

National Secondary Drinking Water Regulations

Recognized Treatment Techniques for Meeting the National Secondary Drinking Water Regulations with the Application of Point-Of-Use Systems

National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effect (such as taste, odor or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Note: This document addresses the United States Environmental Protection Agency National Primary Drinking Water Regulations in effect at its time of publication. These regulations are continually being reviewed and updated at the federal level. Accordingly, this list of recognized treatment technologies will be reviewed and amended periodically.

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Contaminant	SMCL, MG/L+	Treatment Methods	
Alkalinity (measured as calcium carbonate, CaCO ₃)	No federal limit Low alkalinity - <30mg/L High alkalinity - >300 mg/L	Raise alkalinity by feeding 1.5 mg/L of soda ash for each mg/L of alkalinity needed or calcite filtration Lower alkalinity by feeding white vinegar (acetic acid), citric acid or any acid; add carbon dioxide; ion exchange dealkalization; reverse osmosis; distillation or electrodialysis	
Aluminum (Al +3)	0.05 to 0.2 depending on case-by-case circumstances	Cation Exchange Reverse Osmosis Distillation	Electrodialysis Ultrafiltration Deionization
Chloride (Cl -1)	250	Reverse Osmosis Anion Exchange Deionization	Distillation Electrodialysis
Color	15 color units	Anion Exchange Activated Carbon Filtration Chlorination	Reverse Osmosis Distillation Ozonation
<i>Note: Color units are based on the APHA recommended standard of 1 color unit being equal to 1 mg/L of platinum or chloroplatinate ion.</i>			
Copper (Cu +2)	1.0	Reverse Osmosis Cation Exchange (20-90%)	Corrosion Control Distillation
Corrosivity	Non-corrosive	Calcite or Calcite/Magnesium Oxide (Magnesia) (5 to 1) Filter to raise pH Soda Ash Chemical Feed Polyphosphate Feed Sodium Silicate Feed Remove all hydrogen peroxide Reduce TDS via Reverse Osmosis (partial, split stream treatment) Coatings Insulating Unions with Ground straps around all insulating breaks in metal pipe	
Fluoride (F ⁻¹)	2.0	Activated Alumina Reverse Osmosis	Electrodialysis Distillation
Foaming agents (MBAS)	0.5	Chlorination Activated Carbon Ozonation	Reverse Osmosis Distillation
Hard Water (measured as calcium carbonate CaCO ₃)	No federal limit Soft - <17.1 Slightly hard -17.1 to 60 Moderate -60 to 120 Hard - 120 to 180 Very Hard - >180	Remove all calcium and magnesium ions with a cation exchange water softener (general limit is 1710 mg/L total hardness. Above 70 grains per gallon, install two softeners in a series.	

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Contaminant	SMCL, MG/L+	Treatment Methods
Iron Ferrous Iron (Fe ⁺²)	0.3 (total iron)	Filtration (oxidizing filters) Electrodialysis Pressure Aeration/Filtration Oxidation/Precipitation/Filtration
Ferric Iron (Fe ⁺³)	0.3 (total iron)	Distillation Cation Exchange Reverse Osmosis*
Sequestered iron Iron Bacteria		Filtration Greensand Calcite (also raise pH to 7.2)
Colloidal Iron		Sand Cartridges
*Ferrous Iron (clean water iron) is readily converted to ferric iron (red water iron) in the presence of any air or oxidizing material; precipitating ferric iron must be prevented to avoid fouling and interference with effective reverse osmosis membrane rejection.		
Manganese (Mn ⁺²)	0.05	Strong oxidation and/or fine (10 micron or <) filtration Disinfection and Retention followed by activated carbon filtration for dechlorination
Manganese (Mn ⁺⁴)		Coagulation/Filtration Submicron Filtration
Sequestered Manganese Colloidal Manganese		Filtration (Oxidizing Filters) Reverse Osmosis Oxidation/Precipitation/Filtration Pressure Aeration/Filtration
		Cation Exchange Distillation Electrodialysis
		Filtration Sand Cartridges
		Calcite (raise pH to 7.2) Greensand
		Strong Oxidation and/or fine filtration
		Coagulation/Filtration Submicron Filtration
*Manganese must be maintained in the soluble manganous (Mn ⁺²) state to avoid fouling and interference with effective reverse osmosis membrane rejection.		
Methyl Tertiary Butyl Ether (MTBE)	No federal limit	Activated Carbon (similar to chloroform and TTHMs, except the treatment life of the activated carbon may be one-half or less of that for chloroform when MTBE will begin to break through). For MBTE concentrations greater than 0.1 mg/L, pre-treat with high air-to-water ratio air stripping prior to activated carbon filtration.
Odor	3 threshold odor number	Activated Carbon Air Stripping Oxidation followed by retention and filtration Disinfection for sulfate-reducing bacteria If H ₂ S is in the hot water only, remove the hot water anode rod or replace it with an aluminum anode rod.
Note: Chlorine and hydrogen sulfide are examples of odors that may be reduced by the treatment methods suggested.		
pH	6.5-8.5	Neutralizing filter (calcite or calcite plus magnesia oxide). pH may be increased by alkalies and may be decreased by acids. Chemical feed of soda ash to raise pH or white vinegar to lower pH.
Silver (Ag ⁺¹)	0.1	Coagulation/Filtration Submicron Filtration/Activated Carbon Ion Exchange (Anion or Cation depending on complexed Ion Species)
Sulfate (SO ₄ -2)	250	Distillation Reverse Osmosis Anion Exchange
Total dissolved solids (TDS)	500	Distillation Electrodialysis
Zinc (Zn ⁺²)	5	Reverse Osmosis Deionization by Ion Exchange (Cation/Anion in two bed or mixed bed) Electrodialysis
		Reverse Osmosis Cation Exchange
		Distillation Electrodialysis

(P)* = Proposed Standard

SMCL (mg/L+) = Secondary Maximum Contaminant Level expressed in milligrams per liter (unless otherwise specified).