

**RESTRUCTURING STRATEGIES FOR SMALL WATER  
SYSTEMS:  
VIRGINIA SMALL WATER SYSTEMS CO-OPERATIVE**

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## EXECUTIVE SUMMARY

The Safe Drinking Water Act Amendments of 1996 (SDWA) added Section 1420 to motivate states to improve the capacity of their small water systems. The objective is to increase compliance with the National Primary Drinking Water Standards as well as provide information and guidance to small water systems.

The goals of this study were to investigate various options for consolidation and restructuring of small water systems as a component of capacity development for small water systems in Virginia and propose a strategy for capacity development and restructuring of public small water systems in Virginia.

The report details the concept of capacity development, an overview of capacity development initiatives in several other states, and different approaches for consolidation and restructuring of small water systems by public and private sectors. Literature indicates that many of the small public water systems, especially those functioning as ancillary operations to other businesses, do not have the resources or the motivation to expand. Many small public water systems could benefit from revenue growth or cost cutting ventures available to larger water systems, but small systems do not have the access to capital or are limited by geographic location.

After careful consideration of the different approaches by public and private organizations, the needs and motivations of those interested in capacity development, and the available resources, we concluded that a new approach, i.e., the implementation of a co-operative operations and management for small water systems will be most suitable in Virginia. The co-operative as a body will decide and implement the most cost-effective operational, administrative, managerial, and technical options for its members. Co-operatives have been used in many industries, mainly in agriculture, to protect and improve on utilizing scarce resources and to guarantee returns to all interested parties based on the level of use. Much in the form of the agricultural co-ops, the water systems co-op is an attempt to pool the resources of many small water systems (small businesses) to reach their objectives.

This report discusses the concept of co-operatives, and presents a strategy to form a model Virginia Small Water Systems Co-Operative. The report details the co-op activities and responsibilities, co-op management, co-op administration, financial management, technical assistance, merits of the proposed water systems co-operative, and implementation and marketing strategy. The report concludes with a recommendation that the Virginia Department of Health (or a sub-contractor) take the lead and provide start up costs to initiate a demonstration project that will produce sufficient data and offer an incentive for many potential participants. Once a successful co-op is established in a selected region it would create an incentive for many other small water systems to form regional co-operatives. It is suggested that for long-term implementation, the Virginia Department of Health should make grants and loans to small water systems conditional on the basis of participation in a cooperative.

## **1. Introduction**

The Safe Drinking Water Act Amendments of 1996 (SDWA) recognized the value of small water systems for the welfare of the United States and added Section 1420 to motivate states to improve the capacity of their small water systems. States are to ensure the capacity of new water systems and develop strategies to assist the existing public water systems in acquiring and maintaining technical, managerial, and financial capacity. The goal is to increase compliance with the National Primary Drinking Water Standards, as well as provide information and guidance to water systems lacking these expertise. States that do not take action to improve the capacity of their public water systems risk losing allotments from the state revolving loan fund, as set by the SDWA (7). States are to implement programs that empower legal authorities or other means to ensure consistent water delivery that meets or exceeds national drinking water standards.

Several public and government organizations across the nation have devised strategies to address capacity development of small water systems. These include mandatory water system planning, satellite management agreements, additional water supply permit requirements, and other statutory control arrangements. Each of the developed plans has varying levels of state involvement, ranging from active participation to basic monitoring by appointed agencies. Each plan has a unique approach to the problems of small water system, and each has strengths and weaknesses. These solutions present a solid ground to begin the discussion of capacity development in Virginia.

Private participants in the water industry, including private and publicly traded businesses, have been changing their operational and managerial approaches to the water utility industry. Large water suppliers have been buying smaller systems at an accelerating rate. The free market approach and corporate efficiency appear to increase the profitability of water systems. Consolidating water systems reduces overhead costs and allows companies to distribute technical, managerial, and financial costs over larger customer bases. Buy/Sell and Operations and Management contracts are increasing as water suppliers recognize the opportunities available with outside contracting. The private sector is constantly evolving, and with it, new opportunities develop for capacity development.

This report addresses the need for capacity development for small water systems in Virginia. Capacity development of small water systems is important to all citizens of the Commonwealth, whether they receive water from a large or small water supplier. In the absence of programs that develop public water system capacity, Virginia will lose up to 20% of the state revolving loan and grant funding offered by the federal government. Innovative plans for capacity development are necessary to ensure the returns that the state needs to build and restore public water systems in the state.

A hybrid organization may be created that can address the needs of all interested parties by integrating the ideas generated by public and private organizations. This report discusses capacity planning and development by public organizations, as well as managerial and operational techniques used by private organizations. The report then

proposes and details co-operative operations and management that could solve many of the capacity development needs for Virginia.

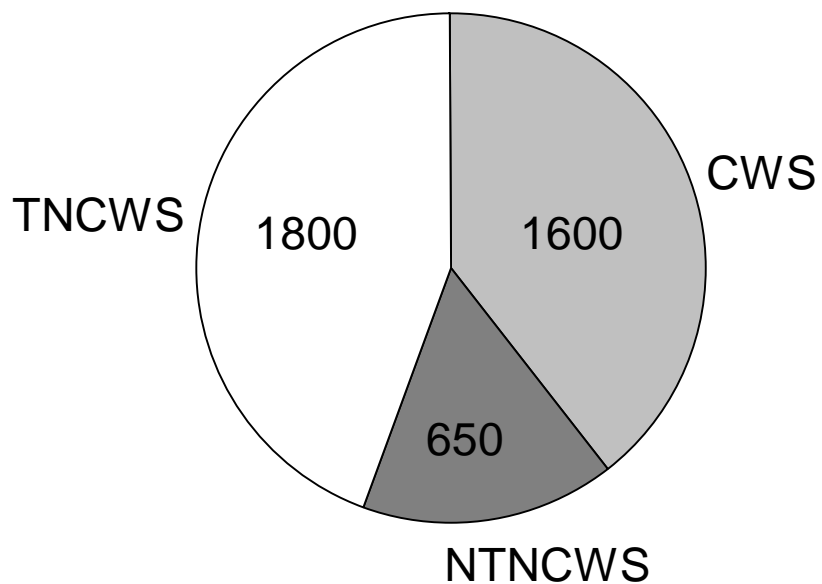
## **2. Background**

The water supply industry has developed out of the necessity of water for life, business, and recreation. Humans need water to survive. This is a simple statement, but it is the driving force behind the evolution of the water supply industry. Water is needed for drinking, cooking, washing, sewerage, heating, and agriculture. Water is needed to operate businesses, institutions, and recreational areas to ensure proper hydration and hygiene. Water supply organizations emerge wherever there are demands that can support the high fixed cost of creating a water supply.

### **2.1 Public Water System**

Public water supply systems (PWS) are defined as water systems serving 15 connections or 25 users for 60 days of the year. Public water systems may be broken down into three main categories; community water systems (CWS); non-transient, non-community water systems (NTNCWS); and transient non-community water systems (TNCWS). The CWS serve residents year round, such as residential communities, businesses, or institutions. The NTNCWS serve the public at least 6 months out of the year, such as schools, factories, and industrial parks. The TNCWS serve water to more than 25 people or 15 connections for more than 60 days but less than 6 months. These classifications may be stated another way; CWS provide water year round, NTNCWS provide water more than 6 months but not all year, and TNCWS provide water more than 60 days, and less than 6 months (reference). Figure 1 shows the breakdown of PWS in Virginia.

The PWS can also be categorized by size. This report addresses the capacity development for small PWS (SPWS), which are defined as water systems serving fewer than 3,300 persons. In Virginia, Small Public Water Systems account for 90.2% of water suppliers, or 1400 CWS's. For the purposes of this report, large CWS's (LCWS) will be defined as CWS's serving more than 3,300 users. The major difference between the large water systems and small water systems, other than size, is that approximately 70% of SPWS's are investor owned in contrast with approximately 7% of LCWS's (6). The SPWS's are an integral part of the water supply in Virginia. Although these systems serve a minority of the citizens of Virginia, development of these systems is necessary to preserve federal funding, and more importantly, to ensure safe water delivery to citizens in the rural areas of Virginia.



**Figure 1. Categories of Public Water Systems in Virginia**  
Reference (6)

CWS: Community Water Systems

TNCWS: Transient Non-Community Water Systems

NTNCWS: Non-Transient, Non-Community Water Systems



## 2.2 Capacity Development

Capacity development is the main concern of this report, and thus, shall be defined in terms of the Safe Drinking Water Act (SDWA). Water system capacity is the capability of a water system to plan, construct, operate, maintain, and manage a water system that is compliant with drinking water standards set forth by state and federal regulators and has sufficient resources to maintain these capabilities for the life of the water supply. Capacity development can be categorized into three generalized areas: technical, managerial, and financial capacity. These three areas comprise the basic capacity development elements addressed in the SDWA. States need to educate water systems about these capacities, and advise and aid small water systems in developing these capacities to secure state funding and guarantee long-term operation. An in depth discussion of each area is given below.

*Technical capacity* refers to the ability of a water system to construct, operate, and maintain a water plant and delivery system that meets regulated standards (5). This capacity relates to a water supplier's knowledge of the system infrastructure, water source, water treatment, and necessary testing and reporting procedures to ensure compliance with the regulations. Beyond this, owners and operators must exhibit the ability to plan and implement projects that will secure the future water system operations. Technical capacity encompasses all activities that relate to the success of plant operations, and proper capacity development is necessary for long-term feasibility.

*Managerial capacity* encompasses a water supplier's accountability for the water system, as well as the system's ability to communicate with employees, customers, and regulators (5). System management, and/or owners, must clearly understand their accountability for system non-compliance and capacity development. The managerial capacity includes employee relations, proper licensure and education of employees, and staffing for future demand. It also includes appropriate customer relations including meeting customer needs, regular reporting on operations, and reasonable billing for services. Water system management must also confer with regulators and develop relationships to stay current with new regulations and maintain regulator confidence. Water system management must be the liaison between customer, employee, and regulator, and this capacity is vital to the welfare of the system.

*Financial capacity* refers to the ability of a water supply to control its financial concerns, including revenue sufficiency, access to capital for improvement or expansion, and fiscal management (5). Revenue sufficiency is based on the concept of matching cash flows, where revenues generated from operations should be equal to or greater than the costs of producing and distributing water. Water suppliers must be able to cover costs or risk jeopardizing long-term operations. Access to capital is imperative for system improvements in the volatile regulatory environment. A water system that does not have ready access to capital for improvements will suffer if unable to comply with changing regulations. Fiscal management encompasses all internal accounting controls, financial forecasting, planning, and billing. Appropriate financial systems and procedures will

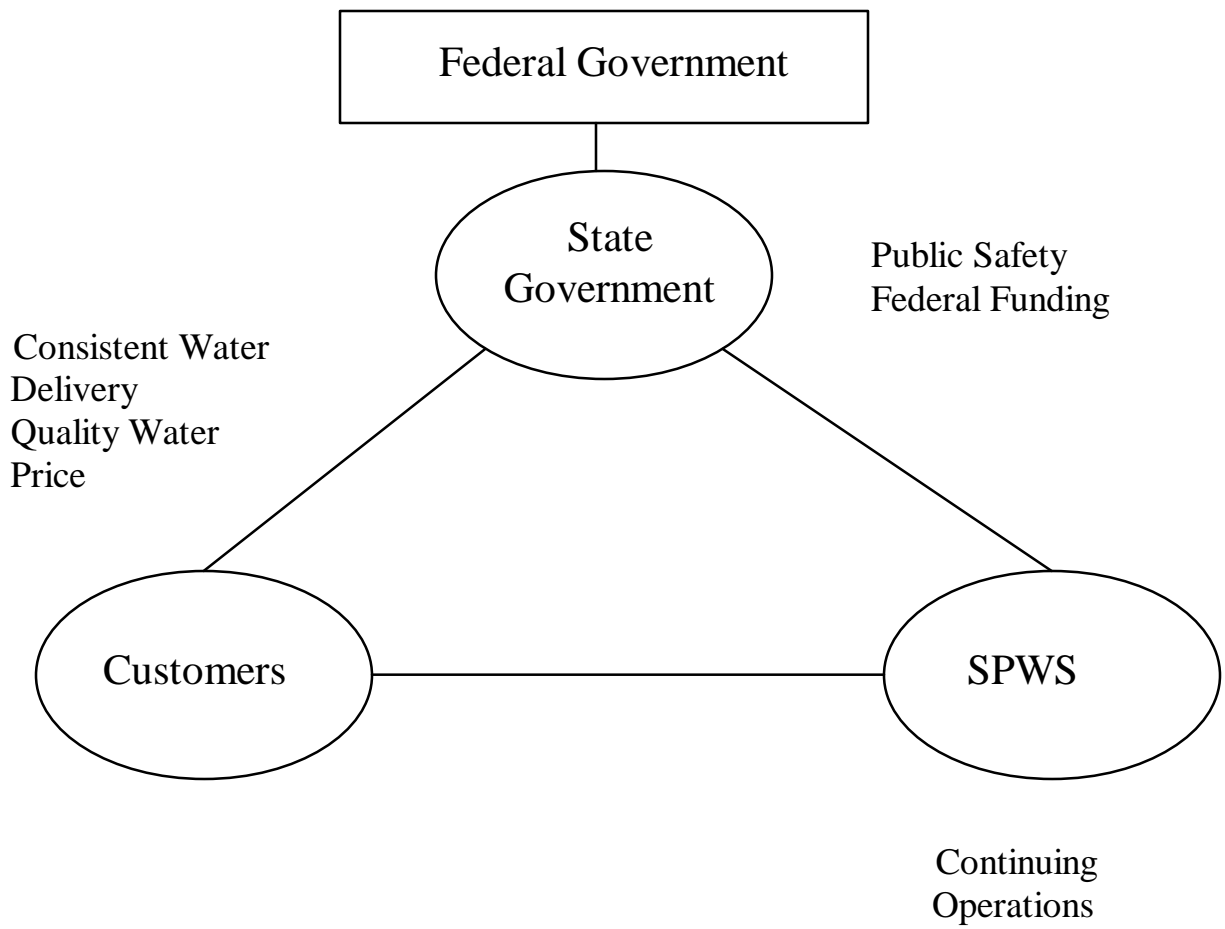
enable water systems to operate effectively and limit inefficiencies in managerial and technical capacities. Financial capacity development is necessary to ensure that water systems remain solvent, to logically control and plan capital and asset placement, and to have ready access to the capital resources necessary to continue operations that meet regulated standards.

### **2.3 Problem Statement**

The problem to be addressed is the development of a strategy that will increase the capacity of the SPWS. This report addresses the issue from a managerial structure approach and addresses the type of structure that would optimize water system capacity in Virginia. The SPWS model shown in Figure 2 graphically illustrates the problem at hand. The three main participants, depicted in Figure 2, are customers, SPWS, and the state government. Each participant is made up of many different members and organizations, but this model can be used to simplify the visualization. A brief description of objectives and motivations of each participant is listed in the model, and will be expanded in this discussion.

Customers are, for the most part, citizens of Virginia. Their demand is simple: safe and consistent delivery of water. When individuals go to a public restroom, tap, or water fountain, they expect the water to flow and the water to be safe to drink. In their homes they expect the same. This consistently delivered safe water is also expected at a reasonable price. Beyond the expectation of inexpensive, consistently delivered, safe water, the citizens desire the access to the testing records and violation history of their water supplier. This information increases their knowledge of the water they are drinking and any problems with their system. Inexpensive, consistently delivered, safe drinking water, with testing reports to insure the safety of the delivered water, is demanded by the citizens of Virginia. The Consumer Confidence Reports provided by the water systems address some of these issues.

Water suppliers strive to produce and deliver safe water, to meet all water safety and reporting regulations, and to continue operations. However, many water systems need to develop their technical, financial, and managerial capacities to achieve these goals. Water systems, especially SPWS's, serve many purposes, and thus, have evolved with many different objectives and management structures. Public restrooms and water fountains serve citizens away from their homes, as do many businesses. Trailer parks and other residential communities have water systems that provide water to citizens year round. A majority of these systems are privately owned. There are many opportunities available to the publicly and privately owned water systems, but there appears to be apprehension in the management of these systems when capacity planning is considered.



**Figure 2. Conceptual Small Public Water Systems Model**

Consolidation of physical and administrative facilities to increase managerial and technical capabilities is one way to help small water systems develop capacity. However, the results of a recent survey by the Virginia Water Resources Research Center at Virginia Tech indicate that small public water systems are hesitant to relinquish control over their resources (8). About 49% of the respondents answered that they would not be interested in consolidating physical facilities with other systems, while 28% indicated they would be interested. About 50% of the respondents indicated that they would not consolidate management with other systems, while 22% indicated that they would be interested. Many of these water systems need to improve their technical, managerial, and financial capacities to continue operations. A new strategy must address apprehensions toward consolidation and develop solutions to aid small public water systems to optimize capacities.

The state government must ensure safe water for the citizens of Virginia by working as an agent for the federal government to promote the SDWA and National Primary Drinking Water Regulations. Section 119 of the Safe Drinking Water Act Amendments, amending Section 1419 and 1420 of the SDWA, which expands on the state's responsibilities and penalties for non-compliance is documented in Appendix 2. If the state does not obtain "legal authority or other means" to ensure that new water systems have the necessary capacities, or "develop and implement a strategy to assist (existing) public water systems in acquiring and maintaining" the necessary capacities, they forfeit a percentage of the allotment they are entitled to receive through state loan funds. The state must develop means to ensure that new and existing water systems achieve the necessary capacity, or suffer real financial losses that will limit further investment in water system infrastructure. The new strategy must allow the state to take an active role in the development of SPWS capacity and establish "legal authority or other means" to control SPWS's and assist existing SPWS's.

The problem is simple. A strategy must be formulated that will foster the development of technical, managerial, and financial capacities for SPWS's in Virginia. The solution is not so simple. The new strategy must ensure that Virginians receive consistent, clean water, and are confident in its quality. The SPWS's must be motivated to buy into the new strategy, using the resources available to develop capacities. These systems appear hesitant to relinquish control over their resources, but, at the same time, must remain operational. The state, motivated by federal legislation, must increase control over new water systems, as well as aiding established water systems in acquiring and maintaining capacity. There are numerous possible solutions to this problem, many of which will be addressed in the next section. The question, "Is there a simple solution that will address all of the objectives, and fulfill all of the needs of all interest groups?," is addressed in this report.

### **3. Review of Capacity Development Programs**

State governments and private businesses are in the process of developing new strategies to increase the capacity of water systems. This report addresses government level programs as public, and business level approaches as private. Both public and private sectors are implementing programs to increase and/or optimally utilize water supply capacity. The strategies discussed are used to illustrate the approaches and key points of public and private strategies but are not all-inclusive restatements of project plans. The following section is intended to increase the understanding of capacity development strategies and set a foundation for further discussion of capacity development strategies.

#### **3.1 Public Sector**

States are developing programs to establish authority over new systems and to aid existing systems in acquiring and maintaining technical, managerial, and financial capacities. An EPA report entitled “Initial Summary of Current State Capacity Development Activities” details the efforts of nine states (4). Key points of the state programs aimed to increase PWS capacity development are summarized below.

The first chapter of the EPA report addresses programs aimed to limit developing new water systems. The states cited in this section were motivated to limit new construction of unnecessary water suppliers and increase the utilization of existing resources. These states approached the capacity development problem from differing viewpoints and created alternative solutions, each with considerable merit.

The state of Washington requires new PWS’s to submit Water Supply Plans. The plans are to detail the expected operations of the water supply for a 20-year planning horizon. PWS’s are expected to submit these plans every six years. Writing these plans forces water suppliers to examine their capacities and make necessary adjustments to improve capacity. Washington has also established regional Water System Plans that will attempt to utilize available capacity in any region before construction of a PWS. The regional authority prevents creation of redundant systems that cannot generate sufficient revenue streams. The third part of Washington’s water program is the Financial Viability Program. Water systems must submit a Financial Viability Test that examines the PWS’s budget, cash reserves, emergency reserve, and water rate affordability. By this, the state ensures that PWS’s have the financial capacity to continue operations. The last alteration to Washington’s water programs was the Satellite Management Program. A PWS may not be constructed unless it can prove its long-term capacities, or has arranged a Satellite Management Agency to own or operate the facility. An established water system must operate the water supply if the system does not have sufficient capacities.

Connecticut, much like its mentor, Washington, has developed systems to fully utilize SPWS’s. Prior to receiving a permit to build, the SPWS must obtain a Certificate of Public Convenience and Necessity. To obtain a certificate, an applicant must prove technical, managerial, and financial capacities to qualify. Once obtained, the certificate commits a SPWS to serve the community. If a new system is needed adjacent to an

existing certificate bearing SPWS, the existing system is obligated to offer services to the new applicant. The plan limits the construction of unprofitable water systems and forces the optimal utilization of existing capacities.

Pennsylvania has a plan similar to Washington that mandates new water systems to submit a business plan. The difference in this plan is that it emphasizes the investigation of alternatives. It is expected that many applicants will discover that connecting to an existing system would be more beneficial than creating a new one.

Alabama has taken a different approach. Alabama has made it financially infeasible to construct water systems for fewer than 500 users. High permit costs and stringent construction standards drive up the costs of new water systems, discouraging many “would be” water systems.

Maryland has developed programs that rely heavily on county governments to fully utilize existing capacities before the construction of new facilities. One interesting point of the Maryland plan is that new, privately owned water systems must establish three escrow accounts. The first account must contain sufficient funds to replace the most expensive component of the system, the second account must contain sufficient funds to ensure successful initial operations and maintenance, and the third must contain sufficient funds to replace the entire system 20 years after construction. The mandatory escrow accounts dramatically increase the costs of new system construction and force many developers to find alternative water sources.

Many states appear to have developed a business plan approach to new water systems, forcing new water systems to plan for the future. Beyond planning, many states mandate the establishment of accounts for future needs and emergencies. All of these plans increase the capacities of new water systems and aim to ensure safe water delivery to their citizens.

The second chapter of the EPA report documented state programs to ensure SPWS compliance with state and federal regulations and illustrated efforts to aid these systems in acquiring and maintaining technical, managerial, and financial capacities.

The state of Washington has applied all of its programs for new systems to existing water systems. Beyond the aforementioned Individual and Regional Water Plans, the Financial Viability Programs, and the Satellite Management Program, public water systems must develop an operating budget, create and operate a cash reserve equal to one-eighth its operating budget, and create and fund an emergency cash reserve equal to its most vulnerable system component. Beyond these requirements, each PWS must obtain an annual operating permit. These check points ensure that systems maintain their business plans and keep up with reporting requirements.

Connecticut and New Jersey have developed legislation to take over grossly non-compliant water systems. Both states allow the takeover of a water system by the most suitable public or private entity after public notice and hearing. In the New Jersey Act,

provisions are made to compensate the acquiring entity, as well as allowing for rate increases. The Connecticut law only allows the acquiring entity to recover losses through increased billing rates. Both states use the threat of takeover to motivate water suppliers to remain compliant.

Massachusetts mandates that each water system be evaluated every six years. If systems are not satisfactory, technical assistance is assigned until the system is deemed viable. The technical assistance is provided by non-profit organizations called Mobilization Partners. These organizations operate independent of the state. The Massachusetts approach limits the state's involvement yet ensures that the systems are feasible water suppliers.

The state's plans for capacity development of existing water suppliers discussed above address the need for a standard evaluation technique yet have varying consequences of non-compliance. Consequences of non-compliance range from mandatory assistance through an outside organization to forfeiture of the water system. Although each of these programs aims to achieve the same goal, which plan best benefits all interested parties?

## **3.2 Private Sector**

In recent years, the water industry has been going through dramatic changes. The low growth rates and constant revenues for water suppliers have incited a mad rush to increase revenues through expansion and to decrease costs through contract agreements that fully utilize capacities. The following discussion entails the efforts of some private companies to increase the capacities of their organizations.

### **3.2.1 Expansion and revenue growth**

The water supply industry is naturally monopolistic. Due to the high fixed costs of establishing a water system, supply by one water supplier incurs significantly lower costs to consumers than supply by several. It is infeasible to construct multiple water delivery systems to provide water to one area. For this reason, there is little direct competition in the water supply industry, but there is indirect competition. Water suppliers compete for new customers (3). One efficient way to increase revenues for a water supply company is to increase its customer base.

Water suppliers expand within a region to take advantage of economies of scale. These suppliers can connect many smaller water systems in series, increase purification plant sizes, and maximize production throughout the network. This expansion increases efficiency of operations, and as a result, decreases the cost of producing water. Large water systems have an absolute advantage when expanding into adjacent areas in comparison to building a new system. Having assets already in place, the existing suppliers can move into new regions with significantly smaller capital outlays as compared to a new water supply system.

A secondary effect of the economies of scale and connection of multiple water systems dramatically reduces the risks of water outages. Water may be imported from adjacent supplies if there is a failure at some point in the system. This limits the effect of failures in any one system, increasing the effectiveness of the water supply.

A large customer base adds strength to the large water supplier. Expansion in the water supply business involves large capital outlays for new systems, improvements, and repairs. The costs incurred from capital improvements, as well as administrative costs, in any one region of the company may be spread across the customer base, limiting the risk of default of the water supply.

Another benefit of a large customer base is the constant revenue streams. The inelastic demand for water ensures continuing cash flows. The large, constant cash inflows reduce risks of default, increase cash availability, and reduce the cost of new capital. Increasing a water supplier's customer base increases the expected cash flows, which, in turn, increases the available capital for expansion.

Expanding the geographic coverage limits the risks due to weather effects. Droughts significantly increase the costs of producing water and decrease the operating efficiency. Water suppliers may need to purchase water from other sources to maintain water availability in the system. Also, mandatory and voluntary water use restrictions lower the amount of water needed so the sales volume decreases.

Expanded geographic coverage also limits the effects of regulation. Because states and municipal districts vary on allowed rates of return to water suppliers, diversifying through expansion into different districts and states limits the effects of rate of return caps and other changes in the regulatory structure.

A few examples of water works that have been successful are given below.

### **American Water Works**

American Water Works (AWK) is the largest publicly traded water utility in the United States. The company serves approximately 7 million customers in 21 states, and has acquired 50 utilities since 1990 (9), concentrating on potable water supply. The acquisitions are possible through access to capital markets. The inelastic nature of water demand and the reduced risks due to geographic diversification ensure cash flows from operations allowing AWK to obtain capital for expansion.

The basic strategy of AWK is to acquire inefficient municipal water suppliers, access capital markets to finance system upgrades, and utilize efficient water supply management procedures to maximize system operations. Acquiring established systems reduces the need for the large capital outlays necessary to design and construct new water delivery systems. Eliminating the need for design and construction reduces the time lag between conception and profitable delivery of water to customers. There is little risk



inherent in the acquisition of a functioning water supplier, and increasing efficiency and effectiveness can only increase profits.

American Water Works is successful, and will continue to be successful, because of their large customer base and ready access to capital markets. Because profit generation in the water supply business comes from economies of scale, AWK's continuing acquisition practices will ensure their long-term performance.

### **AquaSource**

AquaSource is a subsidiary of the Pennsylvania based Duquesne Light Company. The company takes advantage of opportunities available to large utility companies using utility management techniques and technological advancements to optimize operations. Although this strategy appears similar to other utility companies, Aquasource has proposed a different strategic approach to acquisition.

AquaSource has appropriated \$200 million for acquisition of water systems. The company plans to take advantage of economies of scale in small water systems by purchasing rights to enter small community water systems. AquaSource plans to optimize small water systems by implementing new technologies and spreading administrative costs over multiple small water systems (2).

Small water systems represent a majority of water systems in America and are readily available for acquisition. There is little demand for small, privately owned water systems so AquaSource can obtain these systems with relatively low capital investment. This innovative acquisition strategy utilizes available opportunities, and takes advantage of economy of scale to optimize operation of small water systems.

### **Tazewell County Public Service Authority**

Tazewell County Public Service Authority (TPSA) supplies potable and wastewater services to the rural regions of Tazewell County, Virginia. The system was formed in 1969, to "bridge the gaps" between the towns of Tazewell County. TPSA serves 2800 customers, classifying the water works as small. The small water supplier has a small staff, with the majority of employees living in Tazewell County. The staff is close to the consumer, which increases the visibility of the needs of the customers.

TPSA uses buy/sell water contracts to supplement its water supply. The organization buys water from neighboring towns to supply certain areas of the county and to ensure the availability of emergency water in case of fire or pipe failure. TPSA utilizes buy/sell contracts to reduce the costs of obtaining clean water and to reduce the risks of emergency outages.

TPSA is taking advantage of funding available through the state revolving fund to pursue expansion through construction. The small water system plans to construct 11 new systems that should be completed by 2001. TPSA plans to use new technologies to

increase the operating efficiency of these systems while utilizing excess capacity of existing water plants to maximize the output of the system (10).

### **3.2.2 Contract agreements and cost reduction**

The cost of obtaining safe drinking water is highly dependent on access to clean water sources. Contaminated water sources increase the costs of water treatment, and decrease the operating efficiency of a system. These costs will be passed on to the customer and may affect the ability of water suppliers to continue operations.

One option for water suppliers is to buy water from an adjacent water company. This is normal practice for water suppliers to ensure regular supply without increasing costs. Buy/sell contracts are a common option used by water suppliers with limited access to clean water for distribution.

Buy/sell contracts have similar effects on the cost structure of water suppliers as consolidation. Connecting systems through buy/sell contracts reduces the risk of outages in case of system failures. The risk reduction adds value to each independent system that enters into an agreement.

Water suppliers enter into long-term buy/sell contracts, buying water when they have excess demand, and selling water when they have excess supply. Long-term buy/sell arrangements are normal practice for water suppliers, and limit the power of the seller to inflate prices. In many ways, buy/sell contracts are similar to forward contracts between corporations. The contracts allow the companies to forecast available water supplies and the cost of those supplies.

Short-term contracts, on the other hand, may be needed in case of a system failure or water outage. In this case, sellers have increased power to dictate the contracted price of water. Short-term contracts give water sellers leverage over the buyer and may dramatically affect the buyer's (water supplier's) ability to provide affordable water.

Another mitigating factor in the use of buy/sell contracts is the decreased ability to control water quality. For example, in the case of the Tazewell Public Service Authority (TPSA), the TPSA purchases water from the town of Pocahontas to meet some of its demands. However, the water supplier (town of Pocahontas) has one of the highest rates of boil water advisories\* in Virginia (10). The TPSA has no control over the treatment practices of Pocahontas but is subject to distribute water low in quality to its customers. This situation reduces the ability of the secondary water supplier (TPSA) to distribute quality water and decreases the consumer's perceptions of the water supplier's product.

Another option for a water supplier is to enter into an operations and management (O&M) contract. The O&M contracts allow water suppliers to outsource their operations to an O&M company. The O&M Company operates, maintains, and conducts the

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\* A boil water advisory is issued if water contaminant levels exceed a required level, and boiling water before consumption is recommended.

business practices of the water supplier. In other words, the O&M company rents the delivery system. The O&M contract is an increasing practice in the water supply business. The O&M contracts allow water suppliers the ability to maintain control of their assets, while locking in revenues from the contracted firm. The contracted firm will increase the efficiency of operations to maximize profits from its core business.

United Water Services (UWS) is a subsidiary of United Water, which is the largest provider of water supply O&M contracts in the U.S. United Water has entered into long-term agreements with Indianapolis and Gary, Indiana, Milwaukee, Wisconsin, and San Antonio, Texas. Recently the UWS signed the largest public-private water utility O&M contract in American history. The company will take over the operations and management of Atlanta's water works, including operations, maintenance, and billing. This aggressive expansion reduces capital outlays and allows United Water to concentrate on its core competency, information management. United Water plans to optimize Atlanta operations by using information systems that could increase maintenance efficiencies and result in a projected \$400 million cost saving over the next 20 years (7).

### **Options for Small Water Systems**

Many of the SPWS's, especially those functioning as ancillary operations to other businesses, do not have the resources or the motivation to expand. These systems would neither be profitable acquisitions for companies like AquaSource nor would they be profitable for a large operations and management contractor like United Water Services. Many SPWS's could benefit from revenue growth or cost cutting ventures available to larger water systems, but they do not have the access to capital or are limited by geographic location. To address the small water systems problems, the formation of a Co-operative operations and management is suggested in this report.

## **4. Co-Operative Operations and Management Solution**

After careful consideration of the different approaches by public and private organizations, the needs and motivations of those interested in capacity development, and the available resources, we concluded that a new approach, i.e., the implementation of a co-operative operations and management for small water systems will be most suitable in Virginia. The co-operative, as a body, will decide and implement the most cost-effective operational, administrative, managerial, and technical options for its members. Before the new strategy is detailed, a generalized definition and purpose of a co-operative is defined below.

### **4.1 Co-Operatives**

Co-operatives have been used in many industries to protect and improve on utilizing scarce resources and to guarantee returns to all interested parties based on the level of use. Co-ops have been used mainly in agricultural areas as a media to increase the power of farmers, each of whom has a relatively small percentage of the market. Through co-ops, farmers are able to pool their marketing resources and ensure better sales. Much in the form of the agricultural co-ops, the water co-op is an attempt to pool the resources of many small water systems (small businesses) to reach their objectives. Citizens, state and federal agencies, and water suppliers share a common goal; that is, all public water systems should produce adequate and safe water. Although the motivations for each of the parties are different, it is possible to bring these parties together under a co-operative structure that will strive to achieve their common goal.

In general, co-ops are formed for the “preservation or improvement of a scarce resource as a long-term asset” and for the “regular exploitation for the benefit of those who have the right to draw on the resource” (1). This is exactly what the Virginia Small Water Systems Co-Operative plans to achieve: to protect and preserve water systems and their infrastructure, and ensure fair returns to all interested parties. The report provides six generalized rules for co-ops:

- 1) Membership must be fully voluntary.
- 2) All members have an equal vote.
- 3) All members make contribution to the capital resources of the co-op. Contributions can be monetary, labor, management, physical investments, etc.
- 4) Interest in shares is restricted and relatively low.
- 5) Surplus is distributed to members in proportion to the amount of business they perform.
- 6) A co-operative must be owned and controlled by those who participate in its activities.

These basic guidelines were used in the formation of the ideas of the Small Water Systems Co-Op. The next section will detail the key points of the proposed co-op.

## **4.2 The Virginia Small Water Systems Co-Operative**

### **4.2.1 Activities and Responsibilities**

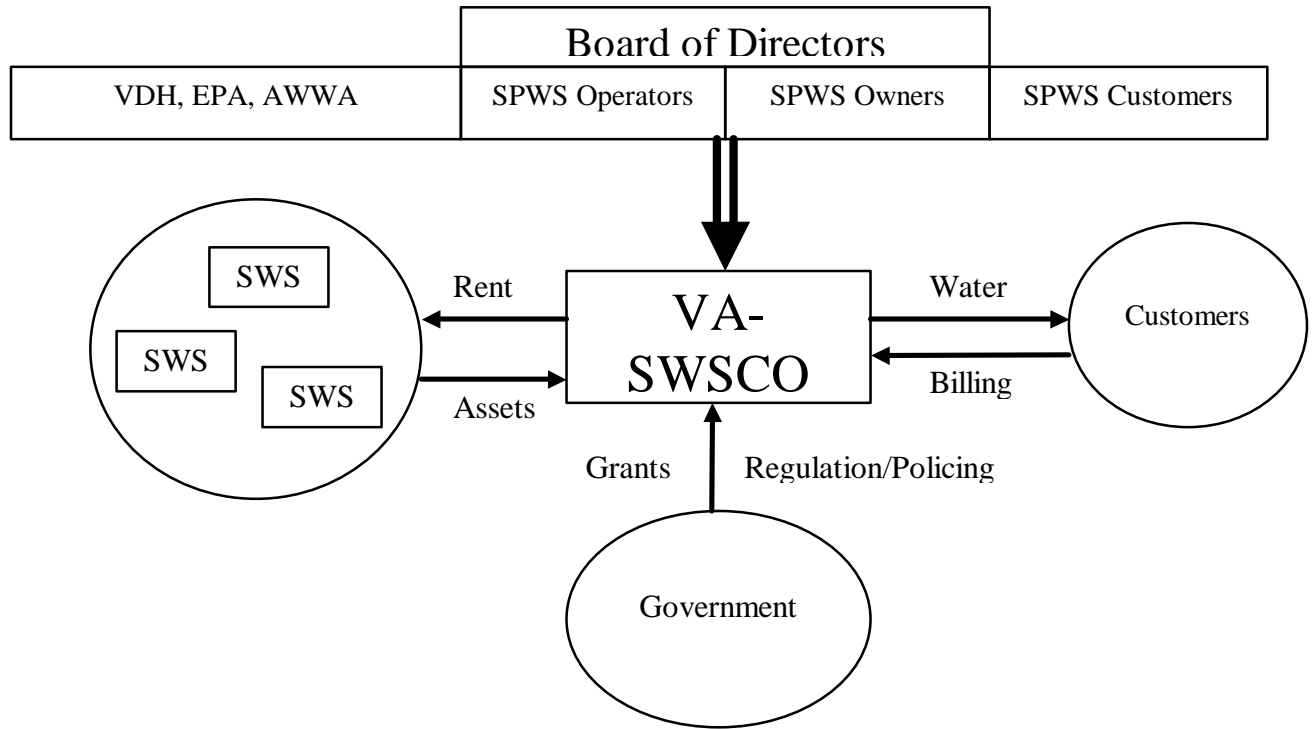
The Virginia Small Water Systems Cooperative (VA-SWSCO) will be formed upon the premise of protecting the best interests of co-op members. The co-op members shall be comprised of water system owners, water system operators, and water system customers. The co-op will be set up as a non-profit corporation, and each of its members will have limited shares in the corporation.

The VA-SWSCO will be responsible for operation and management of all participating water systems and will insure their operation at optimal capacity by pooling all available resources of its members and redistributing the resources to its members. The co-op will be responsible for all technical aspects of the participating water systems, including, but not limited to, the planning, construction, operations, maintenance, and repairs. If it becomes financially feasible to connect water systems to optimize plant capacities then the co-op will plan, finance, and construct the connections and will apply for loans and grants to meet its needs. The co-op will assume responsibility for non-compliance with state and federal regulation of the water systems.

The co-op will have the authority to reorganize the administrative structure of participating water systems. The co-op may decide to ask current employees of a water system to conduct operations and maintenance for their existing water supply and, if under utilized, ask them to perform operations and maintenance on other participating systems. The co-op will hire additional operational, managerial, administrative and technical staff as deemed necessary.

### **4.2.2 The Co-Op Management**

The co-op shall be provided oversight and direction by a Board of Directors. The board members will consist of representatives from all interest groups that form the VA-SWSCO, the state agency (VDH), the federal government (EPA) and a representative from the American Water Works Association (AWWA). State, federal, and AWWA board members will be appointed by the VDH, EPA and AWWA, respectively. Each component of the VA-SWSCO (water system owners, water system operators, and water system customers) will elect their representatives to the board. The co-op board will assure that the co-op finances are sound and its member water systems are in compliance with state and federal regulations. The co-op operation and management structure is shown in Figure 3.



**Figure 3. The Virginia Small Water Systems Cooperative Structure**

### **4.2.3 The Co-Op Administration**

Administrative costs are a major factor in the operation of small water systems. Several regional co-ops can be established to more effectively utilize administrative personnel and resources (Appendix 3). For each regional co-op, the administrative operations will be centralized. Planning, engineering, management control, electronic system control, customer service and billing will be conducted from the central location. The centralized information management system will control all operations of the member water systems. The information management system will ease all reporting and billing needs by collecting all data in a central location.

Beyond the planning and control functions, central administrative staff will have access to all current water system information. The information management system will ease all reporting and billing needs by collecting all data in a central location. The data will be used by the administrative staff to prepare consumer confidence reports for state officials and customers.

### **4.2.4 Financial Management**

The incentive to start a co-operative shall be provided by a grant and leadership from the Virginia Department of Health. Once the co-operative is formed, as stated in the generalized rules for co-ops, all members must make a contribution to enter into and maintain membership in the co-op. Small public water system owners will lease their assets and the water systems to the co-op. Customers will pay their monthly water bills, which will provide a revenue stream for the co-op.

Billing rates will be determined based on usage per unit cost of water delivered, water delivery systems rent payments, and co-operative overhead. The system will attempt to function at a surplus level, with the surplus re-invested into the water system infrastructures of the participating water systems or returned to members.

The co-op will recruit an analyst to investigate all possible options available to the participating water systems. If buy/sell contracts or outside operations and maintenance contracts become feasible alternatives, the co-op will contract these activities. The purpose behind the co-op is to protect the best interest of the co-op members. The co-op will take advantage of any cost effective solutions and opportunities that may become available.

### **4.2.5 Technical Assistance**

The Virginia Small Water Systems Co-Operative shall utilize emerging technologies to increase the efficiency and effectiveness of all operations. Each participating water

supplier will be responsible for updating their water delivery systems, upgrading outdated equipment, and implementing necessary technologies to bring their infrastructure up to co-operative standards. The co-op will assist in the evaluation and planning of the system upgrades. The water systems have access to state revolving loans and grants to upgrade their systems. Participants shall apply through the co-op for securing funds. The co-op will establish priorities for upgrading its member water systems.

The co-op will implement an advanced network of electronic sensors and controls that will monitor customer usage, water system integrity, and contaminant levels. A computer server will be put in place at a specified location to control and record all sensor readings. The servers will be linked to a central control unit that will be used to monitor and record all events within the network. All data retrieved from the servers will be archived by the central control unit.

Operators and maintenance personnel will be stationed strategically throughout the state and charged with service regions. The personnel will be assigned regular operational and maintenance tasks, and will be called upon by central control for emergency tasks if the computer systems or customer reports indicate that a problem exists. A logistical diagram of central control and regional operations and maintenance teams is illustrated in Figure 5.

### **4.3 Merits of the Proposed Cooperative**

The interested parties mentioned in the problem statement include state and federal governments. Under this plan, state and federal officials can obtain control over the capacity development of new and existing water systems by taking an active role in the management of the co-operative. They will have managerial control over the new projects implemented by the co-op and can contribute knowledge of changing regulations to allow participating water systems to make appropriate changes and remain in compliance. The participating government agencies will also have direct access to all information on these water systems, beyond that available in submitted reports. This added influence over small water systems will provide state government officials a way to ensure capacity for new water systems and assist with upgrading existing water systems to acquire and maintain the necessary capacities.

Small public water systems will have the opportunity to reduce costs, shift accountability of ineffective operations, and obtain the capacities needed to remain operational. This program is open to all public water systems, including CWS's, NTNCWS's, and TNCWS's. The program creates an opportunity for many water suppliers (owners) to unload the responsibilities of managing and operating a water system that, in many cases, is an ancillary business. The co-operative is an "easy out" for SPWS management that do not want the responsibility of managing the water system, and a feasible alternative for the systems that do not have the technical, managerial, and operational capacities to continue operations. In all cases, the co-operative plan allows water supply owners to maintain control of their assets by having the ability to withdraw from the program if the system does not prove satisfactory.



SPWS customers have the opportunity to reduce water costs, participate in the management of their water system, and increase their knowledge of their water system. The co-op provides customers with a tool to have control over the water they receive and the price they will pay for the service.

#### **4.4 Implementation and Marketing Strategy**

The initial stages of the implementation include, in this order, writing a formal business plan, soliciting the interest of SPWS owners, obtaining funding to start the co-operative, evaluating the feasibility of the program, fulfilling the legal requirements to establish the corporation, forming the Board of Directors, determining water system standards for water systems entering the co-operative, and designing the information system. Once these tasks are completed the co-operative will be ready for a trial run.

The first co-operative to be formed will be a test for the implementation of a successful co-operative program in Virginia. It is recommended that the Virginia Department of Health take the lead and identify a demonstration area where the proposed concept can be tested. The co-operative will be implemented in the selected region; its performance will be evaluated, and the necessary adjustments will be made. Once the demonstration co-operative is fully operational and deemed acceptable, the strategy will be expanded and implemented across Virginia using an incremental approach. New systems will be added to the co-operative as interest increases in other Virginia localities and as the co-op expansion becomes financially feasible.

The co-operative administration shall be located such that future expansion does not incur significant managerial or administrative costs. The new participants will be evaluated for compliance with co-op standards, and technical assistance will be provided to plan any system upgrades. Financial counseling will also be available for system owners that need to obtain capital for improvements through state funding or alternative financial institutions. The existing technical staff and available capital will limit the speed of expansion for the co-operative, but additional employees will be hired as demand increases. The co-operative will continue to expand by offering its resources for new and existing water suppliers.

The implementation plan has one overpowering problem. The co-operative must sign-on clusters of water systems in its operating regions. Although the co-operative is designed such that systems may join independent of geographic location, a large part of the cost savings from the co-operative is based on sharing of operators and maintenance crews. Transportation costs and emergency response times for operators and maintenance crews will be high if participants are dispersed unevenly throughout the geographical region. Widely dispersed water systems could limit the effectiveness of the proposed co-op.

A second problem with implementation is the speed of expansion. Expansion will be limited by the technical staff evaluating and planning upgrades for existing water systems trying to join the co-operative. This will delay entry of interested parties and may deter

others from trying. The expansion will be slow unless the co-operative has the resources to employ and train the necessary evaluation staff.

These problems may be solved through proper marketing. By focusing the marketing on certain regions, the co-op can concentrate its resources in a limited region. The focused approach will allow for more direct sales and limit the necessary technical staff.

It is recommended that the Virginia Department of Health (or a sub-contractor) take the lead to initiate a demonstration project that will produce sufficient data and offer an incentive for many potential participants. For long-term implementation, the Virginia Department of Health should make grants and loans to small water systems conditional on the basis of participation in a cooperative. To initiate the program in Virginia, the following steps are proposed:

- 1) The VDH or its sub-contractor will select a region where drinking water violations are documented for a large number of small water systems to test the co-operative concept as a demonstration study.
- 2) Letters would be mailed to small water system owners (and announced in newspapers) in the selected region inviting the owners and operators of small water systems and their water system customers to a public forum. The letter should also stress in lay terms the capacity development needs of small water systems and the technical, financial, and managerial assistance available to these systems.
- 3) In the forum, the VDH or its sub-contractor will present the SDWA and the need for capacity development. As a solution, the forum facilitator will discuss the concept of co-operatives for small water systems and stress its advantages, such as cost savings and better drinking water quality. The forum facilitator will present the financial opportunities of entering the co-operative and explain how it may lower administrative and managerial costs through economies of scale. The facilitator will highlight the opportunities available through sharing resources and fully utilizing the capacities of participating water suppliers. The facilitator shall present concise descriptions of the capacity development opportunities available through the co-operative program; the availability of start up funding through the VDH as an incentive; and the technical, financial, and managerial assistance available to program participants.
- 4) The forum should conclude with plans for follow up meetings and sign ups of owners of small water systems and other interest groups willing to participate in the proposed co-operative demonstration project.

Once a successful demonstration project is completed, participants of the demonstration project can contribute to future program implementation by initiating and promoting a grass roots marketing strategy.

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- EPA. 1991. Restructuring Manual, EPA 570/9-91-035.

## Appendix 1

Virginia Small Water Systems Survey, Virginia Water Resources Research Center  
(For details see Reference 8).

### Abbreviations

ID – identifiable respondent survey  
 NID – non-identifiable respondent survey  
 CWS – Community water systems  
 NTNC – Non-transient Non-community water systems  
 TNCWS – Transient Non-Community water systems

### Questions 65-67

65. Has the water system considered reducing costs by consolidating facilities/management with another water system?

N=409

Yes	68	16.6 %
No	302	73.8 %
Don't know	39	12.9 %

	CWS N=118		TNCWS N=53		NTNC N=50	
Yes	25	21.2 %	5	9.4%	12	24.0 %
No	88	74.6 %	38	71.7 %	34	68.0 %
Don't know	5	4.2%	10	18.9 %	4	8.0%

ID N=221

NID N=188

Yes	42	19.0 %	26	13.8 %
No	160	72.4 %	142	75.5 %
Don't know	19	8.6%	20	10.6 %

Question 66. If the water system had the option to consolidate physical facilities with another system would it be interested?

N=433

Yes	120	27.7 %
No	211	48.7 %
Don't know	102	23.6 %

CWS N=123

TNCWS N=56

NTNC N=55

Yes	34	27.6 %	12	21.4 %	28	50.9 %
No	55	44.7 %	34	60.7 %	19	34.5 %
Don't know	34	27.6 %	10	17.9 %	8	14.5 %

ID N=234

NID N=199

Yes	74	31.6 %	46	23.1 %
No	108	46.2 %	103	51.8 %
Don't know	52	22.2 %	50	25.1 %

Question 67. If it had the option to consolidate administration/management with other systems would it be interested?

N=419

Yes	92	22.0 %
No	211	50.4 %
Don't know	116	27.7 %

	CWS N=116		TNCWS N=54		NTNC N=55	
Yes	21	18.1 %	9	16.7 %	24	43.6 %
No	58	50.0 %	32	59.3 %	16	29.1 %
Don't know	37	6.8%	13	24.1 %	15	27.3 %

ID N=225

NID N=194

Yes	54	24.0 %	38	19.6 %
No	106	47.1 %	105	54.1 %
Don't know	65	28.9 %	51	26.3 %

## Appendix 2

### SEC. 119 of the Safe Drinking Water Act

Part B (42 U.S.C. 300g et seq.) is amended by adding after section 1419 the following:  
`Sec. <<NOTE: 42 USC 300g-9.>> 1420. (a) State Authority for New Systems.--A State shall receive only 80 percent of the allotment that the State is otherwise entitled to receive under section 1452 (relating to State loan funds) unless the State has obtained the legal authority or other means to ensure that all new community water systems and new nontransient, noncommunity water systems commencing operation after October 1, 1999, demonstrate technical, managerial, and financial capacity with respect to each national primary drinking water regulation in effect, or likely to be in effect, on the date of commencement of operations.

(b) Systems in Significant Noncompliance.--

``(1) List.--Beginning not later than 1 year after the date of enactment of this section, each State shall prepare, periodically update, and submit to the Administrator a list of community water systems and nontransient, noncommunity water systems that have a history of significant noncompliance with this title (as defined in guidelines issued prior to the date of enactment of this section or any revisions of the guidelines that have been made in consultation with the States) and, to the extent practicable, the reasons for noncompliance.

``(2) Report.--Not later than 5 years after the date of enactment of this section and as part of the capacity development strategy of the State, each State shall report to the Administrator on the success of enforcement mechanisms and initial capacity development efforts in assisting the public water systems listed under paragraph (1) to improve technical, managerial, and financial capacity.

``(3) Withholding.--The list and report under this subsection shall be considered part of the capacity development strategy of the State required under subsection (c) of this section for purposes of the withholding requirements of section 1452(a)(1)(G)(i) (relating to State loan funds).

``(c) Capacity Development Strategy.--

``(1) In general.--Beginning 4 years after the date of enactment of this section, a State shall receive only--

``(A) 90 percent in fiscal year 2001; ``(B) 85 percent in fiscal year 2002; and

``(C) 80 percent in each subsequent fiscal year, of the allotment that the State is otherwise entitled to receive under section 1452 (relating to State loan funds), unless the State is developing and implementing a strategy to assist public water systems in acquiring and maintaining technical, managerial, and financial capacity.

``(2) Content.--In preparing the capacity development strategy, the State shall consider, solicit public comment on, and include as appropriate--

``(A) the methods or criteria that the State will use to identify and prioritize the public water systems most [[Page 110 STAT. 1648]] in need of improving technical, managerial, and financial capacity;

``(B) a description of the institutional, regulatory, financial, tax, or legal factors at the Federal, State, or local level that encourage or impair capacity development;

“(C) a description of how the State will use the authorities and resources of this title or other means to-- (i) assist public water systems in complying with national primary drinking water regulations; (ii) encourage the development of partnerships between public water systems to enhance the technical, managerial, and financial capacity of the systems; and (iii) assist public water systems in the training and certification of operators;

“(D) a description of how the State will establish a baseline and measure improvements in capacity with respect to national primary drinking water regulations and State drinking water law; and;

“(E) an identification of the persons that have an interest in and are involved in the development and implementation of the capacity development strategy (including all appropriate agencies of Federal, State, and local governments, private and nonprofit public water systems, and public water system customers). (3) Report.--Not later than 2 years after the date on which a State first adopts a capacity development strategy under this subsection, and every 3 years thereafter, the head of the State agency that has primary responsibility to carry out this title in the State shall submit to the Governor a report that shall also be available to the public on the efficacy of the strategy and progress made toward improving the technical, managerial, and financial capacity of public water systems in the State. (4) Review.--The decisions of the State under this section regarding any particular public water system are not subject to review by the Administrator and may not serve as the basis for withholding funds under section 1452. (d) Federal Assistance.-- (1) In general.--The Administrator shall support the States in developing capacity development strategies. (2) Informational assistance.-- (A) In general.--Not later than 180 days after the date of enactment of this section, the Administrator shall-- (i) <<NOTE: Review. Publication.>> conduct a review of State capacity development efforts in existence on the date of enactment of this section and publish information to assist States and public water systems in capacity development efforts; and (ii) initiate a partnership with States, public water systems, and the public to develop information for States on recommended operator certification requirements.

(B) Publication of information.--The Administrator shall publish the information developed through the partnership under subparagraph (A)(ii) not later than 18 months after the date of enactment of this section. [[Page 110 STAT. 1649]] (3) Promulgation of drinking water regulations.--In promulgating a national primary drinking water regulation, the Administrator shall include an analysis of the likely effect of compliance with the regulation on the technical, financial, and managerial capacity of public water systems. (4) <<NOTE: Publication.>> Guidance for new systems.--Not later than 2 years after the date of enactment of this section, the Administrator shall publish guidance developed in consultation with the States describing legal authorities and other means to ensure that all new community water systems and new nontransient, noncommunity water systems demonstrate technical, managerial, and financial capacity with respect to national primary drinking water regulations. (e) Variances and Exemptions.--Based on information obtained under subsection (c)(3), the Administrator shall, as appropriate, modify regulations concerning variances and exemptions for small public water systems to ensure flexibility in the use of the variances and exemptions. Nothing in this subsection shall be interpreted, construed, or applied to affect or alter the requirements of



section 1415 or 1416. ``f) Small Public Water Systems Technology Assistance Centers.-

-``(1) Grant program.--The Administrator is authorized to make grants to institutions of higher learning to establish and operate small public water system technology assistance centers in the United States. ``(2) Responsibilities of the centers.--The responsibilities of the small public water system technology assistance centers established under this subsection shall include the conduct of training and technical assistance relating to the information, performance, and technical needs of small public water systems or public water systems that serve Indian Tribes. ``(3) Applications.--Any institution of higher learning interested in receiving a grant under this subsection shall submit to the Administrator an application in such form and containing such information as the Administrator may require by regulation. ``(4) Selection criteria.--The Administrator shall select recipients of grants under this subsection on the basis of the following criteria: ``(A) The small public water system technology assistance center shall be located in a State that is representative of the needs of the region in which the State is located for addressing the drinking water needs of small and rural communities or Indian Tribes. ``(B) The grant recipient shall be located in a region that has experienced problems, or may reasonably be foreseen to experience problems, with small and rural public water system. ``(C) The grant recipient shall have access to expertise in small public water system technology management. ``(D) The grant recipient shall have the capability to disseminate the results of small public water system technology and training programs. ``(E) The projects that the grant recipient proposes to carry out under the grant are necessary and appropriate. [[Page 110 STAT. 1650]] ``(F) The grant recipient has regional support beyond the host institution. ``(5) Consortia of states.--At least 2 of the grants under this subsection shall be made to consortia of States with low population densities. ``(6) Authorization of appropriations.--There are authorized to be appropriated to make grants under this subsection \$2,000,000 for each of the fiscal years 1997 through 1999, and \$5,000,000 for each of the fiscal years 2000 through 2003.

``g) Environmental Finance Centers.--

``(1) In general.--The Administrator shall provide initial funding for one or more university-based environmental finance centers for activities that provide technical assistance to State and local officials in developing the capacity of public water systems. Any such funds shall be used only for activities that are directly related to this title.

``(2) <<NOTE: Establishment.>> National capacity development clearinghouse.--The Administrator shall establish a national public water system capacity development clearinghouse to receive and disseminate information with respect to developing, improving, and maintaining financial and managerial capacity at public water systems. The Administrator shall ensure that the clearinghouse does not duplicate other federally supported clearinghouse activities.

``(3) Capacity development techniques.--The Administrator may request an environmental finance center funded under paragraph (1) to develop and test managerial, financial, and institutional techniques for capacity development. The techniques may include capacity assessment methodologies, manual and computer based public water

system rate models and capital planning models, public water system consolidation procedures, and regionalization models.

“(4) Authorization of appropriations.--There are authorized to be appropriated to carry out this subsection \$1,500,000 for each of the fiscal years 1997 through 2003.

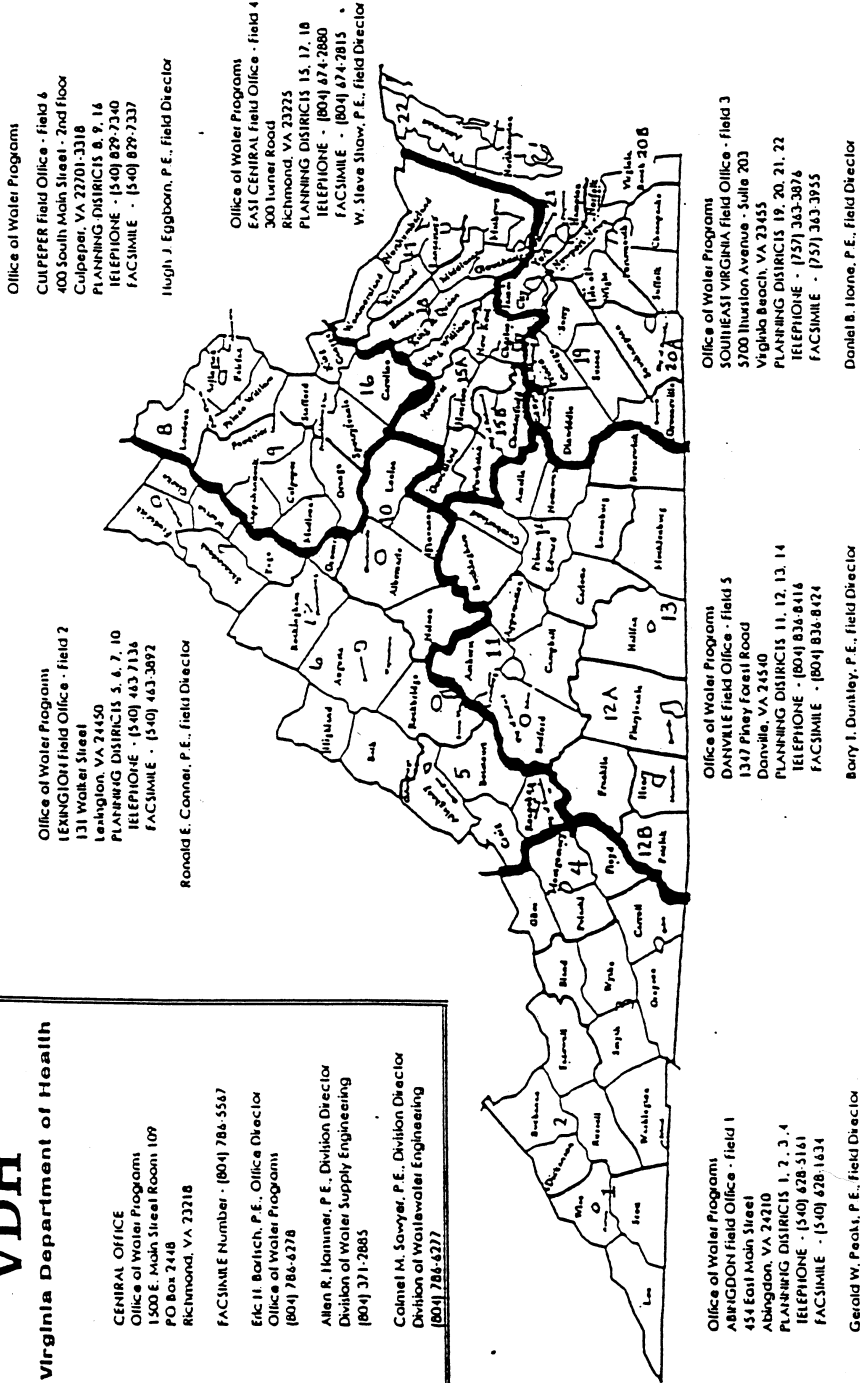
“(5) Limitation.--No portion of any funds made available under this subsection may be used for lobbying expenses.”.

Source: Safe Drinking Water Information System

JULY 18, 1996

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