Drinking water containing high levels of volatile organic compounds (VOCs) may be harmful to human health. VOCs are a class of chemicals that have important properties in common: They evaporate, or vaporize, readily (they are volatile), and they contain carbon (and are therefore called organic). When present in water at low concentrations, some VOCs produce a sweet, pleasant odor.

The U.S. Environmental Protection Agency (EPA) estimates that VOCs are present in one-fifth of the nation's water supplies. They can enter ground water from a variety of sources. Benzene, for example, may enter ground water from gasoline or oil spills on the ground surface or from leaking underground fuel tanks. Other examples of commonly detected VOCs are dichloromethane (methylene chloride), an industrial solvent; trichloroethylene, used in septic system cleaners; and tetrachloroethylene (perchloroethylene), used in the dry-cleaning industry. Table 1 lists...
possible sources and potential health effects for some VOCs commonly detected in water supplies.

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**Health Concerns**

Volatile organic compounds may have a variety of harmful health effects. At high levels of exposure, many VOCs can cause central nervous system depression (drowsiness, stupor). All can be irritating upon contact with the skin, or to the mucous membranes if inhaled. At [http://water.epa.gov/lawsregs/rulesregs/sdwa/chemicalcontaminantrules/basicinformation.cfm](http://water.epa.gov/lawsregs/rulesregs/sdwa/chemicalcontaminantrules/basicinformation.cfm) is a lists the eight VOCs currently regulated by EPA in public water supplies (those which serve 25 or more people). Also listed are other VOCs commonly found in drinking water. For each chemical, EPA has established a maximum contaminant level (MCL). Water containing a chemical in an amount lower than the MCL is considered safe to drink. Drinking water containing one or more VOCs at levels above standards should not be consumed. In addition, because little is known about the additive effects of these chemicals, special attention should be paid to detecting and eliminating VOC sources if two or more chemicals are found in water. In any case, sources of VOC contamination should be eliminated if possible.

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**Protecting Your Water**

The most effective method for preventing VOC contamination is to ensure that these compounds are not used or disposed of near wells or surface water supplies. Protecting your water source is the most effective method to eliminate exposure to these chemicals. Be sure that your well is constructed properly and is protected to prevent surface water from moving down the well casing into your drinking water supply. See Cooperative Extension service publication AG-469, *Your Water Supply: Well Construction and Protection*, or contact your county Cooperative Extension Center or local health department for information on proper well protection.

Public water systems are required to be monitored on a routine basis for contamination. For private water supplies, however, it is the homeowner's responsibility to regularly have water quality evaluated. If VOCs or other contaminants are found at levels approaching or above drinking water standards, the source of contamination should be eliminated. Prior to transfer of property, the prospective owner may wish to request in writing that well water be analyzed to determine water quality. This testing is especially important in cases where the property is a current or former agricultural or industrial site, or where buried fuel tanks are located nearby. Cooperative Extension Offices and Health Departments can provide lists of certified private laboratories.
Treatment Options

Options for homeowners with contaminated water include preventing further contamination, locating an alternative water supply, or treating water to remove contaminants. Identifying and removing the contamination source is the safest and most permanent solution. However, it is not always possible to identify and eliminate the source.

In some cases, ground water is contaminated to the extent that cleanup may take many years and be extremely expensive. Alternative water supplies include new wells, public water systems, and bottled water. If a new well is constructed, be sure that it is not susceptible to contamination from the same source as the polluted well.

Bottled water can be used as a short-term source of drinking water. Keep in mind, however, that VOCs may also enter the body through skin absorption or through inhalation of water vapor.

Home filter systems may provide a high-quality water supply if properly installed and maintained. Filters may be purchased for point-of-use (POU) treatment at the faucet or point-of-entry (POE) treatment where water enters the home. POE treatment systems are recommended for VOC removal to ensure that all water used for drinking, cooking, cleaning, and bathing is free of contamination. There are a variety of filter systems available. Before purchasing a filter system, it is wise to consult with several reputable water treatment companies to ensure that the equipment purchased will treat the specific water quality problem.

Granular activated carbon (GAC) filters are typically used to reduce VOC levels in home drinking water. The effectiveness of carbon filters is related to (1) the type and amount of contaminant, (2) the rate of water usage, and (3) the type of carbon being used. Large contaminant concentrations and high water use rates reduce the carbon life. The manufacturer's guidelines for replacing carbon filters should be followed. Water entering and leaving the filter should be tested periodically to ensure that the treatment system is working properly.

Bacteria may grow on the surface of a carbon filter. Water should be disinfected after it passes through the filter to ensure its safety. Many types of disinfection systems are available. Ultraviolet (UV) radiation is one type of system shown to work effectively and efficiently to eliminate bacteria problems in water.

Summary

Effective drinking water protection includes source protection and regular testing to ensure that the water is safe. Source elimination and proper well protection are the most effective methods for protecting ground water. If you live in an area where there is potential for organic compounds in your water, have it tested periodically for VOCs. If testing indicates contamination, water treatment systems can be used to remove chemicals. Be sure that systems purchased for home treatment of VOCs are certified to remove those found in your water.
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AG 473-5

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