ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Taste and Odor in Drinking Water

INTRODUCTION AND OCCURRENCE

People often relate the quality of the water they consume by its taste, odor and color. Although these are important factors, they reflect only aesthetic properties and do not provide direct information about if the water is safe to drink. Only laboratory testing can determine if the water is safe to drink. Information regarding the testing of private wells can be found at the NHDES Be Well Informed water treatment application. If you obtain your water from a public water system, you can obtain a summary of the water quality of the water system from your water supplier or by contacting the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov. The information is also available online at www.des.nh.gov.

The taste and odor of water is subjective; not all that use the water taste and smell the same thing. The cause of taste and odor issues can be from water fixtures, plumbing materials, water heaters, water treatment, pressure tanks and/or the source (the well). Determining the characteristics (ex. is both the hot and cold water affected, is it experienced at all sinks) and the potential cause of the taste or odor are important in identifying the best remedy to obtain a more desirable taste and odor.

HEALTH EFFECTS

Many causes of taste and odors in water are not associated with contaminants in water that cause health effects. However, if the taste and odor of the water supply suddenly changes, it is advised that alternative water be used for cooking and ingestion until the source of the problem is identified. It is recommended that the water be tested following the testing guidelines provided at the NHDES Be Well Informed website.

DETERMINING AND ADDRESSING THE SOURCE OF TASTE AND ODOR IN WATER

Rotten egg, sewage or must odors are common odor complaints and can be caused by hydrogen sulfide, organic materials or even septic issues. These three causes and potential remedies are described below.

Hydrogen Sulfide Odors

The most common nuisance odor is a rotten egg smell that is most commonly attributed to hydrogen sulfide gas which is produced by iron and/or sulfur-reducing bacteria. These bacteria are not harmful if ingested and only exist if there is sulfide in the water. Although water laboratories can test for sulfides, it is not necessary to have laboratory confirmation as human senses can detect it at much lower concentrations than most laboratory equipment. This means a laboratory may report that water has "non-detectable" concentrations of hydrogen sulfide, but in reality, there is still enough hydrogen sulfide in the water to cause an undesirable odor. If this odor is present, first determine if it is in the hot and cold water, all faucets or only select faucets.

Here are some tests you can complete to determine the source of the odor and possible ways to correct.

1) Does the water exhibit the odor from **all hot and cold water** faucets in your home, or does the water obtained from all cold water taps exhibit the odor when it is heated? If "yes," it is likely that hydrogen sulfide produced by sulfur and/or iron bacteria are impacting the water in your well and/or plumbing system. Disinfecting your well in accordance with WD-DWGB-4-11 "Disinfecting a Drinking Water Well" is recommended. The disinfection process will kill the gas-producing bacteria for an unknown period of time. The well is a desirable environment for this bacteria to grow. You can disinfect and have no odor for months, even years, but it may return. If the odor reoccurs after disinfecting the well and plumbing system several times, a water treatment system may be needed. The options for removing hydrogen sulfide from water are described below.

   Aeration: In this process large volumes of air are blown through the water. The hydrogen sulfide volatilizes into the air bubbles. The "used" air is then vented outside the home. Aeration is also beneficial in removing radon gas and in raising the water's pH by allowing the "off-gassing" of excess carbon dioxide. Aeration systems often incorporate filter tanks and detention tanks to filter out any oxidized minerals and unused air. The principal disadvantage of this method is possible bacterial growth in the treated water caused by the use of dirty air. Off-gassing of the hydrogen sulfide will be less complete where the pH of the raw water is high.

   Oxidation: In this method an oxidizing chemical (potassium permanganate, chlorine or ozone) is added to the water. The oxidizer chemically reacts with the odor compounds so as to destroy the odor. If there is a high concentration or iron in the water an oxidation treatment system may be recommend primarily to remove the iron and the odor may also be treated in this process. Oxidizers are typically not installed on private well systems unless other treatment methods have proven to be unsuccessful, as these can be hazardous chemicals in high concentrations and require continual maintenance.

   Adsorption: In this process water is passed through granular activated carbon (GAC). The taste/odor components are taken up and held on the interior surfaces of the carbon particles as the water passes through. If intending to use GAC, also test the water for radon. See NHDES fact sheet WD-DWGB-3-11 "Radionuclides in Drinking Water."

2) Does the water obtained from **only your hot water** faucets exhibit the odor? If "yes," the odor is likely associated with the hot water tank. The first measure that can be taken is to drain the tank from the bottom to flush out sediment that make a favorable environment for sulfur and iron bacteria. After completing this, the water temperature of the tank can be increased to 160 degrees Fahrenheit for several hours to destroy the bacteria. Increasing the water heater temperature can be dangerous. Consult with the manufacturer or dealer regarding an operable pressure relief valve, and for other recommendations. Be sure to lower the thermostat setting and make certain the water temperature is reduced following treatment to prevent injury from scalding hot water and to avoid high energy costs.

   A second measure that can be taken is to disinfect the water heater. The easiest way to accomplish this is to disinfect the well and plumbing system in accordance with WD-DWGB-4-11 "Disinfecting a Drinking Water Well."

   A third measure that can be taken is to replace or remove the magnesium anode. The purpose of the anode is to protect the hot water tank from corrosion by corroding preferentially itself. Many

water heaters have a magnesium anode, which is attached to a plug located on top of the water heater. It can be removed by turning off the water, releasing the pressure from the water heater, and unscrewing the plug. Be sure to plug the hole. Removal of the anode, however, may significantly decrease the life of the water heater. You may wish to consult with a water heater dealer to determine if a replacement anode made of a different material, such as aluminum, can be installed. A replacement anode may provide corrosion protection without contributing to the production of hydrogen sulfide gas.

3) Does the water obtained **only for a specific fixture** exhibit the odor? If "yes," the odor may be associated with the water fixture itself or the odor may be coming from the drain associated with the water fixture. Fill a narrow glass with water and relocate to another area of the home. If the water exhibits the odor, it is likely that the water fixture needs to be replaced or the internal wetted surfaces of the fixture need to be thoroughly cleaned. If the water in the glass does not exhibit the odor, the drain associated with fixture may contain debris that needs to be removed or that proper water traps and not installed such that gas from the sewer or septic system is migrating through the drains. Another possible source of the odor near a water fixture is a failing or improper air admittance valve in the plumbing system. These valves are sometimes used in the interior of the house for wastewater drainage if it is not possible to vent wastewater drains to the rooftop.

Septic or Wastewater System Odor

Although less likely, a sewage odor could be associated with contamination of well water from a septic system or improper plumbing that cross-connects the potable water plumbing system to the wastewater plumbing system. Testing the water for bacteria, nitrite and nitrate immediately is imperative if this is the possible source of contamination.

Organic Material Odors

An organic (decaying vegetation) odor is very similar to the odor associated with hydrogen sulfide. A hydrogen sulfide odor is produced by a gas, so a rag soaked with an odor will not smell after it dries because the hydrogen sulfide will have evaporated. Organics materials are not a gas, so soaked rag will still smell after it dries. When the odor is present, soak the rag and verify it smells. Then lay it out and let it dry (not in a dryer). If it smells when it is dry, the cause of the odor is likely organic material. It has also been anecdotally reported that water with an odor from organic material opposed hydrogen sulfide seems linger on skin after washing or bathing.

Wells that are influenced by surface water are most often affected by organic material. This can include bedrock wells because vertical fractures can connect surface water with bedrock wells. Water treatment companies may be able to treat water to remove the organic material, but often times these systems fail. Trying to remedy the problem in the well itself or installing a new well located farther away from surface water and with extra casing sealed deep into bedrock may a more effective measure that can be taken to address odors associated with organic matter in water.

Other Odor and Taste Issues

Elevated levels of sodium, chloride, manganese, iron and/or a low pH of water can cause a variety of taste and odor issues. If water quality exhibits a value outside of the thresholds listed for the parameters below, then this could be the cause of a taste or odor problem:

Parameter	Concentration Affecting Taste or Oder	Impact
Either Sodium or Chloride	250 mg/L	Salty taste, corrosion, metallic taste
Manganese	0.05 mg/L	Dark stains on laundry or water fixtures and/or strong oil like odor
Iron	0.3 mg/L	Red or orange staining on laundry or water fixtures
pH	Below 6.5 or above 8.5	Metallic taste and greenish colored stains on fixtures due to plumbing corrosions

The following documents provide more information about these parameters in drinking water.

WD-DWGB-3-17 Sodium and Chloride in Drinking Water
WD-DWGB-3-8 Iron and/or Manganese in Drinking Water
WD-WDGB-3-4 Water Corrosivity, Lead and Copper (for pH)

HUMAN CAUSES

Occasionally, taste and odor can indicate the presence of serious health-related contaminants such as those from man-made chemicals. These are often associated with nearby land uses such as landfills and industrial areas. To determine the presence of these contaminants, complicated and relatively costly laboratory testing is typically required. If your water comes from a public water system, a change in the amount of chemicals used for water treatment systems could be the cause of the change in taste or odor.

For More Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at www.des.nh.gov.

Note: This fact sheet is accurate as of October 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.