United States
Environmental Protection
Agency

Office of Water
WH-550

EPA 570/9-90-006
April 1990

EPA

Citizen Monitoring: Recommendations to Household Well Users

As a user of a household well, you are probably interested in learning more about the types of substances and activities that represent potential threats to your water supply and health. Moreover, you are probably interested in knowing the steps you might take as a consumer to protect your well and become more informed of drinking water issues. This fact sheet is designed to provide you with this information as well as provide a list of pertinent reference material.

Approximately 15 percent of the American public (40 million people) receive their drinking water from individually owned and operated sources such as household wells, cisterns, and springs. As "private" sources, system owners are solely responsible for the quality of the water provided.

In contrast, public supplies are regulated by the U.S. Environmental Protection Agency (EPA) as well as most State health or environment departments. By virtue of being regulated, public supplies are required to ensure that their water meets health standards as defined by the government. The body of law which governs the regulation of public supplies is called the Safe Drinking Water Act (SDWA). This law requires that public supplies *test* their water on a routine basis for the presence of contaminants and, as necessary, *treat* their water continuously to remove or reduce specific contaminants to levels that will not adversely affect human health.

Public water supplies are defined by Federal law as systems connecting to 15 or more households/businesses, or systems serving 25 or more persons daily at least 60 days out of a year. Some States, however, define public water supplies more broadly. The State of Washington, for example, considers any system connecting to more than one household/business as a public supply. Approximately 85 percent of the Nation's citizens (230 million people) receive their drinking water from public water systems, as the term is defined by Federal law.

Although private water supplies or wells are not regulated under the SDWA, many States have programs to help well owners protect their water supply. In most cases, these programs are not regulatory in nature but, rather, are based on providing pertinent safety information. Such safety information is important because private wells often are more shallow than those used by public supplies. The shallower the well, the greater the potential for contamination.

Potential Drinking Water Contaminants and Their Related Health Threats

Probably one of the most important and basic concepts to understand about the Earth's water is that it is not pure. The composition of water is such that materials — both natural and man-made — are easily dissolved upon direct contact. The level or quantity of a substance in water is the central issue with respect to determining whether the water is adequate for human consumption.

Potential drinking water contaminants include both *microbiological* and *chemical* substances. These agents can be found in nature or be the result of some past or present human activity. Microbiological substances of concern include *bacteria, viruses*, and *protozoa*. Chemical contaminants primarily include *metals, minerals*, and both *organic* and *inorganic substances*.

The health effects related to drinking contaminated water can either occur over the short- or the long-term, depending upon the nature of the pollutant. Short-term or acute effects are those that occur within hours or days following consumption of contaminated water. Long-term or chronic effects are those that occur after water with low doses of a contaminant has been consumed over several years or a lifetime.

Microbiological organisms in drinking water are generally associated with human and animal wastes. These organisms are naturally occurring and can be found in source waters as well as in distribution systems. Although the potential for serious disease remains a concern, the most common ill-

nesses due to the microbiological contamination of drinking water are short-term gastrointestinal disorders. Typical symptoms include cramps and diarrhea that may be mild to very severe.

Naturally occurring chemical contaminants found in some drinking water are primarily metals (e.g., chromium, mercury, zinc) and minerals (e.g., asbestos). Some naturally occurring chemical contaminants, such as radium and radon, are radioactive.

Man-made chemicals found in drinking water are primarily organics and inorganics. These substances have numerous industrial, agricultural, municipal, and residential applications. The improper discharge or use of man-made chemicals in the environment can result in their presence in drinking water.

The health effects related to the consumption of chemicals in drinking water are highly chemical-specific. With a few exceptions (nitrates), these effects are chronic (long-term) in nature. Some of the important health risks resulting from high exposure to chemical contaminants include liver, kidney, and nervous system disorders, cardiovascular and hypertensive effects, anemia, and carcinogenicity.

Most Common Contaminants Found in Private Wells

Bacteria — namely *coliforms* — appear to be the primary contaminant found in private wells. The presence of these microbiological organisms suggests the infiltration of animal or human wastes into well water. Septic fields, due to their location, are often the source of such contamination.

In general, *nitrates* represent the second most common type of contaminant found in private wells. The presence of this naturally occurring chemical suggests that animal and/or human wastes or that agricultural applications of such substances as fertilizers are entering the well. Nitrates are of special concern to young children and women of childbearing age. Excessive levels of nitrates have been linked to the occurrence of "Blue-Baby" syndrome.

Two other important contaminants about which private well owners should be concerned include *lead* and *radon*. Both substances are naturally occurring. Lead is a poison that can accumulate in the body and cause brain, kidney, or nerve damage in addition to anemia and even death. Lead is espe-

Action Steps for Private Well Owners

1) Obtain the following information from State and local health or environmental officials:

   - listing of contaminants whose levels of occurrence are regulated in public water supplies by the Federal government and the State;
   - State or local standards for the drilling and construction of wells and information concerning whether testing is required during property transfers; and
   - listing of land-use activities in the vicinity of the well and the types of contamination problems that have been known to occur in other local wells.

2) Test your water for bacteria at least once per year. If any changes are noticed in the water's taste, odor, or color, conduct bacteriological tests on at least a quarterly basis. It is also recommended that well water be tested for bacteria after periods of significant rainfall or after flooding has occurred.

3) Test your water for nitrates once a year, especially if young children and women of childbearing age are consuming the water, if agricultural activities including home gardening are taking place in the area, and if animal and human wastes are suspected of entering the well. (Whenever bacteria is found in a well as a result of testing, the well water should also be analyzed for nitrates.)

4) Test your primary kitchen tap at least once for the presence of lead or radon.

5) Test for other contaminants of concern based upon information obtained from land-use and well assessment activities.

   - Assess the sanitary features of the well (i.e., depth to water, proximity to septic field, etc.). If this information is not known by the well owner, a sanitary survey or well inspection can be contracted. The State's drinking water office or the local health department should be able to provide suggestions on how to obtain these services from a licensed sanitarian or engineer. Prices for inspection services are likely to vary.
   - Assess surrounding land-use activities — industrial, agricultural, governmental, and residential. Identify potential threats to private wells from these activities. Some questions to ask oneself when assessing land-use activities include a) is your well close to or downhill from your septic field; b) are there gas stations nearby whose underground storage tanks could be leaking; c) are there municipal and hazardous waste disposal and storage facilities nearby; d) are materials used on local road surfaces, such as de-icing salts, properly stored and applied; e) are pesticides and

cially dangerous to children and pregnant women. While lead exposure through various media can happen, it has been found to occur in drinking water at sufficient levels to warrant concern. Lead gets into drinking water through the corrosion of plumbing materials. Lead pipes, lead-based solder, and brass faucets used in household and distribution system plumbing are the sources of this substance in drinking water.

Radon exists naturally underground. As a gas, it can enter homes in two ways. First and foremost, radon can seep through soil into cracks in household foundations. Second, it can seep through soil into well water. When well water is agitated at warm temperatures in the home, as in a shower or washing machine, radon is released into the air. Airborne radon has been linked to lung cancer in humans. Consequently, it has become a contaminant of concern to public health officials.

Contamination of private wells by other chemical contaminants — whether naturally occurring or man-made — remains a potential problem but generally occurs less frequently than the types of contamination described above. *The degree to which any well is vulnerable to contamination depends upon a variety of factors including local geology; depth to water table; characteristics of soil, water, and climate; local land-use activities; and characteristics of home plumbing materials.*

Selected Sources of Information

- **State Drinking Water Office** (usually located in the Health or Environment Department of State Government; often referred to as the Public Water Supply Program; consult blue "government pages" in your local phone book for the proper address and phone number)
- **U.S. Environmental Protection Agency (EPA) Safe Drinking Water Hotline,** 800/426-4791 or 202/382-5533 (can explain and provide copies of Federal drinking water regulations, provide information on health issues specific to given drinking water contaminants, and help locate your State drinking water office)
- **Local Drinking Water Officials** (city, county, or township level officials charged with drinking water duties by the State; these officials do not always exist; if they do

Action Steps for Private Well Owners (continued)

fertilizers applied in the area; and f) are oils, paints, pesticides, and solvents safely stored and discarded in or around the home?

6) Contact State or local (i.e., city, county, town) drinking water officials for information on water testing. In some instances, these governmental agencies may be able to provide free testing services.

7) Consult the State drinking water office to obtain a list of laboratories certified by the State to conduct drinking water analyses. Contact a number of laboratories to assess the manner in which tests are taken and their relative cost(s). Laboratory tests are generally *substance-specific* or specific to a given *class of contaminants*. It is not likely that one test will cover all contaminants of concern to any given well owner. Depending upon the sophistication of the sampling and testing procedures, the laboratory will either collect the appropriate sample(s) or will provide sampling equipment and instructions to the homeowner. Prices vary for testing services and can be expensive.

8) Regardless of how or by whom testing services are obtained have test results explained by lab personnel or ask State or local drinking water officials for assistance. Concentrations of contaminants, if detected, for which testing has been conducted will be listed on the test result form. Results will be expressed in milligrams or micrograms per liter (parts per million and parts per billion, respectively). Test results should be compared to Federal and relevant State standards for the particicular contaminant in question. *Remember, a contaminant may exist below some level in water at which it does not pose a threat to human health. Just because a substance is detected through testing does not mean that the well from which the sample was taken is contaminated.*

9) If testing reveals concentrations of contaminants above levels acceptable to human health, conduct additional tests. If repeat tests also show unacceptable levels of a given contaminant, take remedial action. In some cases, a remedy may involve disinfecting the water source, digging or drilling a new well, replumbing or repairing the distribution system, or possibly hooking into a nearby public water system. Consult the State or local drinking water office for suggestions on remedies.

10) Home treatment units represent a potential means for remediating a contamination problem. *It is important to keep in mind that no single household treatment unit will remove all potential drinking water contaminants. Treatment is very specific to the substance(s) of concern.*

❑

exist, they may be able to provide information on local land-use activities as well as provide guidance on the technical aspects of drinking water contamination; local officials might include such professionals as sanitarians and well inspectors)

- **Nearby Public Water System** (may be able to provide information on common threats to water supplies in area as well as provide some testing services; the State drinking water office should be able to provide the names of nearby systems)
- **Local Cooperative Extension Agent** (may be able to provide information on agriculture and forestry practices in the area; may also provide information on water testing)

For Information on Home Treatment Units, Contact:

National Sanitation Foundation
P.O. Box 1468
Ann Arbor, MI 48106

Water Quality Association
P.O. Box 606
Lisle, IL 60532

Applicable Reference Materials

Overview of Drinking Water Issues:

- *Safety on Tap: A Citizen's Drinking Water Handbook.* Available from League of Women Voters, 1730 M Street, NW, Washington, DC 20036, 202/429-1965. Publication No. 840.
- *Drinking Water: A Community Action Guide* or *Groundwater: A Community Action Guide.* Available from CONCERN, Inc., 1974 Columbia Road, NW, Washington, DC 20009, 202/328-8160.

Specific to Private Well Owners or to Given Contaminant (Available from EPA Safe Drinking Water Hotline, 800/426-4791 or 202/382-5533)

- *Manual of Individual Water Supply Systems.* Publication No: 570/9-82-004.
- *Is Your Drinking Water Safe?* Publication No: 570/9-89-005.
- *Protecting Our Drinking Water from Microbes.* Publication No: 570/9-89-008.
- *Lead and Your Drinking Water.* Publication No: OPA-87-006.
- *Removal of Radon From Household Water.* Publication No: OPA-87-011.