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Typical Contaminants And Problems

Nitrate

A major public health concern across the United States today is groundwater contamination by nitrates. There is some validity to this concern since 98 percent of our fresh water supply is groundwater and 50 percent of our population drinks groundwater. As high as 95 to 98 percent of rural residents in some areas get all of their drinking water from groundwater supplies.

In Alabama, nitrate contamination of groundwater does not appear to be a widespread problem although there is concern for some areas. Levels of 2 to 3 mg/L of nitrate are common in many Alabama wells, but these levels appear to be holding steady with no major increase or decrease and nothing present to indicate a specific source. Recent well-water monitoring in the Sand Mountain area of the Cumberland Plateau, however, suggests that nitrate levels may be increasing. More than 30 percent of selected rural wells monitored in certain counties in 1987-88 had nitrates above the 10 mg/L maximum contaminant level set for public drinking water supplies. Both human and animal wastes are believed to be the problem in this area. More surveys will be conducted in the near future.

Nitrate is not a problem for adults but can be a problem for babies less than 6 months of age. Babies are more susceptible because of their small size and their totally liquid diet. During the first few months of life a certain bacteria can live in an infant's digestive system that can convert nitrate, which is not poisonous, to something that is, called nitrite.

If nitrite is absorbed into the blood, it combines with hemoglobin, the chemical that carries oxygen, to form methemoglobin, a chemical that cannot carry oxygen. Called methemoglobinemia, this condition causes a baby to turn blue because of oxygen starvation and may result in death if not treated.

Young animals are affected by nitrates in the same manner as babies, and nitrate is a problem for ruminant animals of all ages. Some livestock have been known to abort fetuses because of drinking high

nitrate water. A recommended safe level for animals is 100 milligrams per liter.

There is also some concern that in human beings nitrites may interact with other nitrogen compounds to form nitrosoamines, which some scientists believe are carcinogenic. Current studies have not yet conclusively related exposure to high levels of nitrate and nitrite to increased incidence of stomach and esophageal cancer, but research continues in this area.

Sources Of Nitrate

Nitrate may come from several kinds of natural and human activity-related sources. Principal natural sources are soil nitrogen, nitrogen-rich geologic deposits, and atmospheric deposition. The most important human activity-related sources include fertilizers, crop residues, septic tank drainage, animal wastes from livestock and poultry enterprises, land disposal of municipal and industrial wastes, and excess soil leaching as a result of irrigation.

Organic nitrogen is everywhere around us because it is common in plant residues and animal wastes including human wastes. Much organic matter is inadvertently or purposely applied to the land. Organic nitrogen in this material is then converted by bacteria in the soil to ammonia, and other bacteria convert the ammonia to nitrate. Nitrate, however, is very soluble in water. If more nitrate is present in the soil than plants can use, it can be leached to groundwater.

While over application of fertilizer may be a source of nitrate pollution, fertilizer spills at mixing and loading areas of fertilizer dealerships and fertilizer use at greenhouses, nurseries, golf courses, and residences may also cause problems. Stormwater runoff from all these areas may move fertilizer nitrogen to permeable zones where it infiltrates into shallow wells and groundwater supplies.

Treatment Of Nitrate

When To Treat. The drinking water standard for infants under 6 months is 10 mg/L of nitrate-nitrogen.

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Concentration above 3 mg/L may indicate that other more harmful materials are leaching from the same source.

How To Treat. If you find your well water supply is contaminated with nitrate, take steps to locate the source of contamination. Make sure the well is a minimum of 100 feet away from sources of contamination such as septic tanks and field lines. Check to see that the well is properly cased and that surface water is diverted around the well.

There are several methods of reducing or removing nitrates from water: distillation, reverse osmosis, and anion exchange. Distillation and reverse osmosis are expensive and consequently they are usually employed to treat drinking water only. Water for other household uses should be left untreated.

Nitrates can be removed by certain anion exchange processes. However, the equipment must be extremely reliable, particularly in households with infants. Undetected equipment failure can be fatal. Because of this possibility and the high probability of pollution in high nitrate waters, nitrate removal for home consumption is not recommended. Instead, the cause of the nitrate contamination should be found and eliminated.

Nitrate At A Glance

Symptoms: Methemoglobinemia (Blue Baby Syndrome); tests showing levels of nitrate greater than 10 mg/L or levels of nitrite greater than 1 mg/L.

Causes Of The Problem: Nitrate and nitrite from fertilizers, manure, septic systems, or the breakdown of organic wastes.

Suggested Treatments: Anion exchange, reverse osmosis, or distillation.

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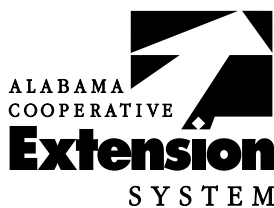
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For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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