WaterReview
Consumer Report
A Publication of the Water Quality Research Council
Volume 4, No. 3, 1989

Contaminants: Home Technologies For Improving Water Quality

Tens of thousands of consumers are becoming aware that they can have control over the quality of their water. Most want to know how to make their water better tasting, better looking, odor-free, and safer to drink. On-site or point-of-use (POU) treatment offers alternatives for improving water quality in the home or business.

Public water supplies are required to periodically monitor for contaminants listed on the Primary Drinking Water Standards and most public systems meet those regulations. If a public water system exceeds any of the standards, they are required to notify their customers.

The following is offered as an introduction to the Primary and Secondary Drinking Water Standards and provides information on just a few of the more familiar contaminants. It also references alternative technologies for homeowners not served by a municipal system or who simply want to improve water quality in their home further.

For aesthetic water problems such as hardness or chlorine content, the Water Quality Association (WQA) suggests contacting a local dealer who can recommend technologies to improve the water quality on-site. If consumers are concerned about health-related contaminants, consider having the water tested. Dealers can conduct simple aesthetic water tests in the home, but for health testing consumers will want to contact a reputable laboratory or one certified by the state or the U.S. Environmental Protection Agency (EPA).

Becoming Informed

Understanding water test results is important in making a decision on what technology can solve the specific problem of that water supply.

Briefly, the U.S. EPA has two classifications for contaminants: primary and secondary. Contaminants listed on the Primary Drinking Water Standards are enforceable on the federal level and are felt to be health-related. Contaminants listed on the Secondary Drinking Water Standards are those that are not required to be regulated by the federal government. Although the state may regulate them if they choose, secondary standards are advisory in nature and deal primarily with the aesthetic characteristics of water.

Several POU treatment methods can be used for reduction of both primary and secondary contaminants. In some cases, more than one technology may be necessary. It is also important to realize that once a system is operating, maintenance or replacement is essential. Some consumers choose to maintain and/or clean the system themselves, others may choose to enter into a maintenance contract with their dealer.

Contaminants

The following is a summary of the more familiar primary and secondary contaminants and POU treatment techniques found to be effective for reduction in past use. For health-related contaminants, regular monitoring under U.S. EPA standards or testing of the water is advised.

Primary: Inorganic Contaminants

Arsenic: This is a contaminant that could be in a water supply without the person even knowing about it. Arsenic has no visible color, taste or odor in water. It's usually a public health matter. There are many reasons why it may be found in a water supply, including: industrial waste from electroplating; herbicides containing arsenic entering water source through a field run-off; or natural groundwater contamination.

Treatment Techniques: Reverse osmosis, distillation, or deionization for drinking and cooking purposes. In some cases, for organic arsenic complex, an activated carbon filter may be effective.

Flourides: Like arsenic, flouride is not visible, nor is there a distinct color or odor present in the water supply. Higher than normal levels of fluorides could be a result of a malfunction of sodium flouride feed into a public water system, or it may occur naturally in the water supply.

Treatment Techniques: Reverse osmosis, distillation, and activated alumina can be used to improve water quality for cooking and drinking purposes.

Lead: Lead generally does not occur naturally in water. Common sources of lead in water are: industrial waste pollution; paints produced before lead bans; auto emissions; and leaching from lead in a municipal delivery system or home plumbing.

Treatment Techniques: Reverse osmosis and distillation can reduce lead for the purposes of cooking and drinking; ion exchange can be effective if it is applied after the lead leaching occurs; activated carbon has been shown to reduce lead when the pH level of the water is between 6.5 and 8.5.

Nitrates: Nitrates, like many other primary drinking water contaminants, may not be visible in water. In some instances, however, nitrates may produce a rotten egg or sewage smell and sometimes the water appears to be foamy.

Various factors can cause higher than normal levels of nitrates, including heavy use of commercial fertilizers and improper sewage disposal where human or animal waste pollution leach into the water supply.

Treatment Techniques: For drinking and cooking purposes, reverse osmosis (depending on pressure) and distillation systems can reduce nitrates. For whole house treatment or larger volumes of water, one can use an anion resin in a process that appears similar to water softening.

Primary: Pesticides/Herbicides

While some consumers nationwide have raised the issue of pesticides being sprayed on the fruit they eat, many more are concerned that those chemicals are leaching into private and public water supplies. One indicator of whether the water is tainted with these contaminants

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is if there is a noticeable chemical taste or odor when using the water. Excessive agricultural spraying in certain areas contributes to these chemicals leaching into the system.

Treatment Techniques: An activated carbon filter can reduce a limited amount of chemicals. As with all health-related contaminants, these levels should to be carefully monitored.

Primary: Radiological

Radium: Radium occurs naturally in water in many parts of the U.S., specifically radium 226/228.

Treatment Techniques: Generally, low levels of radium can be reduced by a water softener and reverse osmosis systems.

Secondary Contaminants
(Aesthetic Recommendations)

Copper: The more corrosive the water supply, the more likely that copper may be present in water if it passes through a home's copper piping.

Treatment Techniques: Reverse osmosis and distillation are capable of reducing copper in water for cooking and drinking.

Iron: Iron is one of the more common elements found in nature, accounting for five percent of the earth's crust. Therefore, many water supplies contain some measurable amounts of iron. Iron is predominantly found in well water supplies. Municipal water companies are usually not required to remove iron if it exists in their water supply. There are two types of iron: ferrous and ferric. Ferrous iron is colorless in solution, but when it comes in contact with the air it oxidizes, creating a red particulate. Ferric iron is the oxidation of ferrous iron.

Treatment Techniques: There are several treatment techniques available for the reduction of iron at varying levels including: filtration, water softening, aeration, reverse osmosis, distillation, and oxidation.

Manganese: Manganese is rarely found alone in a water source, but is generally found in conjunction with a dissolved iron. Deposits of manganese can collect in plumbing systems, and the tap water drawn may display a black sediment and blackish turbidity.

Treatment Techniques: Manganese reduction is commonly accomplished by the same methods used in iron removal including: filtration, water softening, reverse osmosis, distillation, and oxidization.

Colors, Odors: Examples of odors commonly found in a water supply are a chlorine or rotten egg smell (hydrogen sulfide). The color of the water can differ depending on the contaminants found in that particular water supply. While many of these kinds of taste and odor contaminants have no bearing on hygienic safety and use of the water, they can be objectionable for laundry and other home uses as well as for drinking and cooking.

Treatment Techniques: In the case of odor reduction, an activated carbon filter can be effective. They are commonly used for chlorine reduction. Other methods that can be used are oxidation, filtration, and aeration. For color reduction, water softeners and filtration systems are often recommended.

Summary

Keep in mind that the effectiveness of the treatment techniques and the performance of on-site point-of-use systems available may differ depending on the amount and type of contaminants found in a water supply, the source of the supply, and the size and capability of the system. When contemplating the purchase of one of these systems, WQA encourages consumers who want more information about the water quality improvement industry to write for a consumer packet. Send requests to:

Water Quality Association
Post Office Box 606
Lisle, Illinois 60532

The packet includes helpful brochures on several treatment techniques; a listing of WQA members in the consumer's state; and the *Validated Water Treatment Equipment Directory*, which is a listing of systems that have been tested and found to meet certain voluntary industry standards as they relate to performance claims made by the manufacturer.

Many effective POU technologies are available to solve water quality problems in the home or business. That's why today, quality water is a matter of choice, not chance. □

Consumers Ask. . .

Q. We have a water softener in our home and since I'm in a hard water region, I would never consider living without it. However, I am wondering what is the best kind of water to use for my plants?

A. For those of you who live in a warmer climate, your outside tap water may be a good source of water for your plants.

Two water quality improvement technologies—distillation and reverse osmosis—provide a very high quality water for your plants, as well as for cooking and drinking water needs. **Distillation** is perhaps the oldest and one of the more familiar methods of on-site water treatment for the consumer. In addition to the convenience factor, distilled water is ideal for indoor plants and other household uses. **Reverse Osmosis** (R/O) systems can offer consumers a supply of clear, fresh-tasting water for a very reasonable price per gallon. Like distillation, an R/O system can dramatically reduce a wide range of contaminants in your water, making it more pleasing for people and acceptable for water plants. □

***Water Quality Research Council** is a tax exempt research and educational organization. The purpose of the **Water Quality Research Council** is to conduct or sponsor scientific research and public education in the area of water chemistry as it relates to aesthetics, health and pollution. The Council publishes or causes to be published articles, pamphlets, books, magazines, papers, and other educational materials relating to water quality.*

This consumer publication is published in cooperation with the Water Quality Association, 4151 Naperville Road, Lisle, IL 60532.

For local information you may contact: