NELSON ANALYTICAL LAB - TEST DESCRIPTIONS

Total Coliform & E.coli Bacteria (Limit = "ABSENT" per 100ml)

The organisms in the total coliform group are called indicator organisms. That is, if present, they indicate that there is a **possibility, but not a certainty**, that disease organisms may **also** be present in the water. When absent there is a very low probability of disease organisms being present in the water. The ability of the total coliform test to reliably predict the bacterial safety of water relative to the hundreds of possible diseases that might be present is critical since it is impossible, in a practical sense, to check separately for every disease organism directly on a monthly or quarterly basis. The presence of only **Total Coliform** generally does not imply an imminent health risk but does require an analysis of all water systems facilities and their operation to determine how these organisms entered the water system. **Escherichia Coli (E.coli).** This is a specific species (subgroup) within the coliform family. They originate only in the intestines of animals and humans. They have a relatively short life span compared to more general Total Coliform. Their presence indicates a strong likelihood that human or animal wastes are entering the water system, and have a much higher likelihood of causing illness.

Iron & Manganese (Limits = 0.3 & 0.05 mg/l respectively)

These occur naturally in New England's geology. They dissolve into groundwater as acidic rainfall percolates through the soil and rock. In higher concentrations, they can cause the following problems:

1. Staining on laundry and water fixtures.
2. Taste - a metallic or vinyl type taste in the water.
3. Appearance – occasionally will give an oily appearing, "crusty" sheen to the water's surface.
4. Clogging. - supports the growth of Iron bacteria. This non-health related bacteria can clog strainers, pumps, and valves.

EPA, at present, has not set health standards for either iron or manganese in drinking water. They are both considered aesthetic concerns only.

Hardness

The presence or absence of conventional hardness in drinking water is not known to pose a health risk to users. Hardness is normally considered an aesthetic water quality factor. The presence of some dissolved mineral material in drinking water is typically what gives the water its characteristic and pleasant "taste". At higher concentrations however, hardness creates the following consumer problems:

1. Produces white mineral deposits on tubs, showers, and dishes
2. Reduces the efficiency of devices that heat water. As hardness deposits build in thickness, they act like insulation, reducing heat transfer.
3. Can reduce the ability of soaps to create suds, thus reducing the efficiency of cleaning ability. Can cause problems with laundry.

Nitrate & Nitrite Nitrogen (Limits = 10.0 & 1.0 mg/l respectively)

Nitrate is a component in fertilizer, and both nitrate/nitrite are found in sewage and sanitary wastes from humans and animals. Nitrate/nitrite concentrations are not normally high in New England's wells or surface waters. When elevated, the surrounding area is often heavily developed, used for agricultural purposes, or subject to heavy fertilization. Excessive levels of these nitrogen compounds in drinking water have caused serious illness and sometimes death in infants under six months of age. Symptoms include shortness of breath and blueness of the skin (methemoglobinemia).

Sodium & Chloride (Chloride = 250 mg/l)

The compound known as "salt" consists of the elements sodium and chloride. Substantially higher levels of Sodium and Chloride tend to imply contamination by activities of man including road salt storage, use of road salts, and discharges from water softeners. Typical background levels of Sodium and Chloride for pristine locations in New England's are generally less than 15 mg/L and 30 mg/L respectively.

pH (Acceptable Range = 6.5 – 8.5)

The pH of water is a measure of its acidity or alkalinity. A low pH indicates acidic water, which is therefore likely to be corrosive to household plumbing such as copper pipes. In older homes (prior to mid to late 1980's) the plumbing may also contain Lead in the soldered joints. Corrosive water will dissolve these metals from the plumbing into the water. Dissolved Copper & Lead in drinking water can be a health concern, and can also be a maintenance concern as the water corrodes the plumbing in the home eventually causing water leaks.

Lead & Copper (Limits = 0.015 & 1.3 mg/l respectively)

Found in water with corrosive tendencies (see pH). There is an extremely low occurrence of naturally occurring lead & copper in water. It is nearly always from plumbing systems with copper lines and/or lead solder. Levels are highest after water has been stagnant in the pipes. The recommended method for testing of Lead & Copper when plumbing is a concern is to sample water after it has been sitting in the pipes for 6 – 10 hours, without running the water at all prior to filling the bottle. This is called a "first draw" and simulates a worst case test.

Radioactivity (Limit = 15 pCi/L for Gross Alpha)

New England's bedrock contains naturally occurring radioactivity. A few examples **include Radon, Radium 226, Radium 228 and Uranium**. Radon is a gas (see separate description); the others are minerals. The basic test to determine the total radioactivity from all these sources is **Gross Alpha**.

Alkalinity: A measure of water's acid neutralizing capacity. A low alkalinity in combination with low hardness may increase corrosive tendencies, especially in water that already has a pH below or at the low end of the acceptable range.

Arsenic (Limit = 0.010 mg/l)

Arsenic occurs naturally in New England. In fact, arsenic was mined commercially in New England during the 1800s. Arsenic also occurs as a result of human activities. Activities that could have left arsenic residuals include apple orchard spraying and coal ash disposal. Generally it is not possible to predict if a well will have elevated arsenic. Arsenic has no smell, taste or coloration when dissolved in water, even at high concentrations. Only water quality testing can determine its presence and concentration in well water. Arsenic has been classified by the U.S. Environmental Protection Agency (EPA) as a human carcinogen (cancer causing agent.) Long term exposure to arsenic has been linked to cancer, cardiovascular disease, immunological disorders, diabetes and other medical issues. On February 22, 2002 a new EPA rule for arsenic in drinking water became effective. This new Limit is 0.010 mg/l, the old limit was 0.050 mg/l. This new rule is final, and became fully enforced on all public water systems in January of 2006. New England's DES recommends that at least two tests be processed before concluding the well's arsenic concentration, as well water quality can change due to many factors.

Radon (No regulated limit)

IMPORTANT NOTE: Radon levels may test significantly different when collected from a well that is not in a normal pattern of use, compared to Radon levels from the same well when in normal daily use.

Radon gas is normally found in all well water. Bedrock wells typically have much higher levels then dug or point wells. The most significant concern is the inhalation of Radon from the air. Radon typically enters air via two common pathways:

1. Migration (up from the soil) into the house air through cracks and/or other openings in the foundation.
2. Release of dissolved radon gas into the air from water usage in the home.

In New England's, the migration of radon up from the soil contributes the largest percent of radon found in the average home. Radon from a groundwater type water supply source, particularly a bedrock (artesian, drilled) well, contributes the next largest percentage of radon in the home. The US EPA has set an advisory "action level" of **4 pCi/L for radon gas in indoor air**. While not a mandated health standard, this level is a guideline for people to use in assessing the seriousness of their exposure to airborne radon. Studies show that high levels of radon gas in the air increase the risk of developing lung cancer. **At present there is no federal or state regulated standard for radon in drinking water.** In 2016, the New Hampshire Department of Environmental Services (NHDES) and the Maine Radon Program recommended that private wells with radon concentrations at or above 10,000 pCi/L be treated to reduce radon levels. Treatment for water with concentrations between 2000 and 10,000 pCi/L (in NH), or 4000 and 10,000 (in ME), may be advisable if the air concentrations in the home exceed 4 pCi/L. The EPA has proposed a limit of 4000 pCi/L, but this has never been enacted. Massachusetts recommends 10,000 pCi/L and Vermont 4,000 pCi/L. A useful equation developed by the EPA to determine the seriousness of Radon in water is that 1 pCi/L of Radon will develop in air for every 10,000 pCi/L in water.

Fluoride (limit = 2.0/4.0 mg/l secondary/primary)

Fluoride occurs naturally in New England's bedrock. Fluoride has no taste, color or odor and **thus the only way** to determine its concentration is by laboratory analysis. The Centers for Disease Control (CDC) have recommended 1.0 to 1.2 milligrams per liter (mg/L) as the optimum beneficial concentration of fluoride in drinking water for dental protection in state of New England's. Below 0.5 mg/L there is little tooth decay protection. Above 1.5 mg/L, there is little additional benefit. In the range of 2.0-4.0 mg/L of fluoride, staining of tooth enamel is possible. At concentrations above 4.0 mg/L, studies have shown the possibility of skeletal fluorosis as well as the staining of teeth. In its most severe form, skeletal fluorosis is characterized by irregular bone deposits that may cause arthritis and crippling when occurring at joints.

MtBE / Volatile Organic Compounds (VOC's)

MtBE is the abbreviation for the compound "methyl tertiary butyl ether". This compound is a colorless liquid added to gasoline. Thus its presence in well water would indicate that gasoline contamination exists in the well. MtBE degrades very slowly, is highly soluble in water, and has very low taste and odor thresholds. The EPA has not set a formal health based drinking water standard for MtBE. However, the NH. Department of Health and Human Services has recently developed a health-based drinking water standard for MtBE of 13 micrograms per liter (ug/L). Studies with animals suggest drinking water with high levels of MtBE may cause stomach irritation, liver and kidney damage, and nervous system effects. An increased amount of liver and kidney cancer was found in rats and mice breathing high levels of MtBE. Because of the animal studies on MtBE, New England's considers MtBE a possible human carcinogen. MtBE is tested in a group of approx. 70 compounds associated with petroleum or organic chemical contamination called Volatile Organic Compounds (VOC's). Many of these compounds are also known carcinogens.

Sulfide (Rotten Egg Odor)

Sulfide can be formed naturally as a by-product of the decomposition of organic material possibly aided by the presence of non-hazardous sulfur reducing bacteria, or by chemical reactions of soil and bedrock minerals containing sulfur. At the concentrations typically found in drinking water, it is not hazardous to health. It is also important to note that the odor threshold for sulfide is considerably lower than the point at which our laboratory test detects it. So you may smell it before we can find it.

Conductivity: A very basic test measuring the total dissolved mineral content of water. Includes all individual minerals separately listed on this page.