National Testing Laboratories, Ltd.
Quality Water Analysis

Water Testing: Why Customers Should Be Informed

People must recognize that drinking water contamination is a serious problem. It is a problem that is constantly being addressed by government officials, public interest groups and the scientific community. Since this is a complex and multi-faceted problem, it will take years of research and testing before resolution may be found.

While we wait for the numerous sources of contamination to be cleaned up, we must live with these satisfactory conditions, which is possible if the following questions are addressed.

- What form of contamination, if any, is present?
- What is the source of the contamination?
- Does the contamination pose a health hazard?
- How can the contaminant(s) be removed from the drinking water supply?

What is Contamination?

Pure water (H20) consists of 11.1888 percent hydrogen and 88.812 percent oxygen by weight. Although the term "pure water" is used commonly, it is a virtually a non-existent liquid due to its aggressive nature. Water often is referred to as the "universal solvent" because of its ability to dissolve almost anything it comes into contact with. The superior solvent action of water allows it to easily be contaminated by water soluble materials. For example well water typically contains calcium, magnesium, iron and manganese due to its contact with rock formation containing these minerals. Water also dissolves metals from pipes and plumbing fixtures, which contain lead, copper, iron, etc. Gasses and dusts from the atmosphere and other water-soluble compounds may be dissolved by water as they come in contact with it. Water is considered contaminated when it contains harmful or objectionable substances that may be dissolved, suspended or biological.

Where did this problem originate and why now?

Water pollution and contamination are issues that have been attracting more and more attention since the beginning of America's Industrial Revolution. The Industrial Revolution prompted a rise in the manufacturing of goods. This increased manufacturing led to the creation of new synthetic materials. The U.S. chemical industry produced 11 trillion pounds of synthetic organic chemicals between 1945 and 1991, most of which has ended up in our environment (soil, air, and/or water).

In mankind's effort to improve the quality of life, many different chemicals have been developed. Some of the numerous uses include food preservation, sprays for personal hygiene, pet care and cleaning homes and automobiles. More than 1,000 chemicals are created each year to meet demands in the marketplace.

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In the past these chemicals were developed and released into the environment with little thought given to the potential dangers they might present. Environmental activist have forced the industry and governmental agencies to become more conscious of waste disposal and is impact on the environment. Traditionally, hazardous waste has been disposed of via deep-well injection, surface impoundments and landfills. Current regulations for deep well injections do not require long-term monitoring of the sites, which allows waste to contaminate the soil and water long after monitoring periods have passed. According to the U.S. Environmental Protection Agency (EPA) approximately 70 percent of surface impoundments (pits, ponds and lagoons) that are used for hazardous waste disposal do not have liners and as many as 90 percent may threaten groundwater. The Office of Technology Assessment has determined that eventually even the best designed and secured landfills will leak hazardous waste into nearby surface and groundwater. Past hazardous waste management practices have allowed thousands of chemical compounds to find their way into many drinking water supplies.

When is a Contaminant Considered Harmful?

In 1974, Congress passed the Safe Drinking Water Act, which authorized the EPA to establish safety levels for specific contaminants in public water supplies. These safety levels are referred to as maximum contaminant levels (MCLs), which are the maximum allowable amounts of the regulated compounds in drinking water.

The EPA has divided the standards for drinking water into primary and secondary standards. Primary standards regulate contaminants that present a health risk. Secondary standards regulate contaminants that cause aesthetic problems such as taste, odor, color and appearance.

The original list of inorganic and organic contaminants with MCLs has grown from 18 in 1975 to 94 in 1999 additional contaminants are constantly being considered for future regulations.

What is the Risk?

Unfortunately, chemicals are being introduced into the environment faster than we can calculate their risks and benefits. Here are currently is in excess of 70,000 chemicals in commercial use. According to the National Academy of Sciences, only 10 percent of these have been tested for toxicity.

The effects of some toxic substances on human life have been understood for some time. For instance, arsenic studies have indicated that arsenic is a potent carcinogen (India, Bangladesh). The effects of mercury poisoning became apparent in the early 1900's in Japan where eating mercury-contaminated fish crippled and killed thousands of people. Numerous studies have determined the even small amounts of lead can have adverse health consequences, especially in infants and small children. According to the EPA, almost one in five Americans drink tap water containing excess levels of lead (including seven million children).

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The Threat is Real!

The National Water Quality Assessment program, an on-going study by the U.S. Geological Survey (USGS), reports about 50 percent of wells sampled contained one or more pesticides and more than 50 percent of streams sampled contained five or more pesticides.

According to studies conducted by the Environmental Working Group (EWG), between 1994 and 1995 (the most recent federal data available) more than 45 million Americans were supplied drinking water that violated federal health standards for fecal matter, parasites, disease-causing microbes, radiation, toxic chemical, lead and other pollutants.

There are approximately 1.4 million underground storage tanks containing petroleum products or other hazardous chemicals in the United States. The EPA estimates approximately 20 percent of these are leaking, which breaks down to 280,000 tanks.

According to another EWG study in 1999, Atrazine, a common weed killer, was found in the drinking water of 796 towns throughout the Midwest.

Many contaminants are colorless, tasteless and odorless, which leads people to believe drinking water is safe. This may not be a safe assumption. Analysis by a qualified laboratory is the only way to accurately determine the presence or absence of contaminants.

How Small is One Contaminant?

Very Small. The standard units for measuring contaminants include milligrams per liter (mg/l) or parts per million (ppm) and parts per billion (ppb). The maximum contaminant levels are written in mg/l. The unit mg/l and ppm are interchangeable. To give you an idea of how small these measurements are one ppb is equivalent to one second in 32 years. Sixteen parts per million equals 1600 ppb. Very small quantities of toxic contaminants usually do not cause immediate health problems, but if consumed over a long period of time, they can cause serious and possibly irreversible health complications.

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