ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Air in Drinking Water

The purpose of this document is to identify possible explanations for fine white bubbles that are sometimes seen in drinking water immediately after the water is taken from a faucet. The condition is similar to effervescence. These bubbles disappear within approximately one minute after the water is drawn from the tap.

DES does not believe that there is a health significance to these air bubbles, however, they may create a safety risk as explained below. They may also indicate improper physical conditions in pumps, pipes, or other water system equipment. There are numerous possible explanations for these bubbles. Some are given below.

DISSOLVED GASES

A variety of natural processes take place underground that produce dissolved gas in groundwater. Some examples include:

- Radon produced from radionuclide decay of uranium in bedrock, and
- Carbon dioxide, hydrogen sulfide, methane or other gases generated from:
    a. the decomposition of dissolved organic matter in groundwater, with or without oxygen available, or
    b. the by-products of chemical reactions of various naturally occurring mineral deposits.

The capacity of water to hold dissolved gases depends on many factors including both ambient pressure and temperature.

- In bedrock (artesian or drilled) wells, the water pressure at the bottom of the well is high. At greater water depths, a higher concentration of some gases can be dissolved in the water. When this water is raised by the pump to the ground surface and the ambient pressure is reduced, these gases may spontaneously come out of solution causing fine bubbles.

- Water temperature can also play a roll in the amount of dissolved gas that water can hold. As a general rule, the lower the temperature of water, the more dissolved gas can be held. When the temperature of the water increases (as happens in household plumbing and in a water storage tank), these gases may spontaneously come out of solution producing the same fine bubbles.

Methane is a colorless, odorless gas that is expected to be found in bedrock wells. Methane at high concentration is explosive and thus there is a fire hazard if large amount of water with methane are used near an open flame in a closed space. The presence of methane gas in water can be simplistically detected by agitating a small volume of water in a plastic container in an outdoor location and attempting to ignite the gas released. Have a neighbor present when you try this testing. If you have such a well, please contact us at the telephone number given at the end of this fact sheet. DES is conducting research on wells containing methane and may incorporate your well into this free DES study.

Lowering the settings of the pump's start/stop switch and/or providing an air release vent on the water storage tank at the high point of the **stored water** might allow this "off gassing" to occur at a point other than your faucet. Since this is a natural condition, and no damage is caused, there is no need to take any particular action.

INADEQUATE SOURCE YIELD OR OVERSIZED WELL PUMP

The level of water in a well will "drawdown" when the well pump is running. If the drawdown is excessive, air may enter the pump intake. Excessive drawdown can occur if the capacity of the pump is too large for the well's safe yield or if a drought condition has substantially lowered the groundwater table.

This problem can be reduced, in the short run, by using less water. A drawdown "cutoff" device might also be installed to control over-pumping. If drawdown is excessive, damage to the electric motor may occur due to over-heating. Immediate corrective action is necessary to prevent motor damage.

OTHER MECHANICAL CAUSES

Corrective action is necessary in all of these alternatives below.

Venturi Air Injectors. Certain water treatment systems (typically those used for iron, manganese and odor removal) have a special nozzle that is used to "inject" air into the raw water. The water is then routed through a tank to provide "reaction" time prior to filtration and to allow excess "air" to be removed.

Check the slope on the plumbing to ensure that excess air can reach the air relief valve. Also, make certain that the size of the aeration nozzle is proper for the amount of water being discharged by the pump. Try reducing the air-to-water ratio produced by the nozzle until just short of the condition when the iron/manganese or odor treatment device begins to be negatively affected.

Pump Selection. Cavitation is the technical name given to a condition where a severe vacuum forms inside a water pump. This often occurs near the pump impellers and is caused by an inappropriate sizing of the pump. When this occurs, dissolved gases will often come out of solution at the point of maximum vacuum. This can cause severe and damaging loads to the pump. The pump should be resized and the condition evaluated.

Drain-back Systems. Older water systems, without an air compressor or captive air pressure tank, often have an automatic method for replacing the air "head" in an older pressure tank. This plumbing arrangement has a vacuum breaker near the tank and a "bleed" installed on the discharge line inside the well casing.

It is unlikely that this situation would produce fine air bubbles. However, if your well has this configuration, please check the amount of air added at each pump start/stop cycle and ensure that the air release valve is functioning.

Faucet Design. The design of certain water use fixture creates great turbulence as the water comes from the faucet. Try another faucet in your home to see if the air bubble condition is the same. If similar, the origin of the bubbles is likely not in the faucets.

FOR MORE INFORMATION

Please contact the Drinking Water and Groundwater Bureau and the New Hampshire Water Well Board at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at www.des.nh.gov/organization/divisions/water/dwgb/-index.htm. All of the bureau's fact sheets are on-line at www.des.nh.gov/organization/commissioner/pip/fact-sheets/dwgb/index.htm.

Note: This fact sheet is accurate as of September 2008. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.