PRIVATE WELLS IN URBAN AREAS

An increasing number of people in the Boston metropolitan area are installing private wells in areas where public water supply is available. Some of them are installing wells because of the increase in MWRA water rates; some because they live in towns with summer water restrictions. But are these wells really safe? And are they being connected in a way that puts the public supply at risk?

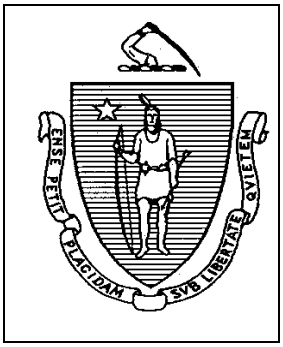
Most private wells are not tested for volatile organic compounds (VOCs), which include many of the most common – and potentially dangerous – groundwater contaminants, such as industrial solvents and gasoline. The standard well test only includes bacteria and a few inorganic chemicals like nitrate and sodium. A clean bill of health for the standard test does not mean a well is free of VOCs. Most of these chemicals are tasteless and odorless in drinking water. Unless you test your well for VOCs, you won't know whether you have a VOC problem.

VOCs have been found in many private wells in pristine settings in Massachusetts. In developed and urbanized communities like those that make up the MWRA service area, the chance of having VOCs in the groundwater is much greater. All private wells in these areas should be tested for VOCs before being used for drinking water.

*If a residence is connected to both a private well and public water supply, the piping carrying the private well and public water cannot be connected **anywhere**. Otherwise an illegal "cross connection" is created, through which private well water in the building's pipes may be siphoned into the public water mains. Therefore, residences served by private wells must either be physically disconnected from the public water system, or the pipes carrying private well and public water must be kept **completely** separate.*

If you intend to install a private well, you must contact your local Board of Health. If you presently receive public water supply, you must also contact your local water supplier.

This fact sheet is designed to give guidance to Boards of Health, public water suppliers, plumbing inspectors and present or potential well owners.



- Prepared by the Massachusetts Department of Environmental Protection, Northeast Regional Office, July 1992. Contact and reference information updated October 2008.

Private Wells

Neither the Federal government nor the Commonwealth of Massachusetts has direct jurisdiction over private water supplies. Under Massachusetts law, local Boards of Health have broad authority to "make reasonable health regulations" and are specifically authorized to require a safe and adequate supply of water for any place of habitation. Therefore, local Boards of Health have jurisdiction over private wells.

The Massachusetts Department of Environmental Protection (DEP) has published the *Private Well Guidelines* to assist Boards of Health in regulating private wells. This publication discusses design, construction, maintenance, testing, contamination sources and closure procedures for private wells; a model Health regulation for private wells is included. The *Private Well Guidelines* may be obtained from the State Bookstore in Boston or Springfield.

A simple, but vital, fact about private wells is that they are "private." The well owner is not subject to water bills or to the requirements placed upon public water suppliers; however, the well owner has the responsibility to maintain the well and ensure that the water is fit to drink.

Public water supplies must be tested for bacteria and many chemicals on a regular basis – and must meet drinking-water standards – under the Federal Safe Drinking Water Act. State and Federal officials review tests of the public supplies to ensure their fitness to drink. Beyond the testing required by the local Board of Health, a private well is only tested at the discretion of the owner. Therefore, a private water supply is not likely to be as thoroughly tested as a public water supply unless the owner of the private supply makes a concerted effort to do so.

If a private well is contaminated by petroleum or a hazardous material, the Department of Environmental Protection will endeavor to find the party (or parties) responsible for the contamination. However, finding the source of the contamination and cleaning up the water supply can take years. In the meantime, connection to a public water supply or installation of a home water treatment device may be necessary — at the well owner's expense.

Overburden and Bedrock Wells

Contrary to popular belief, the groundwater that supplies wells does not flow in underground rivers (except in rare cases in limestone areas; the only limestone in Massachusetts is west of the Berkshires). Groundwater originates with rain or melted snow that soaks into the ground and seeps downward due to gravity. If contaminants have been disposed on the ground or buried, the water may soak through them and carry contamination down into the groundwater.

Overburden wells (often called "dug" or "shallow" wells) are installed in sand or gravel. These wells pump water that fills the tiny spaces between the grains of sand and gravel. The wells have some form of screen at the bottom to keep sand out. Usually these wells are not drilled more than twenty or thirty feet below the water table. Contaminants that reach an overburden well

usually come from a source fairly close to the well.

Bedrock wells (often called "drilled" or "artesian" wells) are drilled deep – usually hundreds of feet – into rock. Except for sandstone, most rock does not have pore spaces like sand and gravel for water to move through. The water in bedrock wells usually fills cracks in the rock. Depending on where these cracks reach the surface, the water in a bedrock well may be coming from nearby or from miles away. It can be difficult to find the source of contamination in bedrock wells because the source may not be nearby.

Well Testing

The traditional analysis for private wells is often called the "sanitary series" of chemicals or "regular chemical analysis". This includes bacteria, nitrate, sodium and several inorganic chemicals that may affect the aesthetics of the water, such as hardness, iron and manganese. Lead is occasionally included.

The laboratory that does the regular chemical analysis will point out any results that indicate a potential health threat or aesthetic problem. But this analysis can only tell you about the chemicals that were specifically tested for. A clean bill of health on the regular chemical analysis does not necessarily mean that the well water is free of all undesirable chemicals. Many chemicals require separate tests to determine whether or not they are present.

The most important of these undesirable chemicals are the volatile organic compounds (VOCs). This group of chemicals includes many of the most common contaminants in Massachusetts groundwater. VOCs also tend to be more soluble and mobile in groundwater than other contaminants such as heavy metals or PCBs. Many industrial chemicals and the major components of gasoline and fuel oil are VOCs. These chemicals are potentially dangerous if present in well water (depending on how much of any chemical is present). At the levels found in drinking water, VOCs are usually colorless, tasteless and odorless. So a VOC problem may not be obvious to the well owner.

Many public wells in eastern Massachusetts have had to be shut down because of VOC contamination – some of them in pristine areas with no obvious source of contamination. Likewise, contaminated private wells have been found in undeveloped towns where no threat is apparent. The more developed and urbanized an area is, the greater the chance that the groundwater is contaminated with VOCs. These chemicals have been in use for many decades, and until about 1970, a common method for disposing of VOCs was to pour them out on the ground (or down the drain into a septic system). This led to widespread groundwater contamination.

Thousands of underground tanks used for storage of gasoline or oil have been found to be leaking in Massachusetts. A well drilled near an active (or former) service station could be at high risk for contamination. Wells drilled in neighborhoods where houses have underground tanks for heating oil may be threatened by leaking oil.

One common group of VOCs is the "chlorinated solvents." This group includes many chemicals used as solvents, degreasers and drying agents, such as trichloroethylene (TCE) and tetrachloroethylene (also called perchloroethylene, or PCE). More public wells have been shut down in Massachusetts because of TCE in the last fifteen years than any other contaminant. Chlorinated solvents are heavier than water and tend to sink in the groundwater. They can therefore be a bigger threat to bedrock wells than petroleum chemicals.

There are many possible sources for chlorinated solvent contamination. Any business that has to clean equipment or wash trucks may use solvents (or may have used them previously). TCE is widely used for cleaning and finishing metal. Dry cleaners use large amounts of PCE. In areas with septic systems, any chemical that is poured down the drain may end up in the groundwater. Many septic system cleaners and additives contain solvents such as TCE or 1,1,1-trichloroethane; use of septic system cleaners or additives may cause groundwater contamination.

A VOC analysis costs about $150. The analysis includes dozens of common industrial and petroleum-related chemicals. A VOC test should be done on any new well before it is used for drinking water. Once the well is in use for a period of time, it will gradually begin pulling in water from farther away – from areas that might be contaminated. Therefore, another VOC test should be done after the well has been used for a year or two. After that, tests should be done every three to five years. The DEP Drinking Water Program can tell you what laboratories in your area are certified by the Commonwealth to do VOC analyses.

Bedrock wells should also be tested for radon. Radon is a radioactive gas that occurs naturally in rock; it can be released from drinking water into household air and inhaled. Other chemicals that may be tested for in private wells include trace metals (lead, arsenic, etc.), phenols and base-neutral compounds (such as naphthalene). These chemicals are found in private wells much less often than VOCs and radon. Naturally high levels of trace metals can occur in bedrock wells; arsenic problems have been found in some bedrock wells in New England. Pesticides and herbicides may be a problem for wells in current or former agricultural areas and near utility right-of-ways.

Even if a private well is only used for non-drinking purposes, it should be tested. Bathing in contaminated water, or swimming in a pool filled with it, can cause skin contact with contaminants. VOCs and radon can be released from the water into household air during bathing, laundering or dishwashing. If well water with high levels of trace metals is used to water a vegetable garden, the metals may accumulate in the vegetables.

Cross Connections

Massachusetts drinking-water regulations state that an approved public water supply may not be connected to an unapproved supply, such as a private well. Such a hookup is considered an illegal cross connection. Therefore, a residence may receive water from a private well or from a public water supply — but not from both, unless the two sets of pipes are kept **completely** separate.

For a residence to have a legal hookup to both a private well and a public water supply, the pipes carrying private well water must not be connected **anywhere** to the pipes carrying public water; there is no cross connection in such an arrangement. For example, a private well may be used for laundry, filling a swimming pool, or watering the yard, while public water is used for drinking and cooking, as long as the two sets of water pipes are not connected anywhere.

Cross connections expose the public water supply to potential contamination. A drop in the pressure in the public water main, or high water pressure in the house (from a pressure storage tank for the well), can cause water from the household pipes to siphon back into the public water main. If the private well is contaminated, the contaminated water can enter the public water supply in this way. The private well owner could be liable for the cost of correcting the contamination in the public water supply.

To prevent cross connections, residences served by private wells must be physically disconnected from the public water system, unless the two sets of pipes are completely separate. People who wish to use private wells instead of public water must notify the public water supplier of their intention (in MWRA communities, this is the local Water Department, not the MWRA). The supplier will then disconnect the service line from the residence to the main. Plumbers, plumbing inspectors, building inspectors and well drillers should be aware that connections between private wells and public water systems are prohibited.

Contacts and Sources of Additional Information

Massachusetts Department of Environmental Protection

If you have general questions regarding private wells, you may call the Boston office of the DEP Drinking Water Program at **(617) 292-5770**.

To obtain information on State-certified laboratories in your area, call the DEP Drinking Water Program in your region. If you have reason to believe your well has been contaminated by oil or a hazardous material, call the DEP Bureau of Waste Site Cleanup in your region. The Bureau of Waste Site Cleanup may have information on known or suspected contamination sites in your area. The regional offices of DEP are:

Western (Springfield)	**(413) 784-1100**
Central (Worcester)	**(508) 792-7650**
Northeast (Wilmington)	**(978) 694-3200**
Southeast (Lakeville)	**(508) 946-2700**

This fact sheet is available on-line at:

http://www.mass.gov/dep/water/drinking/privatew.htm

The following publications, along with other information on private wells, are available on-line on the DEP web site at:

http://www.mass.gov/dep/water/drinking.htm

- ***Private Well Guidelines*** - A DEP guidance manual for the construction and maintenance of private wells.
- ***Guidelines and Policies for Public Water Systems*** - A complete guidance manual for public drinking water purveyors detailing water supply facility maintenance, approved procedures, and construction requirements.
- ***Drinking Water Regulations, 310 CMR 22.00*** - The regulations pertaining to Massachusetts public drinking water supplies.

A searchable database of State-certified laboratories is available on-line at:

http://public.dep.state.ma.us/Labcert/Labcert.aspx

For information on the requirements for siting, installing, and testing a private well in your city or town, contact your local Board of Health.