



Nitrate and Drinking Water

SOURCES OF NITRATE

Nitrate is a contaminant found in groundwater that comes from both natural and manmade sources. Low concentrations of nitrate come from the erosion of natural deposits in soil. High concentrations of nitrate originate from fertilizer application, animal waste, and/or leaky sewer pipelines. Nitrate, carried by rain or irrigation water, can easily travel through soil and into groundwater.

NITRATE RISKS

Drinking water consumed with high nitrate concentrations can cause adverse health effects in infants. Infants that are six months and younger have a greater risk of nitrate poisoning, known as methemoglobinemia, or “blue baby syndrome.” The nitrate in the infant’s stomach converts to a form of nitrogen that limits the blood’s ability to transport oxygen to the body tissues. When this happens, the infant can experience shortness of breath and blueness of the skin around the eyes and mouth, which can lead to coma and eventual death if immediate medical care is not administered. Pregnant women are also susceptible to methemoglobinemia and if using a private well should be aware of the nitrate concentrations in their drinking water by getting their private well tested.

More information on nitrate toxicity in drinking water can be found on the websites of the United States Environmental Protection Agency (USEPA), the State Water Resources Control Board (SWRCB), and the California Office of Environmental Health Hazard Assessment (OEHHA). OEHHA establishes Public Health Goals (PHGs) which are levels of chemical contaminants in drinking water that do not pose a significant risk to health. OEHHA’s nitrate PHG is 10 milligrams per liter (mg/L) as nitrogen (i.e., 10 mg/L $\text{NO}_3\text{-N}$).

NITRATE IN DRINKING WATER CAN BE REMOVED

According to California’s State Water Resources Control Board (SWRCB), nitrates in drinking water can be removed by several technologies including demineralization (i.e., distillation or reverse osmosis) and ion-exchange. These treatment approaches can be adopted by a utility at a treatment plant or by water system customers at individual buildings or homes using appropriately certified treatment units (see NSF certified products at [nsf.org/Certified/DWTU/](https://www.nsf.org/Certified/DWTU/)).



YOUR DRINKING WATER IS TESTED FOR NITRATE

The San Francisco Public Utilities Commission (SFPUC) has monitored nitrate in all its waters, including surface water reservoirs, groundwater wells, and treated water delivered to homes. The SFPUC’s drinking water is safe to drink, with nitrate levels in water delivered to customers far less than the State drinking water maximum contaminant level (MCL) of 10 mg/L $\text{NO}_3\text{-N}$. For nitrate, the OEHHA PHG (health goal) and the State MCL (regulatory standard) are the same.

As summarized in the table below, from 2017 to 2020, nitrate in surface water supplies ranged from non-detect to 0.13 mg/L $\text{NO}_3\text{-N}$, and nitrate in groundwater supplies ranged from non-detect to 38.3 mg/L $\text{NO}_3\text{-N}$. Blending groundwater with surface water lowers nitrate levels so treated water delivered to customers is always far below the PHG and State MCL of 10 mg/L $\text{NO}_3\text{-N}$.

SFPUC Nitrate Monitoring Results (PHG and MCL = 10 mg/L NO₃-N)*

Location	Date	NO ₃ -N (mg/L)
Surface Water Supplies	2017 - 2020	Non-detect (<0.01) - 0.13 (median = 0.03)
Groundwater (Peninsula and SF Wells)*	2017 - 2020	Non-detect (<0.01) - 38.3 (median = 4.94)
Treated Water Delivered to Customers	2017 - 2020	Non-detect (<0.01) - 0.44 (median = 0.09)

*Groundwater is never delivered directly to customers. Groundwater is always blended with surface water to ensure nitrate is well below the PHG/MCL of 10 mg/L NO₃-N.

THE WESTSIDE GROUNDWATER BASIN IS A SAFE WATER SOURCE

SFPUC has been studying and monitoring the quality of the Westside Groundwater Basin, which runs from San Francisco to the Peninsula, for more than a decade. Blending groundwater with surface water is a practice approved by the SWRCB for consistent compliance with the MCL requirement. Water supplied by the SFPUC has consistently met, and will continue to meet, all drinking water standards (monitoring data are provided at sfwater.org/sfgroundwater).

Approximately 80 percent of Californians depend on groundwater for at least part of their drinking water supply, and in drought years, groundwater can provide close to 60 percent of the State's water supply. Many of SFPUC's wholesale customers utilize a blend of groundwater and Hetch Hetchy system water, and prior to the construction of the Hetch Hetchy system, San Francisco relied on groundwater for part of its supply.

Prior to urban development, San Mateo County land use was dominated by agriculture. Fertilizers and manure from dairies are likely sources of nitrate in the groundwater. Nitrate can persist in groundwater for many years and is an ongoing groundwater challenge for many areas.



Farmland in the Colma Valley, 1915 (Source: San Mateo County Historical Association, photo by A.G.C. Hahn)



Golden Gate Park groundwater facility (Source: C. Ripley, 2020)

CONSUMER RESOURCES: REGULATION/HEALTH

- SFPUC: San Francisco Groundwater Supply Project
sfwater.org/sfgroundwater
- OEHHA: Nitrate PHG
oehha.ca.gov/chemicals/nitrate
- SWRCB: Nitrate Drinking Water MCL
waterboards.ca.gov/gama/docs/coc_nitrate.pdf
- USEPA: Information About Nitrate in Water
epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations

We're Committed to Quality: Our highly trained chemists, technicians and inspectors consistently monitor the water we serve—throughout our system, every day of the year. For additional information and materials, please visit sfwater.org/quality. For questions about YOUR water, please call 311. You can also visit 311.org.

And follow us on    

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