United States
Environmental Protection
Agency

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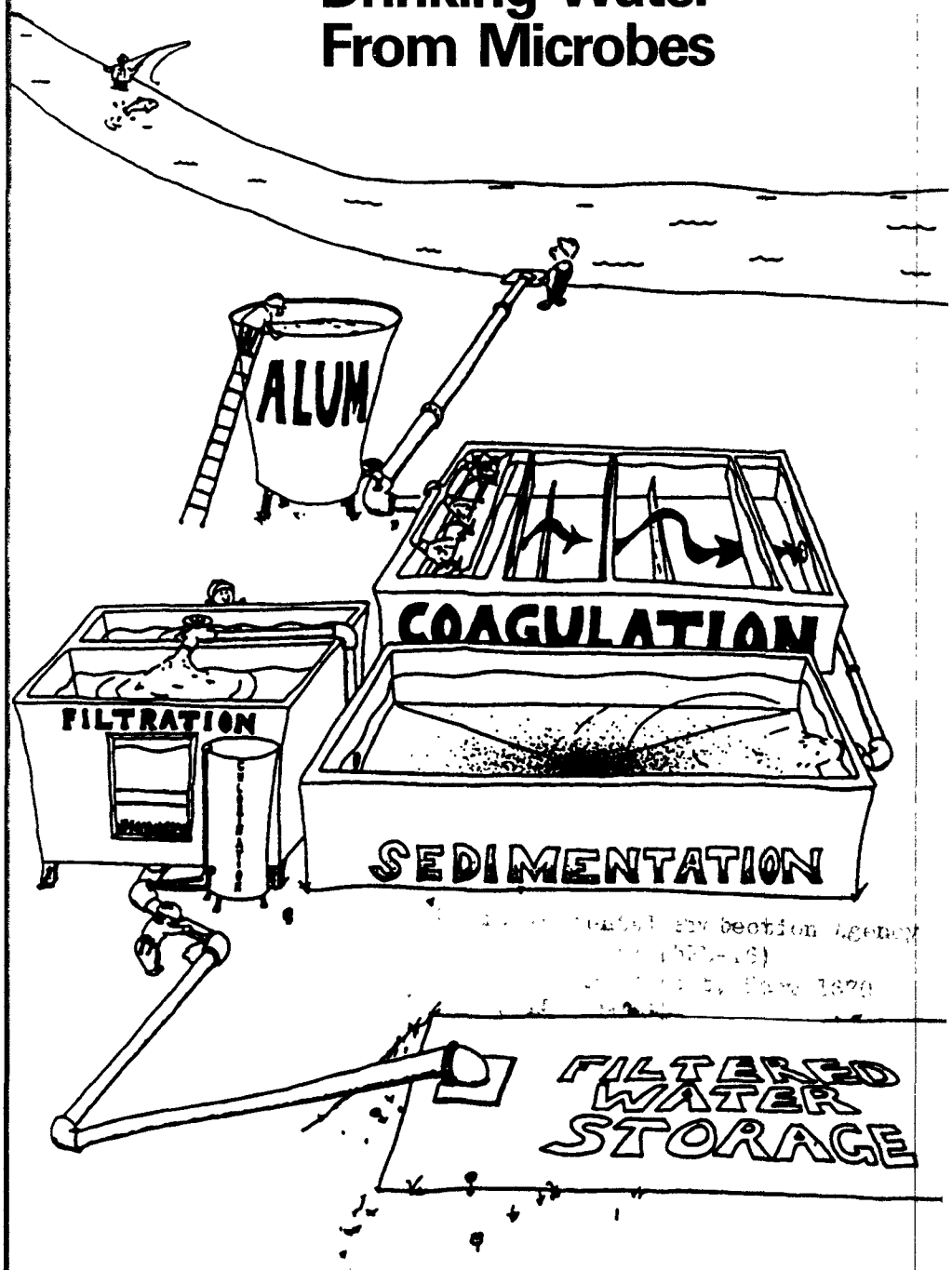
Office of Water (WH-550)

EPA

Protecting Our Drinking Water From Microbes



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Protecting Our Drinking Water From Microbes

Most of us take safe, clean drinking water for granted. Conventional wisdom says only travelers to foreign countries or campers roughing it on vacation get sick from the water they drink. But conventional wisdom is often wrong. Waterborne diseases are still a problem in the United States, especially in areas where the water supplies are not subject to adequate treatment.

Although filtration, chlorination, and other preventive actions have helped control cholera, typhoid fever, and other waterborne bacterial diseases once common in this country, other microbes such as viruses and protozoa—usually more resistant to chlorination than bacteria—are still not being adequately controlled in some water supplies.

Safe Drinking Water Act

To deal with this serious problem, Congress enacted the Safe Drinking Water Act (SDWA) in 1974. The law was amended in 1986 to expand EPA's role in protecting the public health from contaminated drinking water. The amendments require the Agency to:

- Control specific disease-causing organisms and indicators of their presence in drinking water.
- Require public water-supply systems that use surface water sources such as lakes to filter their water unless it is established that their sources are very clean and well-protected.
- Require public systems to disinfect their water, with allowance for variances if the water comes from sources that are determined not to be at risk from microbiological contamination.

Public Water Systems Sources and Users

Sources	Systems*	Population Served
Surface Water	14,500	150 Million
Ground Water	174,000	90 Million

**Includes systems that purchase their water*

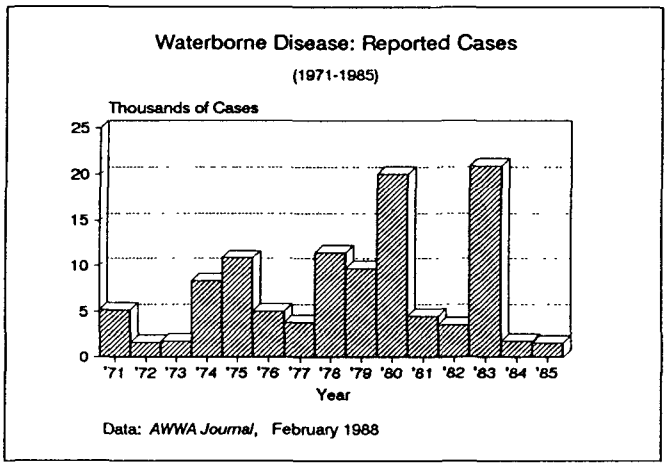
EPA Drinking-Water Regulations

EPA has published new regulations to implement these amendments. All public water systems and virtually every American will be affected by the new rule regulating total coliform bacteria levels in drinking water. The filtration and disinfection requirements of the Surface Water Treatment Rule (SWTR) will affect surface water systems. Filtration removes many contaminants, including microbes, and improves the overall quality of the drinking water. EPA is also developing disinfection regulations for ground-water systems.

The public health protection provided by these new rules will not be inexpensive, however. EPA estimates compliance with the revised total coliforms rule alone will cost water supply systems collectively about $70 million more than they now pay to comply with the current requirements. In addition, surface water systems that do not already filter their water will have to spend $2.3 billion in capital costs to meet the SWTR requirement to provide filtration or to meet the criteria for avoiding filtration. Public water systems that already filter, but must upgrade their operations to meet federal standards collectively will face $660 million in additional capital costs. Ultimately, consumers will be charged for these improvements in higher water bills.

This pamphlet explains what they will be getting for their money. It also explains what causes various waterborne diseases and how public water suppliers can control such diseases, and tells what EPA is doing under the 1986 Safe Drinking Water Act amendments to see that the quality of drinking water is improved.

Because we all have a stake in safe drinking water, readers served by public water systems (those with at least 15 service connections or at least 25 customers) will find this information useful in keeping tabs on what their water system is, or should be, doing to make sure their drinking water is as safe as possible. Private well owners will find some ideas for improving the quality of their own water.



Waterborne Disease In The United States

Safe . . . But Not Perfectly

Drinking water in the United States is among the safest in the world. Between 1971 and 1985, however, there were more than 500 "outbreaks" of waterborne disease involving 110,000 illnesses related to contaminated surface- and ground-water systems, household wells, and cisterns reported in this country. An "outbreak" is when two or more people contract similar illnesses after using drinking water from the same source that contains disease-causing organisms responsible for their maladies. Public health experts believe the actual number of illnesses may be much higher.

The number of reported outbreaks and cases varies year by year, but this is probably due to variability in the reliability of detection and reporting. Actually, the risk of contracting a waterborne disease is probably declining, thanks to better treatment and management of the water supply.

Smaller Water Systems, Bigger Problems

Generally, waterborne diseases tend to break out among customers of small public water systems serving fewer than 3,300 persons. Although such systems account for more than 85 percent of all U.S. public water suppliers, they serve only about 25 million people. Such systems often lack the financial and technical resources to ensure that the water they provide is safe to drink. Unfortunately, many serve campgrounds, recreational areas, etc., so large numbers of people—in addition to those living in the vicinity—may be exposed to waterborne bacteria and other infectious contaminants every year. Hikers and backpackers who drink from untreated and unfiltered rivers, lakes, and springs are also vulnerable because these "pristine" sources may contain disease-carrying microorganisms.

What are the most common waterborne diseases?

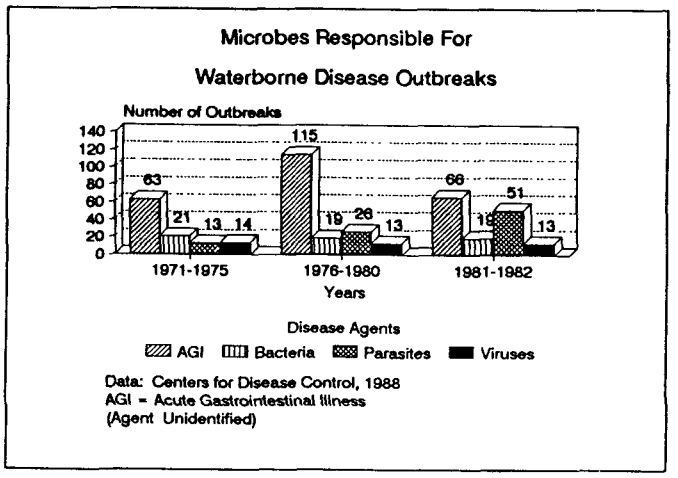
AGI

The most frequently reported waterborne disease in the United States is acute gastrointestinal illness (AGI), also called gastroenteritis. AGI is actually a group of diseases caused by various viruses, bacteria, or protozoa. When health professionals cannot identify the exact cause of a waterborne illness or outbreak, they call it AGI. Possible symptoms include nausea and vomiting, diarrhea, and abdominal discomfort. (These fairly common symptoms are also usually associated with colds, flu, and many other problems, unrelated to drinking water, which might account for some of the underreporting referred to earlier.)

Giardiasis

From 1971 to 1985, a severe intestinal ailment known as giardiasis was the most frequently diagnosed waterborne disease. More than 23,000 cases have been reported in the last 20 years. Its symptoms are the same as AGI, but more severe, and may include severe dehydration, weight loss, and fatigue. Giardiasis can persist for several months or longer.

A single-cell protozoan, *Giardia lamblia* causes this disease. Sometimes called "backpacker's disease," giardiasis is usually associated with unfiltered surface-water supply systems whose disinfection was either interrupted or inadequate to kill the *Giardia* protozoan. It may also result from inadequately designed or operated filtration systems. (Because the *Giardia* protozoan is large enough to be naturally filtered out of ground water as it passes through sand and gravel, outbreaks of giardiasis are rarely associated with ground-water systems.)



Other Diseases

Other prevalent diseases transmitted in drinking water are **shigellosis, campylobacteriosis,** and **salmonellosis.** Caused by bacteria, their symptoms also include diarrhea, vomiting, and nausea. These diseases are considered specific types of AGI. Hepatitis A, which is caused by a virus, can also be spread in drinking water. Symptoms vary from minor flu-like complaints to fatal liver failure.

Even Without Drinking

You can also get sick by inhaling the disease-causing organisms (also known as pathogens) that live in water, or from exposure to contaminants at beaches and pools, in standing water, or in moisture collecting in ventilation and air-conditioning systems. One example is a common soil bacterium called Legionella pneumophila which causes legionellosis, which is most familiar in its pneumonia form, "Legionnaire's Disease" or in a milder, non-pneumonia form, "Potomac Fever." There have been reports that some patients might have contracted Legionnaire's Disease by inhalation exposure to bacteria in water.

How are the causes of diseases detected?

Current federal and state drinking-water regulations require operators of public water systems to test their drinking water for bacteria and other contaminants. (Coliform bacteria have been regulated in some water supplies since 1914 and universally since 1976.) These same regulations set enforceable limits, called maximum contaminant levels (MCLs), which specify how much of a contaminant can be present before the water is considered unsafe.

But identifying every type of disease-causing organism in water samples is impossible and unnecessary. So many varieties of bacteria, viruses, and protozoa can make people sick that EPA cannot develop MCLs for each one. Also, analyzing water samples for many of these harmful bacteria is expensive and, in some cases, not yet possible. Regulators and water suppliers, therefore, must look for "indicators" to determine if drinking water meets safety standards.

Indicators

An indicator is an easily identified single microbe or group of related microorganisms whose presence can mean drinking water has been contaminated by animal or human feces—the source of most waterborne diseases.

Indicators also serve as a check on the efficiency of water treatment and the integrity of the water distribution system. Treatment that provides indicator-free water greatly reduces the likelihood that disease-causing organisms are present. The absence of an indicator, however, doesn't necessarily mean that no disease-causing organisms are present in a given sample.

Coliforms

Total coliforms, a group of closely related, generally harmless bacteria, are regarded as the best indicator and are most often used because they are common in the environment and easy to measure. Occasionally **fecal coliforms,** a sub-group of total coliforms that usually live in human or animal intestinal tracts, are also used.

Coliforms are good indicators of possible drinking water contamination because their presence in a sample can signal (1) possible fecal contamination, (2) the effectiveness of water treatment to combat contamination, and (3) deterioration of the drinking water system. Total coliforms are a sensitive screening system since they normally outnumber pathogens in drinking water by a wide margin and are easily detected in the small water samples used for laboratory analysis. Fecal coliforms, when present, are even more accurate indicators of fecal pollution, but are harder to detect because of their smaller numbers.

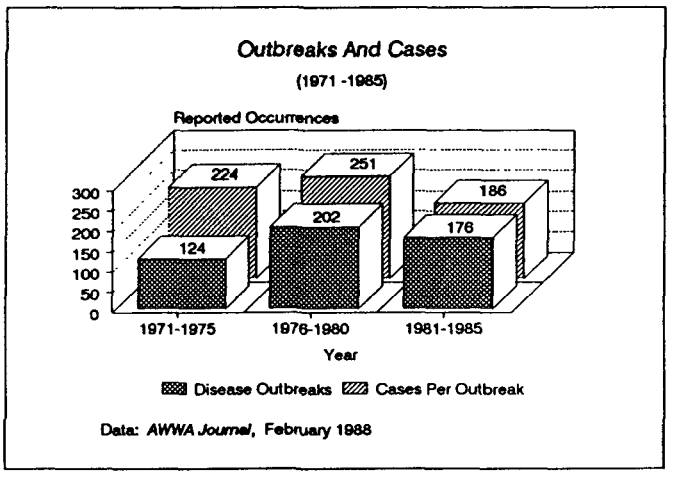
Coliforms are very reliable as indicators, but not infallible. Because coliforms are generally more sensitive to disinfection than other pathogens (e.g. chlorine-resistant bacteria, some viruses, and protozoa such as Giardia), their absence from drinking water does not necessarily mean that such pathogens are not present. Also, some coliforms occur naturally so their presence in a sample may not indicate the water has fecal contamination.

Other Indicators

Other indicators used in laboratory analysis include:

Heterotrophic bacteria, which are bacteria that use organic nutrients for growth and activity. This large group includes almost all bacterial pathogens and most harmless microbes. Their presence in high numbers might signal deficiencies in water treatment or problems with the pipes through which water is distributed, but it does not necessarily indicate a risk of waterbourne disease.

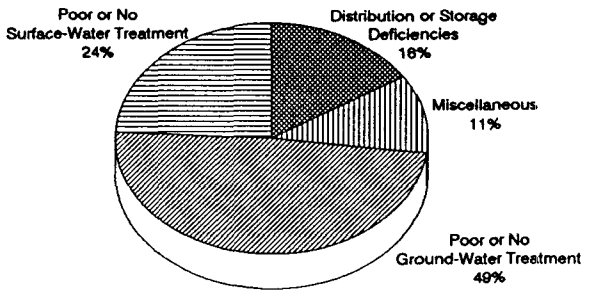
Turbidity, which measures solid particles that often make water cloudy. These particles can show if filtration techniques are working. This is important because particles may interfere with coliform analysis and reduce the effectiveness of disinfecting agents such as chlorine. There is no direct link between turbidity and waterborne illness, but in general "less is better."



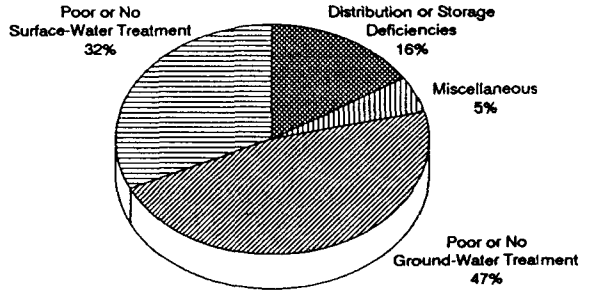
How can waterborne diseases be controlled?

Almost half of the waterborne disease outbreaks and illnesses from 1971 to 1985 affected people who drank untreated or inadequately disinfected ground water. Twenty-four percent of the outbreaks and 32 percent of the illnesses were traced to untreated or inadequately treated surface water, and another 16 percent of the outbreaks and illnesses were specifically linked to distribution and storage deficiencies. The remainder were attributed to miscellaneous causes. **Virtually all of the illnesses associated with inadequate water treatment or system operation could have been avoided.**

Water Supply Problems Linked To Disease Outbreaks and Cases
(1971 - 1985)



Causes of Outbreaks
(Outbreaks = 502)



Causes of Illness
(Cases = 111,228)

Data: *AWWA Journal*, February 1988

Multiple Barriers

Experience shows that the best defense against waterborne diseases is a multiple barrier concept. This begins with watershed management to protect high quality surface- and ground-water sources from contamination by human and animal waste. It extends to drinking water systems where contaminants are filtered out or treated before the water is sent on to consumers. Each of these steps—watershed management, filtration, and disinfection—is a barrier to waterborne pathogens.

Most public water systems that use a multiple-barrier approach rely on some

combination of disinfection, chemical pre-treatment, filtration, and sedimentation in addition to watershed management.

Disinfection kills or disables, usually with chemicals, any pathogens remaining in the water. Sometimes ultraviolet light is used instead of chemicals, particularly to treat well water. Disinfection is not intended to sterilize the water.

Filtration passes water through beds of granular material—such as sand—that remove a substantial amount of solids, including many microbes. Filters remove solids that can interfere with disinfection and large organisms that might resist disinfectants.

Chemical Pretreatment relies on alum or other chemicals to form clumps of impurities, known as floc. Most of the floc settles out of the raw drinking water; the floc that remains—with the attached impurities—can easily be filtered out of the water.

Sedimentation involves the settling out of heavy particles from raw water in holding ponds or basins before filtration.

Common Techniques

Disinfection is the most common treatment technique. It is used by about 97 percent of the U.S. surface-water supply systems; two-thirds of them also filter their water. Less than half of the public water systems drawing on ground-water sources disinfect their water because the water is filtered naturally as it moves through the soil. However, ground-water systems should disinfect their raw water if it is vulnerable to fecal contamination from sewage.

Chlorine

Used since the turn of the century, chlorine is the most frequently applied disinfectant. When applied before filtration, it controls the growth of algae and other microbes that reduce filter efficiency, and it kills many microbes, including most pathogens. When applied after filtration, chlorine kills additional pathogens and controls the

growth of microbes in the drinking water distribution system.

Mixed with water, chlorine forms hypochlorous acid, which is the actual disinfectant. Household bleach contains a form of hypochlorous acid, which is why campers can disinfect their drinking water with a few drops of bleach.

Unfortunately, chlorine can also combine with natural organic chemicals in raw water to create some undesirable by-products such as trihalomethane. Some researchers suggest that long-term use of chlorinated drinking water might slightly increase the risk of bladder and colon cancer. Additional studies are underway that should yield new information about how chlorine affects human health.

Nonetheless, the benefits of chlorine as a treatment for waterborne, disease-causing organisms far outweigh the presently known risks from chlorine or its by-products. EPA regulations already control certain by-products and other rules are being developed to provide additional protection from other disinfectants and their by-products.

Other Disinfectants

Chloramine (NH_2Cl) is a pungent colorless liquid made by adding ammonia to chlorine. It is weaker than hypochlorous acid so more must be used. Unlike chlorine, it breaks down slowly in the water supply distribution system so its disinfection properties last longer.

Chlorine dioxide (ClO_2) is used to control tastes and odors in drinking water. Because of concern about health risks related to its by-products, EPA recommends that chlorine dioxide be used only at concentrations of less than one part per million.

Ozone (O_3) is an unstable form of oxygen sometimes used to disinfect drinking water. It works more quickly than chlorine or chloramine but is more expensive and does

not produce a residual for controlling bacterial growth in the distribution system. Ozone also eliminates some bad tastes and odors in water.

Ultraviolet (UV) light is used by some small systems to disinfect water. For effective UV disinfection, the water should contain few particles, which is usually the case for ground water. UV light does not leave a disinfectant residue in the water to kill remaining organisms and it is not effective against Giardia.

Iodine is occasionally used by campers to treat small amounts of water.

Filtration

There are three types of filtration: rapid sand or "mixed media" used by 90 percent of the U.S. filtration systems, slow sand, and diatomaceous earth (DE). DE is the fossilized remains of single-cell algae known as diatoms and is used by some rural systems whose water is relatively clear. It is commonly used in swimming pool filters.

The major differences are the size of the sand and the speed at which raw water passes through the filters. Water passes relatively quickly through rapid sand filters, and much more slowly through slow sand filters. The rapid sand technique also requires that the water be chemically pretreated to make the solid particles in it easier to filter. Such filters are suited to urban areas because they require relatively little space.

Slow sand filters are simple, do not require chemical pretreatment of the water, are easy to operate, and are biologically active. Bacteria growing naturally on the filter surface make it more effective for removing disease-causing organisms and some other contaminants. Slow sand filters are especially appropriate for systems with little solid material in their raw water, but because the filters require large surface areas they are usually found in rural areas.

Safe Drinking Water Act Requirements

The Safe Drinking Water Act of 1974 (SDWA) established a far-reaching federal program to ensure clean drinking water for everyone and to protect the public health. Under this program, EPA sets national standards and monitoring requirements which are to be adopted and implemented by the states and met by the public water-supply operators. The 1986 SDWA Amendments updated this program and set deadlines for EPA to regulate key contaminants, required EPA to set criteria for deciding when public water systems using surface sources must filter their water, and mandated that EPA write a regulation requiring disinfection of all public water systems, as appropriate.

SWTR

To comply with the 1986 amendments, EPA published the Surface Water Treatment Rule (SWTR), under which all public water systems that use surface water—or water (including ground water) that is under the direct influence of surface water—must disinfect their source water. These systems may also be required to filter their water if their sources do not meet certain quality requirements and site-specific conditions.

The SWTR also establishes treatment technique requirements in lieu of Maximum Contaminant Limits (MCLs) for Giardia, viruses, heterotrophic plate count bacteria, Legionella, and turbidity. The rule also requires that all public systems be managed by qualified operators, as determined by the state.

The SWTR requires disinfection because all surface-water sources may be subject to fecal contamination, and because water

quality indicators, such as total coliforms, are not adequate to signal whether a surface-water system is vulnerable to Giardia and other organisms more resistant to disinfection than are the indicators. Also, pretreatment and filtration without disinfection do not provide adequate protection from pathogens.

Ground-Water Disinfection Rule

The Ground-Water Disinfection Rule is several years away. EPA anticipates that the rule will regulate viruses, heterotrophic bacteria, and Legionella by requiring drinking-water systems to disinfect any ground water they use, with allowances for variances as appropriate. The Agency may also regulate for *Cryptosporidium*, a protozoan similar to *Giardia*, which has caused recent outbreaks of waterborne disease.

EPA is confident that the total coliform rule, the SWTR, and the ground-water treatment rule will, together, protect the public from most pathogens in drinking water.

NPDWRs

The National Primary Drinking-Water Regulations (NPDWRs) are another key element in EPA's effort to keep drinking water clean and protect the public from waterborne disease. They define either a **Maximum Contaminant Level** (MCL) or a treatment technique requirement to control the presence of a contaminant in drinking water. These are enforceable standards that protect the public health by limiting how much of a contaminant is permitted in drinking water. A treatment technique is established instead of an MCL if EPA decides that measuring a contaminant level is not technically or economically feasible. Public water systems are required by law to monitor their water to ensure it does not endanger the public health by exceeding MCLs or treatment technique requirements.

MCLGs

The 1986 amendments also provide for **Maximum Contaminant Level Goals** (MCLGs). These are the highest concentration of a drinking-water contaminant at which no known or anticipated health effects occur, plus an adequate margin of safety. These are non-enforceable, ideal health goals issued as part of the National Primary Drinking Water Regulations. EPA must set MCLs as close as possible to MCLGs, taking into account the cost and limits of technology for large public water supplies.

The amendments required EPA to regulate six microbiological contaminants by mid-1989. Five are regulated under the Surface Water Treatment Rule. EPA also regulated total coliforms in ground- and surface-water supplies, and will establish ground-water disinfection or treatment requirements to control for bacteria, viruses, heterotrophic bacteria, and Legionella in the near future.

Regulation of Microbiological Contaminants & Turbidity By Surface Water Treatment Rule

Contaminant	MCLG
Giardia lamblia	Zero
Viruses	Zero
Legionella	Zero
Heterotrophic Bacteria	None
Turbidity	None

MCLGs setting zero levels for **Giardia, viruses, and Legionella** have been published. The zero levels were established because the minimum numbers needed to cause illness are not known. No MCLs were published because EPA finds the analytical methods to measure Giardia, viruses, and Legionella are neither technically nor economically feasible, so these contaminants are better controlled in surface water by treatment techniques such as filtration or disinfection. The SWTR requires that at least 99.9 percent of Giardia and 99.99 percent of viruses in the source water be killed or removed from drinking water. Any water system that meets those regulations should also control Legionella and heterotrophic bacteria.

No MCLG or MCL has been established for **heterotrophic bacteria** because EPA believes the test for heterotrophic bacteria counts innocuous bacteria and pathogens alike, so no sensible test is possible. Nevertheless, since high counts of heterotrophic bacteria can indicate poor water quality, they are regulated in the SWTR. And, although they are easy to monitor, EPA recognizes that the extra cost of monitoring for these microorganisms, compared to total coliforms, is not worth the small gain in benefit that would result. Therefore, EPA believes that the treatment techniques required by the SWTR and the forthcoming Ground-Water Disinfection Rule are better ways of controlling these bacteria.

No MCLG has been published for **turbidity** because there is no direct health risk associated with it. It is, however, useful as an indicator of treatment effectiveness and turbidity limits have been set in the SWTR.

Total coliforms are an indicator of possible fecal contamination, but their actual number does not correspond to the number of disease-causing organisms present in a water sample. Nevertheless, coliforms are so closely related to potential microbiological contamination that EPA published a zero MCLG for them since it is technologically possible to achieve virtually zero levels of total coliforms. They are the only contaminant on the list for which EPA has also set an MCL (1 per 100 milliliters) instead of a treatment technique requirement. Drinking water suppliers can tell if their system complies with this MCL because they must monitor the quality of their water. The larger the system, the more samples it must collect. Systems that collect fewer than five samples each month must perform periodic on-site sanitary surveys to evaluate the capability of the system to produce and distribute safe drinking water.

Summing Up . . . What All This Means To You

Current federal and state drinking water regulations help protect the public health, but, in general, they do not go far enough. Every year, thousands of Americans still get sick because their drinking water is not safe. That is one reason why Congress strengthened the nation's environmental laws by passing the 1986 amendments to the Safe Drinking Water Act, and why EPA has set more drinking-water standards.

Improving and maintaining drinking-water quality is not just the responsibility of the states, the water suppliers, and EPA. It is also the responsibility of all concerned citizens. With the public health—and so much time and money—at stake, everyone should be paying more attention to drinking water and how safe it is.

This pamphlet has described the threat to public health posed by waterborne pathogens and what EPA proposes to do about them as it implements the 1986 SDWA amendments. Your cooperation and support are vital to this program's success.

Now that you have the facts, you can monitor what your drinking water supplier is doing to maintain and/or improve the quality of the water you drink. You also know why your water rates may increase to help suppliers meet these new standards. If you get your water from a private well, you can read EPA's *Manual of Individual Water Supply Systems* (EPA 570/9-82-004) to find out how to correct household well problems. And there is one other fact to keep in mind—the added cost of safer drinking water is a small price to pay for ensuring that your water, the community's water, and that of all Americans, is truly safe to drink.

Glossary

Public Water System — A system that pipes water for human consumption to least 25 people or has 15 or more service connections

Community Water System — A Public Water System serving at least 25 year-round residents or that has 15 or more connections used by year-round residents.

Non-Community Water System — A Public Water System that does not meet the definition of a Community Water System. Some schools, factories, campgrounds, motels and restaurants are examples of Non-Community Water Systems.

Surface Water — Sources of water such as lakes, reservoirs, rivers, and streams found on the earth's surface.

Ground Water — Water sources found below the surface of the earth.

Raw Water — Untreated surface or ground water.

Bacteria — Minute one-celled organisms such as total coliforms, the vast majority of which do not require a host organism for survival or do not cause disease.

Pathogens — Microbes such as *salmonella* and *shigella* that cause disease.

Protozoa — One-celled animals which are larger and have a more complex structure than bacteria. A few types, such as *Giardia* and *Cryptosporidium,* cause disease.

Microbe — An organism too small to be seen without a microscope. Microbes include bacteria, protozoa, and viruses.

Viruses — The smallest and simplest form of microbial life. Viruses can only reproduce inside a host cell. Examples of viruses include Hepatitis A agent and Norwalk Agent.

Need More Information?

Additional information about safe drinking water, the 1986 amendments to the Safe Drinking Water Act, and other related issues is available from EPA's Drinking Water Hotline: 1-800-426-4791 (in Alaska and the Washington, DC, area, 202-382-5533). The following EPA regional offices and State agencies can also provide you with information.

EPA Regional Offices

Region 1
Room 2203
John F. Kennedy Federal Building
Boston, MA 02203
(617) 565-3610

Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Region 2
26 Federal Plaza
New York, NY 10278
(212) 264-1800

New Jersey, New York, Puerto Rico, Virgin Islands

Region 3
841 Chestnut St.
Philadelphia, PA 19107
(215) 597-9873

Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia

Region 4
345 Courtland St., N.E.
Atlanta, GA 30365
(404) 347-2913

Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee

Region 5
230 South Dearborn St.
Chicago, IL 60604
(312) 353-2650

Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

Region 6
12th Floor, Suite 1200
1445 Ross Ave.
Dallas, TX 75270
(214) 655-7155

Arkansas, Louisiana, New Mexico, Oklahoma, Texas

Region 7
726 Minnesota Ave.
Kansas City, KS 66101
(913) 236-2815

Iowa, Kansas, Missouri, Nebraska

Region 8
Suite 500
999 18th St.
Denver, CO 80202-2405
(303) 293-1424

Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming

Region 9
215 Freemont St.
San Francisco, CA 94105
(415) 974-0763

Arizona, California, Hawaii, Nevada, American Samoa, Trust Territories of the Pacific, Guam, Northern Marianas

Region 10
1200 Sixth Ave.
Seattle, WA 98101
(206) 442-1225

Alaska, Idaho, Oregon, Washington

State Water Supply Agencies

Region 1

Water Supplies Section
Connecticut Department of Health
150 Washington Street
Hartford, CT 06106
(203) 566-1251

Division of Water Supply
Department of Environmental Quality Engineering
One Winter Street
Boston, MA 02108
(617) 292-5770

Division of Health Engineering
Maine Department of Human Services
State House (STA 10)
Augusta, ME 04333
(207) 289-5685

Water Supply Division
New Hampshire Water Supply and Pollution Control Commission
Post Office Box 95
Hazen Drive
Concord, NH 03301
(603) 271-3503

Division of Water Supply
Rhode Island Department of Health
75 Davis Street, Health Building
Providence, RI 02908
(401) 277-6867

Environmental Health Division
Vermont Department of Health
60 Main Street
Post Office Box 70
Burlington, VT 05401
(802) 863-7220

Region 2

Bureau of Safe Drinking Water
Division of Water Resources
New Jersey Department of Environmental Protection
Post Office Box CN-029
Trenton, NJ 06825
(609) 984-7945

Bureau of Public Water Supply Protection
New York Department of Health
2 University Place, Room 406
Western Avenue
Albany, NY 12203-3399
(518) 458-6731

Water Supply Supervision Program
Puerto Rico Department of Health
Post Office Box 70184
San Juan, Puerto Rico 00936
(809) 766-1616

Public Water Supply System
Government of Virgin Islands
Post Office Box 4340
Charlotte Amalie
St. Thomas, Virgin Is. 00801
(809) 774-3320

Region 3

Office of Sanitary Engineering
Division of Public Health
Jesse Cooper Memorial Building
Capital Square
Dover, DE 19901
(302) 736-4731

Water Hygiene Branch
Department of Consumer and Regulatory Affairs
5010 Overlook Ave., S.W.
Washington, DC 20032
(202) 767-7370

Division of Water Supply
Office of Environmental Programs
201 West Preston Street
Baltimore, MD 21201
(301) 225-6361

Division of Water Supplies
Department of Environmental Resources
Post Office Box 2357
Harrisburg, PA 17120
(717) 787-9035

Bureau of Water Supply Engineering
Virginia Department of Health
James Madison Building
109 Governor Street
Richmond, VA 23219
(804) 786-1766

Drinking Water Division
Office of Environmental Health Services
State Department of Health
1800 Washington St., East
Charleston, West Virginia 2530
(304) 348-2981

Region 4

Water Supply Branch
Department of Environmental Management
1751 Federal Drive
Montgomery, AL 36130
(205) 271-7773

Drinking Water Program
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241
(904) 487-1779

Water Protection Branch
Environmental Protection Division
Department of Natural Resources
270 Washington Street, S.W.
Atlanta, GA 30334
(404) 656-5600

Division of Water
Department of Environmental Protection
18 Reilly Road, Fort Boone Plaza
Frankfort, KY 40601
(502) 564-3410

Division of Water Supply
State Board of Health
Post Office Box 1700
Jackson, MS 39205
(601) 960-7518

Water Supply Branch
Division of Health Services
Department of Human Resources
Bath Building
Post Office Box 2091
Raleigh, NC 27602-2091
(919) 733-2321

Bureau of Water & Special Environmental Programs
Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 734-5310

Division of Water Supply
Tennessee Department of Health and Environment
150 9th. Ave., North
Nashville, TN 37219-5404
(615) 741-6636

Region 5

Division of Public Water Supplies
Illinois Environmental Protection Agency
2200 Churchill Rd.
Springfield, IL 62706
(217) 785-8653

Division of Public Water Supply
Indiana State Board of Health
5500 West Bradbury Ave.
Indianapolis, IN 46241
(317) 243-9100

Division of Water Supply
Michigan Department of Public Health
P.O. Box 30035
Lansing, MI 48909
(517) 335-8318

Section of Public Water Supplies
Minnesota Department of Health
717 Delaware St.
Minneapolis, MN 55440
(612) 623-5330

Office of Public Water Supply
Ohio Environmental Protection Agency
1800 Watermark Drive
P.O. Box 1049
Columbus, OH 43266-0149

Bureau of Water Supply
Department of National Resources
P.O. Box 7921
Madison, WI 53707
(608) 267-7651

Region 6

Division of Engineering
Arkansas Department of Health
4815 West Markham St.
Little Rock, AR 72205-3867
(501) 661-2623

Office of Preventive and Public Health Services
Louisiana Department of Health and Human Resources
P.O. Box 60630
New Orleans, LA 70160
(504) 568-5105

Drinking Water Section
New Mexico Health & Environment Department
P.O. Box 968
Santa Fe, NM 87504-0968
(505) 827-2778

Water Facility Engineering Service
Oklahoma State Department of Health
P.O. Box 53551
Oklahoma City, OK 73152
(405) 271-5204

Division of Water Hygiene
Texas Department of Health
1100 West 49th St.
Austin, TX 78756-3199
(512) 458-7497

Region 7

Environmental Protection Division
Iowa Department of Natural Resources
Wallace State Office Building
900 East Grant St.
Des Moines, IA 53109
(515) 281-6284

Support Services Section
Kansas Department of Health and the Environment
Forbes Field
Topeka, KS 66605
(913) 296-5503

Public Drinking Water Program
Division of Environmental Quality
P.O. Box 176
Jefferson City, MO 65102
(314) 751-0535

Division of Environmental Health and Housing Surveillance
Nebraska Department of Health
301 Centennial Mall South
P.O. Box 95007, 3rd Floor
Lincoln, NE 68509
(402) 471-2674
(402) 471-0510

Region 8

Drinking Water Unit
Colorado Department of Health
4210 East 11th Ave.
Denver, CO 80220
(303) 331-4546

Bureau of Water Quality
Health and Environmental Services
Cogswell Building, Room A206
Helena, MT 59620
(406) 444-2406

Division of Water Supply and Pollution Control
State Department of Health
1200 Missouri Ave.
Bismarck, ND 58501
(701) 224-2354

Office of Drinking Water
Department of Water and Natural Resources
Joe Foss Building
523 Capital Ave., East
Pierre, SD 57501
(605) 773-3754

Bureau of Drinking Water/ Sanitation
Utah Department of Health
P.O. Box 16690
Salt Lake City, UT 84116-0690
(801) 538-6163

Water Quality Division
Department of Environmental Quality
401 West 19th St.
Cheyenne, WY 82002
(307) 777-7781

Region 9

Field Services Section
Office of Water Quality
2655 East Magnolia St.
Phoenix, AZ 85034
(602) 392-4002

Sanitary Engineering Branch
California Department of Health
714 P St.
Sacramento, CA 95814
(916) 323-6111

Drinking Water Program
Sanitation Branch
Environmental Protection and Health Services Division
P.O. Box 3378
Honolulu, HI 96801
(808) 548-4682

Public Health Engineering
Nevada Department of Human Resources
Consumer Health Protection Services
505 East King St., Room 103
Carson City, NV 89710
(702) 885-4750

Guam Environmental Protection Agency
Government of Guam
P.O. Box 2999
Agana, Guam 96910

Division of Environmental Quality
Commonwealth of the Northern Mariana Islands
P.O. Box 1304
Saipan, Mariana Islands 96950

Marshall Islands Environmental Protection Authority
Hospital
Majuro, Marshall Islands 96960

FSM Environmental Protection Board
FSM Health Services
Kolonia, Pohnpei 96941

Palau Environmental Quality Protection Board
Hospital
Koror, Palau 96940

Region 10

Alaska Drinking Water Program
Water Quality Management
Department of Environmental Conservation
P.O. Box O
Juneau, AK 99811
(907) 465-2653

Bureau of Water Quality
Division of Environment
Idaho Department of Health and Welfare
Statehouse
Boise, ID 83720
(208) 334-5867

Drinking Water Program
Health Division
Department of Human Resources
1400 S.W. 5th Ave.
Portland, OR 97201
(503) 229-6310

Drinking Water Program
Section
Department of Social and Health Services
Mail Stop LD-11
Olympia, WA 98504
(206) 753-5954

EPA Regional Map