810R95002

# Restructuring Small Drinking Water Systems

## Options and Case Studies

# Contents

# Introduction to Restructuring

If you are reading this booklet, you care about small water systems. Perhaps you manage one of the more than 50,000 small community water systems in the United States. Maybe you provide technical assistance, training, or other services to these systems. You might work for a local, State, or federal regulatory or financial assistance agency.

No matter what you do, you probably know of small systems that provide excellent service at reasonable cost. You probably also know of small systems that are struggling. They want to provide safe water and good service, but their system is run down or their source water is of poor quality and their customers just can't afford big rate increases. Maybe you know of systems that are doing okay today, but are concerned about their ability to continue to provide the best possible service in the years to come.

Small systems face many significant challenges in consistently providing quality service at an affordable cost. These challenges include:

- Deteriorated physical infrastructure.
- Lack of access to capital.
- Limited customer and rate base.
- Lack of economies of scale.
- Limited technical and managerial capabilities.

Systems that are having problems now, or those that are worried about the future, will want to evaluate all the options available to them for overcoming these challenges. These options include restructuring system management/operations, utilization of appropriate technology, financial assistance through grants or subsidized loans, and training and technical assistance. Most systems will probably find they need some combination of these options to address their problems. This booklet explains restructuring options.

Restructuring is a broad term referring to a wide range of changes a small system could make in its operations, management, or institutional structure. Simply put, restructuring means changing the way a system does business in order to ensure its customers of the best possible service at the lowest possible cost. Restructuring can be as simple as raising rates and improving system financial management, or it can be as ambitious as creating a regional water authority.

The wide array of restructuring options is shown in Figure 1, "The Restructuring Spectrum." The spectrum consists of five broad categories of restructuring options. In reality, there are a very large number of restructuring options available to small water systems if they are willing to look at old problems in new ways and be creative.

Maintaining local control is an important factor for many small water systems considering restructuring. Most restructuring options largely preserve local control over the water system. As you move from left to right across the restructuring spectrum, there is an increasing transfer of responsibility for the water system's operation and management.

This booklet presents over 30 case studies of successful small systems restructuring. Figure 2 organizes the case studies by restructuring category. In addition to the case studies of systems that adopted a single restructuring option, the stories of systems that employed more than one restructuring technique are also presented. These cases are referred to as multifaceted restructuring.

The circumstances of each drinking water system that could benefit from restructuring are unique. Consequently, it is not possible to provide a structuring "cookbook" that explains step-

**Figure 1**
**The Restructuring Spectrum**

| Internal Changes | Informal Cooperation | Contractual Assistance | Joint Powers Agencies | Ownership Transfer |
|---|---|---|---|---|
| • Completely self contained<br>• Requires no cooperation or interaction with other systems<br>• Examples of internal changes:<br>- Installing meters<br>- Raising rates<br>- Hiring a qualified operator<br>- Drilling a well<br>- Soliciting technical assistance from the state, or from local organizations | • Work with other systems, but without contractual obligations<br>• Examples of informal cooperation:<br>- Bulk purchases of supplies<br>- Mutual aid arrangements | • Requires a contract, but contract is under the system's control<br>• System negotiates the terms and duration of the contract<br>• Contract renewal at the option of the system<br>• Examples of contract services:<br>- Engineering<br>- Legal<br>- O&M<br>- Purchasing water<br>- Supplies<br>- Laboratory services | • Creation of a new entity designed to serve the systems that form it<br>• Creating systems continue to exist as independent entities<br>• Requires cooperation of, and possible negotiation with, member systems in areas covered by joint powers agency<br>• Examples of areas covered by joint powers agencies:<br>- System management<br>- Source water | • Take over by existing entity<br>• Take over by newly created entity<br>• Examples of ownership transfers:<br>- Acquisition and physical interconnection<br>- Acquisition and satellite operation<br>- Transfer of privately owned system to new or existing public entity |

**Increasing Transfer of Responsibility →**

by-step when and how to restructure. EPA hopes that these case studies, showing how very different water systems from all over the United States have benefitted from restructuring, will inspire other small water systems to consider how they might benefit from restructuring.

## Figure 2
## Case Studies of Small System Restructuring

| Internal Changes | Informal Cooperation | Contractual Assistance | Joint Powers Agencies | Ownership Transfer |
|---|---|---|---|---|
| • Hurlock, Maryland<br>• Vernon, New York<br>• Dolgeville, New York<br>• Joseph, Oregon | • Tremonton, Utah<br>• Great Falls and Helena, Montana | **Technical Assistance**<br>• Cherokee Rural Water District #13; Cookson, Oklahoma<br>**Purchased Water**<br>• WEB Water Development Association, Inc.; Ipswich, South Dakota<br>• Lakewood Benefited Water District; Norwalk, Iowa<br>• Washington County Sanitary District, Maryland<br>**Laboratory Services**<br>• South Kaweah Mutual Water Company; Three Rivers, California<br>• Water Well Technologies, Inc. (WELLTECH); Akron, Ohio<br>**O&M**<br>• County Service #33; Freestone, California<br>• Program of Shared Operation and Management (POSOM); Florence, Montana<br>**Full Operation**<br>• Beckham County Rural Water #2; Erick, Oklahoma<br>• Village of Pecatonia, Illinois | • Boone County Public Water Supply Service, Inc.; Columbia, Missouri<br>• The Woodlands Joint Powers Agency; Montgomery County, Texas | • Quantabacook Water District; Harrington, Maine<br>• Trailer Village Mobile Home Park; Centralia, Washington<br>• East Prospect Water Authority; East Prospect, Pennsylvania<br>• Greenacres Water Supply; North Canaan, Connecticut |

### Multifaceted Restructurings

- Community Water System; Higden, Arkansas
- North Lakeport-County Service District #21; Lakeport, California
- Warren Rural Electric Cooperative; Bowling Green, Kentucky
- Pioneer Electric Cooperative; Greenville, Alabama
- Roaring Creek Water Company; Shamokin, Pennsylvania
- Consumers New Hampshire Water Company; Londonderry, New Hampshire
- Lonaconing, Maryland
- Derry Waterworks; Derry, New Hampshire
- Homestead Municipal Utility District; El Paso, Texas
- Rolesville, North Carolina

# Internal Changes

The simplest form of restructuring that a drinking water system can pursue is to make **internal changes** in the way it operates. Internal changes enable systems to be "all that they can be" while retaining complete autonomy. They can help a system increase its operating efficiency while reducing or containing costs. By avoiding contractual arrangements, or even informal cooperative agreements, system owners are free to take the initiative and make the improvements they feel are necessary and to control the timing and implementation of those changes.

For example, a system's owners or managers may decide that the time has come to install water meters, hire a certified operator or a part-time bookkeeper, or drill a new well. They can take these steps on their own, or they can seek outside help if they think they need it. Another advantage is that they are reversible. Ideas that may seem to make sense in theory, but don't work out in practice, can be reversed or revised at management's direction.

Internal changes will be most beneficial to systems that are in good shape, that do not face serious or persistent compliance problems, and that can generate sufficient revenues or volunteer labor to meet all their needs. In most cases, however, internal changes alone will not be enough to solve the problems confronting seriously compromised or badly dilapidated systems.

Not all drinking water systems have the same internal capabilities, and some systems may want limited outside help in making internal changes. State drinking water programs are available to help drinking water systems make internal changes. So are organizations like the National Rural Water Association and its local affiliates, and the Rural Community Assistance Program. These groups can also help systems figure out which internal changes are the most important and should be made sooner rather than later. But the final decision rests with the system.

As the following examples of internal changes show, when it comes to making system-wide operational improvements, creativity—and a willingness to try—are critically important.

# Internal Changes

## Hurlock, Maryland: New Well and Service Expansion Improves Water Quality

***Drilling a new well helped this system solve a nitrate contamination problem, and extending its lines with state assistance brought a reliable supply of safe water to a nearby community.***

In 1984, the Hurlock drinking water system on Maryland's eastern shore had a problem with nitrate contamination of its well water. Hurlock had three wells. The nitrate level of its tap water was 11 mg/l, exceeding the maximum contaminant level (MCL) of 10 mg/l. Hurlock's solution to this problem was to drill a deeper well with low-nitrate water and blend that with water from one of the three original wells so that nitrate levels in the finished water fell below the MCL.

Immediately adjacent to Hurlock were the 60 homes that made up the minority community of Jones Village. They were served by individual wells, and most of those wells had both nitrate and bacteriological contamination.

The Maryland Department of the Environment (MDE) was interested in seeing Hurlock address its nitrate problem and in finding a solution to Jones Village's water quality problems. Working with MDE, Hurlock came up with a plan to drill a new well and extend its water lines to serve the adjacent village.

Drilling a new well and making other improvements to Hurlock's system were estimated to cost \$323,535. Extending Hurlock's water lines to Jones Village, and constructing a water distribution system there, would cost an estimated \$331,765. Hurlock secured a \$211,000 loan from a local bank, and DEP provided a \$55,865 loan and a \$56,385 grant to drill Hurlock's new well. DEP also made a \$331,765 grant available to pay for extending Hurlock's water service to Jones Village. The restructuring was completed in 1990.

Today, Hurlock's water system treats its water with chlorine and fluoride; it uses lime to control pH, which naturally runs from 6.0 to 6.5. By blending water from its new well with that of the older wells, Hurlock lowered the nitrate level in its drinking water to 7 mg/l, which meets the nitrate MCL. In addition, Jones Village now has a safe, reliable source of drinking water.

Water rates in Hurlock and Jones Village are identical, about \$50 per quarter.

## Vernon, New York: Installing New Distribution Line Reduces Costs

***A partnership formed by the Town of Vernon, the Village of Vernon, and the City of Oneida brought safe drinking water to 47 homes formerly served by contaminated wells, and will permit growth in both the Town and Village.***

The upstate New York Village of Vernon purchases water from the neighboring City of Sherrill. In 1994, Sherrill charged Vernon some $65,000 per year for this service, based on Vernon's water consumption and use of Sherrill's water lines to bring water to the Village's lines. Dissatisfied with the limits placed by Sherrill on Vernon's water purchases (the Village needed more water to accommodate additional growth), Vernon officials decided some internal changes in their operation were in order.

The state's Self-Help Support System reviewed Vernon's operations budget and discovered the excessive cost Sherrill charged Vernon to use Sherrill's pipes. This excessive cost was converted over different time frames into capital costs. Village officials could now clearly see how this money could be used to finance a water project without raising water rates. (Established by New York's departments of State, Environmental Conservation, and Health, with assistance from Rensselaerville Institute, the Support System provides technical advice and other support to help small communities alleviate their drinking water and wastewater problems.)

The Self-Help Support System was helping the Town of Vernon provide safe water to 47 homes with unsatisfactory household wells. This required formation of a Town water district and interconnection to a water supplier, but the project was too expensive. The Self-Help Support system brought the Town of Vernon, the Village of Vernon, and City of Oneida together and formed a partnership. Before proceeding with the project, several key issues had to be negotiated between the Town and Village. The Town was willing to waive all local taxes levied on the transmission line if the Village would serve water to the 47 residences that had contaminated water. The Village incurred the debt, operation, and new distribution system. This was a critical issue.

Vernon installed a 4.5-mile, 12-inch pipe around Sherrill at a cost of $420,000. Now, Oneida's water could be piped directly to Vernon's 200,000-gallon storage facility. The Village of Vernon financed the pipeline project with a 10-year, $600,000 bank loan at 1 percent above the prime rate. The extra funds were used to make internal improvements to the Vernon system, including the installation of new meters and new billing equipment. Water service also was extended to an additional 47 homes that had been plagued by poor-quality water and other service problems. Before the expansion, the Vernon system served 499 customers.

By June 1994, the cost of purchased water from Oneida was $7,000 less than it had been the previous June, when the water came through Sherrill. Water rates of $3.30/1,000 gallons within the Village and $3.80/1,000 gallons for customers outside it have not increased a result of the project. In less than 10 years the project's capital costs will be paid.

## Dolgeville, New York: Self-Contracting for New Treatment Plant Dramatically Cuts Costs

***Acting as its own contractor, and arranging for project financing on its own, this rural New York community upgraded its drinking water system—saved almost $1 million.***

When the New York State drinking water program told Dolgeville it had to treat its surface water used for drinking, the town had an unfiltered surface water supply and needed to install treatment.

The town considered building a treatment plant that uses diatomaceous earth as a filtration medium. It also considered drilling wells to replace its surface water source. Officials met with representatives of the New York State Self-Help Support System and discussed treatment options, financing, and other related issues. (Established by the departments of State, Environmental Conservation and Health, with assistance from Rensselaerville Institute, the Self-Help Support System assists small communities in alleviating their drinking water and wastewater problems by providing technical advice and other support.) Eventually, the town opted for slow-sand filtration.

Slow sand filtration does not require high energy or chemical usage. Its simple operation makes slow sand filtration particularly appropriate for a small village. A slow sand filter plant will last three or four times longer than a package facility. Consequently, the community will not have to invest in facility renovations in 25 years. By using slow sand filtration, the system will operate as it had for 100 years, except for the new filter and covered storage.

Town officials hired an engineering firm to design a 1 million-gallon-per-day slow-sand filter and related facilities, including a 1 million gallon clearwell. The estimated cost of construction was $2.2 million. Dolgeville decided to do its own contracting and arrange for its own financing. (The Town had acted as its own contractor before, most recently to make improvements to the local sewage treatment plant.)

Construction began in April 1994, and the filter should be operational in the fall of 1995. (Winter conditions required that work stop between December 16, 1994 and April 10, 1995.) The Village has bought and rented equipment and hired temporary civil service employees to do the construction. The project was on schedule and within budget as of July 1995. And the town estimates the project will cost $1 million to $1.2 million.

The town is using $400,000 from a HUD small cities grant to pay for materials and engineering only. Payroll and related expenses have come from a one-year bond anticipation note. The town has been pre-approved for a $773,700 million Farmer's Home Administration (FmHA) loan, according to the mayor. Water rates were increased by 40 percent in the third quarter of 1993, and are anticipated to rise again in 1995 to approximately $20 per month.

## Joseph, Oregon: Installing Treatment and Making Other Changes Improves Service

*A series of internal changes that improved water quality and dramatically reduced usage have been a net plus for this Pacific Northwest community.*

This 630-connection system serving a town of 1,135 residents provided no treatment besides chlorination. It had long been unmetered because Wallowa Lake, the source of the system's drinking water, provided an unlimited amount of "cheap" water. The system was plagued by taste and odor problems associated with algae in Wallowa Lake, and water pressure was low in the higher elevations of the community.

Prompted by a requirement to filter its surface water supply, the system hired a consultant who designed a treatment system that included slow sand filtration and a reservoir. The consultant also designed system improvements including new fire hydrants and meters. Total cost of the project was $2.7 million, which was paid with a combination of grant and loan funds from the Farmers Home Administration.

This internal restructuring was completed in November 1993. Treating the system's surface water solved the taste and odor problem and has been very popular with its customers. The combination of leak repairs and installation of water meters has cut monthly water usage 33 percent, from 27 million gallons to 18 million.

Before the restructuring, system customers paid $6 per month for their water. Now the average monthly bill is more than $20, but the improvements in water quality realized by the restructuring have outweighed any complaints about the increase in rates.

# Informal Cooperation

Sometimes a drinking water system's limited resources mean it can't make the restructuring changes it needs on its own. Rather than go it alone, systems in need of outside help can seek out opportunities for **informal cooperation.**

In many parts of the country, informal cooperation isn't a new way of doing business, it's an old way of life. In region after region, Americans pride themselves in helping their neighbors, and in looking out for the other guy. They volunteer to become firefighters, or they join a town or county board. They get involved in improving the quality of life for everyone.

The informal cooperation we're talking about here takes that "get involved" attitude and puts it to work in the water business. Many systems are already involved in informal cooperation. It's so second-nature, many system owners may not even realize there's a name for what they're doing. When systems get together and agree to buy supplies in bulk, that's informal cooperation. When a larger system uses its purchasing power to buy supplies at a discount, then re-sells the supplies to its small neighbors at cost, that's informal cooperation too.

By working together informally, systems benefit in many ways. They share knowledge and expertise. They may even share supplies and equipment, or they may share their purchasing power. In a crisis or an emergency, they know there's someone they can call on to help.

Informal cooperation may be most useful for small systems that are already in good shape and well managed, but would like to increase their efficiency and reduce or contain their operating costs. Informal cooperation alone will not solve the problems of seriously impoverished or badly dilapidated systems.

Through informal cooperation there is virtually no transfer of responsibility, and water systems remain virtually autonomous.

# Informal Cooperation

## Tremonton, Utah: Regional Provider of Equipment and Supplies

***As the largest water system for 30 miles, Tremonton helps smaller systems buy supplies at a discount, borrow equipment when they need it, and stay current with industry developments.***

The custom of neighbor helping neighbor is firmly rooted in the pioneer spirit of the West. In northern Utah that spirit is evident in the informal cooperation between the Tremonton water system (service population 3,500) and its 30 smaller neighbors.

For years, Tremonton has shared equipment parts with its neighboring systems, with the understanding that the borrowing systems would replace what they use. Since chlorine distributors won't deliver to many of these systems, principally because of logistics problems, the Tremonton City Council agreed to act as a "chlorine clearing house." Tremonton buys the chemical disinfectant, and systems within a 30-mile radius pick up what they need when they need it. The systems pay Tremonton the same price for the chlorine that Tremonton paid the distributor.

In 1993, Tremonton was instrumental in establishing an organization to provide training to water system operators. The Utah section of the National Rural Water Association and the Rural Community Assistance Program (RCAP) provided assistance, but the operators' group is not affiliated with any national organization. The monthly meetings cover the latest developments of interest to drinking water system operators; a recent session covered lead and copper monitoring. The meetings also provide opportunities for systems to replace the parts they borrowed from Tremonton, or to pick up chlorine if they need it.

Tremonton's transformation into an informal regional supplier of equipment parts and supplies grew out of long-standing practice. The operators' organization it helped found grew out of need. Such informal cooperation has helped more than 30 small systems in Utah improve their quality of service.

## Great Falls and Helena, Montana: Providing Specialized Expertise Aids Systems in Surrounding Communities

***Helping neighboring systems tap their water mains provides a useful, and specialized, service.***

Because the communities surrounding Great Falls and Helena, Montana, typically lack the equipment and expertise to make large taps in their water mains, the Great Falls Department of Public Works, Division of Water Distribution, and the Helena Water Department makes the taps for them.

The process in Great Falls is simple. The system that requires assistance approaches the public works department for help. The Division of Water Distribution requests permission from the city manager. Having obtained the city manager's okay, the division schedules the tap for off-duty hours. Personnel from the division use the city's equipment to make the requested tap. Great Falls bills the requesting community for its employees' time and travel expenses, plus a minimal charge for the use of the equipment. Division of Water Distribution staff have traveled as far as 150 miles to make a tap.

The city of Helena provides a similar service for communities within a 50-mile radius. Helena Water Department staff have the equipment to make taps as large as eight inches; to make larger taps they must borrow cutting heads from Great Falls. Like Great Falls, Helena bills the community for its costs in providing this service. In addition, Helena will loan neighboring systems valves, pipe fittings, and other parts that they cannot immediately obtain from a supplier, with the understanding that the system will replace any parts provided by the Helena Water Department.

By making its equipment and expertise available to communities in the surrounding area, the cities of Great Falls and Helena provide their neighbors with an essential service.

# Contractual Assistance

When a drinking water system requires more complicated, specialized, or regular support than informal cooperation can provide, **contractual assistance** may be a good solution.

There are numerous providers of contract services. Some may be other drinking water systems. Others may be companies formed especially to provide certain types of services, such as contract O&M, to drinking water systems. Still others may be firms, such as engineering, accounting, or law firms, that provide professional services to a range of industries including water systems (or that specialize in water utilities).

Just about any normal business function of a drinking water system can be obtained in this way. Contract operations and maintenance may be the most familiar example, but there are others. Engineering, legal, and laboratory services are all available on a contract basis. Operating supplies such as disinfectants can also be obtained with a contract.

Obtaining services through contracts allows a system to acquire exactly those services that it needs, no more and no less. The contractor works for, and reports to, the system owner, board of directors, or other governing body which retains complete control over financial and policy matters.

# Contractual Assistance

## Cherokee Rural Water District #13; Cookson, Oklahoma: Solving a Water-Loss Problem

***A short-term contract for a water audit to determine why it was losing water also helped this system identify a need for operator training.***

The 473-connection drinking water system known as Cherokee #13 had a problem. Somehow, the system was losing a great deal of water, and no one knew why. System managers turned to the Oklahoma Rural Water Association (ORWA) for help.

Cherokee #13 hired Water Systems Management, Inc., the "for-profit" subsidiary of ORWA, to do a water audit and leak detection survey. The review of the system determined that:

- The system's pumps were cycling on and off too rapidly, thus creating a "water hammer" that was fracturing the system's plastic pipes.
- Use of the two pumps that draw raw water from the system's lake source should be alternated to extend pump life and reduce power consumption.
- Meters should be installed to improve the efficiency of chemical treatment, and to monitor the discharge from recently installed chlorine and turbidity monitors.
- The operator's daily water log should be expanded to include estimates of the amount of water associated with line flushing, leaks, overflowing storage, cleaning the settling basin, and unmetered discharge from the distribution system.
- A low-pressure switch should be installed on the clear well to prevent the distribution pumps from potentially pumping air, and a pressure switching device should be installed at the storage tank to monitor the level of water in storage.
- A meter testing program should be initiated to ensure that corrective actions are taken as needed.

Correcting the water hammer problem became a simple matter of repairing the pipe and, more important, correcting the operation of the pumps. Water Systems Management, Inc. estimated that if its recommendations were adopted, Cherokee Country RWD #13 could save $4,880 annually in reduced electrical power consumption and reduced water loss caused by leaks.

## WEB Water Development Association, Inc.; Ipswich, South Dakota: Purchasing Water to Address Quality Problems

***When its own water proved to have overly high concentrations of minerals, this South Dakota small water system decided the best solution to the problem was to purchase better quality water.***

The need to provide quality drinking water at a reasonable price was a driving force behind the creation of the WEB Water Development Association (WEB) by the South Dakota counties of Walworth, Edmunds, and Brown. WEB's purpose was simple: to provide good quality surface water to communities in those counties. The association was incorporated in 1978, and construction was finished in 1991. The system's creation and construction was funded by $121 million (99 percent of it grant funds) from the federal Bureau of Reclamation.

The town of Ipswich (population 1,000) is the seat of Edmunds County and one of the communities that pushed for the creation of WEB. Ipswich was plagued with highly mineralized, warm water pumped from a municipal well. Laboratory analysis of the water showed the following concentrations: sulfate 1,205 mg/l; hardness 1,178 mg/l; and total dissolved solids (TDS) 2,131 mg/l. The water temperature was 70 degrees Fahrenheit.

The 350-service-connection Ipswich water system could not remedy its water quality problems by itself. Instead, it made the same decision as more than 50 communities in more than 20 counties have made. Ipswich decided that forsaking the highly mineralized water from municipal wells for good quality water provided by WEB was a wise move. In 1986, Ipswich connected to the WEB transmission line, which ran right through the town. Now Ipswich's drinking water has acceptable levels of minerals: sulfate, 203 mg/l; hardness, 236 mg/l; and TDS, 469 mg/l.

By 1994, water bills in Ipswich ran between $12 and $15 per month for residential customers; previously, the average residential water bill was about one-third as much.

## Lakewood Benefited Water District; Norwalk, Iowa: Purchased Water Improves Water Quality

***To obtain better-quality drinking water, residents of a large subdivision decided to buy the groundwater system from the subdivision's developer and tie into the nearby Des Moines system.***

When a private developer built a 500-home subdivision about two miles south of Des Moines, wells were drilled to provide drinking water. The well water was highly mineralized, however, and residents wanted better quality drinking water. The developer refused to make any investments to improve water service after the subdivision was completed, so the residents took matters into their own hands.

In 1981, they formed the Lakewood Benefited Water District. Funded by a $380,000 Farmers Home Administration (FmHA) loan, the district bought the development's water system from the developer and connected it to Des Moines' water system. (The feasibility study required to obtain the FmHA loan had determined this to be the most cost-effective solution. The loan was paid off in 1988.) The minimum water bill in 1995 was $7.56 for 3,000 gallons, and the average bill was just $15 per month.

## Washington County Sanitary District, Maryland: Purchased Water Addresses A Health Problem

***After private wells were implicated in an outbreak of a serious waterborne disease, state officials ordered a restructuring that involved the purchase of drinking water from a nearby municipal system.***

Private drinking water wells were the suspected source of a 1983 outbreak of Hepatitis A in the Cearfoss/Martins Crossroads area of Maryland's Washington County. In response, the Maryland Department of the Environment (MDE) exercised its authority to order the county government to construct or extend a public water system. MDE ordered Washington County officials to provide water service to the area.

Three years after the hepatitis outbreak, the Washington County Sanitary District completed its feasibility study. The study determined that the most cost-effective way to bring drinking water to the Cearfoss/Martins Crossroads area was to purchase it from Hagerstown, about three miles away.

Later in 1986, design of the drinking water system began. System construction started in 1987 and was completed in 1988. Some 55,000 feet of pipe were laid at a cost of $2.8 million to serve 329 customers. Project funds came from grants ($1,842,252), loans ($804,000) and connection fees ($164,500).

By the end of 1994, 412 connections were being served by the system. Customers in the 6-square-mile area pay $70.70 per quarter for 10,000 gallons of water, and $1.65 for each additional 1,000 gallons.

## South Kaweah Mutual Water Company; Three Rivers, California: Laboratory Services Improve Compliance

***When the merger of two small rural systems failed to solve their operating problems, the surviving system decided it was time to contract for help in meeting monitoring requirements.***

In the late 1980s, the South Kaweah Mutual Water Company absorbed the Three Rivers Mutual Water System, which was located near Sequoia National Park in California. Before the merger, South Kaweah Mutual had two wells, no storage, and 65 connections; Three Rivers had one well, 35 connections and a storage system. The acquisition benefitted both systems, but problems remained.

The Tulare County Health Department took water samples to analyze for the presence of microbiological contaminants. The system was responsible for taking samples to analyze for chemical contaminants, but operators were uncomfortable with the labs with which they were dealing. To solve that problem, in 1989 South Kaweah contracted with FGL Labs in Santa Paula, more than 150 miles away, to take, ship, and analyze the chemical samples and report the results to the county health department. By knowing what sampling is required at what time, the lab helps the system avoid monitoring and reporting violations.

South Kaweah pays the county health department $15 to collect a sample monthly and more than $20 to process it. The system's 1994 contract for chemical sampling by FGL was $540. Two other labs serve the Three Rivers area, and South Kaweah chose FGL on the basis of price and service.

The systems' water rates rise with consumption, thereby encouraging conservation: vacant lots are charged $78 per year, and the base cost of water is $132 per year for 10,000 gallons a month. Monthly charges for additional water usage are as follows: 10,000 to 20,000 gallons, $0.50 per 1,000 gallons; 20,000 to 40,000 gallons, $1.50 per 1,000 gallons; 40,000 to 60,000 gallons, $3 per 1,000 gallons; and over 60,000 gallons, $5 per 1,000 gallons. Under this system, homeowners with large green lawns pay about $200 per month for their water.

## Water Well Technologies, Inc. (WELLTECH); Akron, Ohio: Pooled Purchasing Power Reduces Lab Costs

*Consolidating the buying power of more than 100 Ohio drinking water systems brings them great savings on laboratory services—and provides a new line of business for the consortium's organizer.*

Recognizing a wide variance in what laboratories were charging for various tests turned into a business opportunity for WELLTECH, a full service company that provides operations and maintenance services to 32 Ohio public water systems.

In 1992, WELLTECH formed a consortium of more than 100 systems that buy their laboratory services in bulk—and at a discount. WELLTECH solicits bids from laboratories and contracts with winning laboratories on behalf of member systems. In a typical arrangement, WELLTECH tracks required sampling and orders necessary sample kits from certified labs. A lab sends sample containers to systems, which are responsible for taking samples. The systems send the samples back to the lab for analysis. The laboratory reports the analysis results to the Ohio Environmental Protection Agency, and to WELLTECH. The laboratories also bills WELLTECH, which reviews the analysis results and forwards the lab reports to system owners, along with their bills.

In three years of operation, there has been a noticeable drop in the cost of laboratory analyses. In 1992, the cost of testing for volatile organic chemicals (VOCs) ranged from $150 to $290; in 1995, the contract price was $85. Testing for maximum contaminant levels of inorganics posted a similar price decrease, from $250 in 1992 to $95. The cost of nitrate-nitrite testing dropped from $15 - $20 each in 1992 to $10.20 for both in 1995, and lead and copper testing declined from as much as $27 to $7 each during the same period.

The consortium approach illustrated by WELLTECH shows how volume discounts offered by laboratories can reduce monitoring costs. A recent survey by the Ohio Environmental Protection Agency found that five of six laboratories surveyed provided volume discounts of 10 to 50 percent, depending on the type of analyses and number of samples. Drinking water systems would be well advised to shop around for the best deal they can get before deciding whether to proceed with the formation of a consortium.

## County Service #33; Freestone, California: Telemetry-Assisted Contract O&M Reduces Operating Costs

***Contract O&M helped address some of this rural California system's operating problems, but it wasn't until a filtration system monitored by telemetry was installed that operations really improved.***

The water system serving the historic village of Freestone grew gradually from the village's founding in the 1860s to the installation of a distribution network during the 1920s. Over the years, however, the system fell into a serious state of disrepair. A frequent violator of turbidity, bacteriological, and monitoring requirements, it was also plagued by inadequate supply.

In the late 1980s, the citizens' association responsible for the system's operation and maintenance successfully sought the creation of a County Service District (CSD). The CSD assumed responsibility for the system and in turn hired a contract O&M firm to run it. Operations improved, but violations persisted until upgrades, including the installation of a dual filtration system, were made in the early 1990s.

A major factor in the success of this restructuring was the installation of telemetry equipment so that the treatment plant's operation could be monitored from the O&M firm's office 13 miles away. Because of the telemetry system, the state cut the frequency of required visits to the site from daily to weekly. This reduced to an average of 13 hours per month the time required to operate and maintain the equipment. (That 13 hours per month includes travel time and state-mandated weekly site visits.) As operator time went down, so did O&M costs.

The overall cost of Freestone's dual-stage filtration system was $7.56 per 1,000 gallons, about 42 percent less than the estimated cost of a similarly sized coagulation-filtration system for the site (approximately $13.00 per 1,000 gallons). Transferring system ownership to the county was a key factor in the project's success.

The system's customers have seen their water rates decline as a result of the restructuring. Prior to 1990, the system charged each of its 23 connections $60, and customers still had to use bottled water because of the contamination problems. By 1995, three new connections had been added, water rates had declined to $42, and bottled water was no longer mandatory. Water is sometimes in short supply, however, and must be trucked in to supplement water from surface and ground water sources.

## Program of Shared Operation and Management (POSOM), Florence, Montana: Contractual Assistance Targets Individual Very Small System's Needs

***A flexible system of contract management and operational services enables volunteer operators and managers of very small systems to stay on top of what they need to know to do their jobs, and helps keep State officials apprised of the issues these systems are facing.***

Very small drinking water systems with as few as 13 to 14 hookups—particularly homeowners associations, schools, and mobile home parks—are served by volunteer operators and managers. These volunteers have full-time jobs, earning livings for their families, and now they find themselves facing the difficult task of managing or operating a water system. None of these systems can afford to hire a full-time operator, and none of them need one anyway.

The Midwest Assistance Program affiliate of the Rural Community Assistance Program set up the Program of Shared Operation and Management (POSOM) to meet the needs of these very small systems. By contracting with several systems clustered in the same geographic area, the per-system cost is very affordable—and must less than the cost of hiring an individual operator for each system.

Most of these systems don't really need operational assistance, but they desperately need management help. They know how to take samples, but they need to know when to take them, what new contaminant they will need to test for next, and what the projected costs of analysis are. In other words, they need to know what they must do to stay in compliance with the Safe Drinking Water Act. Another problem they face is not knowing who can give them the answers to these questions. They are unable to attend training sessions regularly due to cost, travel time, and the loss of wages from their jobs, so many times they are "in the dark" about new requirements.

Each contract with POSOM is individualized to meet a particular system's needs. The program offers management services and operation services components. Systems may contract for one or both components at various costs. The monthly cost of a three-month contract is more than that of an annual contract.

Each system receives a newsletter with information answering questions they have raised and with any new and timely information the POSOM program deems helpful to these systems. The program also works closely with the State Water Quality Division, and regularly reports to the Division on issues identified in the field.

## Beckham County Rural Water #2; Erick, Oklahoma: Full Contract Operation Reduces Operating Costs

***When the technical demands of operation surpassed the capabilities of this sprawling drinking water system, those in charge found that contracting system operations was cheaper than hiring an operator.***

The board in charge of this water district in western Oklahoma county of Beckham was having a difficult time keeping up with the technical demands of system operations. The system's single employee lacked sufficient skills to operate the system, and when he quit in 1993 the board decided to seek outside help.

The Board contracted with Water Systems Management (WSM), the "for-profit" subsidiary of the Oklahoma Rural Water Association, to fully manage and operate the district's 212-connection system. WSM looks after the system's 100+ miles of water main, its three wells, and its chlorination, storage, and pumping infrastructure. The association also is responsible for meter reading, billing, accounting, and O&M. The water district provides material and equipment free of charge for WSM's use in operating the system.

This arrangement has proved to be a cost-effective one for Beckham County; contracting with WSM is cheaper than hiring a system operator or paying for other labor to operate the system. Average water bills for residential customers range from $25 to $50 per month; the minimum bill is $18.50 per month for 1,000 gallons of water.

## Village of Pecatonica, Illinois: Privatized Water Services Address Supply and Other Problems

***The privatization of this community's public works operations, including the water system, may enhance fire protection and correct supply and other problems plaguing drinking water customers.***

The drinking water system in this community of 1,800 located a few miles west of Rockford in Winnebago County is in need of major improvement. It does not have enough water at high enough pressure to provide adequate fire protection. In a number of instances, two or three homes are served by the same 1-inch service line. This significantly contributes to the low-pressure problems. In addition, the system's 100,000-gallon elevated storage tank is too small and set too low; the system needs a third well; and 70 percent of its distribution network is made up of 4-inch pipe that needs to be replaced with larger lines to eliminate bottlenecks. Residential customers are unmetered, so daily per capita usage averages 155 gallons. The rate system needs updating; residential customers now pay $20 per month for sewer and water services.

In 1994, the village contracted with St. Louis-based Environmental Management Corporation to provide all public works services, including water. EMC is revising the local water and sewer ordinances before undertaking a rate study. The water system needs to generate enough cash to fix its problems.

EMC is one example of the many firms that began in the waste water business and are now branching out into drinking water.

# Joint Powers Agencies

When systems face challenges greater than each can meet on its own, they may want to form a **"Joint Powers Agency."**

In this method of restructuring, systems form a new entity to serve them, while continuing to exist, and operate, independently. For example, let's say four neighboring systems served by wells realize they'd be better off tapping a nearby lake for source water, but no system alone can afford to run pipe to the lake and install treatment. These systems could form a joint powers agency to provide them with water from the lake.

Where there once were four entities, there are now five. Each system is represented on the new agency's board of directors, and each system has a say in the agency's operation. Depending on how the agency is set up, most or all of the member systems will have to agree to an agency action before it is implemented. But, except in matters over which the agency has jurisdiction, each member system remains free to operate as it sees fit.

Forming a joint powers agency can be more complicated than some of the other forms of restructuring presented in this manual. Depending on local and state laws, it may be necessary to obtain governmental approval at some point. Legal counsel experienced in regulatory and other governmental affairs is an absolute necessity during the formation of a joint powers agency.

Once established, a joint powers agency will likely remain in existence as long as its members need it. And once they join, member systems should be committed to participating in the agency as long as the need for the agency remains. In this way, member systems can address the concerns that affect them all.

# Joint Powers Agencies

## Boone County Public Water Supply Service, Inc.; Columbia, Missouri: Centralized Administration Provides Cost-Effective Service

***Centralizing purchasing, accounting, and other support services in a joint powers agency has streamlined the administration of several Water Districts in this central Missouri County.***

The Boone County Public Water Supply Service, a nonprofit corporation, was formed in 1968 to provide administrative and other services for the 10 water districts in this Missouri County. Four of the 10 districts initially joined. In 1975 three of the districts merged and the organization now serves two water districts with a total of 6,700 customers. By 1995, Boone County Public Water Supply Service was providing:

- Computerized billing, accounts receivable, accounts payable, and payroll services.
- A communications center for telephone calls and two-way radio communications.
- Insurance and annual audit administration.
- Work-order preparation and record keeping.
- Join purchasing of materials and services.
- Financing and refinancing assistance.
- Attendance at Board meetings, and preparation of agendas, correspondence, financial reports, and meeting minutes.
- Assistance in the processing and distribution of quarterly newsletters to customers.

The service company develops an annual budget, which must be approved by its Board of Directors. The Board is made up of the presidents of the participating water districts. (The consolidated district, Public Water Supply District No. 1, has two representatives on the Board.) Funds for the annual budget are raised by charging each District a monthly fee. In 1995, the monthly fee was $2.10 per customer.

Boone County Public Water Supply Service, Inc. has provided a cost-effective service to its member districts. Its central office eliminates separate, duplicate office for each district and provides a central location at which customers, suppliers, and government agencies can do business.

In 1990, a joint project with the local electric cooperative provided new, expanded headquarters for the company and the consolidated water district. The offices of the county sewer district are also located on the electric cooperative's property. This arrangement has drawn a positive response from the customers served by all three utilities.

## *The Woodlands Joint Powers Agency; Montgomery County, Texas: Joint Powers Agency Streamlines Member Systems' Operations*

***Rather than staff 10 separate water systems, this planned community relies on a joint powers agency to operate nine municipal utility districts serving residential customers and one serving the downtown commercial area.***

The Woodlands is 25,000-acre planned community located in the southeast Texas county of Montgomery, whose county seat is Conroe. Ten Municipal Utility Districts (MUDs) deliver water provided by the San Jacinto River Authority from 12 wells; nine districts serve the Woodlands' residential areas, and one serves the commercial area. (The San Jacinto River Authority provides all water lines 12 inches and above in size, all storage facilities, and all the water.)

Staffing separate water systems, each headed by a general manager, was obviously economically inefficient. In 1974, through an interlocal agreement, the nine MUDs serving residential areas formed a Joint Powers Agency to operate the systems, which total 14,000 connections. The MUDs have no staff, but the Woodlands Joint Power Agency has 26.

Each MUD has an elected board of directors, and one member of each residential MUD sits on the board of the Joint Powers Agency (JPA). In that way, the JPA's activities are coordinated and member utility district has a say in its operations. Water rates for residential customers average $1.13 per 1,000 gallons for a minimum of 10,000 gallons.

# Ownership Transfer

Sometimes the owners of a drinking water system decide, for one reason or another, that they no longer want to "go it alone." Perhaps they cannot afford to make necessary improvements to their system. Or maybe an unforeseen contamination problem threatens to overwhelm their technical or financial capabilities. In such cases, a change in ownership may be the best solution.

Some states have programs in place to facilitate **ownership transfers** by helping to remove regulatory barriers. Such programs can help ensure that the customers of a viable drinking water system are not required to pay a disproportionate share of the costs to acquire or improve a troubled one. A few states, such as Connecticut and Washington, have legal mechanisms to compel, under certain circumstances, the takeover of seriously troubled drinking water systems.

In some cases, it makes sense to transfer ownership of a small water system from the private to the public sector. That's because many low-interest loan and grant programs from agencies such as the Rural Utilities Service, or RUS, (formerly the Farmers Home Administration) are available only to publicly owned water systems.

In other cases, however, private sector ownership would be most advantageous. Private sector water companies may be able to bring economies of scale and management efficiencies to bear to help troubled small systems. They may physically interconnect with these small systems, or they may run them as physically separate operations known as satellite systems.

In the end, the decision to transfer ownership will depend on the financial and technical problems faced by a system's owners. The nature of the ownership transfer also will depend on local conditions, the state regulatory environment, and other concerns.

# Ownership Transfer

## Quantabacook Water District; Harrington, Maine: Transferring Ownership to a Public Water District Kept This System Going

***When the magnitude of its problems surpassed its financial resources, a privately owned system in Maine determined to go public in order to give its customers the quality of service they deserve.***

As a privately owned system, the Quantabacook Water Company had serious problems with its source and with low water pressure, inadequate storage, and undersized water mains that were old and deteriorated. Violations of the maximum contaminant levels for microbiological organisms were numerous, and the system was on a boil water notice from 1988 through 1994. After a sanitary survey, the state ordered that the system be pressurized and that proportion-to-flow disinfection equipment be installed.

The utility's weak financial position ruled out a commercial loan to correct the problems. And other costs loomed ahead for the system, which was founded in the 1860s. A prospective wellhead protection program would require the system to conduct a hydrogeological investigation and, possibly, purchase several acres of land for protection. The three-person board of directors was concerned about the project cost and about depleting the system's $25,000 reserve fund. In the early spring of 1989, with the help of the Maine Rural Water Association, they decided to restructure by transferring the company's assets to a water district.

Although the town selectmen endorsed the action, and the state legislature unanimously passed the water district charter, Harrington's voters defeated the restructuring in a referendum. Many voters were concerned that the town would be liable for the system's debt. (Actually, the town faced no liability.) Some voters were concerned about whether the Farmers Home Administration (FmHA) would require fire hydrants. After their concerns were addressed by a state Public Utilities Commission attorney in a subsequent meeting, voters endorsed the water district's creation by almost 4:1.

The district's new board of directors hired an engineering firm and applied for a grant and a loan from the FmHA. An engineering firm put together a $1.9 million project that included developing a larger, more reliable water source; replacing 21,000 feet of undersized water main; and erecting a 300,000 gallon storage tank for fire protection. Construction began in the fall of 1993, and the system went on line in the fall of 1984.

FmHA provided the district with a $1.36 million grant and a $536,000 loan; the 5-percent loan will be amortized over 40 years. Average annual water bills for the system's approximately 145 customers will increase from $75 to about $264.

## Trailer Village Mobile Home Park; Centralia, Washington: Annexation Ensures Safe Water For Low-Income Housing

***A contamination problem that may have begun 30 years earlier led a neighboring community to annex this mobile home park and to assume ownership of the park's drinking water system.***

When Phase I (Volatile Organic Chemical) sampling found high concentrations of tetrachloroethylene (PCE) in its drinking water wells in 1991, the Trailer Village Mobile Home Park outside Centralia, Washington had few options. Its two wells, which showed PCE concentrations of 25 ppb and 103 ppb (the maximum contaminant level is 5 ppb), were taken off line and bottled water was provided to its 85 households. The park's water distribution system was connected to the irrigation well of a nearby cemetery to provide water for washing and other domestic purposes in the short term.

A preliminary site assessment implicated a dry-cleaning business that had operated on the mobile home park site from 1960 to 1978 as the likely source of the contamination. The PCE contamination threatened hundreds of area wells that pumped water from the aquifer. Working with Portland, OR-based Backflow Management, Inc., the mobile home park owners investigated several long-term options, including:

- Installing an air stripper to control PCE in water pumped by the park's two wells.
- Drilling a new well.
- Connecting to the city of Centralia's water system about five miles away.

They chose to connect to the Centralia water system. Before that could happen, however, the state health department had to approve the design and construction of a new distribution system for the park. Nor could the park just hook up to the Centralia system and buy water from it. The health department required that Centralia own and maintain the new system. This was consistent with the health department's policy of promoting the annexation of small systems by larger ones whenever possible. Local ordinance prevented Centralia from extending water service beyond the city's boundaries, so Centralia had to annex the mobile home park. The park could not hook up with city water without also hooking up to the city sewer, so new sewer lines also were laid to serve the park, which previously had been served by a septic system.

Construction was completed in September 1994. Total costs exceeded $640,000. A portion of the costs will be covered by a loan to Centralia from the state-funded Public Trust Fund. Because 81 percent of park households have low-to-moderate incomes, a state Community Development Block Grant also provided loan funds. The park's owners will repay the loans.

The mobile home park's residents will keep their homes and will have an adequate supply of safe drinking water. Their bills will be about $35 per month for both water and sewer; previously water service had been included in their rental fee. Centralia has increased its tax base and gained a low-income housing community served by new water and sewage systems and a new city well.

## East Prospect Water Authority; East Prospect, Pennsylvania: Ownership Transfer Is Economical Solution to Supply, Quality Problems

*Concerned about water supplies and increasing operating costs, town officials in East Prospect, Pennsylvania opted to sell their drinking water system to a nearby water company. The company had already acquired three small systems that were faced with rising operating costs.*

When the developer of a 60-home subdivision half in and half out of the town of East Prospect drilled a well to serve the homes, he became concerned about the quality of the water. This raised concerns among East Prospect officials, who were facing water problems of their own. The East Prospect Water Authority's operating costs were increasing, and a recent drought had raised concerns about the quantity of water available in town. An engineering feasibility study speculated that the town's three springs and two wells, located within 200 feet of a river, were ground water under the direct influence of surface water and so would require the construction of a treatment plant under the Surface Water Treatment Rule (SWTR).

Faced with mounting compliance costs, East Prospect officials examined their options. The potential water quality problems with the developer's well ruled out tapping the aquifer beneath the town. So, the officials decided to opt for the most economical alternative available and transferred ownership of their system to The York Water Company, whose transmission main was 12,000 feet away.

The restructuring will be completed in 1995. Although water rates in East Prospect are expected to increase from their pre-restructuring level of $160 annually, they would have doubled or tripled had the town attempted to solve its drinking water problems on its own. Pre-restructuring customers of the York Water Company are not expected to see their $240 annual cost increase significantly.

By the end of 1995, The York Water Company will have connected with water systems serving three small Pennsylvania communities that petitioned to be taken over in 1993. Concern about rising operating costs led the systems to petition for the takeovers. The York Water Company has added the private system serving Saginaw (60 connections) and the municipally owned systems serving East Prospect and Seven Valleys (200 and 180 customers, respectively). York replaced the small systems' water sources and ran 6,000 feet of pipe to serve Saginaw, 12,000 feet to serve East Prospect, and another 12,000 feet to serve Seven Valleys. The physical connections were completed by late 1995. The Pennsylvania Department of Environmental Resources and Public Utility Commission helped remove regulatory hurdles York faced in taking over the private system in Saginaw.

The added customers will give York a greater customer base over which to spread its own increasing operating costs. The company currently has a 30 million-gallons-per-day surface water treatment plant with storage and distribution systems. It charges $36.74 per 10,000 gallons of water; the average annuai bill is about $240. That compares favorably with the Pennsylvania-wide average residential water bill of $200 to $300.

## Greenacres Water Supply; North Canaan, Connecticut: State-Facilitated Takeover Improves Quality of Water Service

*When the owners of a very small, troubled system decided to quit the water business, Connecticut's takeover statute helped facilitate a fair and orderly ownership transfer.*

Although ordered by the Connecticut Department of Health Services (DOHS) to make a variety of improvements, the owners of Greenacres Water Supply determined they couldn't afford the $191,000 required to upgrade their 115-connection system. Instead, they notified DOHS that they wanted to quit the water business altogether.

DOHS asked the state Department of Utility Control (DPUC) to hold a hearing on the matter. During the hearing, two water systems expressed interest in purchasing Greenacres Water Supply and operating it as a satellite system. Later, Greenacres' owners agreed to sell the system to the Tyler Lake Water Company for $10,000, but the DPUC consumer counsel opposed the price as excessive. After examining Greenacres' financial records and considering the improvements that the system required, DOHS and DPUC determined (1) that $617 was a more reasonable price and (2) the Bridgeport Hydraulic Company (BHC) was the "more suitable entity" to own and operate Greenacres. (Bridgeport Hydraulic already operated the North Canaan water system, and its water mains ran within 4,000 feet of Greenacres Water Supply.)

Ownership of Greenacres was transferred in 1988. The drinking water system that BHC purchased had three wells, one spring, a 6,300-gallon and a 2,500-gallon atmospheric water tank, and a 5,000-gallon pressure tank. The distribution system consisted of 11,583 feet of 1- and 2-inch galvanized, plastic, and copper pipe. None of the 107 residential, 1 commercial, or 7 industrial customers were metered. There was no fire protection.

The state ordered BHC to spread the cost of system improvements across its base of 96,000 customers to reduce the financial burden on Greenacres' customers. DOHS and DPUC also ruled that Greenacres' customers would be billed at their old rate until all the residences were metered. Then BHC could bill them at the same rate as its other customers in the area. BHC was given a schedule for improving the Greenacres system. It also was required to submit certain financial information to the DPUC and to notify Greenacres' customers of the acquisition.

This ownership transfer was facilitated by Connecticut's takeover statute, which empowers the state to promote system acquisitions as a way of correcting the problems of troubled systems.

# Multifaceted Restructuring

This manual presents a spectrum of restructuring options from which drinking water systems can choose. In many cases, however, drinking water systems may need to implement more than one type of restructuring option at a time. We call such actions **multifaceted restructuring.**

Multifaceted restructuring can involve the implementation of more than one option within a single category. For example, a system may decide to hire a certified operator and drill a new well. Both actions are examples of internal changes. Or, a system may opt for restructuring options from more than one category. It may decide, for example, to make internal changes and contract for outside operations and maintenance services.

The systems whose stories are presented in this section have all adopted multifaceted restructuring. By matching the restructuring options available to them with the problems they faced, they have derived effective solutions. By thinking creatively about restructuring, these systems have improved the quality of their service, and in many cases have been able to expand water service into new areas.

Necessity is the mother of invention, according to the old saying. Necessity can also be the catalyst to restructuring. And creativity, along with an openness and a willingness to change, can lead to multifaceted restructuring to address complex problems.

# Multifaceted Restructuring

## Community Water System; Higden, Arkansas: Providing Wholesale Water and Technical Services Helps Small Systems

***When buying good quality water at wholesale prices became the most economic alternative they had to meet their customers' need for safe drinking water, more than a half dozen rural systems elected to do just that, and a half dozen more are waiting in line. Now, their supplier sells administrative and technical services, as well as water.***

Built to serve an area of northern Arkansas that lacked drinking water service, Community Water System, located on Greers Ferry Lake in Higden, Arkansas, originally served 1,500 customers in 1972. CWS now serves 4,100 retail customers and is expanding its services to sell wholesale water and provide contract administrative and technical services to over a half dozen rural water systems in northern Arkansas.

CWS has been fortunate to have Greers Ferry Lake, an abundant source of quality raw water. Northern Arkansas lacks an abundance of groundwater, and the systems served by CWS benefit from the lake's abundant source of quality drinking water.

Much of Community Water System's original service area in Cleburn County included recreational areas that saw considerable seasonal use. Eventually, the board of directors decided to expand in an effort to improve the system's economies of scale. In 1986, CWS began selling wholesale water to the City of Shirley, Arkansas, a system with approximately 300 meters, expanding the CWS's service area to 85 square miles in two counties. Since 1992, CWS has performed several extensions to the system, ranging in size from 3 miles of pipe to serve 21 new customers; all the way to 86 miles of pipe to serve 600 new customers.

Construction began in March 1995 to add seven wholesale customers. CWS took the lead role as Project Developer, providing direct interaction with the engineering and legal services and arranging for financing of the project. The system is currently working with a second group of nine rural communities seeking to secure a safe and reliable source of drinking water. The second group has already contracted with CWS for administrative and technical services.

The ability to monitor all the critical elements involved in providing water on a wholesale basis from one site is key to their success. The system's expansion into these activities has had little impact on the retail customers of its base system. The rate they pay for 4,000 gallons per month is $22.70, and this rate is not expected to increase. The impact on the other system's retail rates varies according to their indebtedness and operating costs, but the wholesale water rate is the same for each system. The incentive for all the systems to become involved in CWS projects is based on a need for a long-term, stable supply of quality water at a reasonable price. Simply put, buying good quality water at wholesale was cheaper than the other options they had to meet their customer's needs for safe drinking water.

## North Lakeport-County Service District #21; Lakeport, California: Private-to-Public Restructuring Leads to Reliable, Affordable Service

***A series of ownership transfers and the creation of a county service district have consolidated more than four dozen drinking water systems into one, improving service to existing customers and making additional development possible.***

Ownership transfers and the formation of a county service district brought together 51 small drinking water systems in this county north of San Francisco. (California defines a small system as one with fewer than 200 service connections.) Now the customers of these once-independent systems in subdivisions, mobile home parks, and resorts enjoy safe, reliable drinking water—and new development has been made possible by the availability of adequate drinking water.

Prior to 1981, most small systems in Lake County provided little or no treatment of their water, and this led to numerous violations of drinking water regulations. State and county records indicate that 80 percent of the systems had violated regulations requiring them to sample regularly and limit turbidity and coliforms; systems served by wells often violated limits on arsenic and barium, or had high levels of iron, manganese, and dissolved solids. Water shortages occurred, and development in many areas had stopped because of a lack of water.

In 1984 and again in 1986, California voters approved the Safe Drinking Water Bond Laws, which provided $150 million in low-interest loans and grants for water system construction to correct public health problems. The California Department of Health Services identified North Lakeport as a possible candidate for a regional water system and invited the County Special District Office to apply for funding. The county hired an engineering firm to prepare a feasibility study, which in June 1985 recommended formation of a regional system. That system would be composed of the existing small drinking water systems, individual homes served by poor-quality water, the Lakeside Community Hospital, the county juvenile detention center, four new residential developments, and the county's planned minimum-security jail for 500 prisoners. The total project cost was $10.4 million.

Using the results of the engineering study, the county completed its application; the state committed to providing $5 million in low-interest loans and a $400,000 grant. The county formed an assessment district to raise the additional $5 million the project required. Several meetings were held at which the county health department stressed that the small systems would have to make significant, and costly, improvements to comply with drinking water regulations and provide water of adequate quality. Voters were convinced that forming the district was the least costly solution, and in October 1989 they voted to do just that. The $5 million loan from the state is paid out of water user charges. The bonds sold by the county are being paid back through the assessment district.

Construction of the new regional system began in January 1990. The project was expected to add $10-$12 to the monthly water bill charged to each service connection. In 1994, the regional system's base rate was $11.91 per month, plus $0.64 per 100 cubic feet of water used.

## Warren Rural Electric Cooperative; Bowling Green, Kentucky: Repeated Restructurings Expand Water Service Throughout Region

***In the 30 years since it helped start its first drinking water system, this rural electric cooperative has repeatedly restructured and now provides a full range of services to rural water districts in four western Kentucky counties.***

Providing quality drinking water in rural areas poses many problems. Systems in the rural Kentucky counties served by the Warren Rural Electrical Cooperative (REC) found their lack of operational expertise and economies of scale to be particularly troublesome. Restructuring is a powerful tool for addressing these problems, however, and Warren REC is a good example of how a variety of restructuring tools can be used to good effect.

Warren REC helped start its first drinking water system in 1964. The system had 60 connections, and Warren REC helped operate it after it was up and running. Thirty years later, Warren REC provides a full range of services to the rural water districts of Warren, Butler, Grayson, and Simpson counties, which collectively have more than 23,000 connections. The cooperative performs operations and maintenance tasks, management and administration duties such as billing and contracting, and planning and engineering functions. The four-county area served by the REC stretches almost 70 miles from the Tennessee state line north almost to Elizabethtown, KY.

Typical of Warren REC's projects is 1994's $2 million expansion to bring water service to 550 homes in the Grayson County Water District. Warren REC provided the planning and engineering expertise, arranged for financing, and will continue to operate the expanded system.

Warren REC intends to add the capability to monitor from a central location the drinking water operations for which it is responsible. The cooperative plans to purchase a Supervisory Control and Data Acquisition (SCADA) system to permit remote monitoring of systems throughout its four-county coverage area.

Water rates are set for each county water district. In Warren County, which has the most connections (15,000), the average customer pays $15.25 per month; customers located in less densely populated areas pay about $24 per month.

## Pioneer Electric Cooperative; Greenville, Alabama: Creative Restructuring Helps Bring Community Water to Rural Areas

***In an effort to bring community water to rural parts of southern Alabama, Pioneer Electric Cooperative has aided the creation of county water authorities and, along with existing water systems, provides management, administration, operation, and maintenance services.***

In 1975 Pioneer Electric Cooperative (PEC), headquartered in the southern Alabama community of Greenville, began working to bring community water to rural areas of Butler County unserved by water systems. Since then, PEC has spearheaded a number of projects to expand community water service in this part of the state.

PEC helped in the creation of the Butler County Water Authority (BCWA) in 1975. Initially, the BCWA had 1,200 customers. An additional 2,100 have been added with the assistance of three loans and grants from the Farmers Home Administration and the Community Development Block Grant Program. Half of the BCWA's 3,300 customers get their electric power from PEC.

The South Dallas Water Authority (SDWA) was also organized with the help of the PEC. Funding was approved in 1988, and 1,200 customers were connected to the system during the project's first phase. The second phase, which is pending, will add another 200 customers to the system.

PEC also manages existing systems owned by the West Dallas and the Lowndes County Water Authorities. A project is underway that will add 500 connections to West Dallas' current 345. Lowndes County has 985 connections. In addition, PEC continues to explore options to provide water, O&M services, and other forms of support to systems in need of help.

Each Water Authority has a board, but no staff. PEC performs all management, administration, operation, and maintenance tasks. All the systems it runs use ground water, and they all have chlorination, pumping, and storage facilities. PEC is also responsible for more than 900 miles of pipe. BCWA has 570 miles, Lowndes has 185, SDWA has 156, and West Dallas has 33 miles of pipe.

PEC's goal is to serve all the homes in its counties with water. In Butler County (population 22,000) all but 300 homes are now served, and a project is in place to serve 125 of them. To help meet its goal, PEC plans to have its entire system on a Supervisory Control and Data Acquisition (SCADA) system, which will enable PEC to monitor system operations from a remote location. All of the BCWA is currently on SCADA, and South Dallas will be going on-line soon.

Minimum water rates for 2,000 gallons are as follows: Butler, $10.50; Lowndes, $12.00; South Dallas, $12.50; and West Dallas, $13.00.

## Roaring Creek Water Company; Shamokin, Pennsylvania: Need for Expanded Customer Base Drives Multifaceted Restructuring

***The need for a larger customer base over which to spread the cost of a new treatment plant for two small, recently acquired drinking water systems prompted this case of multifaceted restructuring in Pennsylvania.***

Although the consolidation of water systems most typically occurs locally, some private water companies are recognizing business opportunities on a regional basis. In the case of Consumers Water Company of Portland, Maine, that region can extend as far away as the eastern Pennsylvania town of Shamokin.

In 1986, Consumers Water Company (CWC) purchased the 11,000-customer Roaring Creek Water Company in the Northumberland County town of Shamokin. At the time, Roaring Creek's dams needed repairs and the surface water used by the system required filtration. To reduce the per-connection cost of treatment plant construction, CWC decided to expand Roaring Creek's customer base by acquisition.

Two nearby small water systems, Butler and Treverton, were already connected to Roaring Creek as standby or emergency sources. Both systems had problems of their own, however. Relying on untreated surface water, Butler (800+ connections) was plagued by turbidity problems. Treverton's well didn't provide enough water for the system's 400 connections. Both systems suffered from lack of investment, which had led to O&M problems. Despite these problems, Roaring Creek Water Company purchased the Butler and Treverton systems in 1992. They and the other systems operated by Roaring Creek will be served by surface water and the new $10 million, 8 million-gallons-per-day treatment plant went on line June 6, 1995.

The purchase of the Butler and Treverton water systems resulted in lower water rates for their customers, and more than $100,000 in capital investments by Roaring Creek Water Company. Roaring Creek's system-wide water rate at the time of the acquisition was $42 per quarter; Butler and Treverton customers paid about $50 per quarter. A rate increase to cover the cost of the new treatment plant was approved, and went into effect on June 6, 1995. The Roaring Creek Water Company currently serves some 18,000 customers in 15 Pennsylvania communities spread over three counties. Most recently, the Roaring Creek Water Company purchased the two consecutive water systems serving Mount Carmel and Ralpho Township. (Consecutive systems buy water from another water company and then sell the water to their customers.) Its parent company, CWC, owns and operates 10 water utilities in 6 states which provide service to more than 216,000 customers.

## Consumers New Hampshire Water Company; Londonderry, New Hampshire: Multifaceted Restructuring Addresses Needs of 12+ Small Systems

***More than a dozen developer-built small systems have undergone multifaceted restructuring to address a variety of problems encompassing water quality, distribution, and O&M.***

The Policy Water Company was composed of 14 systems built by developers in southern New Hampshire. These systems were built when there were no state or local design criteria, no construction inspection, and no operational oversight. A developer typically "bid-off" one pump company against another to obtain the least cost system. These developers gave these systems to Policy once they realized the systems were liabilities rather than assets. Together, the systems served about 960 customers; the smallest system had 14 connections, the largest had about 220. These poorly maintained systems had numerous problems, including problems with distribution and O&M.

In the mid-1980s, the Southern New Hampshire Water Company (now Consumers New Hampshire Water Company) purchased these 14 systems for the purpose of obtaining a water utility franchise in the community and set about upgrading them. Six years later, almost all the regulatory deficiencies have been eliminated, and the company is in the process of interconnecting the systems, whose connections now total more than 1,000.

The customers of all 14 of the systems are now charged a minimum of $13.14 per month. The systems are all within a 25-mile radius (1 hour one way) of Londonderry, New Hampshire. They are operated as satellite systems.

Consumers New Hampshire Water Company is a subsidiary of Consumers Water Company in Portland, Maine. (See the case study on the Roaring Creek Water Company for more information about Consumers Water Company.) Consumers New Hampshire Water Company owns and operates 20 non-interconnected satellite systems within 11 towns which, when combined, total 37 wells and 339,000 gallons of storage. Its core service area is composed of the communities of Hudson and Litchfield. It serves a total of approximately 5,000 customers, most of them residential users. Three wells currently provide source water for the core Consumers New Hampshire Water Company system, and purchase agreements with the water systems serving the communities of Derry and Manchester, and with the Pennichuck Water Works, supply additional water. Although the customers of these systems benefitted from this purchase by improved water service, they pay almost the highest rates of any system in New Hampshire.

## *Lonaconing, Maryland: Internal Changes, Contract O&M, Ownership Transfers Ensure Safe Water*

***A restructuring first envisioned more than 70 years earlier finally became reality by 1994 when, through a series of restructurings, a regional water system was developed in Maryland's Upper Georges Creek watershed.***

In the late 1980s, the Allegany County towns of Nikep-Moscow and Barton were plagued by problems with water quality and quantity. The nearby community of Lonaconing had a water system that had three surface reservoirs, but provided no treatment other than disinfection. State action to require the treatment of surface water supplies served as a catalyst to restructuring involving internal changes, contract O&M, and ownership transfers.

As a result of a series of projects from 1988 to 1994, Lonaconing became a regional water system serving the Lower Georges Creek area encompassing Lonaconing (1,134 connections), Nikep-Moscow (135 connections), and Barton (345 connections). Projects in 1988 extended Lonaconing's system to both towns and to an additional 31 homes in an area outside Barton known as Meadows. A follow-on project in 1993 and 1994 provided treatment for each of the three water sources serving the regional system and increased the system's storage capacity. Lacking a certified operator to run and maintain the new filtration plants, Lonaconing contracted out for those services.

The Maryland Department of the Environment was instrumental in encouraging this regional solution to the drinking water problems along Georges Creek. The state provided $1.826 million in grant funds for the projects. The Farmers Home Administration provided a $2.371 million grant and $2.48 million loan. The system improvements cost $6.8 million.

Quarterly water rates in Lonaconing were a minimum of $22 and an average of $41 before the project; after the project, rates will double to a minimum of $44 and an average of $82 per quarter.

he restructuring on the Upper Georges Creek watershed was first described more than 70 years o by state sanitary engineer Robert B. Morse and his assistant, Abel Wolman. In the first gineering bulletin published by the Maryland State Department of Health, they wrote:

> The efforts of the State Department of Health are not being confined to individual towns, but are being extended to encouraging the establishment of water and sewerage districts consisting of favorably located communities or of larger towns and their unincorporated suburbs. In the latter case the extension of municipal systems into sections which have not been able to obtain improvements under county government is rendered feasible. *Progress is now being made towards the formation of a water and sewerage district in the Georges Creek region, where within a comparatively small area there are communities with an aggregate population of over 30,000 which now have inadequate facilities.* [Emphasis added.]

## Derry Waterworks; Derry, New Hampshire: Municipal Ownership of New Systems Prompts Multifaceted Restructuring

***When officials of the New Hampshire town of Derry decided that all new drinking water systems in their community should be municipally owned and operated, they set in motion a multifaceted restructuring involving internal changes, contracts, and ownership transfers.***

Located near the Massachusetts state line, the town of Derry, NH, is a bedroom community for the metro-Boston area. The town experienced phenomenal growth during the 1960s, 70s, and 80s. Numerous housing developments were constructed. Since developers were not required to tie in to the municipal water system, by 1985 there were approximately 35 very small public water systems constructed by developers in the immediate vicinity of the municipal service area.

During the 1980s, citizens complained more and more about these developer systems. Their grievances included water rates, alleged poor responsiveness of state regulators, wells going dry, system disrepair, and poor responsiveness on the part of system owners. These complaints made an impression on local elected officials.

The town had been experimenting with "contract ops" of its municipal water distribution system from 1986 to 1990. Near the end of that period, the public works management team made a crucial decision that Derry's long-term interests were best served by having town employees operate the entire municipal water system. This in turn led to authorization of a master plan for the water system. In preparing the master plan, the town was forced to answer certain conceptual questions concerning whether new systems would be allowed and what would be the operational nature of the existing systems in the future.

Also in 1990, the town-owned Derry Waterworks bought three systems. Since then developers have turned another three systems over to the town. Four systems are operated as small satellite systems by the Derry Waterworks. Each satellite system has its own well(s), storage facilities, and distribution system. (The other two systems are now connected to the core system.) The waterworks also operates a core system of 3,600 connections serving the downtown area. It buys water from the nearby city of Manchester.

In 1992, Derry Waterworks terminated its O&M contract because managers felt they could do the job cheaper, and without the contract they would have better control of the system.

Thirty small drinking water systems in Derry remain privately owned. The city's goal is to own them as well, then physically connect the systems with Derry's where it makes technical and economic sense to do so.

The Derry Waterworks also wants to have all its systems charge the same rate for water. Currently, customers served by the core system pay $12.36 per quarter for their first 500 cubic feet of water and $1.73 for each 100 cubic feet after that. Customers of the satellite systems now pay the same rate.

## Homestead Municipal Utility District, El Paso, Texas: Internal Change Leads to Series of Restructurings

***Obtaining professional management was the key to the internal restructuring of two troubled Texas water systems. That successful restructuring has paved the way for at least 10 privately owned systems to be restructured into public ones that will be acquired by El Paso County and managed by the Homestead MUD.***

Developers built two of the Homestead Municipal Utility District's drinking water systems in the early 1980s. During that decade both systems were expanded and merged with little concern for water quantity or system integrity, and major problems resulted. In July 1992 the 822-connection system, which served only colonias, failed. (Colonias are economically disadvantaged, low-income minority communities that qualify for special programs in the state.) The state took Homestead MUD to court, and the resulting settlement prohibited additional connections to the system. The settlement also stipulated that Homestead MUD would undergo an audit by the Community Resource Group and would follow any recommendations resulting from that audit.

One recommendation was that Homestead MUD hire an outside manager who had no ties to the developers who built the systems that became Homestead MUD. Hiring an outside manager was key to the restructuring of this system. So long as the system was poorly managed, funding agencies and regulators were reluctant to work with the system to correct its problems. With a qualified manager on board, however, they were more willing to act as partners in the system's restructuring.

The new manager had his hands full. His system was in terrible shape; the state's list of required improvements ran to 29 items. Debt-ridden and incapable of meeting secondary water quality standards, the system also was plagued by insufficient well capacity, inadequate storage, and pumping and other problems. He set to work on getting control of the budget and reducing overhead. He paid the bills and obtained loans and grants from the Farmers Home Administration (FmHA) to pay off some of the debt, install elevated water storage, and fund other improvements.

Most of the water system's problems, except the distribution network, had been dealt with by late 1994. The moratorium on new connections will remain in place until the El Paso Public Service Board runs a 24-inch pipe 7 miles to bring water to Homestead at a cost of $6 million. The county plans to obtain $3.2 million from the Texas Water Development Board (90 percent grant funds, 10 percent loans) to replace the distribution system in Homestead's colonias. These state funds are available only to correct problems with water systems that serve colonias; the funds are not available to all water systems. The Texas Water Development Board, Texas Natural Resource Conservation Commission, and FmHA proposed that all the water systems in the area should be publicly held so they could qualify for loans to fund improvements. As a result, 15 privately owned drinking water systems and two colonias serving a total population in excess of 5,500 that lack water service in the Homestead area will be purchased by El Paso

County and operated under a contract by Homestead. Homestead also will buy water from the Service Board and sell it to these systems.

Although water bills as high as $100 a month were not uncommon in Homestead, current bills average 60 percent of what they were prior to 1993. Thanks to the financial support it has received, Homestead MUD has restructured internally to provide improved service and safe drinking water without huge increases in water rates.

## Rolesville, North Carolina: Flexibility Leads to Contract O&M, Purchased Water to Meet Local Needs

***Successful restructuring often requires flexibility. When contract O&M failed to do the trick for this North Carolina system, Rolesville turned to multifaceted restructuring.***

In 1987, the North Carolina town of Rolesville decided to contract out the operation and maintenance of its 250-connection system in order to improve the quality of service in the town. This turned out to be the town's first step in a series of restructurings in response to Rolesvilles' changing needs.

In its first restructuring, Rolesville contacted Crosby Water and Sewer Inc. in nearby Wake Forest to run the town's wells, operate the chemical treatment apparatus, collect monitoring samples and deliver them to the town's contract lab, and read and install water meters. Since 1987, Crosby Water and Sewer Service has closed several wells because of high monitoring costs relative to their yield. Crosby still maintains one well for Rolesville, but the town now buys finished water from Wake Forest. Rolesville handles its own billing.

Initially, contracting out for O&M was the more cost-effective than employing a certified operator to run the Rolesville system. As Crosby closed wells and reduced the scope of its services to Rolesville, the town's payments to Crosby also declined. In 1994, Rolesville paid Crosby $300 per month, which does not include the cost of purchased water from Wake Forest. The average water bill in Rolesville is $25 per month; the minimum monthly bill is $11.10 for 2,000 gallons of water.