaminants or pollutants in drinking water provided by public water systems. Privately-owned domestic drinking water wells are not required to adhere to these standards. There are no statewide drinking water program standards for water served from private domestic water wells. However, in order to provide some context for private domestic well drinking water quality, this fact sheet includes information about drinking water standards for public supply, derived from the CDPH - Drinking Water Program.

The drinking water standards for public supply are as follows.

Maximum Contaminant Level (MCL): MCL's are the highest level of a contaminant that is allowed in public drinking water supplies. The MCL is typically reported in milligrams per liter (mg/L) or micrograms per liter (µg/L) unless otherwise noted.

- **Primary MCL:** set to protect the health of the public.
- **Secondary MCL (SMCL):** set to protect the odor, taste, and appearance of drinking water. Constituents/chemicals with SMCLs do not affect health at the established SMCL level.

Notification Level (NL): NL's are health-based advisory levels established for chemicals in drinking water that lack MCLs. The NL is typically reported in micrograms per liter (µg/L).

The table below lists constituents with primary MCL's, followed by secondary MCL's, aesthetic standards that have no MCLs, and then NL's. If a water quality analysis of water from a private domestic drinking water well exceeds a primary MCL, it is recommended that the well owner have the well re-tested to confirm results, and if the re-test confirms an MCL exceedence, determine protective actions based on information provided by the local health agency.

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
MICROBIALS			
Total Coliform Bacteria (including fecal coliform and <i>E. coli</i>)	Sample that has total coliform must be analyzed for either <i>E. coli</i> or fecal coliforms to determine whether human or animal fecal matter is present	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other potentially-harmful bacteria may be present; fecal coliforms and <i>E. coli</i> come from human and animal fecal waste: septic tank; leaking sewage line; residual from some surface water treatment processes	Fecal coliforms and <i>E. Coli</i> : microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

* µg/L unless otherwise stated

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
INORGANICS			
Aluminum <i>(Also has a secondary drinking water standard; see page 5)</i>	1000	Erosion of natural deposits	Some people who drink water containing aluminum in excess of the MCL over many years may experience short-term gastrointestinal tract effects.
Antimony	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	Some people who drink water containing antimony in excess of the MCL over many years may experience increases in blood cholesterol and decreases in blood sugar.
Arsenic	10	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes	Some people who drink water containing arsenic in excess of the MCL over many years may experience skin damage or circulatory system problems, and may have an increased risk of getting cancer.
Barium	1000	Erosion of natural deposits; discharge of oil drilling wastes and from metal refineries	Some people who drink water containing barium in excess of the MCL over many years may experience an increase in blood pressure.
Beryllium	4	Discharge from metal refineries; coal-burning factories; and electrical, aerospace, and defense industries	Some people who drink water containing beryllium in excess of the MCL over many years may develop intestinal lesions.
Cadmium	5	Erosion of natural deposits; internal corrosion of galvanized pipes; discharge from electroplating and industrial chemical factories and metal refineries; runoff from waste batteries and paints.	Some people who drink water containing cadmium in excess of the MCL over many years may experience kidney damage.
Chromium (total)	50	Erosion of natural deposits; discharge from steel and pulp mills and chrome plating	Some people who use water containing chromium in excess of the MCL over many years may experience allergic dermatitis.
Copper	No MCL, but if Regulatory Action Level AL =1.3 mg/L is exceeded, treatment is required	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
Cyanide (CN)	150	Discharge from steel/metal, plastic and fertilizer factories	Some people who drink water containing cyanide in excess of the MCL over many years may experience nerve damage or thyroid problems.
Fluoride	2 mg/L	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories	Some people who drink water containing fluoride in excess of the federal MCL of 4 mg/L over many years may get bone disease, including pain and tenderness of the bones. Children who drink water containing fluoride in excess of the state MCL of 2 mg/L may get mottled teeth.

Constituent/ Contaminant	Standard ($\mu\text{g/L}$)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
INORGANICS <i>(continued)</i>			
Lead	No MCL, but if Regulatory Action Level (AL) =15 $\mu\text{g/L}$ is exceeded treatment is required)	Erosion of natural deposits; internal corrosion of household water plumbing systems; discharges from industrial manufactures	Infants and children who drink water containing lead in excess of the action level may experience delays in their physical or mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure.
Mercury (inorganic)	2	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills; runoff from cropland	Some people who drink water containing mercury in excess of the MCL over many years may experience mental disturbances, or impaired physical coordination, speech and hearing.
Nickel	100	Erosion of natural deposits; discharge from metal factories	Some people who drink water containing nickel in excess of the MCL over many years may experience liver and heart effects.
Nitrate as Nitrogen (N)	10 mg/L	Erosion of natural deposits; runoff from fertilizer use; leaching from septic tanks, sewage	Infants below the age of six months who drink water in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome. . High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women.
Nitrate as Nitrate (NO_3)	45 mg/L		
Nitrite as Nitrogen (N)	1 mg/L	See above, Nitrate (as N)	Infants below the age of six months who drink water containing nitrite in excess of the MCL may quickly become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blueness of the skin
Perchlorate	6	Perchlorate is an inorganic chemical used in solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries. It usually gets into drinking water as a result of environmental contamination from historic aerospace or other industrial operations that used or use, store, or dispose of perchlorate and its salts.	Perchlorate has been shown to interfere with uptake of iodide by the thyroid gland, and to thereby reduce the production of thyroid hormones, leading to adverse affects associated with inadequate hormone levels. Thyroid hormones are needed for normal prenatal growth and development of the fetus, as well as for normal growth and development in the infant and child. In adults, thyroid hormones are needed for normal metabolism and mental function.
Selenium	50	Erosion of natural deposits; discharge from mines and chemical manufacturers; runoff from livestock lots (feed additive); discharge from petroleum, glass and metal refineries	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years may experience hair or fingernail losses, numbness in fingers or toes, or circulation system problems.
Thallium	2	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories	Some people who drink water containing thallium in excess of the MCL over many years may experience hair loss, changes in their blood, or kidney, intestinal, or liver problems.

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
ORGANICS			
TTHMs (Total Trihalomethanes)	80	By-product of drinking water chlorination	Some people who use water containing TTHMs in excess of the MCL over many years may experience liver, kidney, or central nervous system problems and may have an increased risk of getting cancer.
Benzene	1	Leaching from gas storage tanks and landfills; discharge from plastics, dyes and nylon factories	Some people who use water containing benzene in excess of the MCL over many years may experience anemia or a decrease in blood platelets and may have an increased risk of getting cancer.
Carbon tetrachloride	0.5	Discharge from chemical plants and other industrial activities	Some people who use water containing carbon tetrachloride in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
1,2-Dichlorobenzene (o-DCB)	600	Discharge from industrial chemical factories	Some people who drink water containing "o-DCB" in excess of the MCL over many years may experience liver, kidney, or circulatory system problems.
1,4-Dichlorobenzene (p-DCB)	5	Discharge from industrial chemical factories	Some people who use water containing "p-DCB" in excess of the MCL over many years may experience anemia, liver, kidney, or spleen damage, or changes in their blood.
1,1-Dichloroethane (1,1-DCA)	5	Extraction and degreasing solvent; used in the manufacture of pharmaceuticals, stone, clay, and glass products; fumigant	Some people who use water containing "1,1-DCA" in excess of the MCL over many years may experience nervous system or respiratory problems.
1,2-Dichloroethane (1,2-DCA)	0.5	Discharge from industrial chemical factories	Some people who use water containing "1,2-DCA" in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene (1,1-DCE)	6	Discharge from industrial chemical factories	Some people who use water containing "1,1-DCE" in excess of the MCL over many years may experience liver problems.
cis-1,2-Dichloroethylene (c-1,2-DCE)	6	Discharge from industrial chemical factories	Some people who use water containing "c-1,2-DCE" in excess of the MCL over many years may experience liver problems.
trans-1,2-Dichloroethylene (t-1,2-DCE)	10	Discharge from industrial chemical factories; minor biodegradation byproduct of tetrachloroethylene (PCE) and trichloroethylene (TCE) groundwater contamination	Some people who use water containing "t-1,2-DCE" in excess of the MCL over many years may experience liver problems.
Dichloromethane (Methylene Chloride)	5	Discharge from pharmaceutical and chemical factories; insecticide	Some people who drink water containing "methylene chloride" in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane	5	Discharge from industrial chemical factories; primary component of some fumigants	Some people who use water containing 1,2-Dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
1,3-Dichloropropene	0.5	Runoff/leaching from nematicide used on croplands	Some people who use water containing 1,3-Dichloropropene in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene	300	Discharge from petroleum refineries; industrial chemical factories	Some people who use water containing ethylbenzene in excess of the MCL over many years may experience liver or kidney problems.

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
ORGANICS (continued)			
Methyl-tert-butyl ether (MTBE) [Also has a secondary drinking water standard; see page 5]	13	Leaking underground storage tanks; discharge from petroleum and chemical factories	Some people who use water containing MTBE in excess of the MCL over many years may have an increased risk of getting cancer.
Monochlorobenzene (Chlorobenzene)	70	Discharge from industrial and agricultural chemical factories and dry cleaning facilities	Some people who use water containing chlorobenzene in excess of the MCL over many years may experience liver or kidney problems.
Styrene	100	Leaching from landfills; discharge from rubber and plastic factories	Some people who drink water containing styrene in excess of the MCL over many years may experience liver, kidney, or circulatory system problems.
1,1,2,2-Tetrachloroethane	1	Discharge from industrial and agricultural chemical factories; solvent used in production of TCE, pesticides, varnish and lacquers	Some people who drink water containing 1,1,2,2-tetrachloroethane in excess of the MCL over many years may experience liver and nervous system problems.
Tetrachloroethylene (PCE)	5	Leaching from PVC pipes; discharge from factories, dry cleaners and auto shops (metal degreaser)	Some people who use water containing PCE in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
Toluene	150	Discharge from petroleum and chemical factories; underground gas tank leaks	Some people who use water containing toluene in excess of the MCL over many years may experience nervous system, kidney, or liver problems.
1,2,4-Trichlorobenzene	5	Discharge from textile-finishing factories	Some people who use water containing 1,2,4-trichlorobenzene in excess of the MCL over many years may experience adrenal gland changes.
1,1,1-Trichloroethane (1,1,1-TCA)	200	Discharge from metal degreasing sites and other factories; manufacture of food wrappings	Some people who use water containing 1,1,1-TCA in excess of the MCL over many years may experience liver, nervous system, or circulatory system problems.
1,1,2-Trichloroethane (1,1,2-TCA)	5	Discharge from industrial chemical factories	Some people who use water containing 1,1,2-TCA in excess of the MCL over many years may experience liver, kidney, or immune system problems.
Trichloroethylene (TCE)	5	Discharge from metal degreasing sites and factories	Some people who use water containing TCE in excess of the MCL over many years may experience liver problems and may have an increased risk of getting cancer.
Trichlorofluoromethane (Freon 11)	150	Discharge from industrial factories; degreasing solvent; propellant and refrigerant	Some people who use water containing Freon 11 in excess of the MCL over many years may experience liver problems.
Vinyl Chloride (VC)	0.5	Leaching from PVC piping; discharge from plastics factories; biodegradation byproduct of TCE and PCE groundwater contamination	Some people who use water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Total Xylenes (m,p, & o)	1750	Discharge from petroleum and chemical factories; fuel solvent	Some people who use water containing xylenes in excess of the MCL over many years may experience nervous system damage.
Bromate	10	Byproduct of drinking water disinfection	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
PRIMARY MCL			
RADIONUCLIDES			
Uranium	20 pCi/L	Uranium can be found naturally in the environment. Humans add uranium metals and compounds, because they are released during mining and milling processes	Some people who drink water containing uranium above the MCL for several years may have kidney problems or an increased risk of getting cancer and of kidney toxicity
Combined radium-226&228	5 pCi/L	Naturally occurs in some drinking water sources	Some people who drink water containing radium 226 or 228 above the MCL for several years may have an increased risk of getting cancer
Gross Alpha particle activity	15 pCi/L	Erosion of natural rock or soil deposits	Some people who drink water above the MCL over many years may have an increased risk of getting cancer.
Gross Beta particle activity	50 pCi/L	Naturally occurs in some drinking water sources. Anthropogenic contamination from facilities using or producing radioactive materials	Some people who drink water above the MCL for several years may have an increased risk of getting cancer
Strontium-90	8 pCi/L	Decay of natural and man-made deposits	Some people who drink water containing Strontium above the MCL for several years may have an increased risk of getting cancer
Tritium	20,000 pCi/L		Some people who drink water containing tritium above the MCL for several years may have an increased risk of getting cancer
SECONDARY MCL			
Aluminum	200 µg/L	Erosion of natural deposits; residual from some surface water treatment processes	Some people who drink water containing aluminum in excess of the MCL over many years may experience short-term gastrointestinal tract effects
Color	15 units	Naturally-occurring organic materials	n/a
Copper	1000 µg/L	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives	n/a
Foaming Agents (MBAS)	0.5 mg/L	Domestic (septic), municipal and industrial waste discharges	n/a
Iron	300 µg/L	Leaching from natural deposits; industrial wastes	n/a
Manganese	50 µg/L	Leaching from natural deposits	n/a
Methyl-tert-butyl ether (MTBE)	5 µg/L	Leaking underground storage tanks; discharge from petroleum and chemical factories	n/a
Odor—Threshold	3 Units	Naturally-occurring organic materials	n/a
Silver	100 µg/L	Industrial discharges	n/a
Turbidity	5 Units	Soil runoff	n/a

Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
SECONDARY MCL (continued)			
Zinc	5000 µg/L	Runoff/leaching from natural deposits; industrial wastes	n/a
Total Dissolved Solids (TDS)	1000 mg/L	Runoff/leaching from natural deposits	n/a
Specific Conductance (EC)	1600 µmhos/cm	Substances that form ions when in water; seawater influence	n/a
Chloride	500 mg/L	Runoff/leaching from natural deposits; seawater influence	n/a
Sulfate	500 mg/L	Runoff/leaching from natural deposits; industrial wastes	n/a
Aesthetic only (No MCL, No SMCL)			
Total Hardness (measured as Calcium Carbonate, CaCO ₃)	Soft: <17.1** Slightly Hard: 17.1 – 60** Mod. Hard: 60 – 120** Hard: 120 – 180** Very hard: 180 and above**	Calcium (limestone) and magnesium salts.	<u>Hard water symptom:</u> Soap curd and scum in wash basin & bathtub. Whitish scale deposits in pipes, water heater & tea kettle. **
Public Health Goal¹			
Constituent/ Contaminant	Standard (µg/L)*	Typical Source of Contaminant or Constituent	Possible Health Effects
Hexavalent Chromium (Cr6)	0.02	Occurs naturally, or from industrial plants, or hazardous waste sites	Some studies have found significant numbers of gastrointestinal tumors in rats and mice. It also could cause kidney, liver and circulatory disorders

**Source: Water Quality Association www.wqa.org/consumer/newindex.cfm

¹ Public Health Goal (PHG) is the level of a contaminant in drinking water, below which there is no known or expected risk to health. A PHG will be contribute to develop the future MCL

NOTIFICATION LEVELS (NL)

Constituent/Contaminant	Standard (µg/L)*
Boron	1000
n-Butylbenzene	260
Sec- Butylbenzene	260
Tert- Butylbenzene	260
1,2,3, Trichloropropane	0.005
Chlorate	800
Carbon disulfide	160
2-Chlorotoluene	140
4-Chlorotoluene	140
Dichlorodifluoromethane (Freon 12)	1000
1,4 - Dioxane	3
Formaldehyde	100
Ethylene glycol	14000
Isopropylbenzene	770
Methyl Isobutyl Ketone (MIBK)	120
Naphthalene	17
N- Nitrosodiethylamine	0.01
N-Nitrosodimethylamine (NDMA)	0.01
N-Nitrosodi-n-propylamine	0.01
Propachlor	90
n-propylbenzene	260
RDX (cyclotrimethylene trinitramine)	3
Tertiary butyl alcohol	12
1,2,4 - Trimethylbenzene	330
1,3,5 -Trimethylbenzene	330
2,4,6 Trinitrotoluene	1
HMX (cyclotetramethylene tetranitramine)	350
Vanadium	50

* µg/L unless otherwise stated