



Irrigated Lands Program Nitrate in Domestic Drinking Water Guidance Document

What is nitrate?

Nitrate is a common contaminant found in groundwater that can have serious health effects if consumed at high levels. Nitrate is colorless and odorless. Small amounts of nitrate are normal, but excess amounts can pollute supplies of groundwater. In pristine areas, shallow groundwater that is unaffected by human activities commonly contains less than 2 milligrams per liter (mg/L) of nitrate. Common sources of nitrate are fertilizers, livestock waste, and septic systems. Excess nitrate in the soil is most often found in rural and agricultural areas. Nitrate travels easily through the soil carried by rain or irrigation water into groundwater supplies. Wells in agricultural areas that are shallow, placed in sandy soil, or wells that are improperly constructed or maintained are more vulnerable to nitrate contamination. Many agricultural areas of the central coast region have high concentrations of nitrate in groundwater and, therefore, drinking water wells may be affected.

What is the drinking water standard for nitrate?

The drinking water standard for nitrate is the maximum contaminant level (MCL), which has been established to be 10 mg/L nitrate (as Nitrogen). The Water Board uses the MCL (and other water quality limits) as a basis for its regulatory actions regarding the protection of drinking water.

What are the health effects from drinking water impacted by nitrate?

High levels of nitrate in drinking water are associated with adverse health effects. Infants under six months of age have a greater risk of nitrate poisoning, called methemoglobinemia (or “blue baby syndrome”). Symptoms include shortness of breath and blueness of the skin around the eyes and mouth. Infants with these symptoms need immediate medical attention since the condition can lead to death. High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women.

Some scientific studies indicate a relationship between nitrate in drinking water with other health problems, including birth defects, certain types of cancer, and problems with kidneys and spleen. For more information on the risks of nitrate consumption, consult your doctor.

Do I have to test my domestic well?

Growers enrolled in the Agricultural Order (R3-2021-0040) must sample every on-farm domestic well between March 1 and May 31 each year; sampling results must be reported to the GeoTracker database no later than July 31 each year.

Do I have to notify and provide safe drinking water to well users?

Anyone providing drinking water should make sure the water is safe to drink, especially in higher risk locations, such as farming areas. Growers enrolled in the Agricultural Order (R3-2021-0040) must annually provide a summary of sampling results to on-farm domestic well users within 3 business days of receiving testing results from the laboratory. Growers must also provide a summary of the most recent laboratory results to any new well users within 3 business days whenever there is a change in the population using the well¹. These sampling result summaries must be provided in a language that is appropriate for the domestic well users.

Agricultural Order (R3-2021-0040) does not include a requirement for growers to provide an alternative source of drinking water to on-farm domestic well users if the nitrate concentration detected in on-farm domestic wells exceeds the MCL; however, growers are required to inform domestic well users of nitrate concentrations detected in their drinking water wells on an annual basis so that the well users can make their own decisions regarding the use of an alternative water source (e.g., bottled water) for cooking and drinking (including for baby formula) even if the MCL for nitrate has not been exceeded.

What type of treatment is available if there is nitrate in the well?

Nitrate is easily dissolved in water and there is no simple way to remove all nitrate from water. Although it is common to think of boiling or using a water softener or filter as a means of purifying water, none of these methods reduce nitrate in drinking water. Boiling the water before drinking or cooking does not remove nitrate. In fact, it causes some of the water to evaporate, which increases the nitrate concentration in the remaining water. Water softening and filtration may address other undesirable aspects of drinking water, but neither remove nitrate. Some available solutions are presented below.

Immediate Solution:

- An alternative source of water for drinking, cooking, and mixing baby formula (such as bottled water) should be considered if the nitrate concentration is close to, at, or exceeds the MCL.

Long-term Solution:

- Treatment technologies that remove nitrate include reverse osmosis, ion exchange, and distillation. All treatment technologies require periodic maintenance of the treatment system by a knowledgeable individual to ensure proper function.

How can I protect my on-farm domestic wells from nitrate?

Many options are available to help reduce the vulnerability of on-farm domestic wells to pollution, including the following:

¹ Agricultural Order (R3-2021-0040), Attachment B – MRP, Section C. Groundwater Monitoring and Reporting, pages 13 -15.

- Consider restricting or controlling the use of fertilizers near the well. Also, make sure irrigation water does not flow towards or accumulate near the well.
- Inspect the integrity of the well's surface seal and replace or repair any openings on the ground surface that could allow substances to get into the well.
- In some situations, it may be possible to reconstruct an existing well to extend the casing and annular seal to a depth sufficient to avoid drawing water from the zones contaminated with nitrate. This can be a very expensive process, which still has a possibility of not correcting the problem.
- Another option may be to drill and properly construct a new well in a more suitable location and properly destroy the polluted well.
- If livestock or animal enclosures are located within 100 feet of the well, relocate these enclosures at least 100 feet away from the well.
- If stockpiled manure is stored within 100 feet of the well, relocate the stockpiles at least 100 feet away from the well.
- If the septic system is located less than 100 feet from the well, consider relocating the septic system.

Where else can I get assistance?

For more information concerning human health risks associated with drinking water containing nitrate, please contact the State Water Board's Division of Drinking Water, district office contact information linked below. In addition, if you have concerns regarding your health or for information on the risks of nitrate consumption, you should consult your doctor.

State Water Board Division of Drinking Water:

District Offices

- https://www.waterboards.ca.gov/drinking_water/programs/documents/ddwem/ddw_districtofficesmap_wa_version.pdf
- Sacramento office: (916) 449-5577