United States General Accounting Office

GAO

Report to the Chairman, Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, House of Representatives



March 1994

# DRINKING WATER

# Stronger Efforts Essential for Small Communities to Comply With Standards


GAO/RCED-94-40

GAO

**United States**
**General Accounting Office**
**Washington, D.C. 20548**

**Resources, Community, and**
**Economic Development Division**

B-255093

March 9, 1994

The Honorable Mike Synar
Chairman, Environment, Energy,
and Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

As you requested, this report examines the challenges facing small community water systems in complying with the growing number of regulations governing drinking water. The report discusses the barriers preventing more widespread use of cost-effective alternative technologies and management strategies for improving compliance with drinking water regulations as well as steps the Environmental Protection Agency (EPA) has taken to assist small water systems in overcoming these barriers. The report contains several recommendations aimed at furthering EPA's efforts to assist the states in addressing the problems of small drinking water systems.

As arranged with your office, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; and the Director, Office of Management and Budget. We will also make copies available to other interested parties on request.

This work was performed under the direction of Peter F. Guerrero, Director, Environmental Protection Issues, who can be reached at (202) 512-6111 if you or your staff have any questions. Other major contributors to this report are listed in appendix II.

Sincerely yours,

Keith O. Fultz
Assistant Comptroller General

# Executive Summary

## Purpose

In July 1992, GAO reported that a vast gap exists between the resources available and the funds needed to fully implement the Environmental Protection Agency's (EPA) drinking water program.[1] The problem is particularly acute for the approximately 50,000 small community drinking water systems that, in fiscal year 1991, accounted for 90 percent of all the community systems in violation of drinking water standards.

Given this difficult situation, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, requested that GAO determine (1) what cost-effective and alternative management- and technology-based approaches are being used to improve small water systems' compliance with drinking water regulations, (2) what barriers prevent the effective use of these approaches, and (3) what EPA is doing to remove any existing barriers and promote alternative approaches at the national level.

## Background

To protect the public from the risks of contaminated drinking water, the Congress enacted the Safe Drinking Water Act in 1974. This act requires EPA to, among other things, establish (1) drinking water standards or treatment techniques for contaminants that adversely affect human health and (2) requirements for monitoring the quality of drinking water supplies and ensuring the proper operation and maintenance of public water systems. All states but one have the responsibility, or "primacy," for managing their drinking water programs. These states receive grants from EPA to help pay for the oversight of water systems and for other program responsibilities.

In 1986, the Congress amended the act to increase the number of regulated contaminants and to strengthen EPA's enforcement authority. To implement these amendments, EPA issued new regulations that significantly increase the responsibilities involved in drinking water programs. As a result, small water systems—which make up 87 percent of all community drinking water systems—are expected to incur enormous costs and face difficult challenges in complying with these requirements. According to EPA's estimates, through the end of this century small systems will incur costs of nearly $3 billion to comply with all regulations and an additional $20 billion to repair, replace, and expand the basic infrastructure to deliver drinking water.

[1]Drinking Water: Widening Gap Between Needs and Available Resources Threatens Vital EPA Program (GAO/RCED-92-184, July 6, 1992).

## Results in Brief

States are experimenting with a variety of alternative strategies to improve small water systems' compliance with the Safe Drinking Water Act. These strategies include (1) exploring whether alternative technologies can effectively treat drinking water at a cost affordable to small systems, (2) testing creative ways to provide technical and financial assistance to small systems, and (3) exploring options for restructuring small systems, such as consolidating nonviable small systems with viable systems.

A number of barriers prevent the wider use of alternative strategies. Cost and performance data that the states need to assess alternative treatment technologies are not widely available, and some treatment technologies are too complex and costly for small systems to use. Also, the limited efforts EPA and the states have made to increase technical assistance have generally been ineffective, in large part because of the vast number of small systems that need support. In addition, many states lack the resources needed to identify nonviable water systems and ensure that they are brought into long-term compliance with drinking water standards. Finally, although EPA favors consolidating nonviable systems, the agency's grant formula for providing states with funds to oversee compliance can provide a disincentive to consolidation.

To address some of these barriers, EPA has helped field test some alternative drinking water technologies and has made some efforts to improve the technical and managerial capabilities of the states and individual water systems. EPA has also recommended that the Congress amend the Safe Drinking Water Act to require states to develop viability programs. However, EPA's current priorities for the drinking water program do not emphasize the development of such programs. In addition, state and local officials told GAO that (1) EPA's initiatives are too limited to help significantly and (2) states will not have adequate funding to implement viability programs properly.

## Principal Findings

### Alternative Approaches Are Being Used to Help Small Systems

States are experimenting with technology- and management-based approaches to help small community drinking water systems comply with the requirements of the Safe Drinking Water Act. For example, affordable alternative technologies, such as pre-engineered packaged treatment plants, are sometimes being used to remove contaminants.

Management-based strategies include creative approaches for providing technical and financial assistance to small systems. Several public and private organizations provide free on-site technical services to these systems. Private, state, and federal financial assistance programs have also been created for these systems. For example, the Rural Development Administration awards grants and low-interest loans to finance the construction of small community water systems.

Many state and EPA officials agree, however, that the most fundamental long-term solution is to address the small systems' lack of economies of scale. Connecticut, Pennsylvania, and Washington have adopted viability programs to (1) prevent potentially nonviable new systems from forming and (2) improve the viability of existing systems through laws that direct the restructuring of nonviable water systems.

## Several Factors Impede Wider Use of Alternative Strategies

One key barrier preventing the wider use of alternative treatment technologies is a lack of reliable cost and performance data, making it difficult for small systems' officials and state regulators to evaluate whether the technologies are affordable and will meet regulatory requirements. In addition, many state regulators told GAO that some of the available alternative technologies are too complex for many small systems' operators to properly operate and maintain.

Several barriers also limit the effectiveness of the technical and financial assistance programs established by states and other organizations. The sheer number of systems needing such assistance overwhelms available resources. Also, some state and industry officials maintain that the assistance programs, if not appropriately targeted, can inadvertently perpetuate systems that will eventually fail anyway.

Perhaps most important, few states have been able to reduce the number of their nonviable systems. State officials acknowledge that such reductions could help achieve meaningful resource savings. However, they stress that they cannot develop and implement viability programs because they are using all available resources to address other priorities that EPA deems necessary if they are to retain primacy for the program. Furthermore, although EPA supports the consolidation of nonviable water systems, its drinking water grant formula—which is based, in part, on the number of water systems in a state—inadvertently penalizes states that consolidate their water systems.

## EPA Has Tried to Reduce Barriers to Alternative Strategies

EPA's efforts to remove the barriers to alternative strategies have included, among other things, (1) field tests of new treatment technologies and (2) limited training and outreach programs to improve the technical and managerial capabilities of both the states and their systems. To help remove disincentives to consolidation, in fiscal year 1994 only, EPA revised its method for allocating state grants. In addition, EPA has proposed that the Congress require states to have, as a condition of retaining primacy, both small system viability programs and the authority to restructure nonviable water systems. The agency has also proposed a federally authorized user fee to generate the funding needed to pay for these programs.

GAO acknowledges EPA's progress in addressing technological and managerial issues, particularly in light of the agency's serious budget constraints, and agrees with the agency that the states should develop viability programs and acquire the authority needed to restructure nonviable systems. However, a number of problems still need to be addressed to ensure the success of these restructuring efforts. Specifically, EPA has yet to (1) revise the priorities of its own drinking water program to place greater emphasis on developing and implementing viability programs or (2) work with the Congress to ensure that the proposed requirement that states develop viability programs is accompanied by a detailed and realistic funding strategy for implementation. Finally, EPA has not yet made long-term changes to its grant formula to remove disincentives for consolidating water systems.

## Recommendations

GAO recommends that the Administrator, EPA, (1) revise the agency's drinking water program's priorities to place greater emphasis on developing and implementing viability programs, (2) work with the cognizant committees of the Congress to develop a detailed funding strategy to accompany the agency's proposed requirement that states develop viability programs for small systems, and (3) revise its grant formula for public water supply supervision to remove disincentives for states to consolidate water systems.

## Agency Comments

GAO discussed the facts in this report with EPA officials from the Office of Ground Water and Drinking Water, who generally agreed with their accuracy. GAO has made changes where appropriate. As requested, GAO did not obtain written comments on the draft report.

# Contents

**Abbreviations**

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| EPA | Environmental Protection Agency |
| GAO | General Accounting Office |

# Introduction

Most Americans obtain their drinking water from public water systems. Consumers rely on these systems to provide high-quality water that meets federal and state drinking water standards. However, each year many public water systems are found to be in violation of these standards, and the consumers served by these systems risk ingesting contaminated water. Some contaminants found in drinking water may cause only relatively mild illnesses, but others have been linked to cancer, birth defects, and other serious health problems.

Meeting new and complex drinking water regulations has become increasingly difficult, particularly for small public water systems, which often lack the resources and technical expertise needed to do so. In fact, 90 percent of the community water systems that were found in violation of drinking water regulations in fiscal year 1991 were small systems. EPA defines small systems as those with 3,300 or fewer consumers.

Many states are having great difficulty managing their drinking water programs because an overwhelming number of small water systems require oversight. As we reported in July 1992,[1] in large part as a result of the 1986 amendments to the Safe Drinking Water Act, the complexity and number of requirements that states must meet in managing their drinking water programs have expanded significantly without a corresponding increase in federal or state resources. As a result of serious resource constraints, some states have decided to adopt new strategies to help them deal with the large number of small water systems that do not meet current regulatory requirements and that are expected to have even more difficulty complying with future requirements.

## Public Water Systems Serve Most Americans

A public water system is any system that pipes water to at least 15 service connections or that regularly serves an average of 25 people at least 60 days a year. Public water systems that serve the same population year-round are known as community water systems. All others, by definition, are noncommunity water systems.[2] According to EPA, there are about 200,000 public water systems, and about 57,000 of these are

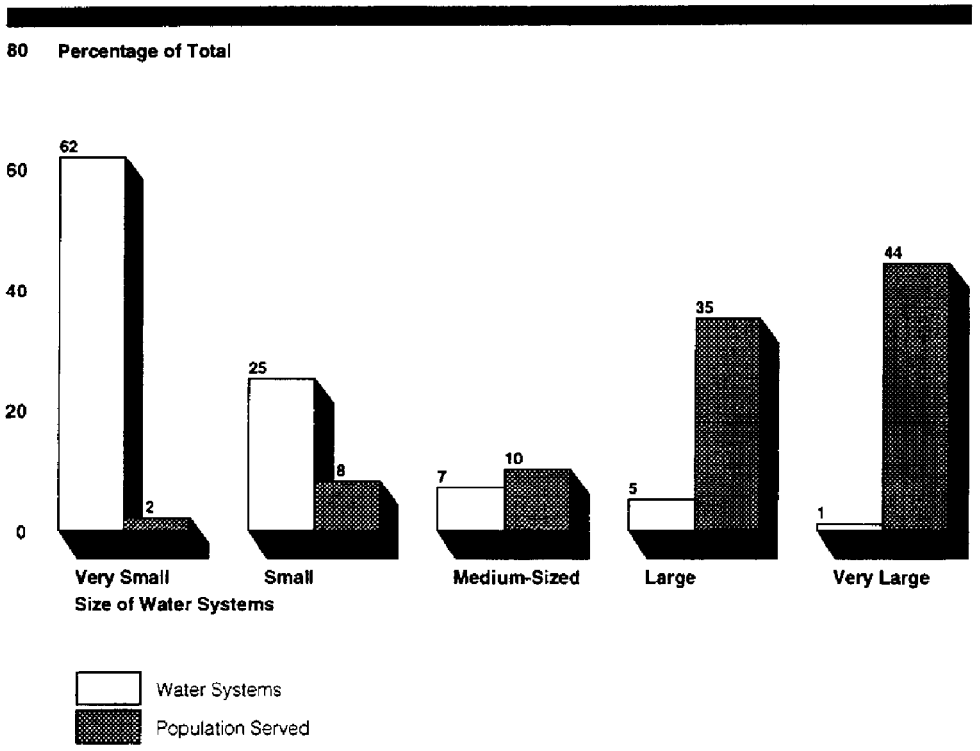
[1]Drinking Water: Widening Gap Between Needs and Available Resources Threatens Vital EPA Program (GAO/RCED-92-184, July 6, 1992).

[2]Noncommunity water systems, in turn, are categorized as either nontransient or transient. Nontransient noncommunity water systems—such as the water systems operated by some hospitals, factories, and schools—serve at least 25 of the same people for at least 6 months of the year. Transient noncommunity water systems cater to transitory customers in nonresidential areas such as campgrounds, motels, and gas stations.

community systems. These community systems serve over 240 million people, or about 90 percent of the U.S. population.

EPA categorizes community water systems by the size of the population served. As figure 1.1 shows, small and very small community water systems account for 87 percent of all community water systems in the country, although they serve only 11 percent of the population.[3]

**Figure 1.1: Community Water Systems and Population Served, by Size of System**




Note 1: According to EPA's definitions, very small systems serve from 25 to 500 customers; small systems, 501 to 3,300 customers; medium-sized systems, 3,301 to 10,000 customers; large systems, 10,001 to 100,000 customers; and very large systems, more than 100,000 customers.

Note 2: As of August 1993, EPA's records showed a total of 57,477 community water systems nationwide, serving a population of 240,916 people.

Source: GAO's illustration based on EPA's data.

[3]In this report, unless otherwise indicated, the term "small systems" refers to both small and very small systems.

## Public Water Systems Are Regulated Under the Safe Drinking Water Act

The Safe Drinking Water Act of 1974 established a national program to ensure that all public water systems meet minimum standards for protecting human health. The act directed EPA to establish (1) national drinking water standards or treatment techniques for contaminants that could adversely affect human health and (2) requirements for monitoring the quality of drinking water and for ensuring the proper operation and maintenance of water systems.

The act also gave EPA the authority to delegate the primary responsibility for enforcing drinking water program requirements—commonly referred to as "primacy"—to states that meet certain requirements. To assist states in developing and implementing their own drinking water programs, the act authorized EPA to award grants to the states and directed the agency to help states administer their programs. All states except Wyoming have assumed primacy for managing their drinking water programs. These states receive grants from EPA to help pay for the oversight of water systems and for other responsibilities.

With EPA's oversight, states with primacy enforce the requirements of the federal program and monitor the quality of the drinking water provided by public water systems within their jurisdiction. Water systems are required to collect water samples at approved intervals and locations and have the samples tested in an approved laboratory. The test results are then reported to the state, which determines whether the water system complies with the regulations. If violations have occurred, the state is responsible for taking appropriate enforcement action.

By the mid-1980s, many drinking water contaminants remained unregulated by EPA. In addition, water systems' compliance with the requirements and states' enforcement actions against systems that did not comply were both uneven. Accordingly, the Congress amended the Safe Drinking Water Act in 1986 to, among other things, (1) establish deadlines to accelerate EPA's efforts to set standards, (2) establish a monitoring program for certain unregulated contaminants, (3) require EPA to issue criteria for determining which systems that rely on surface water must filter their water supplies, and (4) require all public water systems to disinfect their supplies. These new and more stringent requirements significantly increased the responsibilities of the federal and state governments and the public water systems for providing safe drinking water.

## Burdens on Small Systems and State Regulatory Programs Will Increase Dramatically

According to EPA, small community water systems often lack sufficient resources and expertise to comply with complex drinking water regulations. The potential for compliance problems among small systems was understood by the Congress in 1974 when it enacted the Safe Drinking Water Act. At that time, there was recognition that small systems, with their small numbers of customers, might not be able to afford the technological improvements that would be required. Consequently, it was envisioned that some small systems would be closed and replaced with more cost-effective alternatives.

Of the 16,439 community water systems that were found in violation of drinking water regulations during fiscal year 1991, 90 percent were small systems. Although the actual impact of the new requirements will not be known until all the new regulations are implemented, water systems are expected to incur enormous costs and face difficult new challenges in complying with these requirements. EPA estimates that, through the end of this decade, small water systems will require $3 billion simply to comply with these requirements. These costs are over and above the small systems' projected capital requirements—estimated at more than $20 billion by the end of the 1990s—to repair, replace, and expand the basic infrastructure needed to deliver drinking water to consumers.

The states' responsibilities in managing their drinking water programs will also significantly increase in the future as a result of the 1986 amendments. The costs associated with these additional responsibilities are expected to increase by hundreds of millions of dollars annually. However, while the Safe Drinking Water Act authorizes EPA to pay up to 75 percent of the cost of administering state programs, EPA's actual contribution has been substantially less. As a result, states have been forced to cut back or eliminate key quality assurance programs that help ensure that good quality drinking water is provided to consumers.

## Objectives, Scope, and Methodology

In view of the history of problems that small water systems have had in complying with drinking water regulations and the impact of these problems on the limited resources that the states have for oversight, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, asked us to determine (1) what cost-effective, alternative approaches are being used to help small drinking water systems comply with requirements; (2) what barriers prevent the effective use of these approaches; and (3) what EPA is doing at the national level to remove these barriers and promote these approaches.

In this report, each of these objectives is addressed in the context of the major compliance strategies that we identified during our review, including the use of (1) cost-effective alternative technologies; (2) training, technical, and financial assistance; and (3) management methods to increase the small systems' economies of scale.

The bulk of our work was performed at the EPA headquarters' Office of Ground Water and Drinking Water and at agencies in three states that have drinking water responsibilities. To obtain a nationwide perspective, we also gathered information from national associations representing the drinking water industry, drinking water equipment manufacturers and vendors, state drinking water program administrators, and providers of financial and technical assistance to small systems. Our review focused on community water systems, which are the primary source of drinking water for most Americans. The review did not address noncommunity water systems.

We visited Connecticut, Pennsylvania, and Washington to obtain detailed information on state programs. We selected these states for review because they were generally recognized as having the most active state drinking water programs that use alternative strategies to improve small water systems' compliance with state and federal regulations—especially the use of the management-based approaches commonly referred to as restructuring or viability programs.

In each state selected, we interviewed water program officials and examined program policies, guidance, and reports. In addition, we interviewed state water utility regulators; local representatives of national providers of technical and financial assistance; representatives of industry associations; water utilities and management services providers; and local officials familiar with small water system operators and owners and the issues they face.

To address the review's first and second objectives, we relied primarily on the information we obtained from EPA headquarters, national associations, and the three states we visited. In addition, we obtained and assessed information on available, small-scale treatment technologies from local, state, federal, and industry officials involved in current pilot projects that test such technologies. We also attended the 1992 and 1993 American Water Works Association's annual conferences. At these conferences, federal, state, local, and industry officials discussed management-based and technology-based strategies available to improve small systems'

compliance with requirements and the results of current projects and research.

To address our third objective, we obtained information from the officials at EPA headquarters responsible for developing and promoting programs intended to assist states and water systems in improving small systems' compliance with requirements. To determine the states' reaction to EPA's proposals for amending the Safe Drinking Water Act, we contacted state drinking water officials in 10 states—Alabama, California, Connecticut, Idaho, Iowa, Maryland, Mississippi, Montana, Pennsylvania, and Washington. We obtained other information from officials of the Association of State Drinking Water Administrators; American Water Works Association; National Rural Water Association; Association of Metropolitan Water Agencies; Rural Community Assistance Program, Inc.; Farmers Home Administration; and Rural Development Administration.

Our work was conducted between May 1992 and March 1994 in accordance with generally accepted government auditing standards. We discussed our findings with officials in EPA's Office of Ground Water and Drinking Water, who generally agreed with the information presented. We have incorporated the officials' comments where appropriate. As requested, we did not obtain written agency comments on a draft of this report.

# Alternative Technologies Are Available to Treat Drinking Water, but Several Problems Impede Their Widespread Use

Alternatives to constructing full-scale drinking water treatment facilities are available to remove contaminants from drinking water, and some small systems have successfully used these alternatives to meet their treatment needs. These alternatives include packaged plant systems and point-of-entry and point-of-use devices.[1] However, several factors prevent small drinking water systems from making widespread use of these alternative treatment technologies. For example, a lack of reliable cost and performance information about alternative technologies makes it difficult for small system officials and state regulators to identify technologies that are affordable and that meet specific treatment requirements. Also, because many small systems do not have full-time, trained operators, technologies that are difficult to operate and maintain cannot be considered for these systems.

## Several Treatment Technologies Provide Alternatives to Conventional, Full-Scale Treatment Facilities

Most large drinking water systems use full-scale, traditionally designed and constructed treatment facilities. These facilities typically use conventional treatment processes to remove contaminants from drinking water.[2] Large systems usually have a customer base large enough to absorb the design, engineering, and capital costs of full-scale treatment facilities. Because small systems have fewer customers, the costs associated with constructing a full-scale treatment facility are generally prohibitive.

Several alternative technologies are available to remove a variety of substances from drinking water through physical and chemical processes. Packaged treatment plants, which are pre-assembled units that can be transported to treatment sites, can be designed to remove a variety of contaminants from drinking water. Point-of-entry and point-of-use devices can be attractive, low-cost alternatives for treating drinking water. However, concerns about how to monitor the operation and maintenance of these devices have led EPA and many states to place restrictions on the use of these devices as a means of complying with the Safe Drinking Water Act. Under certain conditions, point-of-entry devices are acceptable as a

[1]Point-of-entry units are designed to treat all water entering a home; point-of-use units treat water from a single tap.

[2]Conventional treatment processes begin with coagulation, which is the process of using chemicals such as alum to cause tiny particles in water to attract one another and form larger particles. Then the process of flocculation is employed. Flocculation involves the slow, gentle mixing of water over a period of time and results in coagulated particles colliding to form floc, or larger, denser particles that can easily be filtered from water. The floc-filled water then flows very slowly through a sedimentation tank, and the floc and other suspended matter settle to the bottom of the tank. When water leaves the sedimentation basin, the water moves through a filtering material, which removes any remaining suspended particles.

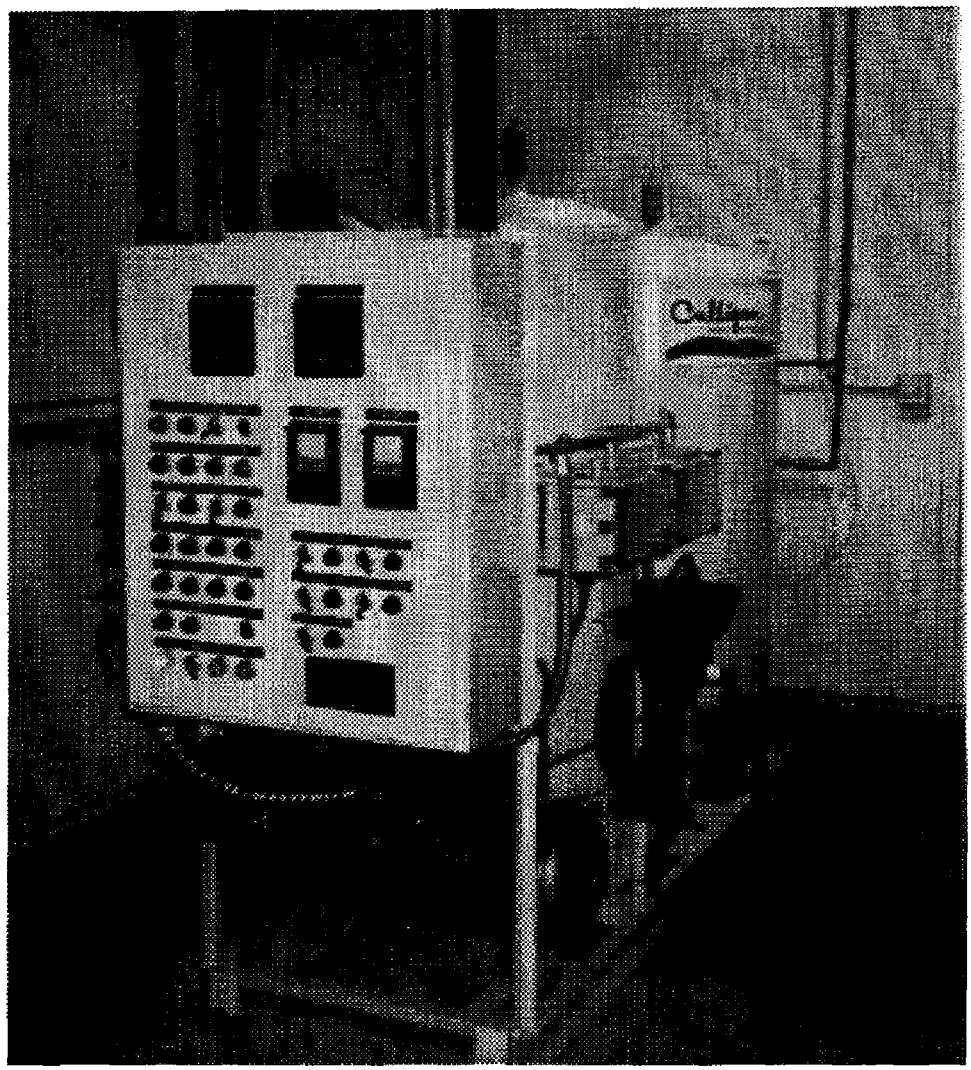
technology for complying with drinking water regulations. However, EPA and many states do not accept point-of-use devices as a means of complying with the act's requirements.

## Packaged Plants Include a Variety of Treatment Technologies

In general, packaged plants are units that are pre-assembled in a factory, mounted on skids, and transported to the treatment site virtually ready to use. An official in EPA's Office of Research and Development described packaged treatment plants as boxes into which a variety of technologies can be placed. The technology chosen depends in part on the type of contaminant that needs to be removed. These systems can be customized to perform one or several treatment functions, including filtration and the removal of inorganic and organic contaminants. The technologies that can be used in a packaged plant include, but are not limited to, the use of granular activated carbon, membranes, diatomaceous earth, cartridge and bag filters, aeration, and ion exchange.[3] Figure 2.1 shows an example of a packaged plant treatment unit.

[3]See app. I for a description of each of these technologies.

**Figure 2.1: Packaged Treatment Plant**

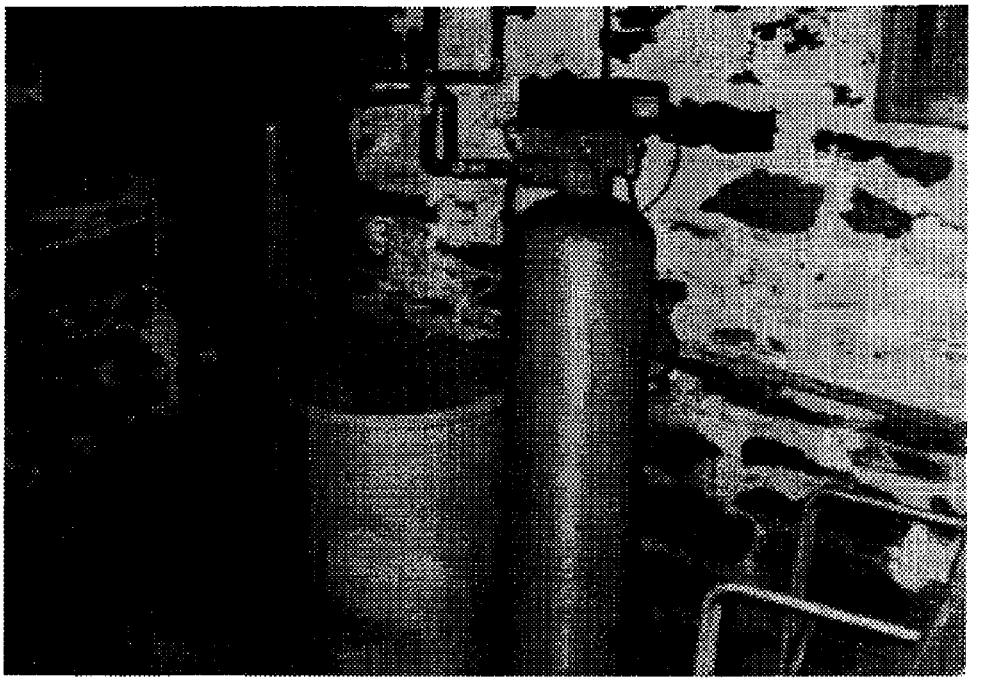


## Point-of-Entry and Point-of-Use Units Can Remove a Wide Variety of Contaminants From Drinking Water

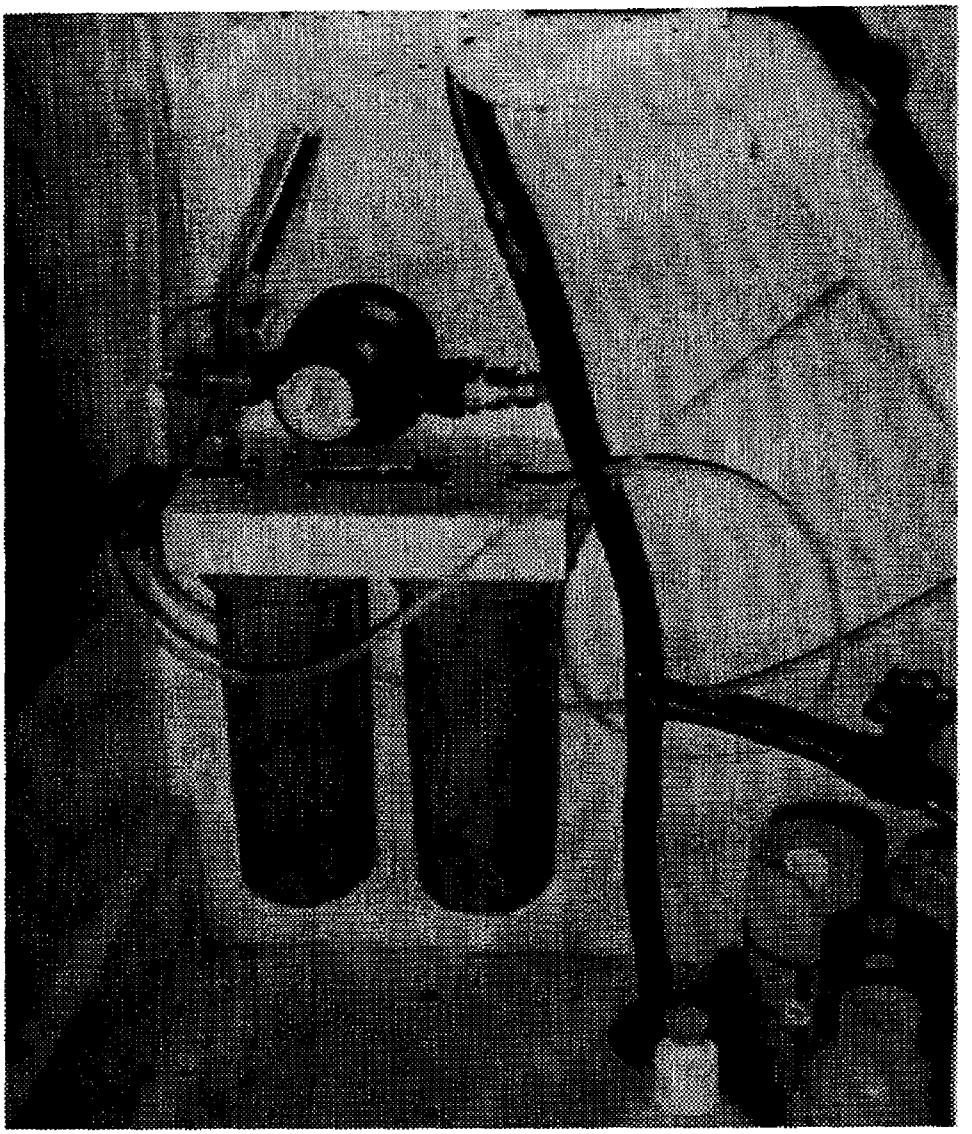
Point-of-entry units can be attractive alternatives for treating all water going into an individual home. Point-of-use systems treat drinking water coming from a single faucet. Basically, the same technology used in treatment plants for community water systems can be used in point-of-entry and point-of-use systems. This technology is applied to reduce levels of organic contaminants, fluoride, iron, radium, chlorine, arsenic, nitrate, ammonia, and many other types of contaminants.

Point-of-entry and point-of-use technology can treat from 10 to several hundred gallons of water per minute. Point-of-entry devices are, under certain circumstances, acceptable means of complying with drinking water standards because these devices can provide drinking water that meets the standards throughout a home. Point-of-use devices are mainly used to address aesthetic problems with drinking water, such as taste, odor, color, and hardness. EPA does not consider point-of-use devices an acceptable means of compliance with drinking water standards because these devices do not treat all the water in a home and, as a result, could cause health risks due to exposure to untreated water. However, EPA is sponsoring an effort to address its concerns about monitoring the performance of point-of-use devices. This effort may result in the approval of these devices under certain circumstances. Currently, these devices may be used only as an interim measure to avoid unreasonable health risks before full compliance with drinking water regulations can be achieved. Figure 2.2 shows examples of point-of-entry and point-of-use devices.

**Figure 2.2: Point-of-Entry and Point-of-Use Units**



A point-of-entry unit treats all the water coming into a house.



A point-of-use unit, like this under-sink unit, treats the water at one faucet.

## Relatively Few Small Systems Take Advantage of Alternative Treatment Technologies

According to drinking water officials in each of the three states visited during our review, relatively few small systems in each state are using approved alternative technologies to treat drinking water. In Connecticut, 3 of the state's 563 small systems are using alternative technologies; in Pennsylvania, 64 out of 2,100 small systems are using these technologies. In Washington state, approximately 50 of the state's 2,200 small systems are using approved alternative technologies.[4]

In all three states, packaged treatment plants were being used to treat drinking water. For example, an official from the Connecticut Department of Health Services said that he is aware of three small water systems that have installed packaged plants in Connecticut. This official added that 4 or 5 of the remaining 12 water systems in the state that must install filtration equipment will probably use packaged plants. A report based on a survey of state drinking water regulatory agencies conducted by the Association of State Drinking Water Administrators in 1991 showed that, at that time, packaged plants were being used nationwide by at least some small water systems in 72 percent of the 46 states responding to the survey.[5]

In the three states we visited, the use of point-of-entry and point-of-use devices varied. For example, officials from the Connecticut Department of Health Services and the Pennsylvania Department of Environmental Resources said that they were not aware of any water systems using these devices to comply with drinking water standards in these states. On the other hand, point-of-entry and point-of-use devices are being used by a few small systems in Washington, although the state has issued a formal policy recommending that these units not be approved for use because of concerns about their operation and maintenance.

## Several Factors Limit the Use of Alternative Technologies by Small Systems

According to officials in the three states we visited, several factors can limit the use of alternative drinking water system technologies by small water systems. In general, these officials agreed that a lack of reliable information on the cost and performance of alternative technologies makes it difficult for state regulators to (1) identify alternative technologies that will satisfy treatment needs and (2) grant approval of these technologies. These officials said that many small systems do not have the resources to hire full-time, trained operators. As a result, these

[4]Connecticut and Washington define a small system as one having less than 1,000 service connections. Pennsylvania defines a small system as one having less than 3,300 service connections.

[5]Report on State Engineering Practices for Small Water Systems, prepared for the Environmental Protection Agency by the Association of State Drinking Water Administrators, July 1991.

systems must eliminate from consideration alternative technologies that are complex to operate and maintain. Also, because small water systems have few customers to share costs and have a limited ability to obtain financing, the choice of alternative treatment technologies must be limited to those that are low-cost.

## Lack of Reliable Cost and Performance Data for Alternative Technologies Impedes Approvals

EPA and drinking water program officials from all three of the states visited during our review said that a lack of adequate cost and performance information about alternative treatment technologies is a major problem in state and local decisionmakers' approval of the use of these systems. This type of information is required by all three states to provide assurance that (1) the alternative technology can effectively address any water quality problems and (2) the small system can afford to properly operate and maintain the technology. The state officials said that while some cost and performance information is available from equipment manufacturers, this information is not always adequate for assessing site-specific conditions that must be evaluated before the technology can be approved. In addition, an official from the Pennsylvania Department of Environmental Resources expressed concern about obtaining this information directly from equipment manufacturers because it is usually delivered "as a sales pitch" and not as an independent assessment of the performance of the technology. In the absence of such information, the states that we visited may require that alternative technologies undergo pilot tests that last from 6 to 18 months. One of the three states also requires equipment manufacturers to guarantee the performance of these technologies when the system receives funding from the state to install an alternative technology.

The 1991 report issued by the Association of State Drinking Water Administrators mentioned above identified the inadequacy of data sources as a major problem in approving the use of alternative technologies. This study noted that state drinking water regulatory staff receive most of their information on new products and technologies from sources such as technical literature and calls or visits from suppliers. The study also found that the travel funds needed for state regulators to make site visits and attend trade shows, technical seminars, and conferences to learn about new technologies are highly limited. The study concluded that existing sources of information on the performance of alternate technologies are inadequate and that expanded third-party testing by reputable organizations, such as the American Water Works Association, NSF

International,[6] and EPA, is strongly favored by state regulatory officials, with the caveat that such testing must be done in a timely manner and at a reasonable cost.

In May 1992, the Association of State Drinking Water Administrators issued another report presenting the results of case studies of nine small water systems that had installed low-cost technologies in an effort to comply with the requirements of the Safe Drinking Water Act. The nine small systems represented a range of system sizes and ownership types, and the technologies they chose represented a range of the available in-place treatment technologies. The nine water systems ranged in size from approximately 100 to 800 service connections. This study found, among other things, that

- water systems need adequate facilities, qualified operators, technical assistance, and adequate funding to meet the requirements of the Safe Drinking Water Act;
- treatment technologies for small water systems are available to provide effective treatment of surface water and groundwater sources to meet the requirements of the Safe Drinking Water Act;
- continued education of water system owners, state regulators, and local engineers is required to encourage the use of low-cost treatment technologies;
- information is needed about the treatment options available and the performance, limitations, and costs of treatment technologies; and
- based on the nine systems examined, low-cost, in-place treatment technologies can be installed for $200 per connection or less, although the total cost for all required system improvements can be much greater, depending on the condition and design of the system's existing facilities.

This report recommended that a design manual be developed for each major treatment technology to provide needed information to aid in the evaluation, selection, design, and operation of small water systems.[7]

Although the state drinking water officials that we contacted during our review said that more information is needed on the cost and performance of alternative technologies, there was some debate about who should develop this data. Drinking water officials from two states said that NSF International should perform third-party testing of these technologies

[6]NSF International is a nationally recognized third-party testing organization.

[7]Case Studies Assessing Low-Cost, In-Place Technologies at Small Water Systems, prepared for the Association of State Drinking Water Administrators by the Greeley-Polhemus Group, Inc., May 1992.

because NSF is generally recognized as a credible source that has the expertise and facilities needed to provide this service. These officials pointed out that EPA, on the other hand, would need to both develop this expertise and acquire additional facilities to provide the same service. A drinking water official from the third state we visited said that EPA should play a larger role in testing and certifying the performance of these technologies because EPA could provide this service at a lower cost than NSF. According to equipment manufacturers, NSF charges up to $10,000 to evaluate and certify their equipment.

Of the six small system officials contacted during our review, all said that small systems need more information about the cost and performance of alternative technologies. Most of these officials expressed concern that without such information, small systems may choose an alternative technology that does not address treatment needs. In such cases, according to these officials, a small system that has few financial resources could be in serious trouble if it must obtain additional funding to modify or replace an alternative technology that is not performing as planned.

In the opinion of three drinking water equipment manufacturers contacted during our review, several states are so conservative in approving alternative drinking water treatment technologies that it is very difficult, if not impossible, for manufacturers to receive approval for their products in those states. For example, one equipment manufacturer said that although the packaged treatment plant it sells has performed successfully at over 100 sites nationwide, many very conservative states will not approve the use of this technology. The same equipment manufacturer pilot-tested a packaged treatment plant for 3 years in Ohio to prove the equipment's performance. After investing a great deal of time and effort in the pilot test, the manufacturer received state approval to use the equipment at the test site only. The state told the manufacturer that separate pilot tests would be needed for approval at additional sites in the state. Also, officials from all three equipment manufacturers said that states do not apply the same standards for approving technologies. Manufacturers said that even within the same state, approval of a system can depend on what district of the state the technology is being tested in. For example, one manufacturer said that a system may be approved in one of the six districts of Pennsylvania but not in others.

Efforts to develop guidelines for evaluating alternative technologies have met with limited success. To help address problems with obtaining state

approvals for alternative drinking water treatment technologies, a group of western states—Alaska, California, Colorado, Idaho, Montana, Oregon, and Washington—with financial support from EPA, has developed a uniform set of guidelines for states to use in evaluating alternative filtration technologies. The goals of this effort were to

- establish a uniform set of guidelines that could be used by all states in evaluating alternative filtration technologies and
- recommend that a clearinghouse be established to support direct communication between states, equipment manufacturers, engineers, and water system operators on issues concerning alternative technologies for drinking water treatment.

The guidelines, called the Western States Protocol, note that the Surface Water Treatment Rule is expected to create a much greater demand for easily operated and maintained filtration technologies.[8] The guidelines further note that the performance demonstration requirement of the Surface Water Treatment Rule and the need to review and accept new technologies creates a need for protocols to review alternative technologies as well as a clearinghouse in which reviewing authorities can have ready access to the latest technical information.

Although the Western States Protocol has been in effect since April of 1992, two of the three equipment manufacturers we contacted that have tried to get technologies approved in some of the seven western states say that the protocol has made little difference because these states are still following their standard, conservative practices. Officials from two of the western states said that they try to adhere to the protocol but that, in some cases, it is not specific enough to provide the data needed for approval.

In response to the need for standard test and approval protocols that are nationwide in scope, NSF International developed a proposal in July 1993 to develop a set of standard guidelines for assessing alternative affordable technologies applicable to small community drinking water treatment systems. According to an official of NSF, it is envisioned that this effort would result in guidelines that specify the initial screening or selection criteria, the laboratory data requirements, and the pilot study protocols for each treatment technology that can potentially achieve the requirements of each specific rule under the Safe Drinking Water Act. This official said

[8]The Surface Water Treatment Rule is one of several regulations adopted to implement the 1986 amendments to the Safe Drinking Water Act. Under this rule, surface water systems and groundwater systems influenced by surface water were required to disinfect and, under certain circumstances, filter their source water by June 29, 1993.

that the guidelines would be developed through a committee with balanced representation from three major parties: regulators, equipment users, and equipment manufacturers. The NSF official said that because of the involvement of all three parties, there would be a greater chance of developing guidelines that are broadly accepted and widely used. As of March 1994, this proposal had not received funding.

Drinking water officials from the three states we visited acknowledge that some states are more receptive than others to the use of alternative technologies. In fact, an official in the Pennsylvania Department of Environmental Resources explained that the authority to grant permits to drinking water systems is decentralized to six regional offices in Pennsylvania. Because this state does not use standard protocols for reviewing alternative technologies, a technology could be approved in one region of the state and rejected in another, depending on how conservative the reviewing official is.

## Complexity and Cost of Some Technologies Place Them Beyond the Reach of Small Systems

According to officials from drinking water agencies in each of the three states and from EPA's Office of Ground Water and Drinking Water, concerns about the cost and complexity of alternative treatment technologies can limit their use. Such concerns arise because many small systems do not have trained, full-time operators and because most small systems cannot easily afford the design, engineering, and capital costs of new technologies. While some small systems may be able to realize substantial cost savings by using alternative technologies, state officials said that many small systems may not have the financial resources and technical expertise needed to use them. Indeed, drinking water officials from the three states we visited said that most very small systems with between 25 and 100 service connections have severely limited financial resources and may not be able to afford any type of alternative technology.

Drinking water officials from the three states we visited stressed that alternative technologies for small systems must be simple to operate and maintain because small system operators generally lack the technical expertise needed to operate water treatment facilities. According to these officials, whether a system is "operator friendly" should be a major factor in determining if a technology receives approval.

The 1991 report issued by the Association of State Drinking Water Administrators cited above found that the majority of state regulators surveyed do not believe that small system operators are capable of

providing adequate operations and maintenance services. The study also noted that state regulators consider this one of the primary reasons that states are having problems identifying safe and reliable alternative treatment technologies for small systems.

The importance of alternative technologies that are simple to operate and maintain can be illustrated in the case of a small water system in Connecticut. In this system, a packaged treatment plant was installed in 1984 to treat raw water from a surface water source and provide drinking water for 435 service connections. This packaged plant was purchased at a cost of approximately $500,000 and financed through a 20-year loan from the Farmers Home Administration. In the opinion of a Connecticut drinking water official, the fact that this system did not have a full-time certified operator is the main reason that the system "has been nothing but trouble from day one of its operation." According to this official, the system has been out of compliance several times since it began operation. Because the system will not be able to meet requirements of the Surface Water Treatment Rule, the system is currently seeking financing from the Rural Development Administration to drill wells and switch to a groundwater source.[9]

For the six water systems located in the three states we visited that have installed alternative treatment technologies, the costs of alternative systems vary widely, depending on the technology used, the water quality problems that need to be addressed, and the amount of auxiliary equipment—such as storage tanks or pumps—that must be installed in addition to the treatment technology. Based on the experiences of these six small water systems, it is possible for small systems to realize significant cost savings by using an alternative treatment technology instead of building a full-scale treatment facility. For example, one small water system in Connecticut serving approximately 3,000 people saved approximately $1 million by installing two packaged treatment plants instead of building a full-scale treatment plant. However, one system in Connecticut discussed earlier invested $500,000 in 1984 in a packaged treatment plant and, in part because the system did not have a knowledgeable, full-time operator, the system is planning to replace the packaged treatment plant with a groundwater system.

[9]In accordance with the Food, Agriculture, Conservation, and Trade Act of 1990, beginning in 1993, the Rural Development Administration took over responsibility for handling this type of loan, which was formerly handled by the Farmers Home Administration.

## EPA Has Efforts Under Way to Help Facilitate the Use of Alternative Technologies

EPA is involved in various efforts to help facilitate the wider use of alternative technologies as a means of helping small systems comply with the requirements of the Safe Drinking Water Act. For example, the agency is developing general guidance for states on how to identify, assess, and select alternative technologies that are appropriate for use by small systems. EPA is also involved in limited efforts to help assess the effectiveness of selected alternative technologies. In addition, EPA is assisting other organizations with on-going efforts to (1) create a centralized data base that states and small systems can use to share information about drinking water technologies that are currently in use across the nation and (2) develop standard protocols for the assessment and approval of alternative drinking water treatment technologies.

### EPA Is Developing General Guidance to Help Small Systems Acquire Alternative Technologies

EPA is developing a workbook that is intended to help small systems acquire appropriate alternative drinking water treatment technologies. According to agency officials, the workbook will provide advice and guidance to small systems on how to work with key players in the acquisition process, such as state and local regulatory officials, professional and consulting engineers, and equipment suppliers and manufacturers. The draft workbook does not contain any information on the cost or performance of specific alternative technologies. Although all of the system operators we contacted said that they believed such a document would be helpful, they also said that they need more specific information about the cost and performance of alternative treatment technologies.

### EPA Is Currently Supporting Efforts to Assess the Effectiveness of Some Alternative Technologies

According to an official in EPA's Office of Ground Water and Drinking Water, EPA organized a meeting in 1988 of representatives of the agency, drinking water equipment manufacturers, state drinking water administrators, and other interested parties to discuss how to promote the development of low-cost technologies that would help small systems comply with Safe Drinking Water Act requirements. As a result of this and subsequent meetings, EPA and various equipment manufacturers agreed to undertake five pilot projects, collectively called the Small System Low-Cost Technology Initiative,[10] to determine if packaged treatment plants and point-of-entry and point-of-use technology could be more widely used by small systems. For example, one of the pilot projects is an examination of the use of point-of-use technology in a very small drinking water system to achieve compliance with drinking water standards. These

[10]In January 1993, the name of this effort was changed to Small System Technology Initiative.

projects are located in five states—California, Indiana, Pennsylvania, Texas, and Virginia. Because EPA was unable to fund these pilot projects, the equipment manufacturers agreed to provide the treatment equipment to be tested at no cost or at a greatly reduced cost to the small systems involved. To date, testing has been completed at two of the five sites. A report on test results from the Texas site was issued in January 1993, and the report for the California test site is currently being prepared.[11]

An official from EPA's Office of Research and Development who is involved in the initiative said that, after test results from the first site were issued, concerns were raised about the credibility of the cost data reported. As a result, EPA decided to reevaluate the entire initiative by forming committees to, among other things, redefine the objectives and future direction of the initiative, develop a standardized method for reporting cost data for the demonstration sites, and develop a generic strategy for approving an alternative drinking water treatment technology. To date, the committee on cost reporting has developed a uniform protocol for reporting and compiling cost information on small system technology demonstration sites. The committee developing the technology approval strategy is currently reviewing a draft generic strategy that it developed for approval of alternative technologies.

EPA is responsible for designating certain drinking water treatment technologies as the "best available technology" for removal of a given contaminant. As an official from EPA's Office of Research and Development explained, EPA conducts lab and field tests of a particular technology, and these data, along with data from other researchers and utilities, are used to determine which technologies should be designated as best available technologies. As a part of this effort, EPA's Office of Research and Development began conducting field research in 1991 and laboratory evaluations in 1994 to assess whether currently available packaged plant drinking water treatment technologies can cost-effectively meet the standards established by the Safe Drinking Water Act's Surface Water Treatment Rule and Disinfection/Disinfection By-Products Rule for very small systems with between 25 and 100 service connections. According to an official from the Office of Research and Development, there are few published data that establish that current packaged plant technologies appropriate for use by small systems can meet the standards established under these rules. Testing is currently limited to packaged

[11]Evaluation of Demonstration Technologies: Quail Creek Water Supply System, U.S. Environmental Protection Agency, Office of Water, EPA 812-R-93-001, Feb. 1993.

treatment plants and point-of-entry units but may be expanded to include other technologies at a later date.

EPA has also cosponsored an effort with the American Water Works Association to examine existing, in-place packaged treatment plants and determine their ability to meet current and future drinking water regulations. This effort involved investigating the cost and performance of packaged plant treatment technology installed by 48 small systems in 19 states. The preliminary findings of this study reveal, among other things, that state regulators, consulting engineers, and equipment manufacturers and suppliers all play a very important role in assisting systems in the selection of a water treatment process. In addition, this survey found that packaged plants that are run by skilled operators performed better than those that are run by operators with less training.

In addition, EPA and the Rural Development Administration are cosponsoring the development of a small drinking water systems data base. This data base, which can be accessed through the National Drinking Water Clearinghouse, is designed to help small systems and state regulators exchange information about alternative drinking water technology that is in-place nationally. Thus far, the clearinghouse has had only limited success in getting state regulators and manufacturers to provide information for the data base. An official from EPA's Office of Ground Water and Drinking Water said that feedback on the original questionnaire used to solicit information for the data base indicated that the questionnaire was too long and time-consuming to fill out. As a result, the questionnaire and the data base have been redesigned. The data base should be available on the clearinghouse computer bulletin board in the late spring or early summer of 1994.

## EPA Has Proposed Establishing Best Available Technologies for Small Systems

EPA has recommended to the Congress that the Safe Drinking Water Act be amended to explicitly allow EPA to establish best available technologies for small systems that may not necessarily achieve the general drinking water standards EPA has proposed that small systems be eligible to comply with drinking water standards by using the best available technology if the systems are not otherwise able to achieve compliance through restructuring their management or operations. The recommendation further states that in cases in which general drinking water standards are not met, even after installation of a best available technology, a small system should be allowed to obtain a streamlined, long-term variance from a state, on the basis of criteria established by EPA. An official from EPA's

Office of Ground Water and Drinking Water said that such variances would only be granted in rare cases and on a temporary basis when certain conditions prevent the system from meeting general drinking water standards. Although officials from 10 state drinking water programs and the Association of State Drinking Water Administrators generally agreed that the designation of best available technologies for small systems could be very helpful, they said that they would be very cautious in granting any long-term variances to systems if general drinking water standards were exceeded. Specifically, one state official said that he would be concerned about having different water quality standards for different sized drinking water systems.

## Conclusions

Officials from EPA, the states, and small systems all agree that more information is needed to evaluate the cost and performance of alternative drinking water technologies. If such information is widely available and accepted as reliable, the use of alternative drinking water technologies by small systems could become more widespread.

Although EPA is involved in efforts to develop such data, limited resources have prevented the agency from expanding its efforts to help field test various technologies. Past efforts by states and other organizations to develop this information have met with limited success. For example, the Western States Protocol has not facilitated the approval of alternative technologies to the extent needed, mainly because the protocol is used by only a small number of states and is not detailed enough to address all state regulators' concerns. In addition, efforts to establish a data base with cost and performance information on alternative technologies have been largely ineffective because it has been difficult to get state regulators and others to submit the needed information.

Even if EPA cannot expand its efforts to develop such information because of resource constraints, we believe the agency could focus on (1) encouraging state regulators, equipment manufacturers, and equipment users to participate in efforts to develop nationwide protocols for the testing and approval of alternative technologies and (2) ensuring that any data developed as a result of these efforts are effectively distributed. Active participation by all of these parties is essential if the resulting protocols are to be widely accepted and widely used to facilitate approval of alternative drinking water technologies. In addition, we believe any progress EPA makes in designating low-cost technologies, such as point-of-use devices, as best available technologies for small systems

could go a long way in helping these systems remain viable. However, because state officials stressed that they would be very conservative in granting any waivers on the basis of the use of these best available technologies, EPA will need to work closely with state regulators to address their concerns in this area. Otherwise, best available technologies could be of limited use to small systems.

# Technical and Financial Assistance Is Available but Is Not Always an Effective Solution for Small Systems' Compliance Problems

States are experimenting with a variety of approaches to help small community water systems comply with Safe Drinking Water Act requirements. In some cases, technical assistance and training, as well as private, state, and federal financial assistance programs, have been created to help improve small systems' compliance. However, the number of systems needing such assistance far exceeds the amount of assistance available. In some cases, providing technical and financial assistance can actually discourage small systems from seeking long-term solutions to their compliance problems.

## A Variety of Technical and Financial Assistance Is Available to Help Address Small Systems' Compliance Problems

Technical and financial assistance is available to small community water systems from private, state, and federal sources. This assistance can help small systems correct deficiencies that cause violations of state or federal safe drinking water regulations. The American Water Works Association recently reported that $100 million to $200 million is being spent annually on technical assistance and training for about 75,000 small water systems.[1] In addition, since 1940 the Farmers Home Administration has provided loans and grants totaling approximately $16 billion to small, rural communities for financing the construction or improvement of community water and wastewater systems.

### Technical Assistance Is Provided by Several Federal, State, and Private Organizations

The technical assistance available to small community water systems ranges from simple advice offered over a telephone to hands-on maintenance and repair of plant equipment. These services are funded by a variety of federal, state, and private organizations. For example, the National Rural Water Association receives funding from both the Rural Development Administration and EPA to provide training and technical assistance to small water systems. With funding from the Rural Development Administration, the association employs "circuit riders" to provide on-site assistance to small water systems. Examples of assistance provided by circuit riders include locating and repairing leaks, setting up preventive maintenance schedules, providing management assistance to ensure the financial integrity of a water system, and solving problems with a system's treatment processes. While the National Rural Water Association initially provided assistance only to small systems financed with Rural Development Administration grants and loans, in recent years the association has obtained additional funding from EPA to expand its technical assistance services to other small systems. According to association officials, circuit riders made over 26,000 technical assistance

[1]Waterweek, American Water Works Association, vol. 1, no. 5, Nov. 9, 1992.

calls to water systems in fiscal year 1992 with approximately $4 million in funding from the Rural Development Administration. In addition, according to association officials, approximately 7,000 technical assistance calls were made to small systems between May 1992 and April 1993 with about $3.6 million in funding from EPA under the agency's training and technical assistance program for rural and small water systems.

The Rural Development Administration also funds the National Drinking Water Clearinghouse, which offers a toll-free call-in service that allows operators of small water systems to obtain technical assistance and referrals on drinking water regulations, financing sources, and technological issues. In addition, the National Drinking Water Clearinghouse offers a computer bulletin board service that enables water system operators who have access to personal computers to share their ideas and pose questions to one another electronically. The bulletin board also gives operators access to other information of interest, and there are plans to include a data base that identifies low-cost drinking water treatment technologies in use in various communities.

The Rural Community Assistance Program is a national network of nonprofit organizations with the goal of improving the living conditions and communities of rural residents, including their access to safe drinking water. The program provides a variety of services, such as direct training and technical assistance in rural communities; publication of books, manuals, field guides, policy documents, and training materials; workshops and conferences; and as well as management assistance. The program receives funding from EPA and the Rural Development Administration, as well as other federal agencies and charitable trusts and foundations. Program officials estimate that in fiscal year 1992, almost 300 communities received technical assistance for a variety of drinking water projects. During this period, the program received $1,680,000 in funding from the Rural Development Administration to assist communities with water and wastewater projects and $700,000 in funding from EPA to assist communities with drinking water projects.

Many states also run their own technical assistance programs. For example, Pennsylvania established a Technical Assistance Program for Small Systems in 1989. Technical assistance is provided through contracts with private consultants that are experienced in water supply treatment and systems operations. Among other strategies for helping small systems, Pennsylvania has established a small water systems outreach program to

provide free, on-site education and training for small community water systems facing specific technical, operational, or management difficulties.

The American Water Works Association has begun a compliance support program to increase small systems' compliance with drinking water regulations. According to association officials, the purpose of this program is to increase the use of existing resources and promote new liaisons between the association and other organizations involved in providing support to small systems, such as EPA regional offices, state health departments, state Rural Water Associations, Rural Community Assistance Programs, and others. The program is intended to emphasize (1) technical assistance and outreach, (2) training and education, and (3) management alternatives. In addition, the American Water Works Association set up a toll-free telephone line in October 1992 to provide personnel at small water systems with potential solutions to their problems and/or referrals to other sources of information. The association reported that the calls it received during the third quarter of 1993 were distributed among the following topics: regulatory issues (26 percent of calls), treatment (26 percent), management issues (20 percent), distribution (17 percent), water quality (6 percent), financial issues (4 percent), and safety (1 percent).

Peer assistance programs—which are currently operating or planned in Hawaii, Massachusetts, California, Ohio, Montana, and Oklahoma—are another means of helping small systems comply with regulations. Under these programs, authorities provide small systems with lists of experts, typically from larger drinking water systems, whom small system operators can contact for advice and assistance on a variety of issues without the fear of being punished for violations. Typically, these programs are organized and administered by private organizations, such as the American Water Works Association or large utilities. They are sometimes funded by EPA or state environmental agencies.

## Federal, State, and Private Financing Is Available to Small Water Systems

Both publicly and privately owned small water systems have had trouble financing needed infrastructure projects through capital markets, in large part because these systems typically have low revenues and financial reserves. Federal, state, and private financial assistance is available to help alleviate this problem.

Several federal agencies offer financial assistance to small water systems. The most significant source of financial support is the Rural Development

Administration. In limited circumstances, the Department of Housing and Urban Development, the Economic Development Administration, the Small Business Administration, and the Bureau of Reclamation may also provide assistance to small water systems.

The Rural Development Administration makes grants and loans available to rural communities of 10,000 or fewer residents that are unable to obtain financing elsewhere.[2] In fiscal year 1993, this organization expects to loan approximately $600 million and distribute grants totaling $390 million to small rural communities needing assistance with water and wastewater projects. According to program officials, the agency currently has $3.5 billion in outstanding loans made to 7,145 borrowers to fund drinking water projects.

The Department of Housing and Urban Development's Small Community Development Block Grant Program offers grants for communities with fewer than 50,000 people for community improvements that principally benefit low- and moderate-income persons. Examples of eligible projects include the rehabilitation of private homes, economic development projects for expanded employment opportunities, and projects to address serious deficiencies in public facilities such as water and sewer systems. In fiscal year 1991, approximately $41 million in federal funds were available under this program for a variety of projects.

Other potential federal sources of financial assistance exist, though they are smaller in scope. For example, the Economic Development Administration offers grants to economically distressed areas to encourage development and increase employment opportunities. If a water system is part of such a program, it may be eligible to receive funds. The Small Business Administration offers guaranties and direct loans to privately owned utilities unable to obtain funds elsewhere. The Bureau of Reclamation offers loans to finance the repair, replacement, or improvement of existing irrigation systems; drinking water systems may qualify if they supplement water service to a portion of an irrigation entity's service area.

Approximately 30 states have also established programs to assist small communities that need financing to improve local water systems. For example, the Pennsylvania Infrastructure Investment Authority (Pennvest), created in 1988, has loaned over $1 billion and made a small

[2]These programs were formerly administered by the Farmers Home Administration. However, in accordance with the Food, Agriculture, Conservation, and Trade Act of 1990, the Rural Development Administration took over these functions beginning in 1993.

amount of grant funding available to communities to improve their water and wastewater systems. Pennvest obtains funds from federal and state sources and also markets investment bonds in the private market. Priority for the distribution of funds is based on need, with immediate threats to public health and safety taking precedence. Washington state also has a program designed to help small communities make capital improvements to small water systems. Program officials told us that the state operates an infrastructure trust fund with moneys obtained from the state's cigarette tax. Eligible projects include constructing or improving roads, bridges, wastewater treatment plants, and community water systems. According to program officials, the state currently has about $15 million available annually to spend on infrastructure improvements statewide.

In the private market, financial firms have recently begun to specialize in selling marketable bonds to investors to raise funds for small community water and wastewater projects. Unlike large water utilities, small systems generally have difficulty obtaining funds from the capital markets because of their size and the fact that these communities often do not have audited financial statements or the legal expertise to judge the validity of bond offerings. As a result, these communities are unable to obtain a bond rating. Recently, however, some firms have arranged bond offerings for small communities by buying insurance to guarantee the repayment of the bonds, thereby obviating the requirement for a bond rating.

## Available Technical and Financial Assistance Is Insufficient to Solve Small Systems' Problems

Although a wide variety of technical and financial assistance is, ostensibly, available to help small community water systems comply with federal and state requirements, the amount of assistance is extremely limited in comparison with the needs of small systems. Yet even if substantially more resources were available, such assistance has inherent limitations and may not always be the best way for small systems to achieve long-term compliance.

### Amount of Assistance Needed Far Exceeds Available Resources

Although assistance is available from several sources to help small water systems comply with federal and state drinking water regulations, the sheer number of these systems needing such assistance greatly surpasses these resources. Given that small water systems accounted for 90 percent of the community water systems in violation of drinking water regulations in fiscal year 1991, many federal, state, and industry officials agree that it is unrealistic to believe that there will ever be sufficient resources to

provide the amount of technical and financial assistance needed to bring these systems into compliance.

These officials further emphasized that small systems will soon be required to meet upcoming regulations with which their larger counterparts are currently having difficulty complying. In addition, these officials pointed out that as EPA develops future regulations in accordance with the Safe Drinking Water Act's statutory requirements, the burdens on small systems are expected to increase dramatically. In fact, EPA estimates that small community water systems will require nearly $3 billion to comply with the requirements of the Safe Drinking Water Act and an additional $20 billion to replace equipment and repair and expand their systems during the 1990s.

## Technical and Financial Assistance Has Limitations as a Solution to Small Systems' Compliance Problems

Notwithstanding the shortage of resources available for technical and financial assistance, some state and industry officials told us that even limitless assistance would not be a panacea for small systems' compliance problems. In particular, the assistance provided does not always address a system's long-term needs and, therefore, may inadvertently contribute to chronic noncompliance problems.

Drinking water officials in Washington state, for example, told us that they have seen many nonviable water systems receive infrastructure funding from the Rural Development Administration and the Department of Housing and Urban Development without regard for the ability of the systems to remain in compliance for the long term. Other state drinking water officials made similar observations, noting that technical and financial assistance may often serve only to bring a system into temporary compliance and may even serve as a disincentive for a small water system to seek a long-term, permanent solution to its compliance problems. We were told of other cases in which technical and financial assistance was provided to systems without regard for their ability to remain in compliance in the future or provide for future expansion.

Officials in Washington's drinking water program explained that these problems stem from a general reliance on short-term "fixes" for compliance problems rather than on solutions based on assessments of a system's ability to meet requirements in the long term. These officials also stated that if assistance services are provided to small systems when longer-term solutions are warranted, scarce financial and technical

resources may be diverted from systems for which no other alternatives exist.

Beyond its limitations in providing longer-term solutions to small systems' compliance problems, technical and financial assistance is limited in at least two other respects:

- Some small water systems do not qualify for certain types of technical assistance or federal or state financial assistance. For example, the Rural Development Administration and the Department of Housing and Urban Development are restricted from offering grants and loans to privately owned water systems. Similarly, Washington's constitution forbids state funds from being loaned or distributed to private enterprises. According to the National Association of Water Companies, 46 percent of community water systems are privately owned or investor-owned, and the vast majority of these systems serve populations of between 25 and 100 people.
- Some small water systems, even when notified of and offered free training and technical services, do not take advantage of this assistance. EPA and state drinking water officials said that because small water systems are unable to attract and pay for qualified operators, many small system operators are part-time employees or volunteers who do not have time to attend training and technical assistance classes because they have other full-time jobs in addition to their responsibilities as system operators.

## EPA Funds Technical Assistance and Encourages States to Develop Training Coalitions to Help Small Systems

As discussed earlier in this chapter, EPA funds technical assistance through several providers, including the National Rural Water Association and Rural Community Assistance Program. In addition, small water system operators can call an EPA toll-free hotline to obtain information on the Safe Drinking Water Act's requirements, available guidance and public information, and appropriate local contacts for further information. EPA also has a mobilization program to, among other things, help small water systems comply with drinking water regulations. One of the mobilization program's objectives is to encourage state and local governments, water systems, and private organizations to use creative approaches to find the resources needed to assist small water systems and fund regulatory programs.

In 1990, as part of its mobilization program, EPA joined with several major organizations with experience in training drinking water professionals to form the National Training Coalition. Other members of the coalition include the American Water Works Association, Association of State

Drinking Water Administrators, National Rural Water Association, Rural Community Assistance Program, National Environmental Training Association, and Coalition of Environmental Training Centers. The objective of this coalition is to encourage states to form state training coalitions and to develop and implement state training plans. Thus far, the coalition has helped three states organize state training coalitions and has implemented training plans.

In fiscal year 1993, EPA's budget included $3.3 million to fund training and technical assistance activities through the National Rural Water Association and $700,000 to fund these activities through the Rural Community Assistance Program. In addition, EPA provided $50,000 in funding to the National Training Coalition in fiscal year 1993.

## Federal and State Funding Shortages Are the Main Problem in Providing Needed Assistance

While EPA has taken steps to address problems with operator training and certification through efforts related to its mobilization program, state officials still raise concerns that many small system operators do not have the expertise needed to properly operate and maintain water systems and typically do not have the time needed to improve their skills through training classes. State officials also emphasize that most states do not have the resources needed to implement operator training and certification programs.

Furthermore, in April 1992 the Association of State Drinking Water Administrators notified EPA's Office of Ground Water and Drinking Water of concerns about the agency's efforts to assist states in providing technical assistance to drinking water systems. Specifically, the association said:

"For state specific program implementation, EPA currently lacks a coordinated direction in this area in terms of assisting states in developing specific programs to meet small water system issues specific to that state. Through the mobilization effort a number of innovative ideas and approaches have been developed. However, these are generally broad concepts or ideas and require specific work at the state level to sell the idea and then implement it. This new program development area is one for which few states have resources available."

While EPA provides funding for technical assistance for drinking water systems, the agency does not provide financial assistance to help small systems meet drinking water requirements. State and industry officials said that additional funding is needed to help drinking water systems repair and upgrade their facilities in order to comply with current and

upcoming requirements of the Safe Drinking Water Act. These officials said that this need is particularly severe for small systems.

With regard to financial assistance to help small systems comply with drinking water requirements, the Association of State Drinking Water Administrators has said:

"There is currently no EPA national direction or strategy regarding financial assistance programs for small water systems in order to meet the requirements of the [Safe Drinking Water Act]. A number of states have grappled with this issue and have all approached the problem independently and differently without national support. In our opinion there should be a strong federal program to provide support for state funding programs as well as provide financial assistance to small systems."

EPA drinking water officials acknowledge that more financial assistance is needed to help water systems comply with the drinking water requirements, and these officials also acknowledge that this need will grow as the number and complexity of these requirements increase in coming years. EPA officials also recognize that there is a need for more training and technical assistance and acknowledge that states are having difficulty funding such assistance programs on their own. However, these officials point out that because of current resource constraints, EPA cannot offer additional funds to the states.

## EPA Has Proposed an Additional Funding Source for Assistance to Small Systems

As a part of its recommendations to the Congress for amending the Safe Drinking Water Act, EPA has proposed that state revolving loans be established. EPA's proposal specifies that states should be allowed to use up to 1 percent of their capitalization grants to provide technical assistance to potential loan recipients for planning activities, including identifying situations in which system consolidation is appropriate. In addition, the agency's proposal recommends that (1) state revolving loan funds be provided to help both publicly and privately owned community water systems meet requirements under the Safe Drinking Water Act and (2) funds be used to encourage the consolidation of small water systems in situations in which this is the most cost-effective means to achieve compliance with the act. EPA proposes that $599 million be allotted to the fund in fiscal year 1994 and $1 billion per year in fiscal years 1995 through 1998. Even at this proposed level of funding, many state and water trade association officials feel that only a portion of water system needs will be met.

## Conclusions

During our review, state and industry officials raised concerns that the number of systems that need technical and financial assistance to address compliance problems far exceeds the amount of assistance available. EPA has made efforts through its mobilization program to create coalitions to, among other things, help coordinate efforts to help small systems comply with drinking water regulations. However, state officials we interviewed and officials from the Association of State Drinking Water Administrators have voiced concerns that these efforts have been ineffective. Specifically, these officials believe that EPA's efforts have generated broad ideas on how to improve assistance delivery but have left the resource-intensive task of implementing these ideas to states. As state officials pointed out, most states cannot afford to do so. While EPA officials acknowledge that more funding is needed to help states develop and implement these programs, these officials said that resource constraints prevent the agency from providing any additional funding.

Because of the inherent limitations of technical and financial assistance, even if limitless funding were available, this type of assistance can only go so far in addressing compliance problems. In fact, when this type of assistance brings a system into temporary compliance only, it can actually contribute to chronic compliance problems by discouraging system operators from seeking longer-term solutions.

The Congress and EPA have recognized, through various proposals for state revolving loan funds, that privately as well as publicly owned water systems are in need of such assistance and that water systems should be provided with incentives to choose long-term, rather than short-term solutions to compliance problems. While such efforts could provide some help to small systems for financing needed improvements, many state and trade association officials agree that even if legislation establishing the fund is passed, the proposed funding level will provide only a portion of the resources needed. At this time, the Congress is still considering legislation to establish this fund, and prospects for passage of the legislation are uncertain.

# Restructuring Strategies and Viability Programs Offer Promising Alternatives for Coping With Small Systems' Problems

As shown in chapters 2 and 3, technological innovation and technical and financial assistance offer some hope for helping small systems, but fall short of a comprehensive solution, in large part because of a shortage of the funds needed to help the thousands of systems in need of support. Furthermore, as EPA develops future regulations in accordance with statutory requirements, this funding disparity is expected to increase exponentially.

EPA and the states are increasingly recognizing that the heart of the noncompliance problem lies with the sheer volume of small systems that are "nonviable" as presently structured and have little chance of ever achieving compliance with the increasing number of drinking water regulations.[1] Accordingly, several states have turned toward restructuring strategies and viability programs to provide a more comprehensive solution. Restructuring is the adoption of management and/or ownership changes that help a drinking water system address new responsibilities and increased costs. For example, one restructuring strategy involves merging or consolidating a nonviable small water system with a larger, viable system that has a larger customer base and can better absorb costs. Viability programs, in general, are designed to assess the viability of water systems and determine the best solution for bringing nonviable systems into compliance. State officials hope that such strategies will not only help systems achieve greater compliance, but will also help resolve their own financial crises by reducing the number of problem systems they must oversee.

However, states have experienced difficulties in using restructuring strategies and developing and implementing viability programs. Ironically, while these strategies offer the states a promising way to help reduce their own long-term program costs, one of the most difficult barriers the states face is the lack of resources needed in the near-term to develop and implement these programs. And while total resources are limited, the problem is compounded by EPA's priorities, which emphasize compliance monitoring, implementing new regulations, and other activities. Other problems include (1) the difficulty of obtaining the authorities needed to direct the restructuring of a nonviable system's operation and management and (2) an EPA drinking water grant formula that inadvertently discourages states from merging or consolidating drinking water systems.

[1]In general, nonviable water systems are those that lack the technical, financial, or managerial capabilities to remain in long-term compliance with drinking water regulations.

## A Variety of Restructuring Strategies Can Potentially Provide Benefits

According to EPA's guidance, restructuring strategies can result in management and ownership changes that help a water system become viable by lessening the costs per household of complying with drinking water regulations. As a result, water systems, consumers, and state regulators may all be able to benefit from restructuring. Potential benefits to the systems include increased economies of scale, improved customer service, and improved planning for future operations.[2] Benefits to customers may include improved water quality, a reduction in water costs in the long term, and increased reliability of supply. Benefits to state regulators may include fewer customer complaints, improved compliance with regulations, a potential reduction in the number of regulated systems, and a potential resource savings due to a corresponding reduction in oversight workloads.

According to EPA, many different strategies can be used to restructure nonviable water systems. All of these strategies can be broadly classified as either external or internal. External restructuring strategies involve active collaboration with adjacent water systems to attain the advantages of increased economies of scale. These strategies include arrangements in which, on the basis of a voluntary agreement or by order of a state agency, the assets and ownership of a nonviable system are transferred to a viable system. External strategies also include arrangements in which (1) a small system extends its water main and physically merges or consolidates with a larger, nearby system and (2) water systems form cooperatives to pool their buying power by sharing the costs of services. For example, by contracting for operation and maintenance services, a small water system may be able to take advantage of the economies of scale already achieved by a large company that provides operation and maintenance services to many other systems.

Internal restructuring strategies involve changes in a system's management or financial condition that allows a system to become viable. For example, a system may be able to make certain management and financial adjustments, such as raising the rate it charges for water or adopting acceptable accounting procedures, that allow the system to become viable.

[2]Large water systems generally have greater economies of scale than smaller systems; that is, the unit cost of providing drinking water is generally less for large systems than for small systems. Because small systems generally cannot afford to purchase items in large amounts, they typically pay high unit costs. In addition, because small systems generally have small customer bases, the impact of such costs on water rates is generally greater than it is for larger systems.

## Viability Programs Can Help Identify Nonviable Systems and Long-Term Solutions to Compliance Problems

According to EPA, state, and industry officials we interviewed, a nonviable water system is one that does not have the technical, financial, and managerial wherewithal to remain in compliance with drinking water regulations in the long term. According to EPA, while a few other states are in the process of developing viability programs and have used restructuring strategies to address nonviable systems to varying degrees, three states—Connecticut, Pennsylvania, and Washington—are recognized as leaders in using these programs and strategies. To varying degrees, all three of these states have adopted procedures to (1) prevent potentially nonviable new systems from forming and (2) improve the viability of existing systems through laws that allow failing water systems to be taken over by solvent water companies or municipalities. Of the three states, Connecticut and Washington have had the most success in addressing small systems' compliance problems by incorporating viability concepts and restructuring strategies into comprehensive water supply plans.

### Connecticut's Viability Program

The state of Connecticut has developed a comprehensive program for controlling the creation of new, nonviable small systems and ensuring the viability of existing systems. The state has achieved this control by placing conditions on the issuance of operating certificates for new and expanding water systems, establishing exclusive service areas for existing utilities, and passing laws that mandate takeovers of nonviable systems.

Connecticut requires that new or expanding water systems serving between 25 and 1,000 people obtain a Certificate of Public Convenience and Necessity, which must be approved by the state's Department of Health Services and Department of Public Utility Control. This certificate allows the creation of a new water system only after it is determined that the proposed system is viable and that interconnection or contracting for management services is not feasible.

The Connecticut plan establishes exclusive service areas for existing utilities, using an areawide planning approach. The purpose of the areawide plan is to coordinate individual water system plans and avoid the creation of systems unable to meet safe drinking water standards. A utility accepts responsibility for all the new and existing water systems in its service area, thereby reducing the potential for creating new nonviable small systems. Once exclusive service areas are established, individual water companies accept responsibility for the new and existing water systems in their area.

Connecticut has also passed laws intended to ensure the viability of existing systems by granting the state's Health Services and Public Utility Control departments the authority to order a solvent water company or municipality to take over a failing small water system. In exchange for taking over a failing system, a solvent water company is allowed to recover reasonable costs in its rate base. If a solvent water company refuses to take over a nonviable system, the Public Utility Control Department has the power to order the takeover. Since this authority was implemented, Connecticut has used it to restructure approximately 25 small water systems. These systems have been restructured both through physical consolidation and by having larger utilities take over the smaller systems and operate them as separate plants.

## Washington's Viability Program

The Washington State Drinking Water Program uses its water supply planning process and permit requirements to discourage the creation of new small systems and to encourage the consolidation of existing nonviable systems. To help achieve this, Washington's Public Water System Coordination Act establishes a planning process for counties to, among other things, demarcate present and future water system service areas, develop procedures for authorizing new water systems, develop shared or joint use of facilities, and develop a support system to provide management, operations, or maintenance assistance to small systems.

The support system and arrangements for systems to share facilities are an important part of the planning process. Small systems needing help may become part of a support system to obtain technical, financial, or managerial assistance from larger water utilities. Joint use of facilities is an arrangement whereby individual water systems having quantity or quality problems agree to share other systems' facilities. The most common arrangement is the physical interconnection of two systems. Utilities may also share water sources, reservoirs, or storage tanks. This process minimizes costs and improves water service.

Like Connecticut's program, the Washington drinking water program has the authority to direct the consolidation of a nonviable water system's management when that system is in violation of safe drinking water requirements. Washington has the authority to place a failing system into receivership, and the county government can ultimately become the receiver of last resort for systems within its jurisdiction. Although the state has not yet used this authority to accomplish any takeovers, the threat that it will do so has been incentive enough to get some failing small water

systems to consolidate and achieve compliance with regulatory requirements.

## Pennsylvania's Viability Program

Pennsylvania also has mandatory takeover laws similar to Washington's and Connecticut's, though more narrow in scope. In June 1992, the state passed a law that allows Pennsylvania's Public Utilities Commission to order the takeover of nonviable investor-owned systems with fewer than 1,200 connections. As a result, between 200 and 250 investor-owned systems that are currently regulated by the commission are subject to mandatory takeover if they repeatedly violate drinking water regulations. Systems with more than 4,000 service connections can be ordered by the commission to acquire a small system that is in violation of drinking water regulations. Acquiring entities must have the financial, managerial, and technical capabilities to operate the troubled systems. The purchase price is negotiated, subject to the commission's approval, or the commission can use its eminent domain authority to accomplish the takeover. To date, the commission has not exercised its power to force a consolidation. However, officials told us that the threat it will do so has already assisted in consolidating some systems and, as a result, has improved overall compliance in the state.

Currently, Pennsylvania's takeover authorities affect only about 10 percent of the state's 2,500 community water systems. However, the Pennsylvania Department of Environmental Resources is developing a more comprehensive approach to ensure the viability of all new and existing water systems in the state. The department is currently developing a process for granting permits to new water systems. As envisioned, this process would incorporate viability into the permitting process, and applicants requesting approval to construct a water system would have to demonstrate that no alternative means of providing water is available. In addition, an applicant would be required to provide detailed estimates of the system's total capital cost, the total operational and maintenance costs, and the amount required in reserves to provide for eventual system replacement. Finally, an applicant would need to prepare a business plan that includes pro forma balance sheets and income statements projected 5 years into the future.

## Other States' Approaches

Some states have accomplished the consolidation of failing water systems without the specific authority to do so. For example, the Iowa drinking water program has the administrative authority to levy fines against water

systems that are in violation of requirements. Recently, aggressive enforcement efforts have led to the consolidation or elimination of approximately 30 percent of Iowa's small drinking water systems—all of which were in violation of state and federal drinking water regulations. The state identifies the use of administrative fines, as opposed to the enforcement of regulations and assessment of fines through judicial processes, as the most significant reason for the success of its efforts.

## States Face Difficulties in Implementing Restructuring Strategies and Viability Programs

EPA officials and drinking water officials from the 10 states contacted agree that restructuring strategies, especially when they are a part of a comprehensive viability program, can help reduce the large number of nonviable water systems and hold promise for helping relieve the significant resource constraints currently experienced by state drinking water programs. According to EPA, approximately 50 percent of the nation's small water systems are located within the Census Bureau's standard metropolitan statistical areas and are potential candidates for physical consolidation or shared management arrangements. While the consolidation of nonviable systems is not always feasible, many EPA, state, and industry officials that we interviewed said that it may be the best option for bringing these systems into long-term compliance. According to these officials, consolidation of nonviable water systems can potentially result in future resource savings as states reduce their oversight workload.

However, states are experiencing difficulties in developing and implementing restructuring strategies and viability programs. Most importantly, despite their long-term savings potential, most states do not have the resources needed in the near term to plan and carry out these activities. In addition, some states have difficulty obtaining the authorities needed to direct the restructuring of nonviable systems. In those states that have such authority, the process of forcing consolidation is often time-consuming and burdensome. Additionally, although EPA supports consolidating nonviable systems, the agency's state grant distribution formula serves as a disincentive for states to consolidate systems.

### States Have Few Resources to Develop Viability Programs

According to officials in EPA's Office of Ground Water and Drinking Water, although most states would support the development of viability programs to help address small systems' compliance problems, many states have not developed these programs because they do not have enough resources to do so. For example, the Chief of Montana's Water Quality Bureau said that Montana is trying to develop a viability program to limit the proliferation

of new water systems and to ensure the viability of existing systems. According to this official, Montana has developed legislation that would require small systems to submit financial, operational, and management information during the systems' construction permit process. However, this official said that although the Montana state legislature passed the viability legislation, as a result of severe budget shortages, the state's drinking water program lost three staff years and the state had to discontinue efforts to develop regulations to implement the legislation.

In the three states we visited that have developed viability programs, state officials said that implementing these programs can be resource intensive. For example, in one of the states, implementing a viability program requires a significant portion of the state's total drinking water grant. For example, the state of Connecticut has estimated that it costs approximately $125,000 annually to implement the state's viability program. This amount is approximately 15 percent of the total drinking water grant that Connecticut received in fiscal year 1993. On the basis of the experiences of two states—Connecticut and Pennsylvania—that have implemented viability programs, EPA estimates that the cumulative annual costs of implementing viability programs nationwide would be approximately $5 million.

Officials interviewed from states that have not yet implemented comprehensive viability programs acknowledge that these programs could potentially help them reduce the number of nonviable drinking water systems and, in turn, help states save resources by reducing their oversight workload. However, as state officials explained, most do not have the resources to develop and implement these programs because the available resources must be used instead to help states meet requirements for maintaining primary enforcement authority for their drinking water programs, or "primacy." As we pointed out in a June 1993 report that examined EPA's drinking water program, the states' ability to effectively carry out the monitoring, enforcement, and other mandatory elements of EPA's drinking water program—key activities for retaining primacy—have been jeopardized in recent years by resource constraints.[3] This report also noted that the ability of the states to retain primacy will be increasingly challenged as their responsibilities continue to grow under requirements in the 1986 amendments to the Safe Drinking Water Act. In recognition of the states' difficulties in meeting primacy requirements, EPA adopted a near-term strategy in June 1992 that assigns priorities to various aspects of

[3]Drinking Water Program: States Face Increased Difficulties in Meeting Basic Requirements (GAO/RCED-93-144, June 25, 1993).

the program. In addition to performing certain "base minimum state functions" deemed critical to maintaining primacy, states will be required to implement the elements EPA has designated as "Priority 1" for each regulatory requirement, while addressing lower-priority elements as their capabilities allow. During a 5-year period, states will be expected to develop the capacity, through alternative financing strategies or other methods, to meet all program requirements after the period expires. This strategy does make it a priority for EPA to encourage states to use viability concepts. However, it does not list the use of restructuring and viability programs as priority activities for states despite these programs' potential to provide long-term solutions for small systems' compliance problems. According to an official in EPA's Enforcement and Program Implementation Division of the Office of Ground Water and Drinking Water, the development of these programs is not included as a state priority activity because the strategy sets priorities for the requirements of EPA's drinking water program, and states are not currently required to develop and implement viability programs.

## Some States Cite Difficulties in Obtaining and Using Authorities to Restructure Water Systems

Some states are trying to develop viability programs but are having difficulty obtaining the authorities needed to direct the restructuring of systems that refuse to do so. Officials from these states cite many problems in obtaining such authority. For example, the Director of the Public Water Supply Branch in Alabama's Department of Environmental Management said that the state of Alabama developed legislation to give the state the authority to direct existing nonviable water systems to consolidate. However, the state legislature was resistant to such an initiative. The director added that, in general, state legislators are hesitant to adopt such legislation because they feel their constituents would not support it. In turn, constituents may not support such efforts because they do not realize the critical condition that many water systems are in and are not aware of the high costs that systems will have to bear as the new regulations take effect. In view of this, the state official said that more efforts are needed to educate the general public on these issues.

State drinking water officials from Pennsylvania cited similar problems with obtaining authorities from their state legislature to direct publicly owned water systems to restructure. As discussed above, Pennsylvania has the authority to direct certain investor-owned systems to restructure. But, according to Pennsylvania state officials, trying to extend this authority to publicly owned systems has been difficult. These state officials cited problems similar to those experienced in Alabama, including

a lack of public knowledge about the growing number of requirements being placed on water systems and about the rising costs of complying with safe drinking water requirements.

Some states that have viability programs and have obtained the authorities needed to direct restructuring of noncompliant systems cite problems caused by long delays in actually directing a system to restructure. According to drinking water officials from Connecticut, it can take, on average, from 1 to 2 years to complete a takeover. However, this process can take significantly longer, especially in cases involving hostile parties. For example, in one case in Connecticut, it took state officials over 5 years to make a small system consolidate with another system because of court delays and long hearing processes.

## EPA's State Drinking Water Program Grant Formula Inadvertently Discourages Consolidation of Water Systems

During our review, some state officials expressed concern that the formula EPA uses to calculate the amount of state drinking water grants can discourage consolidation of nonviable drinking water systems. Through EPA's Public Water System Supervision program, the agency provides grants to administer state drinking water programs to states that have primacy. These Public Water System Supervision grants, which totaled $58.9 million in fiscal year 1993, are distributed among primacy states through a grant allocation formula that considers five factors for each state, including (1) the number of community water systems, (2) the number of nontransient noncommunity water systems, (3) the number of transient noncommunity water systems, (4) the land area in square miles, and (5) the population of the state. The first two factors combined receive a weight of 56 percent; the third factor, 14 percent; the fourth factor, 10 percent; and the fifth factor, 20 percent. In general, the grant formula is weighted so that the states with more water systems receive more funding. As a result, some state officials told us that the formula provides a disincentive for states to reduce the number of small systems in their inventory through consolidation, especially given the current resource constraints of state drinking water programs.[4]

[4]Some reductions in states' water system inventories occur for reasons other than the consolidation of water systems. For example, some water systems are removed from inventories because they have gone out of business. In addition, when states update their inventories, they remove long defunct water systems from the list.

## EPA Has Made Efforts to Encourage Greater Use of Restructuring and Viability Programs

EPA officials acknowledge that states face enormous problems in bringing nonviable small systems into compliance with Safe Drinking Water Act requirements. Accordingly, the agency has either undertaken or is considering actions to help overcome the difficulties preventing wider use of restructuring strategies and viability programs. For example, the agency has encouraged states, through guidance and workshops, to develop viability programs and restructure nonviable systems. The agency is also studying options for modifying the state grant formula to remove disincentives for states to consolidate nonviable systems.

### EPA Has Developed Guidance to Encourage States to Implement Restructuring Programs

EPA has issued guidance documents and sponsored workshops to help states implement viability programs and restructure nonviable water systems. For example, in April 1989 EPA issued a document describing case studies of four states that have established procedures to control the creation of potentially nonviable small water systems. In June 1990, EPA issued a guidance document that discusses various options that states can use to improve the viability of existing small systems. These options include the use of (1) contract operation and maintenance services and (2) public mergers and acquisitions to resolve system viability problems. Also, in December 1991 EPA issued a training manual for state drinking water personnel that provides a discussion of restructuring options and a description of how to choose an appropriate restructuring option for small systems.

EPA has also sponsored workshops to help states share information about viability programs and restructuring strategies. In September 1990, EPA held a 3-day workshop during which state representatives exchanged information about their successes and failures in developing viability initiatives for small systems. Also, in December 1992 EPA cosponsored, with the American Water Works Association and the New England Water Works Association, a workshop to provide an opportunity for state representatives to share information about small systems' viability issues.

Drinking water officials in the three states that we visited—Connecticut, Pennsylvania, and Washington—said that they found EPA's guidance and workshops to be generally useful. However, these officials said that states need more than just guidance from EPA. They indicated that what states really need are the resources to develop and implement viability programs. As these officials explained, developing the legislative and regulatory tools needed to implement an effective viability program is resource intensive, and financially strapped states must instead use their available resources

to meet the requirements for maintaining primacy under EPA's drinking water program.

## EPA Has Made Short-Term Revisions to Its Grant Formula to Reduce Disincentives for Consolidation

When two states in EPA Region IV (Alabama and Mississippi) and one state in EPA Region III (Maryland) experienced reductions in their drinking water program grants because the number of water systems in the states was reduced, mainly through consolidation, officials in EPA Region IV's Water Management Division became concerned that the grant formula was actually providing a disincentive for states to consolidate their water systems. As a result, in December 1992 EPA Region IV awarded a contract to develop an incentive program to encourage states to consolidate nonviable small systems. In April 1993, a draft issue paper was delivered to EPA by the contractor outlining the issues involved in modifying the grant formula and discussing options for developing an incentive program. The contractor recommended that EPA explore refining the grant formula to reward a portion of any yearly increase in grant funding to states that institute predefined viability initiatives, such as the passage of takeover laws. The contractor noted that, by using only the increase in grants to fund incentives, this arrangement would keep state grant funding relatively stable from year to year and would also recognize the need to motivate state legislatures and governors to pass laws that empower state primacy agencies to address nonviable water systems.

In August 1993, EPA and the Association of State Drinking Water Administrators met to discuss options for revising the grant formula. Issues discussed during the meeting included whether (1) the grant formula is an appropriate mechanism for encouraging states to consolidate nonviable drinking water systems; (2) an incentive program should be developed, using some portion of state grant funds, to encourage states to adopt viability initiatives; and (3) EPA should take action to stabilize state grant funding levels in light of the large fluctuations in water system inventories experienced by some states.

According to an EPA official who attended the meeting, officials from the three states—Alabama, Iowa, and Mississippi—and the four EPA regional offices—Regions I, III, IV, and VII—attending the meeting maintained that the grant formula is not an appropriate mechanism for encouraging states to consolidate nonviable systems. According to this EPA official, the state officials generally felt, among other things, that states that eliminate nonviable systems are better off "in the long-run" because even though these states may loose some funding initially, they will save much more by

reducing their oversight responsibilities in the future. For example, Alabama officials said that even though their state could lose $300-$400 in grant funding for each water system eliminated, the state would spend a lot more in the long run overseeing these systems if they were not eliminated. State officials also agreed that reducing water system inventories can help states meet primacy requirements by shifting funds from oversight to other activities.

According to an EPA official who attended the grants formula meeting, state officials at the meeting generally agreed that EPA should not develop an incentive program, based on a portion of state grants, to encourage states to adopt viability initiatives. The EPA official said that state officials had several concerns about developing such a program. First, state officials said that, for planning purposes, states need stable funding from year to year. They were concerned that setting aside a portion of state grants for incentives would upset funding stability. Second, state officials were not comfortable with EPA's awarding incentives to states on the basis of arbitrary criteria designed to determine which states are doing a better job implementing viability initiatives. Third, state officials felt that a one-time "shot in the arm" incentive would not be very useful to them. They would prefer, instead, some assurances that grant funding will remain stable from year to year.

According to the EPA official who attended the meeting, state officials generally agreed that EPA should take action to stabilize shifts in grant funding that occur when states reduce their inventories of water systems. These state officials felt that stabilizing funding shifts would help remove a major disincentive for consolidating water systems. According to the EPA official, the state officials generally agreed that a "short-term safety net" that guarantees that the states cannot receive less than 95 percent of their previous year's grant award would be acceptable. Under this arrangement, states that reduce their inventories could spread funding losses over several years.

In October 1993, the Director of the Office of Ground Water and Drinking Water at EPA headquarters issued a memorandum notifying all EPA regional drinking water branch chiefs of changes in the method for calculating the state grant allotments in fiscal year 1994. As a result of these changes, EPA used a variation of the 95-percent safety net discussed at the August 1993 meeting to calculate state grant funding for fiscal year 1994. Using this method, EPA recomputed each state's allotment using the current distribution formula and ensured that no state received less than

95 percent of its final allotment in fiscal year 1993 . According to an official in EPA's Office of Ground Water and Drinking Water, as of February 1994, EPA has not adopted any long-term changes to the grant formula and the 95-percent safety net was used for fiscal year 1994 only.

## EPA Recommends Amending the Drinking Water Act to Require Restructuring Strategies and Viability Programs

Beyond its efforts to encourage greater use of restructuring and viability concepts, EPA has recently recommended that the Congress require states, as a condition of retaining primacy, to have both small system viability programs and the authority to direct nonviable drinking water systems to restructure. The agency has recommended that states be required to implement operator certification programs as a condition of primacy. EPA hopes this requirement may help encourage wider use of certain restructuring strategies, such as contracting for operation and maintenance services and developing cooperative agreements to share these services. The agency has also made recommendations that are intended to provide the funding needed to pay for these programs.

### EPA Proposes Requiring States to Develop Viability Programs and Adopt Restructuring Authorities

EPA has recommended that the Congress amend the Safe Drinking Water Act to require states to implement a small system viability program as a condition of retaining primacy. The agency recommended that these programs include provisions to prevent new nonviable systems from forming, plans for assessing the viability of existing systems, and the authorities needed to order the restructuring of nonviable, noncompliant water systems. While officials we interviewed from 10 states and the Association of State Drinking Water Administrators generally agreed that such programs could be useful in addressing small systems' compliance problems and could help states save resources by reducing the need to oversee nonviable systems, they raised several concerns.

First, state officials stressed that many states do not have the resources to develop and implement viability programs because they are using current resources to maintain primacy authority under the drinking water program. These officials do not believe that developing viability programs should be a requirement of retaining primacy because, without the funding needed to implement such a requirement, many states would perceive this as another unfunded mandate from EPA. As one state official warned, some states could decide to return primacy to EPA as a result. An official from another state questioned what priority EPA would give to the development of such programs, in light of EPA's recently adopted 5-year strategy of assigning priorities to various aspects of the drinking water program. State

officials said that EPA should not just add on another priority activity without providing the funding to implement it. An official from EPA's Office of Ground Water and Drinking Water acknowledged that the agency's priority strategy would need to be reviewed in light of any changes made to the Safe Drinking Water Act. Specifically, if the act is revised to require viability programs as a condition of primacy, the agency would need to add development of these programs to the state priority activities listed in the strategy.

Second, some state officials are concerned about how EPA will define an "adequate" viability program. For example, some state officials were concerned that EPA would require states to develop elaborate viability programs in a relatively short period of time. Most state officials we contacted felt that all states should be able to implement legislation and regulations to prevent the formation of new, nonviable drinking water systems. However, as these state officials pointed out, dealing with existing nonviable drinking water systems is a much more complex problem that includes, among other things, issues related to a locality's right to manage its own infrastructure.

Third, some state officials are concerned that the increased burdens placed on small drinking water systems will force many small systems that are otherwise viable to become nonviable. According to state officials, one of the most important factors in determining whether many small systems can remain viable in the future is the complexity of future regulations. According to these officials, if EPA continues to adopt drinking water regulations without regard for the cost of implementing these regulations, many small water systems that are currently delivering safe drinking water may be driven out of business.

## EPA Proposes Requiring Operator Certification and Training Programs to Encourage Restructuring Strategies

EPA has also recommended that the Congress require, as a condition of primacy, that states implement a complete program for operator certification and training that includes operators of small systems. The recommendation further states that small systems that cannot afford to train staff or hire certified operators could explore certain restructuring strategies, such as contracting for part-time services or developing cooperative agreements with nearby systems. As of September 1993, EPA reported that 45 states currently have operator certification programs. However, many of these programs exempt small systems to some extent. While the state officials we interviewed and the Association of Drinking Water Administrators generally agree that all drinking water system

operators should be certified, they pointed out that states may find it difficult to find the funding needed to implement such a requirement.

## EPA Proposes Federally Authorized State User Fees to Fund Drinking Water Program Requirements

Recognizing that inadequate funding and rapidly rising regulatory responsibilities has placed the federal/state partnership for protecting drinking water at risk, EPA has recommended that the Congress establish a state user fee program to help fund state drinking water programs. While the details of this program have not been worked out, EPA is recommending that if a state cannot sufficiently fund its drinking water program, the state should have the option of using a federally authorized user fee program to fully fund its program. The agency is also recommending that, if a state loses primacy, EPA should have the authority to implement a federal fee to fund the primacy program in that state.

While officials from seven states and the Association of State Drinking Water Administrators agree that a user fee program could help obtain the resources needed to fund state drinking water program activities, including viability programs, they raised some concerns. First, some state officials feel that EPA's recommendation ignores the political difficulties involved in adopting a user fee. For example, Connecticut has tried to adopt user fee programs but was unsuccessful because both public and private utilities strongly resisted the fees and, as a result, it was difficult to get state legislatures to adopt them. Second, some states are concerned about the criteria EPA will use to define an "adequate" state drinking water program. Third, while some state officials were pleased that EPA recognized that the federal/state partnership for protecting drinking water is in trouble, some state officials believe it would be helpful if EPA further recognized the value of the drinking water program in protecting human health by increasing the federal contribution to it. Currently, EPA is authorized to pay up to 75 percent of the costs of administering the drinking water programs in the states that have primacy. However, due to funding constraints, the agency's actual contribution has averaged about 35 percent in recent years. Fourth, some state officials are concerned that, if a user fee is adopted, EPA will not be held accountable for the cost of the regulations that it adopts and will "just expect states to pick up the tab" for any additional regulations by raising state user fees.

# Conclusions

Experts generally agree that the best approach for addressing small systems' compliance problems is to identify nonviable small drinking water systems and determine how to best bring these systems into

long-term compliance. Many of these experts also agree that the best solution for nonviable small systems is to restructure, whenever feasible, the operations or management of these systems so that they have the financial, technical, and managerial capability to comply with drinking water regulations in the long term. For those small water systems that cannot restructure, other solutions discussed in previous chapters of this report, such as the use of technical or financial assistance or the use of an affordable alternative drinking water treatment technology, may be needed to bring these systems into compliance. In light of this, we believe that the states should develop programs to assess the viability of small drinking water systems and develop authorities needed to direct nonviable systems to restructure. To have the greatest impact in addressing small systems' compliance problems, these programs should be comprehensive in nature. That is, they should not only consider future water supply needs but also include provisions that facilitate approval of alternative technologies and ensure that technical and financial assistance is used effectively to help water systems achieve long-term viability. However, unless EPA makes long-term changes in the agency's state drinking water grant formula to remove disincentives, states could be discouraged from consolidating nonviable systems.

EPA has made a number of recommendations to the Congress for amending the Safe Drinking Water Act that should result in wider use of viability concepts and restructuring strategies. Requiring states, as a condition of retaining primacy, to develop viability programs and adopt restructuring authorities should help ensure that the states have the basic information and tools needed to effectively address nonviable systems. To help ensure that all states implement these programs, development and implementation of the programs needs to be included as a state activity under EPA's current priority strategy. Requiring that small water systems have certified operators should encourage nonviable systems to seriously consider restructuring options, such as contract operation and maintenance arrangements. In addition, requirements for certified operators should help address concerns raised in chapter 2 by ensuring that skilled operators are available to operate alternative drinking water technologies. As discussed in chapter 3, EPA's recommendation that state revolving loan funds be established should also help promote restructuring strategies by requiring small systems applying for loans to consolidate whenever doing so is cost-effective.

Even though state officials acknowledge that viability programs could help address problems with noncompliant small systems and could even help

states save resources in the long run through decreased requirements for oversight of these systems, many states do not have the short-term resources needed to develop such programs. In light of this, we believe that it is important to consider what could happen if EPA's recommendations for additional state requirements, such as the implementation of viability for small systems, are adopted without a detailed and realistic funding strategy. As pointed out in previous GAO reports and acknowledged by EPA,[5] inadequate funding and rising regulatory responsibilities have placed the drinking water program in jeopardy. The effect of any additional requirements at this point, without the funding to implement them, can only worsen the states' difficulties.

## Recommendations

GAO recommends that the Administrator, EPA, (1) revise the agency's own drinking water program priorities to place greater emphasis on developing and implementing viability programs, (2) work with the cognizant committees of the Congress to develop a detailed funding strategy to accompany the agency's proposed requirement that states develop viability programs for small systems, and (3) revise its public water supply supervision grant formula to remove any disincentives for states to reduce the number of water systems in the long term.

[5]Drinking Water Program: States Face Increased Difficulties in Meeting Basic Requirements (GAO/RCED-93-144, June 25, 1993); Drinking Water: Widening Gap Between Needs and Available Resources Threatens Vital EPA Program (GAO/RCED-92-184, July 6, 1992).

# Selected Drinking Water Treatment Technologies

| | |
|---|---|
| **Aeration** | |
| Diffused Aeration | A treatment process in which water is run on a bed containing air jets and contaminants are transferred from the water into the air, where they are removed.[1] |
| Packed Tower Aeration | In this treatment process, drinking water contaminants are transferred from a solution in water to a solution in air. A column of water is run parallel to a column of air, allowing for the transferral. The extent of the removal of contaminants from the water is determined by the length of the column and the volatility of the contaminants. |
| Diatomaceous Earth | This treatment process, similar to other filtration processes, uses a thin layer of diatomaceous earth supported by a filter to remove particles and microorganisms from the water. The diatomaceous earth layer must be continuously replenished to maintain the needed degree of porosity for the filter. |
| Granular Activated Carbon | This treatment process uses a filter containing activated carbon. The carbon bonds with specific contaminants and traps them inside the filter. |
| Industrial Cartridge Filters | In this treatment process, disposable cartridges are used to filter the drinking water. |
| Ion Exchange | In the ion-exchange system, synthetic resins are used to replace ions in the water with ions of similar charge that are fixed to the resin. Through this process, various contaminants can be removed from the water. |
| **Membranes** | |
| Microfiltration, Ultrafiltration, and Nanofiltration | These types of membrane filtration remove particulates and microorganisms above a specific size as delineated by the filter used. |

[1]We obtained these descriptions of the technologies from EPA. The following EPA publications contain further information on the technologies: Technical and Economic Capacity of States and Public Water Systems to Implement Drinking Water Regulations: Report to the Congress, EPA 810-R-93-001, Office of Water, Sept., 1993; Very Small Systems Best Available Technology Cost Document, Office of Ground Water and Drinking Water, Sept. 1993.

## Reverse Osmosis

This pressure-driven treatment process uses a specially prepared membrane that permits the flow of water through the membrane but acts as a selective barrier to contaminants.

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