Water Testing and Interpreting Your Results

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If you're like many Alaskans, your family's drinking water comes from a private, on-site well-your well. The health and well-being of your family depends in a large part on the quality of water from that well. Daily activities of those near your well have a direct impact on the quality of drinking water. To protect that water, your actions should minimize any risk to any surrounding wells. Periodically checking your water supply will assure you that your efforts have been successful and the water your family is drinking is safe.

Which Tests?

Water tests come in a variety of sizes and options. You can test your water for just a few indicators, or for a comprehensive analysis. As with all things, the more you ask for, the more it will cost you.

When deciding which tests are appropriate for you, make sure the most important indicators for your situation are selected, and that costs are kept reasonable. Frequently, labs will group the most common household tests into a "package" for convenience. For an accurate assessment of the quality of your water, have it tested by a certified testing lab.

The following four tests address the most common and serious health concerns, and indicated the possibility of a contaminated water supply.

NITRATES

What is it? Nitrates are a major component of fertilizer and wastewater. They also result from the breakdown of organic matter buried in the soil. Excess nitrates in drinking water could be the result of a number of things: the overuse of fertilizers close to the well; the presence of septic effluent in the groundwater supplies caused by a failed or failing septic system or inadequate dilution or separation between the system and the well; or runoff containing animal wastes close to the well.

Drinking water that has high levels of nitrate can cause a serious illness in infants under the age of six months. This condition is called methemoglobinemia or "blue baby" syndrome, and can result in death.

Methemoglobinemia
"Blue Baby Syndrome" When infants ingest nitrate, the nitrate is converted to nitrite in the body. Nitrites interfere with the blood's ability to carry oxygen, and the infant appears slightly "blue."

Acceptable Levels? Water with nitrate levels above 10 parts per million (ppm) nitrate as nitrogen (mg/l NO3-N), should not be given to children under the age of six months, or pregnant women. If your water has nitrate levels above 10 ppm, consult your physician before using the water for any drinking water purposes.

Treatment Options? Nitrate is not readily removed by filtration or other common home water treatment systems. The best method for limiting nitrate in well water is by controlling nearby sources of nitrate.

BACTERIA

What is it? Bacteria occur naturally in the environment. While some are not harmful to human health, others such as fecal bacteria present a very serious health risk. Fecal bacteria belong to a group of bacteria called coliform bacteria. Labs routinely test for coliform bacteria to determine if your drinking water has been contaminated with surface runoff wastewater. Wastewater not only contains bacteria, but may also contain other microorganisms such as viruses and protozoa that are associated with severe illnesses.

Since not every bacteria can be reasonably tested, labs routinely test for coliform bacteria as an indicator of the presence of

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Surface Water

A few Alaskans, especially in rural areas, use surface water for their family's source of water. If you use surface water, you need to have a good water treatment system that includes disinfection and filtration, to be sure your water is safe to drink. Check with your local water treatment companies for different kinds of surface water systems, or contact the U.S. EPA for a copy of their publication, "Manual of Individual and Non-Public Water Supply Systems," for a description of surface water treatment methods.

Sometimes, a well can also have surface water influence. This means that the water on the surface is in direct contact with the groundwater supply. There are no hard and fast guidelines for determining when a well is surface water influenced. However, shallow wells (less than 30 feet) and wells close to surface water sources (less than 100 feet to the lake or creek) are more at risk of contamination by disease-causing micro-organisms frequently found in surface water. The quality of surface water supplies fluctuates much more than that of groundwater (well water) supplies. It is affected by changes in temperature, algal blooms, amount of rainfall and runoff, and the activities in the watershed. If your well is shallow or close to a surface water source, you should have it tested by a certified laboratory to determine if it is surface water influenced, or install a water treatment system that includes disinfection and filtration.

this type of contamination. This test is used to indicate the "potability" of drinking water. Coliform bacteria enter the environment through the discharge of untreated waste or runoff containing animal and/or human wastes.

Bacteria is most commonly a problem in surface waters. Bacteria, protozoa and viruses can cause severe illness if ingested. Generally not a problem in groundwater sources (i.e. wells), it's presence could signal a real threat.

Acceptable Level? If your drinking water tests positive for coliform bactera, other organisms may be present also. You should take immediate steps to treat your water. To prevent illness, drinking water should be completely free of coliform bacteria.

Treatment Options? Bacteria can only be killed by disinfection (such as chlorine-more for cloudy water, less for clear, 8-10 drops/gallon), or boiling the water for several minutes (3-5 minutes) prior to drinking. Filtration can help improve the performance of disinfectants by reducing the numbers of micro-organisms, and by removing sediments that interfere with the disinfection process. Filtration alone cannot generally remove all microorganisms and should not be considered completely effective.

ARSENIC

What is it? Natural ore deposits of arsenopyrite, a gold bearing mineral, may release arsenic to groundwater under anaerobic (no oxygen) conditions. Some stream sediments have also been found to contain arsenic, particularly those draining through placer mine tailings deposits.

Naturally occurring arsenic has been found in groundwater wells in the Fairbanks area, on the Seward and Kenai Peninsulas and Southcentral Alaska around Wasilla. It is a highly toxic contaminant and listed as a hazardous material. A suspected carcinogen, it is also a teratogen—capable of crossing the placental membrane into the metabolic system of unborn children. The actual toxicity to humans varies. Because it is slow to leave the body, arsenic is a cumulative substance.

Acceptable Levels? The maximum level for arsenic in drinking water is set at 0.01 (parts per million). (EPA Jan. 2006)

Treatment Options? Arsenic can be removed from drinking water by a number of available technologies, the choice of which depends on the amount of water to be treated, the amount of arsenic present, and the presence of other contaminants.

Other water problems.

Your water may contain other substances that while not dangerous to your health, can cause objectionable tastes or odors, or staining of appliances and fixtures. If these qualities are not desirable to your family, home treatment systems can eliminate any of these problems. To ensure that you select the appropriate equipment for your home, the level of a number of minerals needs to be determined.

IRON

What is it? Excess iron in groundwater supplies comes from the parent material of the soil around the well. It can cause a metallic taste, stain clothing and fixtures, and promote the growth of iron bacteria in the water system.

Iron is not considered toxic, but affects the appearance and palatability of the drinking water.

Acceptable Levels? An upper limit of 0.3 ppm of iron has been set for drinking water.

Treatment Options? Depending upon concentrations, iron can be removed by water softeners, or an iron filter with a greensand media and potassium permanganate as a regenerant.

MANGANESE

What is it? Like iron, manganese originates from the soil around a well. It typically produces black staining and can give water an off-taste. Manganese is not considered toxic but does affect the appearance and palatability of the water.

Acceptable Levels? An upper limit of 0.05 ppm manganese has been set for drinking water supplies.

Treatment Options? Again, depending upon concentrations, manganese can be removed by water softeners, or an iron filter as described above.

HARDNESS

What is it? Hard water comes from elevated levels of calcium, magnesium and other similar substances found in the soil around a well. Hard water will tend to deposit calcium carbonate (limestone) scale in plumbing systems, particularly on hot water or boiler heating elements. Soft water tends to be corrosive, dissolving metal pipes and fittings.

Acceptable Levels? There is no toxicity associated with hardness and no health standard has been established by the environmental regulatory agencies.

Treatment Options? Water softeners offer the best treatment method for hard or soft water.

HYDROGEN SULFIDE

What is it? Hydrogen sulfide can be present in ground water containing sulfur under anaerobic (no oxygen) conditions. It is also the product of a bacterial reaction in the presence of sulfate.

Hydrogen sulfide gives water a "rotten egg" taste and odor and is often more noticeable in hot water than cold water. In drinking water supplies it is normally present only at "nuisance" levels.

Acceptable Levels? Like hardness, no health standard has been established by the environmental regulatory agencies for this element.

Treatment Options? Hydrogen sulfide can be converted back to sulfate by any oxidant such as dissolved air, chlorine, or potassium permanganate used to regenerate iron filters. If air is used, the water must be detained in a tank and aerated with a diffuser similar to an aquarium. If the hydrogen sulfide is being produced by bacteria growing in the plumbing or treatment system, a thorough disinfection with chlorine is normally required to eliminate the growths.

Testing Frequency

Drinking water supplies should be tested for bacteria and nitrate at least once a year. The other tests discussed here, should be made regularly (every three years or so).

Events that occur near your drinking water well may indicate a need to have additional tests performed on your water. If your well is located near a fuel oil spill (this would also include any petroleum products), it would be advisable to have your water tested for Volatile Organic Chemicals (VOCs). A less expensive test, Total Petroleum Hydrocarbon or TPH, will also detect the presence of spilled fuel oil. Have your water supply checked if you have drilled a second well or changed the pump or plumbing. Also have the water supply tested if there is new, or increased activity in your area that has the potential to contaminate a water supply.

For more information:

If you have more questions concerning your drinking water or fo more information on this subject, contact your local offices of the Cooperative Extension Service (www.uaf.edu/ces/) or AK Dept. of Environmental Conservation (ADEC). For a listing of certified water test labs in Alaska, check the ADEC website at: http://www.dec.state.ak.us/eh/dw/index.htm

For an excellent reference on this topic, check out Plain Talk About Drinking Water: Questions and Answers about the Water you Drink by Dr. James Symons.

Units of Measure

The most commonly used unit of measure for water tests is milligrams per liter (mg/l). Generally speaking, this is equal to one part per million (ppm)—one part contaminant to one million parts water. Some toxins are reported in even smaller units, parts per billion (ppb).

(For a little perspective, one ppm would be approximately equal to one or two grains of sugar dissolved in a bath tub full of water)

The following table gives a subjective interpretation of relative hardness levels using the two most common units of measure for hardness.

Relative Hardness	***ppm (as $CaCO_3$)***	***grains/ gallon***
soft	*0 - 75*	*0 - 4.39*
mod. hard	*75 - 150*	*4.39 -8.77*
hard	*150 - 300*	*8.77-17.54*
very hard	*>300*	*>17.54*

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Palmer State Office ..... **(907) 746-9459**
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Soldotna—Kenai Peninsula District ..... **(907) 262-5824**
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Soldotna, AK 99669-9728

Tanana Chiefs Conference **1-800-478-6822**
122 1st Avenue **phone (907) 452-8251 ext 3248**
Fairbanks, AK 99701 **fax 459-3936**

If you are located in the city of
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If you are in the following areas:
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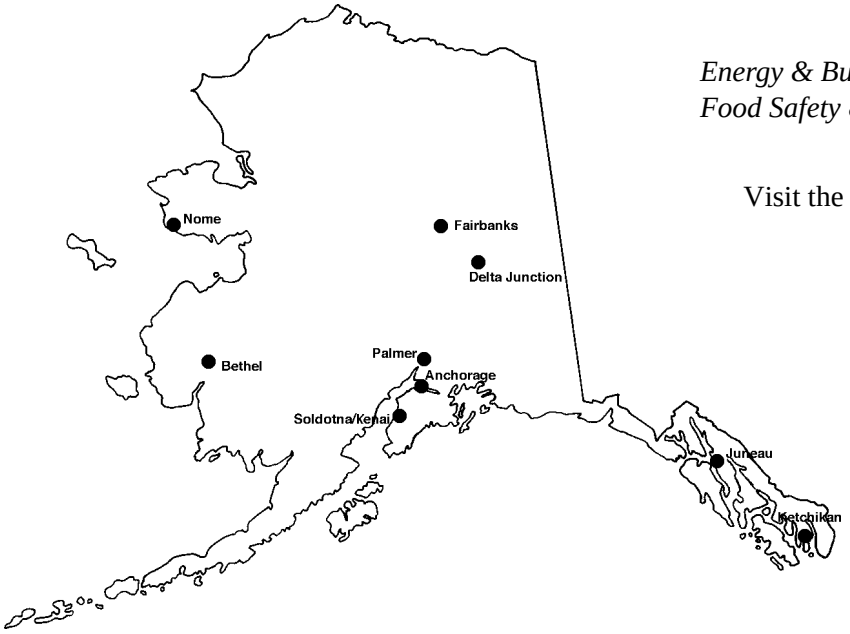
call toll free ..... **1-877-4UA-FACE (1-877-482-3223)**



Hotlines

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