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Nitrate in Public Drinking Water

What is nitrate?

Nitrate (NO_3) is an inorganic chemical composed of nitrogen and oxygen. Nitrate contamination of drinking water usually results from runoff of agricultural fertilizers or from human or animal wastes, such as livestock feedlots or faulty septic systems.

How much nitrate is allowed in drinking water?

The maximum contaminant level (MCL) for nitrate in drinking water is 10 milligrams per liter (mg/L). This is the maximum allowable level of nitrate that may be present in drinking water without a high risk of causing health problems.

What are the health effects of nitrate?

Nitrate is essentially harmless to most people, but is considered an acute toxin to infants under six months of age. In infants, it causes a condition known as methemoglobinemia, or "blue-baby syndrome," which can be fatal. The most obvious symptom is a bluish skin coloring, especially around the eyes and mouth. Other symptoms can include shortness of breath, nausea, vomiting and dizziness. An infant with bluish skin should be taken immediately to a medical facility for treatment.

Blue-baby syndrome is caused when bacteria in the digestive tract of infants change the nitrate into nitrite, a much more harmful substance. The nitrite then enters the bloodstream, where it can lower the blood's ability to carry oxygen to the body, causing a blueness to the skin. Infants under six months of age are at higher risk than others because their digestive tract is not fully developed. By six months of age, the hydrochloric acid in the stomach increases to a level that kills most of the bacteria which change nitrate to nitrite, significantly reducing the risk of methemoglobinemia.

Healthy adults and older children can consume higher levels of nitrate than infants because of their fully-developed digestive systems. It is recommended that women who are pregnant or nursing consult with their physicians about limiting nitrate consumption. People with medical conditions that may make them more susceptible to methemoglobinemia, such as reduced stomach acidity, should also consult their physicians.

What precautions should be taken for someone at risk?

Substitute bottled water for tap water until the nitrate advisory is lifted. Boiling tap water will not get rid of the nitrate; it only concentrates it. It is safe to bathe or shower in tap water with elevated nitrate levels.

How often is monitoring required?

All public water systems (PWS) are required to monitor their water for the presence of nitrate.

Ground water systems typically monitor once a year. However, if nitrate is detected at 5 mg/L or greater, Ohio EPA requires quarterly monitoring (every three months). This increased monitoring allows Ohio EPA to better protect the public health by keeping a closer watch on water supplies with potential problems.

Surface water systems are required to monitor monthly because they are more vulnerable to contamination from agricultural runoff.

What happens if the MCL is exceeded?

A public water system may have a MCL violation if a nitrate result is above 10 mg/L. Another nitrate sample should be collected within 24 hours after the PWS is told about the high nitrate result. If the sample cannot be taken within 24 hours, the PWS must issue a public notice and collect the sample as soon as possible, but no later than two weeks after being told of the high nitrate result.

A nitrate MCL violation has an acute or immediate risk to human health. When a nitrate MCL violation is confirmed, public notice must be issued within 24 hours. Ohio EPA provides instructions on how to issue the public notice and a draft public notice. As proof that the public notice was issued, the system is required to complete a verification sheet and send it to Ohio EPA.



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When a nitrate MCL occurs, groundwater systems that are sampling once a year will be increased to quarterly sampling (every three months) for at least one year. Surface water systems that are sampling monthly may be increased to weekly sampling. This increased monitoring may be required until results are reliably and consistently below the MCL.

In addition, the local Ohio EPA district office may help investigate the source of the nitrate contamination and suggest options such as using bottled water, finding another water source or installing treatment.

Can drinking water be treated to remove nitrate?

Some treatments such as reverse osmosis, ion exchange or distillation can be effective. However, these processes may be very expensive and are usually not practical for a small water system or a homeowner to install.

If you use any of these types of home treatment units, check if the unit has a NSF International Mark for removing nitrate. You can obtain this information by calling 1-800-NSF-MARK ext. 5286 or by accessing the Web site www.nsf.org. NSF is an organization which certifies that products have been independently tested for effectiveness according to manufacturer claims.

For More Information: Call Ohio EPA's Division of Drinking and Ground Waters at (614) 644-2752.

