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Technical Bulletin

Fluoride In Drinking Water

In the United States, the debate over fluoride continues. "What is the cost and are there benefits of adding fluoride to drinking water?" Well owners certainly have a choice about giving children additional flouride. For many millions of Americans with a water utility as their provider, the choice is made for them.

The first municipal program to add fluoride to drinking water started in 1945 in Grand Rapids, Michigan. Today, approximately sixty percent of Americans drink fluoridated water from public water systems. The fluoride is added to public water supplies to achieve drinking water fluoride levels between 0.7 to 1.2 parts per million (ppm*). These are the levels recommended by the American Dental Association to help prevent tooth decay. In 1983, the U.S. Environmental Protection Agency set a concentration level of 4 ppm as the Maximum Contaminant Level (MCL) for fluoride in public drinking water supplies to prevent "skeletal fluorosis" (arthritic "brittle bone" disease). A Secondary MCL was set at 2 ppm to prevent cosmetic "dental fluorosis" (observed as white spots or yellow and dark brown mottling of the teeth).

The MCL is a legally enforceable level that public water utilities must follow. The Secondary MCL is a guidance / advisory level that is not enforceable. Neither level is enforceable for private wells or for water tests required for property transactions. Fluoride of geological origin is often found naturally in trace amounts (generally less than 0.3 ppm) in ground water.

There has been on-going controversy during the last two decades concerning the effectiveness of fluoridation of water supplies in preventing tooth decay. It seems that studies can be found that support both sides of the debate. In the late eighties the National Institute of Dental Research concluded that fluoride has no effect on the incidence of tooth decay and that 66 percent of children in communities with fluoridated-public water suffer from dental fluorosis.

However, other researchers have found that fluoride does reduce the rate of tooth decay. The American Dental Association recommends fluoride supplements for children from 6 months to 16 years old in non- or low-fluoridated communities. In contrast, the Canadian Dental Association advises against fluoride supplements for children before their permanent teeth have erupted, at about 6 to 7 years of age, to avoid tooth discoloration. The Center for Disease Control in Atlanta has stated, and many recent studies now seem to suggest, that topically applied fluoride is more effective in preventing tooth decay compared to ingestion of fluoride in food, drink or fluoride supplements. Virtually all places in Europe (93%) have banned fluoride as an addition to water supply because of the controversy surrounding its use. Europe's precautionary approach is to promote better dental hygiene.

A number of recent studies have indicated that fluoride may be associated with other health risks. It may be a cause of hyperactivity, depressed IQ, elevated blood-lead levels in children, and is a possible carcinogen. Fluoride is used in some pharmaceuticals (e.g. Prozac) and almost 200 pesticides. Some retail beverages are prepared with fluoridated water, although the U.S. Federal Food and Drug Administration does not require the listing of fluoride in the ingredients label.

Some dentists recommend a laboratory water quality test of drinking water before prescribing a fluoride treatment plan. For well owners, testing your water is a good idea whether or not the dentist recommends it. Fluoride tests are not expensive. If you have high concentrations of fluoride in your water, water treatment devices are available. Reverse osmosis is recognized as an effective way to reduce fluoride in water. Activated alumina ion-exchange is also effective but requires a pH (acidity) value between 5.5 and 6.5 to reduce fluoride levels.

HOW TO "OPEN UP AND CLOSE DOWN" A SUMMER HOME

Owning a summer home requires regular maintenance for general upkeep. Your summer home water well should be on the routine checklist. Most private wells will operate trouble-free for many years with periodic inspections and maintenance. Many summer homes, cottages or cabins do not have wells designed and constructed to modern standards. If you have a dug well or a shallow well point as a supply source, you need to be particularly careful about checking the water quality.

During extended periods of inactivity, well water may pick up unpleasant odors and tastes from reactions between the minerals in the soil and rock and the oxygen entering through the well. When "opening up," your first step in checking the water quality is to turn on every tap and faucet in and out of the house for five minutes. This will remove any stale water that has been sitting in the pipes and pressure tank and will also begin to flush the well itself. Depending on the diameter and depth of your well, the rate of inflow, the minerals in your aquifer and other factors, you may have to run the pump for half an hour or longer to stimulate the inflow of "new" water into the well and effectively clear all the "old" stored water from the well.

Next, have your water tested for bacteria and nitrates. A home test kit from a hardware store may be satisfactory as an initial check. If a positive bacteria result or nitrate level above 10 milligrams per liter (ppm) is found, it is recommended that a local state-certified lab do a follow-up water test. Bottled water should be used for drinking in the interim. These and other tests are recommended for all private wells including those in seasonal use and are listed on the Trust's website "Ground Water Information" page (www.agwt.org). Keep a record of the water test results so you can compare them from year to year and identify any trends in water quality. This may be particularly important if there is new construction taking place around your summer home. The annual test information may help alert you to potential water quality problems.

If water tests show the presence of bacteria, first disinfect the well (www.agwt.org has details on the disinfection process). If the problem is not solved by well disinfection, it may be necessary to install water treatment equipment to remove the bacteria. If other contaminants are found, feel free to call the Trust at 1-800-423-7748 or e-mail us at TrustInfo@agwt.org and we will be glad to discuss options to solve your concerns.

Generally speaking, water pumps, switches, and pressure tanks do not pose any special problems related to season use. However, water-conditioning equipment will require maintenance of some kind on a periodic basis. Read the owner's manual pertaining to your system to find out what maintenance is required and what steps (if any) are needed after long-term inactivity. Contact a local well contractor or the equipment manufacturer if you are unsure about how to maintain your equipment. Poorly maintained water treatment systems can concentrate contaminants to unsafe levels and may promote bacteria growth in the treatment system. Keep track of any service performed on the equipment. Recording this information doesn't take much time and may help lead you to the source of any problems.

One of the biggest potential problems for summer home wells is from wastewater disposal. You are advised to make sure that your summer home wastewater system is not overloaded. If you allow your family and guests to use more water than the septic system is designed to handle, there may be a real risk to the well.

When "closing down" a summer home well, turn off the electricity to your water pump rather than just closing a valve. This will ensure that no water will continually leak from a worn connection valve. If you house is located in an area where freezing temperatures could occur, drain your pipes and remove any water from the treatment system to prevent damage. Some companies will store your equipment if complete water removal is not possible. Also, remove and replace any filters or cartridges from your treatment system and perform any other equipment owner's manual recommendations for long-term inactivity.

ABRAHAM **L**INCOLN – **T**HE **G**ROUND **W**ATER **C**ONNECTION

Had it not been for contaminated well water, America's First Lady in 1861 might have been Ann and not Mary! Before Abraham Lincoln married Mary Owens it was speculated that he had a romance with Ann Rutledge. In 1832 when he moved to New Salem, Illinois, the future President stayed at a tavern where Ann worked. Initially, Ann was engaged to John MacNamar. Sometime during 1832, MacNamar told Ann he had to travel to New York but would return to marry her. He never returned.

As one might expect, much of the information about the relationship between Ann and Abraham Lincoln following MacNamar's departure is not well documented. However, most reports indicate that Lincoln and Ann became very good friends. Unfortunately, Ann Rutledge became ill during the late spring of 1835 and in August finally succumbed to the illness at the age of 22. It is suspected that she died of typhoid fever, which is caused by a bacteriologic pathogen found in human and animal feces.

Ann Rutledge probably contracted her illness from the tavern's well water. The seepage from a nearby outhouse could have infected the well water. In the early 1800's people commonly fetched their water by bucket from open dug wells. Pumping systems were not available to transport water from wells to buildings. Water was deemed safe to drink as long as it didn't smell, taste, or look bad. "Modern" bathrooms were not available to flush wastes to home septic or public sewer systems. Instead, outhouses located near homes and businesses were commonly used.

We now know that dug wells are highly susceptible to contamination from septic system and outhouse seepage. This drinking water/health connection was unknown in the early 1800's because many disease-causing organisms are odorless, tasteless and colorless and could pass ineffective "nose, mouth and eye" tests. At that time, people had no way of knowing whether or not their water was safe to drink. Bacteria were discovered in 1676, but the link between bacteria and disease was not confirmed until 1876 when Nobel Laureate Robert Koch confirmed the connection through his work with the anthrax bacterium.

In Lincoln's time, drilling rigs were not available to drill wells. Drilling machines did not appear on the scene in America until the 1870's. Today, drilled wells with well casing protecting the supply from near surface contamination are much safer and yield a more dependable supply of water than dug wells. Private well owners still have the responsibility to test their well water and ensure that the supply is free from contamination. Our knowledge of health protection and hygiene in the U.S. has come a long way since 1835. Wells are a safe daily drinking supply source for 150 million Americans. Unfortunately in some developing countries, the health risk to millions of people from unsafe supply sources has not improved much from the conditions in rural America 170 years ago.

[The Trust's web site, www.agwt.org/Trust_files/info/bacteria_info[1].html has much more information on the subject of bacteria.]

GOLF **C**OURSES AND **G**ROUND **W**ATER **R**ESOURCES

The sport of golf is a multi-billion dollar industry that draws millions of participants annually. The lush deep-green color and well-manicured fairways and greens are a big draw for golf players and fans alike. Golf courses can also offer great wildlife habitat. Many new golf courses are built each year, and many courses use thousands of gallons of well water a day to keep the turf green. In areas where annual rainfall is high, this generally does not pose aquifer overdraft problems. In areas with low annual rainfall, the withdrawal of ground water can impact the levels of the water table in nearby wells by drawing down a large cone of depression around the irrigation well(s).

In some communities, there are efforts being taken to limit ground water withdrawal, particularly during drought conditions. Problems arise when water is pumped out of the ground faster than it can be naturally replenished (exceeding the "safe yield" of the aquifer). As a result of the growing demand for water, many golf courses use water conservation strategies. For example, some have replaced existing turf with more drought tolerant varieties, installed more efficient irrigation equipment for watering the fairways and greens, and added water-retaining polymers to the soil.

Golf courses do offer some advantages with regard to ground water in comparison to a developed built-up site. Turf is much more pervious than paved driveways, parking lots, or buildings, thereby increasing the total volume of precipitation available for recharge to the underlying aquifer. Healthy vegetation promotes increased water infiltration to the subsurface. More infiltration results in less runoff and a reduction in erosion and sedimentation problems in nearby rivers and streams. The vegetation provided by a golf course creates an area within the community where natural-soil filtration may reduce the impact of airborne contaminants. This will help to offset the effects from nearby impervious built-up areas that collect and concentrate non-point source pollution derived from human activities.

Golf course superintendents must be careful to properly manage the application of fertilizers, herbicides and pesticides. They should do so in order to minimize course operating costs, but more important, to control and avoid the potential for adverse impacts to ground and surface water. Many golf course managers are incorporating pest-resistant vegetation and understand that “less is more” when applying chemical products.

It remains to be seen how individual towns, multi-community areas and state/regional governments will manage their finite water supplies in the face of growing populations, ecological and environmental concerns, and potential water shortages. Golf courses are one of many land uses and activities that use water in a community. The key to sustainability of our life-styles will demand choices and compromise among land-use options and the allocation of natural resources.

*(ppm - Parts per million is very similar to mg/L - milligrams per liter.

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