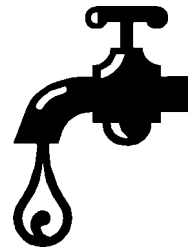


Drinking Water Standards



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Much attention has been focused on the quality of our drinking water in recent years. When you turn on the faucet, you expect to fill your glass with water that is “pure” and safe. Public concern for drinking water and continuous advances in water treatment research have resulted in the establishment of more stringent criteria to measure safety and purity. The United States is proud to have the safest water on earth. However, it is important that we understand issues related to drinking water safety. This publication discusses water safety standards and guidelines.

TERMS AND DEFINITIONS

acute—serious, critical, or dangerous.
chronic—constant, continuous, or ongoing.
contaminant—a substance that can infect, pollute, or make impure.
private water system—residential water supply serving fewer than four families.
public system—water supply that serves at least 15 connections or a minimum of 25 people for at least 60 days a year.
toxicity—the degree to which a substance is harmful, dangerous, or deadly.

Establishing Guidelines for Safety

Contaminants occur in varying levels in all water. These contaminants consist of gases, bacteria, minerals, metals, and chemicals that are in suspended or dissolved form. Many of these are invisible to the eye. Differing degrees of these substances can affect health. However, determining the health effects of contaminants is often difficult and time-consuming to measure since the effects frequently occur over a period of years.

Drinking water supplied by public water systems is regulated and monitored for many contaminants. These regulations are known as *drinking water standards*. They are controlled by the Safe Drinking Water Act and enforced by the Environmental Protection Agency (EPA). Drinking water standards represent conservative judgments by scientists and regulators based on available information on the health effects of the contaminants. Private water supplies are judged against these standards when water samples are taken and tested by a certified water testing laboratory. However, private water supplies are *not* regulated.

All states must meet the federal drinking water standards or issue limits that

exceed them. State regulators *cannot* set and enforce drinking water standards that are less stringent than the levels set by the EPA, but they can set additional or stronger standards. For example, in Kentucky the Kentucky Division of Water (DOW) has an additional requirement related to the disinfectant residual.

As required by the 1996 Safe Drinking Water Act amendments, beginning in October 1999 every community water system must make a quality report to its customers at least once a year. This report will provide information about the system's source water and the level of contaminants in the water.¹ It is believed that public awareness and involvement will foster greater understanding and support, factors which are important to addressing and preventing growing threats to drinking water quality.

The EPA has established two sets of standards for drinking water quality: *primary* and *secondary*.

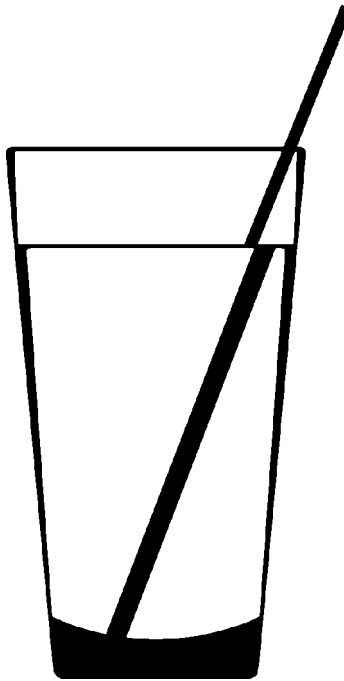
Primary Drinking Water Standards

Primary standards are based on health considerations and are enforced by the EPA. The EPA assigns them to contaminants for only three reasons: they cause adverse (harmful) health effects, they are detectable in drinking water, and they are known to occur in drinking water.

When setting a primary standard for a drinking water contaminant, the government examines all of the toxicological data on

that contaminant. This information is usually obtained from acute and chronic animal studies, although occasionally human clinical or epidemiological data are also available. Experts use this information to estimate the concentration of a drinking water contaminant that may be dangerous and those concentrations, if any, that may be considered safe.

Because the levels of contaminants found in drinking water are seldom high enough to cause acute health effects, health officials are more concerned about chronic health effects, such as cancer, birth defects, miscarriages, nervous system disorders, and organ damage. These health effects may occur after prolonged exposure to small amounts of a substance. In addition, when regulators set drinking water standards, they treat substances that cause cancer (carcinogens) differently from contaminants that cause other health effects.



Non-cancer Causing (Non-carcinogenic) Substances

Officials set standards for substances that cause harmful health effects other than cancer using a figure called the *acceptable daily intake* (ADI), which is calculated from animal studies. The ADI is the daily dose a person can consume over a lifetime without suffering any adverse health effects. The figure includes a conservative safety margin.

Regulators use the ADI to establish a *maximum contaminant level goal* (MCLG) for a contaminant. The MCLG is the concentration of a contaminant that experts

¹ U.S. Environmental Protection Agency, Safe Drinking Water Act Amendments of 1996, EPA 810 S-96-001, August 1996.



believe a person can safely drink during a lifetime. It is based entirely on health considerations and is set at a level where no adverse health effects should occur. The MCLG is not enforced by the EPA.

The primary standard *enforced* by the EPA is known as the *maximum contaminant level* (MCL). It is set as close as possible to the MCLG. When setting the MCL, regulators consider not only health effects but the probability of the occurrence and the combined cost of analyzing the water for the contaminant and of treating the water to remove it. Therefore, the MCL is often less rigid than the MCLG.

Cancer-causing (Carcinogenic) Substances

In setting primary standards for substances believed to cause cancer, regulators assume that no concentration is safe. Consequently, the MCLG is set at zero. However, a zero level is not always possible to achieve, so regulators estimate toxicity by calculating a figure called a *risk estimate*.

In theory, the risk estimate is any concentration of a carcinogen in drinking water that may possibly cause cancer. In

practice, at very low concentrations the risk of cancer becomes so small that it is considered negligible. Therefore, regulators must decide what level of risk is acceptable. For example, one cancer case occurring in one million people who are exposed over a lifetime (70 years) might be considered acceptable. The concentration estimated to cause this “acceptable level” of risk is the *risk estimate*.

Keep in mind that the Primary Drinking Water Standards do not *guarantee* that water with a contaminant level below the standard is risk free, nor do they mean that water with a higher level is unsafe. These standards represent *conservative judgment*, based on a number of factors as previously discussed.

Secondary Drinking Water Standards

Secondary drinking water standards are sometimes referred to as “nuisance contaminants” causing physical and aesthetic problems. They are not enforced or regulated by the federal government through the EPA, although many states, including Kentucky, follow recommended guidelines established for these non-mandatory water quality standards. The concentration limit is known as a *secondary maximum contaminant level* (SMCL).

These contaminants create offensive taste, odor, color, corrosivity, foaming, and staining. They can be damaging to household appliances, fixtures, clothing, cooking, and eating utensils. Although they are not life-threatening, these contaminants can cause minor health-related problems, such as skin flaking and rashes. Generally speaking, the major concern with these contaminants is aesthetic and/or monetary in nature.

Standards Are Not Absolute—and They Change

Setting drinking water standards is an imperfect process, rarely based on absolute or definite human evidence. It is extremely difficult to predict any effects of drinking small amounts of substances over long periods of time. Scientists and researchers, however, continue to gather data and make changes based on the most up-to-date information and technology available.

The enforcement and management of U.S. drinking water standards is a cooperative endeavor by water systems, state governments, and the EPA. When a standard is exceeded, the EPA requires that the contaminant level be reduced to the appropriate MCL. The appropriate action or corrective treatment, however, is left to the respective water company.

It is important to remember that regulatory decisions and actions, at all levels,



are frequently complicated by economic, political, and social issues. Appropriate action and compliance may span a period of many months.

There are also a great number of contaminants for which no MCL has been established, and they are not currently regulated by state or federal agencies. Many of these are under careful study by the EPA and may become regulated in the future.

For a list of current Primary and/or Secondary Water Standards and their contaminant levels, talk with your local county Cooperative Extension Service office.

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