

**Report of the
Joint Legislative Audit and Review Commission
To the Governor and
The General Assembly of Virginia**

**Performance and
Oversight of Virginia's
Small Community
Drinking Water Systems**



**SENATE DOCUMENT NO. 10
2007**

In Brief

Performance and Oversight of Virginia's Small Community Drinking Water Systems

Senate Joint Resolution 82 directed JLARC to assess the effectiveness of the regulatory framework overseeing the quality and cost of drinking water provided by small water systems.

Generally, small system customers reported satisfaction with the quality and cost of their water. However, some small system operators reported operational challenges, and small systems account for most violations.

The Virginia Department of Health (VDH) implements State and federal drinking water standards, and its efforts in providing assistance and funding have been good. Most small systems are well operated, but additional options to address systems with histories of noncompliance are needed. Encouraging consolidation to eliminate nonviable systems may improve compliance.

By statute, the State Corporation Commission (SCC) regulates rates charged by less than a quarter of small systems. Review of these rates is rigorous; however, better coordination by SCC and VDH could improve the rate-setting process.

Water supply protection and planning efforts have been limited in Virginia. Better coordination among State regulatory agencies and local governments may lead to improvements.

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COMMONWEALTH of VIRGINIA

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February 7, 2007

The Honorable Thomas K. Norment, Jr.
Chairman
Joint Legislative Audit and Review Commission
General Assembly Building
Richmond, Virginia 23219

Dear Senator Norment:

Senate Joint Resolution 82 enacted by the 2006 General Assembly directed JLARC to study small and very small community water systems in Virginia. Staff were directed to determine whether the needs of Virginia's citizens are being met through existing regulations with regard to water quality and rates charged and to make recommendations on any needed improvements.

On behalf of the Commission staff, I would like to thank the staff at the Department of Health, the State Corporation Commission, the Department of Environmental Quality, and the Office of the Attorney General for their assistance during this study.

Sincerely,

A handwritten signature in black ink that reads "Philip A. Leone".

Philip A. Leone
Director

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JLARC Report Summary:

Performance and Oversight of Virginia's Small Community Drinking Water Systems

Key Findings

- Most customers of small community drinking water systems responding to a Joint Legislative Audit and Review Commission (JLARC) staff survey found their water quality to be adequate and their rates to be reasonable. However, some owners and operators of these systems report challenges maintaining their systems, and some small systems repeatedly violate water quality or monitoring standards. (Chapters 1 and 2)
- Virginia Department of Health (VDH) assistance to small water systems and targeted loan and grant funding to small water systems have been good. (Chapter 3)
- While most waterworks have qualified operators and generally comply with federal and State standards, some systems do not have a licensed operator, or have a pattern of repeat violations. In addition, a small number of systems have shown an unwillingness to comply with requirements. Efforts to return these systems to compliance could be aided by the creation of additional enforcement tools for eliminating noncompliant systems. State efforts to encourage consolidation of these and other problematic waterworks with successful systems through financial incentives may improve compliance. (Chapter 3)
- The rate approval process for private water systems could be improved through coordination between the State Corporation Commission and VDH. Consolidation could be encouraged through the increased use of rate structures that enable water utilities to spread costs across multiple systems. (Chapter 4)
- Water supply protection and planning efforts have been limited in Virginia. Initiatives targeted at the protection of source waters and system security have had little success, raising concerns about the long-term viability of small systems. Statewide water supply planning is just beginning, and limited data exists. Improved coordination between State regulatory agencies, as well as local governments, could lead to improvements. (Chapter 5)

Senate Joint Resolution 82 as passed by the 2006 General Assembly directed JLARC staff to assess the regulatory framework of small community drinking water systems with regard to both water quality and rates charged. The resolution notes the need for clean drinking water to ensure public health, the impact of small numbers of customers on the financial capacity of these systems to provide adequate drinking water, and the concerns of some small system customers about rate affordability. The resolution is provided in Appendix A.

The U.S. Environmental Protection Agency (EPA) classifies water systems by the number of people they serve, the source of their water, and whether they serve the same customers year-round or on an occasional basis. EPA defines very small systems as systems serving 25 to 500 people and small systems as systems serving 501 to 3,300 people. For purposes of this review, JLARC staff have combined these two categories and will refer to them generally as small systems, as EPA typically does.

Based on this definition, there are almost 1,100 small community water systems in Virginia (see the table below). These systems provide drinking water to fewer than 500,000 people. (As indicated in the table, fewer than 80 systems—the very large and large systems—serve most of the State’s population). Water system ownership is generally divided into four categories: private, public, State, and federal. While most of the 1,090 small systems in Virginia are privately owned and operated, publicly owned and operated water systems serve 65 percent of those served by small systems.

As shown in the map on the next page, of the populations served by public water supplies (excluding those individuals served by private wells), 49 localities have at least half of their population served by small water systems, and in 39 counties small water systems provide service to all of the population using public water. The highest concentrations of these systems are found in the Northern Neck, Valley, and portions of Southwest Virginia. The greatest number of small systems is located in the Northern Neck, but most customers of small systems are located in the Valley and Southwest Virginia.

The Safe Drinking Water Act (SDWA) of 1974 authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants

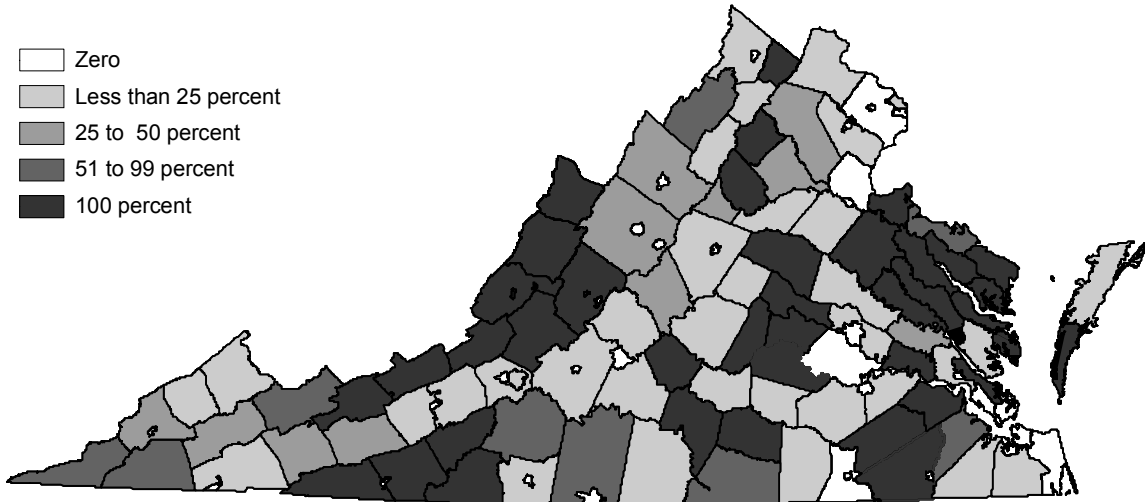
About 1,100 Small Community Water Systems Are Permitted in Virginia

System Size	EPA Classification	Number of Systems	Total Population Served ¹	Percentage of Population Served
Very Small	25 -500	831	118,708	1.9%
Small	501 - 3,300	259	355,786	5.7
Medium	3,301 - 10,000	72	416,839	6.6
Large	10,001 - 100,000	62	1,829,148	29.1
Very Large	More than 100,000	15	3,566,391	56.7
Total		1,239	6,286,872	100%

¹ Individuals using private wells are not included because these wells are unregulated.

Source: JLARC staff analysis of system and population data provided by VDH, spring 2006.

Percentage of Local Population Served by Small Water Systems



Note: Does not include percentage of population served by private wells.

Source: JLARC staff analysis of VDH data.

that may be found in drinking water. In addition, SDWA establishes a "multi-barrier" approach to regulating drinking water designed to ensure water quality from the source to the tap. The multi-barrier approach focuses on source water protection, capacity development, and funding opportunities to assist water systems in meeting the standards. The amendments also created the Drinking Water State Revolving Fund (DWSRF) to give the states financial resources to improve system capacity.

In Virginia, the Department of Health's (VDH) Office of Drinking Water (ODW) is responsible for implementing the SDWA elements and State requirements. Several other State agencies also play a role in Virginia's drinking water program, including the State Corporation Commission (SCC), which regulates water rates for private water companies serving 50 or more customers incorporated after 1970.

The extent to which health-related problems occur as a result of contaminated drinking water is unclear. Limited data regarding waterborne illnesses is collected due in part to underreporting. However, literature indicates that the potential for someone to contract a waterborne illness is higher among small water systems.

CUSTOMERS ARE GENERALLY SATISFIED, BUT SMALL SYSTEMS REPORT CHALLENGES AND ACCOUNT FOR MOST VIOLATIONS

The mandate for this review discusses customer concerns regarding water quality and affordability. To determine the performance of small systems in providing clean and reliable drinking water, JLARC staff (1) surveyed a sample of small systems customers in a subset of localities, (2) surveyed small system owners and operators, and (3) reviewed the number and type of violations issued to small systems by ODW.

According to EPA, successful systems demonstrate adequate technical, financial, and managerial (TFM) capacity. Concerns exist as to whether small system operators possess adequate TFM capacities to remain in compliance with federal and state regulations. In 1997, the National Research Council (NRC) reported that small systems have difficulty providing clean drinking water because they lack the customer base to pay for facility maintenance and improvements. Inadequate financial resources also impact the ability of these systems to hire qualified individuals to ensure the system is properly maintained and operated. Amendments to SDWA in 1996 sought to address these needs by requiring states to develop TFM capacities of these systems.

Customers responding to the JLARC staff survey reported general satisfaction with water quality and operator performance. Some concerns were expressed regarding rates, but most customers indicated that their rates are affordable. Overall, 74 percent of the 353 small system customers who responded were satisfied with the quality of water provided and the ability of the system operator to meet their expectations. Furthermore, 69 percent of respondents reported that their rates are affordable.

Although small system customers reported satisfaction with the quality of water and service they receive, owners identified problems with administering their systems. Respondents to the owner and operator survey indicated moderate to major challenges with certain TFM components. More than one-fifth of the 188 system owners and operators responding to the JLARC staff survey reported meeting water quality standards as a moderate to major challenge. One-third of respondents reported moderate to major challenges maintaining portions of their water systems, which is important to providing clean water. Half of the respondents reported increasing rates as a moderate to major challenge. Rate increases are often the only way in which small systems can pay for needed improvements. Potentially because of these limitations, more than half of the private system respondents indicated that, if

given the choice, they would prefer not to continue operating their water systems.

In addition to surveying owners and customers, JLARC staff reviewed the number and type of violations issued to small water systems since 2001, including health-based and monitoring violations. Health-based violations are considered by EPA to be the most serious and are defined as exceedances of the allowable maximum contaminant levels, or instances where a facility does not use the required water treatment procedure when there is no reliable way to measure contaminants at very low levels. Monitoring violations occur when a water system fails to take a required water sample or fails to take a sample at the required time.

Small systems were issued 94 percent of all violations issued since 2001 (1,518 health-based and 4,520 monitoring violations). However, on a per-system basis, small systems were issued health-based violations at roughly the same rate as large systems (see the table below). Analysis of violations since 2001 by system size found that there were roughly 1.39 health-based violations issued per system to small systems and 1.13 health-based violations issued to large systems. There is a substantial difference between large and small systems in the monitoring violations issued per system. ODW issued slightly more than four (4.15) violations per small system, while large systems were issued approximately one (1.37) monitoring violation per system. JLARC staff found that 72 small systems were cited for the same violation three or more times during the time period from 2001 to 2006. Fifteen of the small systems with the greatest number of violations (1.4 percent) accounted for 20 percent of the small system violations.

Small Systems Receive More Violations per System Than Large Systems

Violation Category	Violations Issued to Systems Serving 3,300 or Less	Violations Issued to Systems Serving More Than 3,300
Health-Based	1.39	1.13
<i>Maximum Contaminant Level</i>	<i>1.27</i>	<i>1.03</i>
<i>Treatment Technique</i>	<i>0.12</i>	<i>0.10</i>
Monitoring	4.15	1.37
Public Notice	0.07	0.00
Reporting	0.19	0.01

Note: There were 6,315 total violations for 1,099 small systems and 373 total violations for 153 large systems.

Source: JLARC staff analysis of data provided by VDH, August 2006.

ODW'S TECHNICAL ASSISTANCE EFFORTS ARE GOOD, BUT ADDITIONAL ENFORCEMENT OPTIONS ARE NEEDED

VDH's efforts to provide waterworks operators with guidance and assistance appear to be useful for the operators. Since 1997, VDH has provided more than \$180 million in federal and State funding to small water systems for construction and planning purposes, and has been recognized by EPA as a leader in this area. VDH also appears to review water quality samples and act on cases in a timely manner when contaminants exceed federal and State standards. For the most part, the department conducts water systems inspections within established timeframes, but should consider conducting more inspections with less advance notice.

However, regulatory compliance is an issue with some systems. The challenges faced by small systems present problems for VDH in taking strong enforcement action, and the department's use of compliance assistance rather than enforcement may be appropriate in some cases. For example, financial penalties may have limited benefit in cases in which the system has limited financial resources. The department's ability to close a poor performing system is also limited by the impact such action would have on the customers of the system.

Both EPA and VDH have systems in place to identify and track the status of noncompliant systems. According to EPA, VDH's enforcement effort has improved in recent years. Nevertheless, that effort could be improved further. Currently, field office staff have discretion to decide under what circumstances to issue violations and refer cases to the central office for enforcement, but no guidance criteria exist.

Additionally, JLARC staff found that approximately nine percent of more than 1,100 water systems do not have licensed operators as required by the waterworks regulations. VDH field staff request operator information at the time of inspection, but most small systems are inspected every 20 months, meaning systems can operate without a licensed operator for some time. VDH does not appear to verify the licensure information it collects with the information maintained by the Department of Professional and Occupational Regulation (DPOR).

Enhancing VDH's enforcement tools might lead to greater compliance from systems with histories of noncompliance with federal and State drinking water standards. Furthermore, the Office of the Attorney General (OAG) does not appear to be pursuing legal remedies in all the cases that it should. According to VDH staff, when the department has referred cases to the OAG to pursue civil penalties, the OAG has not taken action, citing limited resources

and the difficulty of achieving a positive result that benefits users of the system.

Despite ODW's efforts, some water systems still face major obstacles. For example, there may be as many as 104 small systems operating in Virginia without a licensed operator, and another 72 that have been cited three or more times for the same monitoring or maximum contaminant level violations since 2001. Other states have tried encouraging consolidation—the combining of systems to increase economies of scale and improve financial resources—as a way to improve compliance with water quality standards. Consolidating some of the smaller systems may allow VDH to reallocate resources to focus greater attention on the systems serving the most people. Consolidation could also lead to improvements in the consistency of water delivery and the affordability of rates and reduce the frequency of violations and non-compliance. Encouraging such takeovers has been recommended by the NRC and successfully implemented to a small degree in North Carolina.

The following recommendations address ways ODW may be able to improve its oversight of small water systems:

- Initiate a program of unannounced inspections to identify issues that announced inspections might not.
- Require system owners to annually report the name and license number of their operator. ODW should also verify licensure using DPOR's information.
- Require system owners to annually provide accurate and up-to-date contact information.
- Work with successful system owners to identify incentives that would encourage these systems to take over underperforming systems.
- Implement a program to encourage consolidation of small, chronically noncompliant waterworks with successful water systems.

OPPORTUNITIES FOR IMPROVEMENTS TO RATE-SETTING PROCESS EXIST

VDH plays no role in determining rates charged to customers of small water systems, and the rates charged to most Virginians are exempt from State oversight. The SCC has statutory responsibility for regulating rates charged by privately owned water utilities serving more than 50 customers. Currently, SCC regulates the rates charged by 69 public utilities owning 248 small water systems and six large systems. Under this approach, rates charged to customers of publicly owned systems are self regulated, with over-

sight and accountability provided by local government boards and citizens. In Virginia, 402 publicly operated small water systems provide water to almost 306,000 individuals (75 percent of all small system customers).

Annual financial accounting requirements for regulated utilities are rigorous; however, enforcement of these regulations on small water systems is limited. While SCC has the authority to fine small water systems that do not comply with this requirement, ensuring compliance is challenging given the potential negative impact that financial penalties may have on system operations.

Small water utilities are granted limited relief from the rate-setting process under the Small Water or Sewer Public Utility Act, which exempts the majority of proposed rate increases from formal review. Formally reviewed rate cases are heard before a SCC hearing examiner, and the criteria reviewed in each case can vary. For rate requests that are formally reviewed by the SCC, this process can be challenging.

Several criteria are not reviewed by SCC when approving utility rate increases, such as a comparison to rates charged by comparable utilities, and the availability of formal involvement by outside parties is seldom utilized. Financial capacity requirements established by SCC are also more complex than business planning requirements established by VDH, and technical assistance is not readily available. Similarly, through the rate-setting process the SCC does not currently facilitate the creation of pricing structures that allow utilities to charge customers the same rate across multiple water systems as a way to increase economies of scale.

Given the potentially complex and time-consuming challenges of the rate-setting process and lack of available technical support, some small investor-owned systems are wary of raising rates. Moreover, there is limited coordination of the regulatory roles of SCC and VDH. To address these challenges, several improvements to the current process are recommended in this report:

- Development of a formal Memorandum of Understanding between VDH and the SCC for maintaining safe and reliable water supplies for regulated water companies; and
- Development of policies for the voluntary implementation of single-tariff pricing that illustrate the impact of proposed rate structures for improving compliance with water quality regulations and the potential impact of the rate structure on the rate payers.

WATER SUPPLY PROTECTION AND PLANNING EFFORTS ARE LIMITED

Protection of water sources and the infrastructure that supports water production, treatment, and distribution is critical to the long-term sustainability of small water systems. Statewide efforts at source water protection and security initiatives targeted at small systems are minimal and have had limited success.

Beginning in 2001, VDH initiated source water protection assessments for all regulated water systems in order to classify each system based on its susceptibility to possible contamination. While most small water systems were identified as being highly susceptible to contamination, these classifications remain largely unused. Moreover, EPA staff raised concern that Virginia took a narrow approach to implementation of this program, and small system owners have mixed reactions to the program's benefits.

Efforts at protecting small drinking water systems from threats and preparing for emergencies are also limited. Many natural and man-made threats may put water system customers at risk. Despite these concerns, current EPA security guidelines are not enforceable for small systems, and many small systems may not be adequately prepared to respond to an emergency.

Virginia's attempt at protecting the long-term availability of public water supplies is in its infancy. While locating adequate groundwater sources has not historically been a problem for small systems—the Department of Environmental Quality (DEQ) currently permits annual groundwater withdrawals of more than 27 billion gallons from supplies in Tidewater and the Eastern Shore—statewide groundwater mapping and modeling activities have been limited.

Drought conditions in 2002 increased statewide focus on the long-term viability of public water supplies and resulted in 2003 legislation requiring DEQ to develop a statewide water supply plan. Local and regional plans do not need to be completed until 2008 at the earliest. Because these plans are requirements of local governments, not specific water systems, coordination among all system owners (both public and private) during the development of these plans is critical.

Improved coordination of water resources management activities at the local, regional, and State levels is essential to guaranteeing the adequacy of Virginia's water supplies to meet the current and future needs of Virginia's citizens in an environmentally sound manner. In an effort to address these concerns, this report recommends:

- Development of emergency response plans and mutual aid agreements;
- Development of emergency power supplies and coordination with Virginia's electric power utilities for prioritizing small water systems and training operators on the procedure for identifying power failures to improve emergency response;
- Cooperation between local and regional authorities in developing local water supply plans to encourage participation in determining current capacity and long-term needs; and
- Development of a formal Memorandum of Understanding between VDH and DEQ outlining the common goals and coordinated objectives of each agency in ensuring the safety and availability of public water supplies.

Overview of Small Water Systems and Their Regulatory Oversight

In Summary

Small community drinking water systems, those systems providing year-round service to between 25 and 3,300 people, serve about 470,000 Virginians. Virginia's estimated median annual residential water rate for small water systems is \$283. Standards for ensuring clean and reliable drinking water are established by the federal Safe Drinking Water Act (SDWA). The Virginia Department of Health is responsible for implementing SDWA's requirements and four other State agencies also have roles. Limited federal and State data exists to determine the extent to which non-compliance with drinking water standards results in the occurrence of waterborne illness in Virginia.

Senate Joint Resolution (SJR) 82 from the 2006 Session of the General Assembly requires the Joint Legislative Audit and Review Commission (JLARC) "to study very small and small community water systems." The resolution notes that access to clean and reliable drinking water is essential to the health of all Virginians and cites challenges impacting the ability of small systems to meet this need. The resolution is provided in Appendix A.

SJR 82 specifically directs staff to determine whether the needs of Virginia's residents are being met through the existing regulatory framework with regard to both water quality and rates charged. JLARC staff addressed this mandate in part by administering surveys of small system customers and owners and by reviewing system compliance data to identify the challenges faced by small systems in Virginia. Staff also reviewed the Virginia Department of Health's (VDH) performance in implementing federal and State drinking water requirements. An evaluation of the current rate setting regulatory framework was also undertaken, including the performance of the State Corporation Commission (SCC) in approving rates charged by privately owned waterworks. Staff also reviewed the State's efforts to ensure an adequate and safe supply of drinking water. A more detailed discussion of study methods is provided in Appendix B.

VIRGINIA'S SMALL COMMUNITY WATER SYSTEMS

Community water systems, which may be publicly or privately owned and operated, are primarily classified by the characteristics

of the communities served, the number of consumers, and the water source. Together, community characteristics and water sources largely determine the treatment technologies employed prior to distribution to individual consumers.

In Virginia, about 1,100 small community water systems serve approximately 470,000 people, or about eight percent of the State's population. For this review, JLARC staff defined small systems as those serving between 25 and 3,300 people year-round, which is the United States Environmental Protection Agency (EPA) definition for small and very small water systems.

Small Water System Definition

EPA defines public water systems as those systems providing water for human consumption to at least 15 service connections or to at least 25 year-round residents for 60 or more days out of the year. Public water systems are divided into two groups, community and non-community, based on the characteristics of the populations served. Community water systems, the focus of this review, are public water systems that provide water for human consumption to the same population year-round, such as publicly owned water utilities, subdivisions, apartment complexes, manufactured home parks, nursing homes, and correctional institutions. Non-community water systems, which are not addressed in this study, provide water to more limited populations and include such entities such as schools, highway rest areas, motels, and recreation areas.

Private wells are an alternative to public water systems. Approximately 15 percent of Americans rely on such private drinking water supplies, which are not subject to EPA standards. The Virginia Department of Environmental Quality (DEQ) estimates that 500,000 Virginians rely solely on private wells to meet their drinking water needs. Since private wells are unregulated, there is limited oversight of the quality of water provided and the reliability of the water source. Private wells are also not addressed in this study.

More than 95 percent of Virginia's community water systems fall within the very small and small waterworks classification (Table 1). By contrast, the 1,100 small community waterworks serve only eight percent of those Virginians served by community waterworks. Nationally, these numbers are similar. Of the approximately 58,000 community water systems, about nine of every ten are small systems serving 3,300 persons or less. However, these systems serve only about 13 percent of the United States population.

Table 1: VDH Data Indicates There Were 1,090 Permitted Small Systems in Virginia (Spring 2006)

System Size	EPA Classification	Number of Systems	Total Population Served ¹	Percentage of Population Served
Small	25 - 3,300	1,090	474,494	7.6 %
Medium	3,301 - 10,000	72	416,839	6.6
Large	10,001 - 100,000	62	1,829,148	29.1
Very Large	More than 100,000	15	3,566,391	56.7
Total		1,239	6,286,872	100.0 %

¹ Individuals using private wells are not included because these wells are unregulated.

Source: JLARC staff analysis of system and population data provided by VDH, spring 2006.

Small waterworks typically consist of a well house containing the wellhead, a storage tank, and a water treatment system (Figure 1). The picture on the left shows a well house and storage tank. In the foreground of the picture on the right is a container used for adding and mixing chlorine disinfectant to the water supply.

Small Water Systems Are Located Across Virginia

Small water systems are located in all regions of the State. There is considerable variation in the populations served by these systems as well as in the systems' ownership, water source, treatment techniques, and rates charged.

Majority of Small Water System Customers Are in Rural Areas.

While most Virginians are served by large municipal water systems, most small water systems are located in rural Virginia. At

Figure 1: Typical Small Water System Well House, Storage Tank, and Disinfection System (Chlorination)



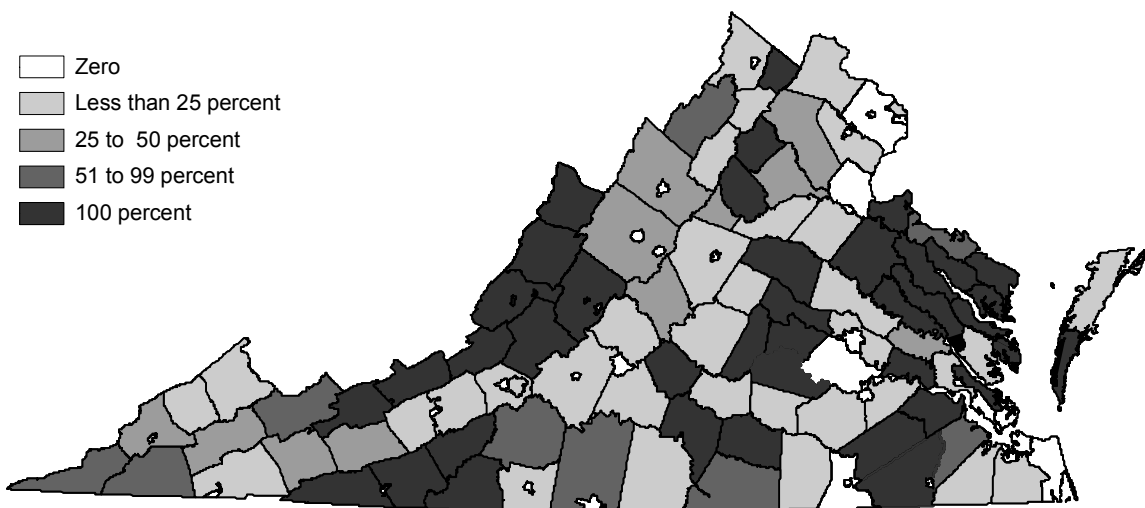
Source: JLARC staff photographs.

least some residents in 95 localities are provided water through small community water systems (Figure 2). Of the populations served by public water supplies (excluding those individuals served by private wells), 49 localities have at least half of their population served by small water systems, and in 39 counties small water systems provide service to all of the population using public water. Customers of regulated water systems in four localities are served only by small private systems.

With 232 systems located there, Virginia's Northern Neck region has the highest concentration of small systems of any region in the State. Although most small systems are located in the Northern Neck, the Southwest and Valley regions contain 46 percent (221,540) of the more than 470,000 small water system customers. In the Southwest region, systems in Tazewell County provide service to the greatest total number of customers at 16,590 and Montgomery County has the most systems at 21.

Private Companies Own the Majority of Small Water Systems. Table 2 illustrates that almost two-thirds of small systems are private (also known as individual and investor owned). In some cases, these systems are built as part of a local subdivision and may be turned over to individuals or homeowner associations. Small investor owned companies may operate a single waterworks (such as a subdivision) or groups of several small systems. Of the privately owned systems, ten companies operate over 200 small systems.

Figure 2: Percentage of Local Population Served by Small Water Systems



Note: Does not include percentage of population served by private wells.

Source: JLARC staff analysis of VDH data.

Table 2: Ownership of Small Systems in Virginia

Type of Owner	Number of Systems	Percentage of Total Systems
Private	662	61 %
Local	402	37
Federal	11	1
State	15	1
Total	1,090	100 %

Source: JLARC staff analysis of VDH's information on the number of permitted systems.

Majority of Small Water System Customers Served by Local Systems. More than one-third of small systems are owned by government entities such as municipalities, local public service authorities, State agencies, and the federal government. Most small system customers are served by these publicly operated systems. The way in which these systems are operated varies, with six localities providing all water through small municipal systems. Many other publicly operated systems have the opportunity to take advantage of economies of scale by operating small systems in addition to a larger core system. For example, James City County owns and operates seven individual systems that each serve less than 3,300 people.

Water Sources and Populations Served Largely Determine Treatment Types

Community water systems provide drinking water to residents from either surface or groundwater supplies. Because both sources of water are susceptible to a variety of different potential contaminants, the water source largely determines how the water is treated prior to its distribution to customers. Additionally, 17 percent of small systems that do not have adequate surface or groundwater supplies provide customers with water purchased from another system's supplies.

Groundwater Is the Main Water Source for Small Systems. Approximately 78 percent of Virginia's small systems provide customers with groundwater from local wells (Table 3). Another 17 percent of systems rely on surface water or purchased surface water for their water supply.

Chlorine Disinfection Is Most Common Treatment Used. Most small systems in Virginia treat their water supply in order to comply with federal requirements. Treatment techniques vary in complexity based on the contaminant being treated. Systems choose from a wide range of processes to meet different purposes. The treatment technology or combination of technologies to be used in a specific

Table 3: Number of Small Community Systems by Water Source

Source	Number of Systems Using Source	Percent of Systems Using Source
Groundwater	854	78%
Purchased Surface Water	136	13
Surface Water	47	4
Groundwater Under the Influence of Surface Water	31	3
Purchased Groundwater Under the Influence of Surface Water	14	1
Purchased Groundwater	8	1
Total	1,090	100%

Source: JLARC staff analysis of system information provided by VDH, spring 2006.

situation depends on the source water quality, the nature of the contaminant to be removed, the desired qualities of the treated water, and the size of the water system.

Among small systems in Virginia, the most common water treatment technique is chlorination; other common techniques include corrosion control, sequestering, and greensand filtration (Table 4). There are currently 373 groundwater systems in Virginia that do not provide any treatment to water prior to distribution to customers. However, these systems are inspected by the Virginia Department of Health (VDH), and water quality is monitored according to State and federal standards.

For the smallest of water systems, point-of-use (POU) and point-of-entry (POE) devices may provide a low-cost alternative to centralized water treatment. POU systems treat only the water at an individual tap. In POE systems, rather than treating all water at a central facility, treatment units are installed at the entry point to individual households or buildings. However, concerns surrounding these devices include the potential health risk posed by not treating all the water in the household (a problem for POU systems), the difficulty and cost of overseeing system operation and maintenance when treatment is not centralized, and liability associated with entering people's homes.

Rates Charged by Small Water Systems Vary

The size, ownership, water sources, and treatment techniques of community water systems determine the rates charged to customers. JLARC staff estimate that Virginia's median rate for residential water service regardless of system size is \$283 annually



Source: JLARC staff photos

Table 4: Types of Water Treatment Technologies

Treatment Type	Objective	Number of Waterworks Using Treatment
Chlorination (top photo at left)	Inactivates microorganisms; pre-treatment oxidation of organic and inorganic compounds	591
Corrosion Control	Adjusts pH to condition water for other treatment processes	161
Sequestering	Prevents oxidation of iron and manganese	88
Greensand Filtration (bottom photo at left)	Removes iron and manganese	73
Conventional Surface Water Treatment	Removes particulates and dissolved organic and inorganic compounds, inactivates microbial contaminants	45
Fluoridation	Promotes dental health; because of complexity of operation, occurs primarily at surface-water treatment plants	43
Membrane Filtration	Removes microbial contaminants	26
Ion Exchange	Softens water (by removing calcium or magnesium ions); removes inorganic compounds, radium, and nitrate	18
Reverse Osmosis	Removes inorganic contaminants	5
Ozone	Limits formation of disinfection by-products	2
Packed Tower Aeration	Removes volatile organic compounds and radon	1

Note: Systems can use more than one treatment and the treatment is largely based on the quality of the water source.

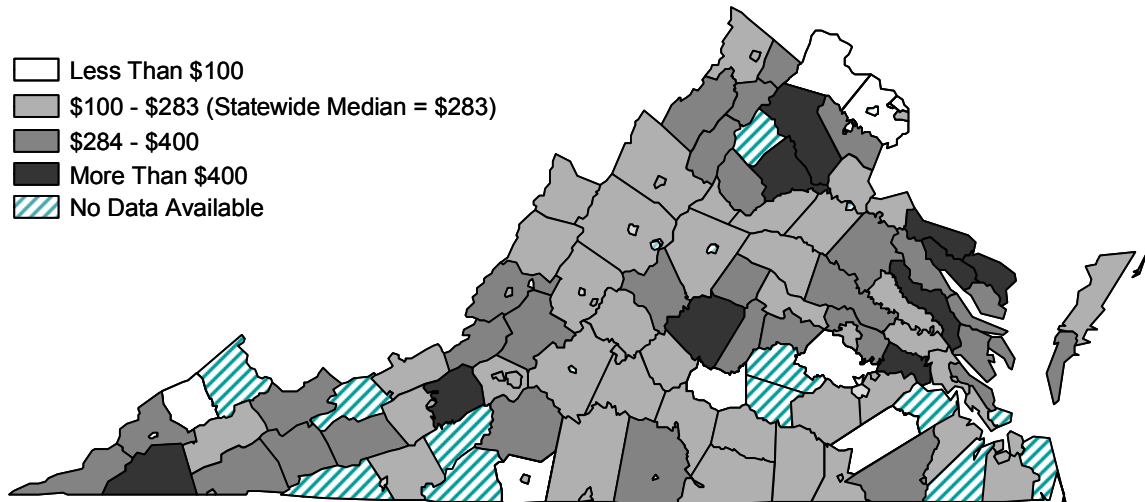
Source: Adapted from *Small Water System Operation and Maintenance*, California State University 2002 and VDH waterworks operator training materials; JLARC staff analysis of system information provided by VDH, spring 2006.

(\$23.50 monthly) for 5,000 gallons per month (Figure 3). Statewide rates vary widely, with estimated residential charges ranging from less than \$50 to more than \$1,100 annually.

Median rates of large systems, which are able to spread costs among a larger rate base, are approximately \$93 less than the statewide median. Small systems serving 3,300 or fewer people had rates \$12 greater than the statewide median of \$283.

System ownership has a limited impact on the rates charged to customers. Small publicly owned system rates are \$75 less than

Figure 3: Estimated Annual Median Residential Water Rates in Virginia



Note: Estimates are based on 5,000 gallons of water usage per month.

Source: JLARC staff analysis of data from the State Corporation Commission; Draper-Aden Associates, JLARC staff survey of system owners.

Average Cost of Drinking Water in the United States

In 2005, the Brookings Institution and American Enterprise Institute reported that the average annual household expenditure for water was \$213 in 2000.

the State median while rates for small investor-owned systems exceed the State median by \$40 annually.

Treatment techniques associated with different types of water sources also impact rates. There are three small private water utilities in Virginia providing customers with treated surface water or groundwater under the influence of surface water. These three systems have higher rates because of the higher costs associated with water treatment. In addition, geographic variations influence the water source and contaminants that may occur and resulting treatments. Additionally, costs of compliance with VDH (and in some instances, the SCC) regulations can increase the rates charged to customers.

As illustrated in Table 5, there is some regional variation in median rates charged regardless of system size. (The regional boundaries listed correspond to VDH regional boundaries that are discussed later in this chapter.) Median rates in regions with higher percentages of small systems (Richmond and Northern Neck, Southwest, and Culpeper) charge slightly higher amounts than areas in the eastern part of the State, which have higher concentrations of larger public systems. Systems in Tidewater have one of the lowest median bills and are primarily comprised of the urban areas of Hampton Roads. Currently, the highest rates charged in Virginia (more than \$1,100 annually) are charged by a small investor-owned system in Culpeper that recently raised rates in an effort to address water quality concerns.

Table 5: Estimated Annual Median Water Bill of Customers by Region

Area of State	Estimated Annual Median Bill
Southwest	\$312
Richmond and Northern Neck	295
Culpeper and Northern Virginia	269
Valley	251
Tidewater	216
Southside	192

Note: Estimated annual bills are based on 5,000 gallons of water usage per month.

Source: JLARC staff analysis of data from the State Corporation Commission, Draper-Aden Associates, and JLARC staff survey of system owners.

REGULATORY FRAMEWORK FOR DRINKING WATER OVERSIGHT

The federal Safe Drinking Water Act (SDWA) sets the standards that states must meet to ensure clean and reliable drinking water. VDH is responsible for oversight of the State's drinking water program, including ensuring the State's supply of clean drinking water through on-site inspections, water quality analysis, and taking enforcement action when necessary. State entities have roles in overseeing parts of the drinking water program, and many other non-state organizations assist with this effort.

Federal Safe Drinking Water Act and EPA Establish Regulatory Framework

The SDWA exists to ensure the quality of drinking water provided by approximately 166,000 public systems nationwide. Under SDWA, EPA sets water quality standards and oversees the states, localities, and water suppliers who implement these standards.

Due to new public health information and scientific and regulatory concepts, the SDWA has increased the number of contaminants regulated under the Act and lowered the maximum allowable level of some regulated contaminants since its passage in 1974. Congress amended SDWA to move beyond after-the-fact analysis of water samples to a program that addresses protecting the water supply from the source to the tap. SDWA amendments create a "multi-barrier" approach focusing on protecting water at its source, developing the capacities of systems owners and the systems to provide safe and reliable drinking water, providing consumers with more information about their drinking water, and providing funding assistance to water systems and state safe drinking water programs (Table 6).

Table 6: Key Components of the Safe Drinking Water Act

- Requires EPA to set maximum contaminant levels for primary and secondary standards
- Establishes the Surface Water Treatment Rule and the Total Coliform Rule, creating specific treatment and monitoring requirements that must be followed by all public water treatment works
- Requires EPA to provide a Drinking Water Priority List of contaminants in drinking water that may be harmful to human health
- Requires development of criteria under which water treatment systems using surface water would be required to use filtration
- Requires every state to assess drinking water sources to identify significant potential threats of contamination and to determine the susceptibility of water to these threats
- Requires small community water systems to prepare and distribute Consumer Confidence Reports
- Requires public water systems to incorporate disinfection under criteria set by the EPA
- Creates a Drinking Water State Revolving Fund for states to use to help water systems make infrastructure or management improvements or to help systems assess and protect source water
- Establishes certification requirements for water system operators based on EPA minimum standards
- Allows small systems to receive special consideration and resources to guarantee technical, financial, and managerial abilities needed to comply with drinking water standards

Source: JLARC staff analysis of the federal Safe Drinking Water Act.

SDWA sets national contaminant-based drinking water standards, including both primary and secondary standards. Primary drinking water standards address adverse health effects and consist of maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs). MCLs are enforceable limits set as close to MCLGs as possible, considering cost and feasibility of attainment.

Secondary standards are guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as unpleasant taste, odor, or color) in drinking water but that do not present major health risks. Most complaints focus on secondary standards because these are more recognizable than primary standards. For example, the presence of iron and manganese, a problem in several Virginia small systems, is easily recognized since it turns the water a rusty color, has a metallic taste, and can stain laundry and fixtures, but at most levels it does not present a substantial health risk.

While regulations are developed at the federal level, the SDWA allows states to seek EPA approval to administer their own public water supervision program. All states, except Wyoming, have primacy for their programs. To gain this approval, Virginia adopted drinking water regulations that are as stringent as the federal regulations and has demonstrated that it can enforce the program requirements.

Office of Drinking Water Is Organized Into a Central Office and Six Field Offices

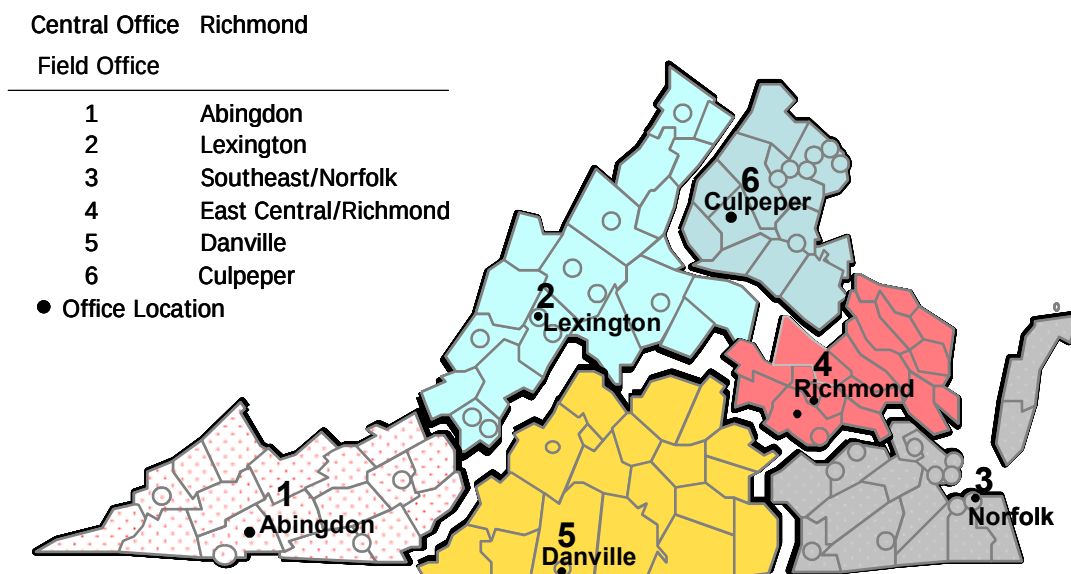
Administration of the State's drinking water program is organized within VDH's Office of Drinking Water (ODW). The office is comprised of 116 full time equivalent (FTE) positions, of which 22 are allocated to the central office in Richmond, with the remaining positions spread among the six field offices (Figure 4).

Federal sources accounted for 41 percent of the office's funding in 2005, and fees from water systems (38 percent) and the State General Fund (21 percent) accounted for the rest of the recurring funds. ODW also received almost \$9 million in one-time grants during 2005 (Figure 5).

Staff in the central office, which includes a small water systems coordinator position, provide management, administrative and training support to ODW field staff and waterworks owners and operators. They also interpret federal policy directives and set the policy direction of the office. Enforcement actions are taken by the central office. Staff in the six field offices provide direct services to the water systems, such as reviewing engineering plans, providing technical assistance, and performing on-site inspections.

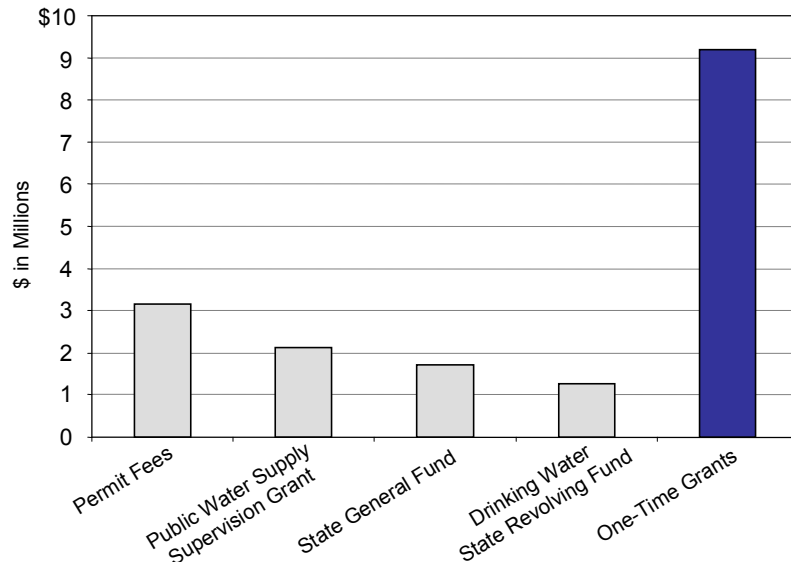
Because the great majority of systems in the Commonwealth are small water systems, these systems receive most of the oversight attention. Small systems require inspections and review of water sample results, and other activities just like large systems. Fur-

Figure 4: Organization of the Office of Drinking Water Is Comprised of Six Regions



Source: Virginia Department of Health.

Figure 5: More than Half of ODW's \$17 Million in 2005 Funding Was From One-Time Grants



Note: One-time grants include financial assistance through State contributions (\$4.5 million), federal operator certification grant (\$3.6 million), federal security grant (\$707,000), and State dedicated special funds (\$381,000).

Source: Virginia Department of Health.

thermore, small systems generally require greater technical assistance from ODW than large systems.

In addition to VDH staff, an advisory panel allows for system owner input in the development of statewide policies. The Waterworks Advisory Committee is established within the Virginia Waterworks Regulations as an advisory board to the VDH commissioner. The committee makes recommendations to the commissioner regarding waterworks and water supply policies, procedures, and programs. Committee members include ODW staff and a diverse group of waterworks stakeholders from throughout the State, and the committee meets every other month.

Role of ODW Is to Ensure Quality of Drinking Water

How ODW views its role in protecting water quality is captured by the office's mission statement.

[ODW is] committed to protecting public health by ensuring that all people in Virginia have access to an adequate supply of affordable, safe drinking water that meets federal and state drinking water standards.

The office implements its mission by

- approving new water system designs;
- providing training and technical assistance;
- funding new construction and maintenance of existing facilities;
- ensuring that water systems test for contaminants;
- conducting on-site inspections; and
- enforcing State and federal water quality standards.

ODW Issues Operating Permits for All Public Water Systems. ODW issues operating permits to public water systems based on a technical review of engineering plans and specifications. In addition, new water systems are required to submit a comprehensive business plan that details the technical, financial, and managerial (TFM) capacity of the owner, including financial data projecting expenses and revenues. ODW uses this permitting process to try to prevent the establishment of waterworks with insufficient TFM capacities.

Technical Assistance and Training Are Provided to Assist Owners in Complying with the Safe Drinking Water Act. Developing competent system operators is critical to operating a successful waterworks. ODW offers technical assistance to proactively help waterworks identify and resolve drinking water issues. The office also educates owners and operators about SDWA regulatory and monitoring requirements to ensure that the drinking water meets applicable standards. ODW staff also coordinate and provide training opportunities to operators.

ODW Allocates Federal and State Funding to Assist Systems in Meeting Regulations. ODW provides funding to small water systems from two sources: the federal Drinking Water State Revolving Fund (DWSRF) and the State Water Supply Assistance Grant (WSAG). The DWSRF provides loans and grants to water systems for planning and construction, as well as funding to the states for operating their drinking water programs. Between 1998 and 2005, ODW allocated more than \$130 million in DWSRF monies to water systems in Virginia. In addition, ODW administers WSAG grants for planning and construction activities and to serve as a source of revenue or security for bonds.

Field Office Staff Monitor Water Quality Compliance by Reviewing Lab Analyses. Federal law requires systems to regularly submit water samples to certified laboratories for analysis. ODW staff review these monitoring results for compliance with established contaminant levels and review the monitoring schedules to ensure

samples are collected at proper frequencies and from proper sampling locations.

Field Offices Conduct Sanitary Surveys of Water Systems on a Fixed Schedule. Environmental inspectors in each VDH field office conduct sanitary surveys to assess each facility's capacity to produce safe drinking water. These surveys consist of (1) a file review of past monitoring results, previous inspections, and compliance history and (2) an on-site inspection of the systems' infrastructure and treatment methods. ODW inspectors summarize their findings, including identified deficiencies, in a letter to the system owner. Currently, SDWA establishes an inspection frequency only for systems using surface water (36 months). ODW has established its own goals for how often inspections should occur. For example, groundwater systems, which constitute most small systems in Virginia, are to be inspected at least once every 24 months.

ODW Enforces Federal and State Drinking Water Regulations and Standards. ODW is authorized to take enforcement action against water systems that violate SDWA. Field office staff are responsible for reporting situations that warrant enforcement action to the central office compliance staff. The office's enforcement philosophy is to achieve compliance using means proportional to the alleged violation and in conjunction with the facility's compliance history, while recognizing the need to protect human health and the environment.

Other State and Non-State Entities Have Complementary Roles in Overseeing and Assisting Small Water Systems

In addition to VDH, other State agencies and non-State organizations play a role in the State's drinking water efforts (Table 7). While VDH assumes primary responsibility for the regulation of waterworks, the State Corporation Commission (SCC) has primary regulatory authority for approving the rates charged by privately owned waterworks which furnish water to 50 or more connections. Within the SCC, the division of Public Utility Accounting reviews rate applications and provides the SCC commissioners with accounting and financial information to use when deliberating utility cases involving rates and services.

Several other State agencies play smaller roles in overseeing various components of public water systems. Licensing of individual waterworks operators is under the purview of the Department of Professional and Occupational Regulation. Additionally, the Department of Environmental Quality approves applications for groundwater removal in designated groundwater management areas. The Division of Consolidated Laboratory Services, a division of

Table 7: Entities Other Than VDH Involved With Drinking Water Systems in Virginia

Entity	Role
State	
State Corporation Commission	Regulates water rates for private companies which furnish water to 50 or more service connections.
Department of Professional and Occupational Regulation	Regulates individuals who operate water systems.
Department of Environmental Quality	Regulates statewide water supplies and is responsible for approving applications for groundwater removal.
Division of Consolidated Laboratory Services	Performs testing on water samples.
Department of Conservation and Recreation	Assists in regulating the safety of dams in systems using surface water impoundments.
Local	
Local Governments	May operate small water systems or establish local water authorities for system operation. May adopt local zoning and subdivision ordinances impacting water systems.
Planning Districts	Can be responsible for performing regional water supply planning. May provide technical assistance to owners.
Other	
Virginia Rural Water Association	Sponsors training programs and offers on-site technical and managerial assistance to meet the needs of small systems.
Virginia Center for Very Small Water Systems	Provides information, training, and reimbursement to small system operators.
Virginia Water Resources Research Center	Performs research on small systems in Virginia.
Southeast Rural Community Assistance Partnership	Assists small communities needing aid in upgrading their water systems. Provides training and technical assistance for operation and maintenance of small systems.
American Waterworks Association	Provides training opportunities.

Source: JLARC staff analysis.

the Department of General Services, tests water samples submitted by waterworks.

Local governments also have a role. The application of local zoning and subdivision ordinances is one way localities have some control over water systems. The *Code of Virginia* also allows local governing bodies to condemn and acquire existing water systems under certain conditions.

Other non-State entities are involved with water systems. The Virginia Rural Water Association and the Virginia Center for Very Small Water Systems (VCVSWS) sponsor training programs and offer on-site technical and managerial assistance to meet the needs of small water systems, with VCVSWS focusing on systems that provide no treatment and serve fewer than 400 people. In addition, the Virginia Water Resources Research Center at Virginia Tech provides academic research on water resource issues and assists in the annual training conference for system operators.

FEW OUTBREAKS OF WATERBORNE ILLNESSES REPORTED IN VIRGINIA

VDH provides monthly and annual surveillance reports on diseases in Virginia. Reports issued from 1999 through 2004 found only two potential waterborne outbreaks. According to VDH, 22 people became ill as a result of an outbreak in 2004, four of whom were hospitalized.

Nationally, limited data exists on the health impacts related to small drinking water systems. Most of the data comes from the Centers for Disease Control and Prevention (CDC), which works with EPA and state health departments in coordinating surveillance and recording incidents and characteristics of waterborne disease outbreaks. The CDC maintains a Waterborne Outbreak Surveillance System, which is voluntary, paper-based, and unfunded. Because of these conditions, it appears that outbreaks may be vastly underreported, according to CDC reports.

Literature indicates that the potential of a waterborne illness is higher among small systems, especially those that do not routinely monitor contaminants or provide chlorine disinfection. For very small systems, treatment may not be a feasible alternative because of the high cost of having a treatment system designed and installed and the complexity of maintaining it.

Based on the most recent CDC data, community water systems of all sizes were responsible for 49 percent of the cases related to waterborne illnesses from 1991 to 2000 (Table 8). However, a 1993 *Cryptosporidium* outbreak in Milwaukee accounts for 95 percent of the waterborne illnesses attributable to community water systems.

Table 8: More Than 860,000 Cases of Waterborne Illnesses Were Recorded Nationally Between 1991 and 2000

Type of System	Outbreaks	Cases
Community Water Systems	57	422,364 ¹
Non-Community Water Systems	64	8,934
Individual Water Systems	34	431,846
Total	155	863,144

¹ More than 403,000 of these cases are related to a 1993 outbreak in Milwaukee of *Cryptosporidium*, which causes severe and prolonged diarrhea.

Source: EPA, *Much Effort and Resources Needed to Help Small Drinking Water Systems Overcome Challenges*, May 2006.

Performance of Small Water Systems Is Mixed

In Summary

Research has indicated that small systems with inadequate technical, financial, and managerial capacities have difficulty meeting the increasing number of federal drinking water standards. To examine the general quality of water service delivery provided by Virginia's small systems, JLARC staff (1) surveyed a sample of system customers in selected localities, (2) surveyed small system owners and operators, and (3) reviewed available data on the extent of health-based water violations by small and large water systems since 2001. The evidence reviewed suggests that a majority of small water systems are able to reliably deliver water which meets water quality standards. However, some small systems are unable to consistently deliver water to customers or meet water quality standards. Also, among private system owners responding to the survey, 56 percent reported that, given the opportunity, they would choose not to operate their systems. While some small water systems are operated without any health-based water quality violations, other systems are characterized by repeated violations of the same standards without correction.

The struggles of small water systems in the United States have been the topic of much research and review. To evaluate the impact of Virginia's current regulatory framework on small community water systems, JLARC staff developed survey instruments to gauge opinions of small water system customers and small water system owners and operators. JLARC staff also assessed system performance through an examination of the number and type of violations issued.

CHALLENGES FACED BY SMALL SYSTEMS IMPACT SYSTEM PERFORMANCE

National research has repeatedly found that small water systems have greater rates of noncompliance than large systems, as measured by the number of violations issued. This difference is due in large part to the technical, financial, and managerial challenges faced by small systems in meeting federal and state drinking water standards.

Small Systems Violate Standards More Than Large Systems Nationally

Nationally, small water systems provide drinking water to only about two percent of the U.S. population but account for 84 percent of all community systems. At the same time, EPA violation statis-

tics indicate that non-compliance with drinking water regulations increases as system size decreases. EPA data may understate the number of actual violations. EPA noted as part of its routine data verification audits and triennial national summary evaluations in 2003 that only 65 percent of the apparent MCL violations and 23 percent of the apparent monitoring and reporting violations had been reported in 2005. As a result, the potential exists that more violations are occurring.

Increases in both the stringency of drinking water regulations and the number of small community water systems over the past three decades have compounded the problem of providing safe drinking water to small communities. For example, the number of water systems in the United States serving 500 or fewer people increased seven-fold, from 5,000 to more than 35,000, between 1963 and 1993; the number of systems serving 501 to 10,000 people increased by more than 60 percent.

Technical, Financial, and Managerial Challenges Are Common Among Small Systems

According to EPA, successful water systems demonstrate adequate technical, financial, and managerial (TFM) capacities (Table 9). Well-run systems have public health benefits. These types of systems have a certified operator who is knowledgeable of the system’s operations as well as potential source contaminants. These systems also communicate with the public through annual consumer confidence reports or, if a violation occurs, through public notices. These systems have developed financial capacities to manage assets and recover operating costs, necessary repairs, and up-

Table 9: Technical, Financial, and Managerial Capacities of Water Systems

Qualities	Examples of Successful Capacity
Technical capacity is the ability of a water system to construct, operate, and maintain a water plant and delivery system that meets regulated standards.	• Submitting properly obtained water samples • Reviewing the adequacy of infrastructure (including treatment and storage) • Fixing or repairing problems
Financial capacity is the ability of a water supply to control its financial concerns, including revenue sufficiency, access to capital for improvement or expansion, and fiscal management.	• Maintaining adequate reserve funds • Increasing rates when necessary • Obtaining necessary financial assistance
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.	• Recruiting and training staff • Developing a business plan • Completing an assessment of the vulnerability of the water source to contamination

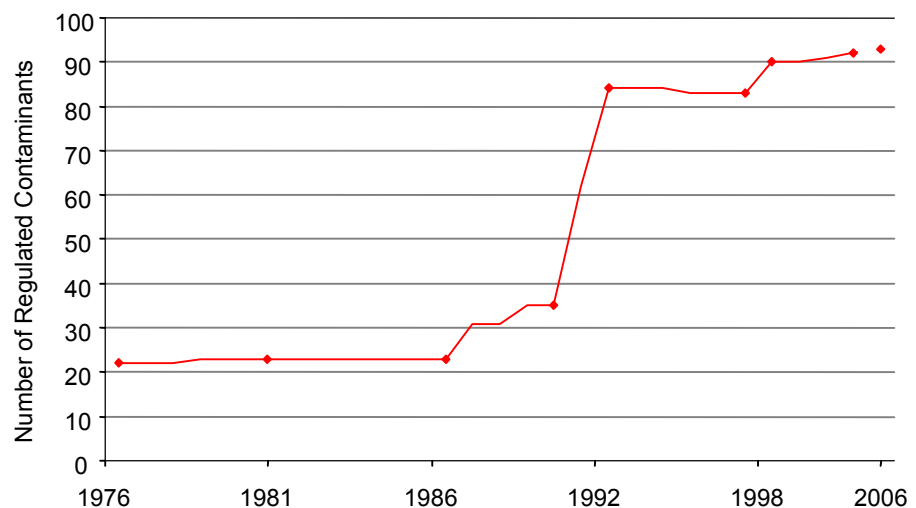
Source: EPA, *Initial Summary of Current State Capacity Development Activities*, August 1997.

grades. Experts are concerned about whether small systems possess adequate TFM capacities to remain in compliance with federal and state regulations.

Technical Challenges Impact a System's Ability to Operate a Waterworks. To address the condition of the physical components of the drinking water system and its water sources, small systems must acquire the necessary technical capacities. Those systems that fail to do so will be challenged to effectively manage system components, treatment facilities, sources, and storage. A U.S. Government Accountability Office report found mounting evidence that the integrity of the nation's drinking water is at risk without a concerted effort to develop technical capacities to improve the condition of key assets and a significant investment in maintaining, rehabilitating, and replacing these assets.

One way in which meeting technical challenges is becoming more difficult is the increase in drinking water standards. Since the inception of SDWA, the number of contaminants regulated by federal drinking water standards increased from fewer than 20 to more than 90 (Figure 6). Technical capacity includes the ability to properly sample water quality at the required times. Increasing the number of contaminants that must be monitored puts pressure on the operator to correctly sample the water and meet sampling schedules.

Figure 6: Water Systems Must Monitor an Increasing Number of Contaminants to Remain in Compliance



Note: Data not available for 2002-2005.

Source: Environmental Protection Agency, *Drinking Water Contaminants*, http://www.epa.gov/safewater/contaminants/pdf/contam_timeline.pdf and VDH Office of Drinking Water.

Small Systems Must Develop Adequate Financial Capacity. Financial capacity is assessed by examining both the fiscal condition and the financial management of a system. In 1997, NRC found that

small communities have the greatest difficulty in supplying water of adequate quality and quantity because they have small customer bases and therefore often lack the revenues needed to hire experienced managers and to maintain and upgrade their water supply facilities.

A water system with adequate fiscal capacity has rates that recover the full cost of providing water and the ability to raise enough revenues to meet expenses for the current year and future years.

In recent years, increased monitoring frequencies and stricter maximum contaminant levels (MCLs) have increased the financial challenges facing small systems by requiring them to submit more samples for analysis and, in some cases, purchase new treatment equipment. The potential financial burden of a new regulation is shown in the following example from Washington State:

Case Study

A small system was required to install technology treatment to reduce arsenic levels. The cost per customer associated with the installation and ongoing operation and maintenance of the various treatment options is considerably greater for the small systems. To install and operate the treatment, for example, customers on a system serving 50 connections face an increased cost of about \$30 per month while the increase for those on a system serving 500 connections would be about \$10 per month.

Managerial Challenges Face Small Systems. Managerial capacity has been recognized for some time as a key component to successful water system operation. The result of good management capacity is a system which operates in a trouble-free manner while providing affordable drinking water to its customers.

In 2003, the Association of State Drinking Water Administrators found two major managerial challenges: high turnover of system operators and a lack of specialized expertise needed to reliably ensure compliance. While the new operator certification program has helped, many small systems still may have difficulty resolving more complex compliance problems.

A 2005 EPA report, *Progress Report on Drinking Water Protection Efforts*, also addressed limitations of managerial capacities. The report found small systems are acutely affected because their man-

agement many times is in the hands of a few individuals for whom a drinking water operation is not their sole occupation. Consequently, small systems are hard pressed to evaluate needs, make improvements, raise capital, and take other steps to meet new drinking water standards.

EPA Has Focused Efforts on Developing Small System Capacity in Meeting TFM Challenges

The 1996 amendments to SDWA sought to improve small water system TFM capacities. The amendments were designed to enable smaller systems facing more protective public health standards to stretch their resources and technical expertise. The amendments addressed two key issues:

- the need for the state authority to ensure that all new community water systems have the TFM capacities for regulatory compliance, and
- the need for state capacity development strategies to assist existing systems in acquiring and maintaining adequate TFM capacities.

States failing to develop and implement such programs were threatened with losing up to 20 percent of their Drinking Water State Revolving Funds allotment of federal funds.

EPA's 2005 *Progress Report* indicated that substantial progress has been made in developing the TFM capacities of small systems. Specifically, the report noted more water systems employ trained and certified operators, and operators are receiving an increased amount of TFM capacity assistance. Despite the progress made, not all systems are taking advantage of available assistance. In particular, the report concludes water systems may not be interested in developing managerial and financial capacities until they are required to do so as part of a request for funding assistance. Further, there is a lack of guidance on what constitutes adequate managerial and financial capacity.

SURVEYED CUSTOMERS INDICATE GENERAL SATISFACTION WITH THEIR WATER SYSTEM

In order to assess the impact of the current regulatory framework for small water systems on their customers, JLARC staff surveyed 1,678 small water system customers from across the State and received 353 responses (Appendix C). Respondents to this survey were from both privately and publicly operated systems, and responses were largely positive. Overall, 74 percent of small system customers were satisfied with the quality of water provided and

the ability of their water system to meet their expectations. Similarly, 69 percent of respondents felt that their water was affordable although some individual customers may find rates unaffordable. However, there was variation in the responses between customers of publicly and privately operated systems—with customers of several privately owned systems having largely negative responses.

Customers Rated Water Quality and Operator Performance Highly, but Some Localized Concerns Exist

Customers responding to the survey largely feel that the performance of their water system is dependable, with more than 90 percent of respondents indicating they had experienced fewer than five service interruptions in the past 18 months (more than half reported that they had not experienced any interruption in service). Additionally, most small water system customers had not experienced any water quality or taste concerns. Of those responses identifying concern with current water service, the majority were from customers of privately operated systems who raised concerns about issues of water quality (such as appearance) and taste.

Customers also indicated a large degree of support for their system owner. Almost three-quarters of customer survey respondents indicated that they felt their water system operator did a good or very good job at providing quality drinking water, and 74 percent indicated that their current system was good or better in meeting their overall expectations. Those respondents that had identified concerns with the knowledge, skills, and abilities of their system operator were predominately customers of several small private systems. Further illustrating the overall positive response to water quality and operator concerns, 75 percent of customers had not contacted their system operator with water quality concerns, and over 90 percent had not contacted VDH.

Rates Considered Affordable but With Some Concerns About Rate-Setting Process

Similar to the overall satisfaction with water system performance, 69 percent of customer survey respondents indicated that their current water rates were affordable. There was limited variation in responses to questions of affordability between customers of publicly and privately owned systems. Concerns regarding the affordability of rates charged were localized in a few systems, and comments largely focused on the ability of older or fixed-income customers to pay.

The most common concerns raised by small system customers were related to the rate-setting process. In particular, customers expressed concern with the communication of information regarding the necessity of rate increases and the timeliness of public notification prior to rate increases going into effect. Public system customers were more likely to report that they were able to provide input into the rate-setting process.

Higher Satisfaction Levels Were Reported by Customers of Public Systems

Respondents who receive water from small publicly owned systems responded positively to questions of water quality, system performance, operator ability, and rate affordability. These respondents reported fewer instances of interruptions in service, water quality, and taste concerns. These customers also reported higher levels of satisfaction with the performance of their system operator and with the water system meeting their overall expectations.

OWNERS INDICATE MEETING WATER QUALITY STANDARDS IS CHALLENGING

JLARC staff surveyed 599 owners and operators of small water systems in Virginia about the challenges of owning and operating a small community water system; the response rate was 32 percent (Appendix D). Results indicated that small systems face numerous technical, financial, and managerial (TFM) challenges in operating and maintaining their systems and meeting regulatory guidelines.

Technical Issues Impact Small Systems' Ability to Meet Water Quality Standards

Technical challenges, such as the condition of the system's equipment and taking required samples, impact the ability of a system to meet water quality standards. Twenty-four percent of private system respondents reported that meeting water quality standards is a moderate to major challenge (Table 10). A survey respondent commented that water quality standards are overly stringent and that compliance with current regulations is onerous for a small community waterworks. The owner also said that many of the required tests are excessive and too expensive for the size of the system.

More than one-third of respondents reported moderate to major challenges maintaining their equipment. For instance, owners identified as moderate or major challenges maintaining their distribution system (47 percent), tanks and equipment (44 percent), or their building or water storage shed (35 percent). Maintaining

Table 10: Twenty-four Percent of Small Private System Owners Report Moderate or Major Challenges Meeting Water Quality Standards

Significance of Challenge	Operators of Public Systems	Owners of Private Systems	Owners or Operators of Both Public and Private Systems
Not an Issue	53%	52%	38%
Minor	29	24	38
Moderate	12	12	25
Major	6	12	0
Total	100%	100%	101%

Note: Owners and operators may be responsible for multiple systems. Survey question asked respondents to answer the challenges faced in "meeting all applicable drinking water quality standards." Percentage does not equal 100 due to rounding. Owners or operators of 49 public systems, 131 private systems, and eight public and private systems responded to this question.

Source: JLARC staff survey of water system owners and operators, summer 2006.

the condition of the water supply equipment is important because failures can result in contaminants entering the system. For example, low water pressure caused by a leaking distribution system can allow contaminants to enter a system through backflow.

Hiring and Retaining Adequate Staff Is Vital to Addressing Managerial Challenges

One of the most difficult managerial challenges for small systems is the hiring and retention of qualified staff. Thirty-one percent of private water system owners responding to the JLARC staff survey cite hiring a qualified operator as a moderate or major problem. Moreover, 22 percent of these owners report a moderate or major challenge in the retention of their employees. For example, a small system owner expressed frustration that once operators get certified, they leave for another system.

Small Systems Must Develop Financial Capacity to Maintain and Improve Their System

Based on JLARC staff survey results, addressing financial challenges, such as the need to initiate rate increases, is a major issue for public and private systems. Of the 179 survey respondents to the relevant question, half (50 percent) indicated raising rates as a moderate or major challenge. A greater percentage of public systems (59 percent) reported increasing rates as a challenge than privately owned systems (44 percent).

Owners who feel challenged in increasing rates have the option of pursuing loans or grants to finance necessary upgrades or improvements. However, 53 percent of owners responding to the JLARC staff survey indicated that obtaining financial assistance

to help with planning or upgrades is a moderate or major challenge. A small system owner commented that his system does not qualify for loans or grants because of the higher than average income of his customers. Consequently, his only option is to continue to increase the rates.

At least four of every ten survey respondents indicated a moderate or major challenge in meeting other financial challenges such as covering operating costs under the current rate structure, maintaining adequate reserve funds, and paying for capital improvements.

Majority of Responding Private Systems Owners Would Choose to Leave Waterworks Operations

More than half (56 percent) of private system owners responding to the JLARC staff survey indicated that, if given the choice, they would not continue to own and/or operate their water system.

As a result of these TFM challenges many private owners are frustrated and may no longer be interested in operating their waterworks. More than half (56 percent) of the 99 private system owners responding to the JLARC staff survey indicated that, if given the choice, they would not continue to own and/or operate their water system.

While the survey responses did not indicate why owners of private systems feel this way, some potential reasons exist. For example, for some owners, owning and operating a water system is not their full-time job. Instead, they check on the system when they have time. Another reason might be that increasing technological and managerial requirements make operating a waterworks more difficult and more costly. Meeting increasingly strict water quality standards means installing costly treatment systems, as well as hiring someone to operate them, in some cases.

SMALL SYSTEMS ACCOUNT FOR MOST WATERWORKS AND MOST VIOLATIONS

EPA classifies violations of drinking water standards into five major categories: MCLs, treatment technique, monitoring, public notification, and reporting. EPA considers MCL and treatment technique violations to be the most serious and refers to them as health-based violations due to their potential for (1) acute and immediate impact on public health and (2) chronic effects derived from many years of consumption. MCLs represent the maximum amount of a contaminant allowed in water delivered to a user of any public system. Treatment techniques are the required treatment procedure or level of technological performance set when there is no reliable method to measure a contaminant at very low levels.

Monitoring violations occur when a system does not submit a water sample for analysis or does not submit a sample within the correct time frame. Because of the acute and long-term public health effects of drinking contaminated water, failing to monitor has the potential to significantly impact public health. Consumers who drink water from systems that are not adequately monitoring for water contaminants may be at risk, but the extent of any possible exposures in violations of drinking water standards and their associated risks would be unknown.

A violation of the public notification requirement occurs when a system fails to inform its customers that certain violations have been identified. Under SDWA, failing to submit a required report to customers documenting the water source and any water quality violations that may have occurred results in a reporting violation.

JLARC staff reviewed data on violations issued to community water systems since 2001, including violations of health-based and monitoring standards. While EPA considers health-based violations to be the most serious, monitoring violations can also be indicative of a troubled water system, and such violations also make it difficult to accurately measure how well the systems are performing.

Small Systems Account for Most Monitoring Violations Per System

Small systems comprise 89 percent of waterworks in Virginia, and they accounted for about 94 percent of the violations issued since 2001. While small and large systems were issued roughly the same proportion of health-based violations when controlling for system size, on a per system basis, small systems were issued almost four times the number of monitoring violations as large systems.

Health-Based Violations Roughly Equal When Controlling for System Size. On a per system basis, small and large systems were issued roughly equal amounts of health-based violations (Table 11). Analysis of violations by system type found that there were roughly 1.39 health-based violations issued per small system and 1.13 health-based violations issued per large system.

Fluoride

Fluoride is an inorganic chemical that in excess may lead to bone disease and cause mottled teeth in children.

Among small systems, MCL violations of fluoride and total coliform standards are the main cause of health-based violations. JLARC staff analysis found that 47 percent of all 1,518 health-based violations issued to small systems could be traced to fluoride issues at waterworks located in portions of Tidewater, where naturally occurring fluoride is a problem (Table 12). In 2005, VDH issued 120 fluoride-related notices of violations (NOVs), down from a high of 193 in 2002. The State has sought to get systems with high

Table 11: On a Per System Basis, Health-Based Violations Are About Equal, but Small Systems Account for Most Monitoring Violations Since 2001

Violation Category	Violations Issued per Small System	Violations Issued per Large System	Total Violations Issued
Health-Based	1.39	1.13	1,686
<i>Maximum Contaminant Level</i>	1.27	1.03	1,540
<i>Treatment Technique</i>	0.12	0.10	146
Monitoring	4.15	1.37	4,724
Public Notice	0.07	0.00	74
Reporting	0.19	0.01	204
Total	5.79	2.50	6,688

Source: JLARC staff analysis of data provided by VDH, August 2006.

fluoride levels to correct these problems, but treatments to remove excess fluoride can be expensive. Since 2001, 56 systems have been issued at least one violation for fluoride, and ODW has entered into 35 consent orders to address improvements.

Total Coliform

The presence of total coliform in drinking water, while not a disease-causing problem by itself, is an indicator of potentially harmful bacteria, such as fecal coliforms and *Escherichia coli* (*E. coli*). Drinking water contaminated by these harmful bacteria may result in diarrhea, nausea, and cramps.

Small systems were also issued 532 violations for exceeding total coliform limits, and account for 35 percent of the health-based violations issued to small systems. Analysis found that 116 small waterworks received multiple total coliform violations, with two systems receiving ten violations each since 2001. (More than 1,100 violations were issued for failure to monitor for total coliform.)

Small Systems Receive Much Greater Proportion of Monitoring Violations. Ninety-six percent of the more than 4,700 monitoring violations have been issued by VDH to small waterworks since 2001. In addition to receiving the most monitoring violations, small systems received the most monitoring violations per system. ODW issued slightly more than four (4.15) violations per small system,

Table 12: Fluoride and Total Coliform Account for Most Health-Based Violations Since 2001

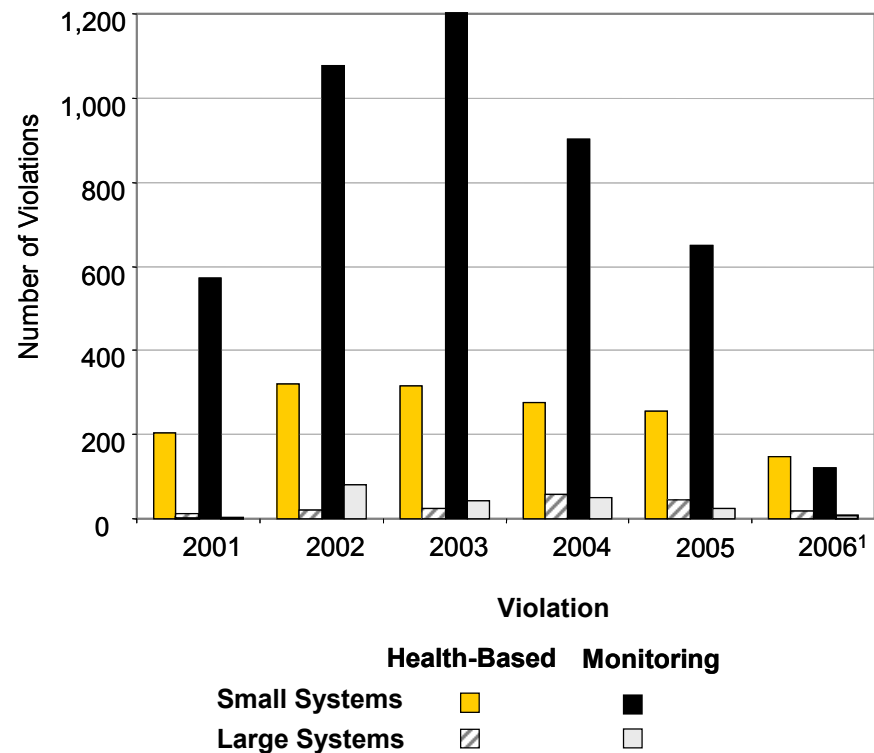
ODW Region	Number of Health-Based Violations	Number of Health-Based Violations Related to Fluoride	Number of Health-Based Violations Related to Total Coliform
Abingdon	112	0	40
Lexington (Valley)	142	0	102
Norfolk (Tidewater)	852	717	128
Richmond	87	0	76
Danville	148	1	73
Culpeper	177	0	113
Total	1,518	718	532

Source: JLARC staff analysis of data provided by VDH, August 2006.

while large systems were issued approximately one (1.37) monitoring violation per system. Moreover, small systems tend to repeatedly fail to meet monitoring requirements. More than 325 small systems received at least two monitoring violations, and five were issued more than 100 monitoring violations each. Missed organic chemicals monitoring comprised the majority of monitoring violations issued to the five systems.

The number of monitoring violations issued to small systems peaked in 2003 at just more than 1,200, and has fallen by almost half since then (Figure 7). According to ODW staff, increased monitoring violations during that time are the result of Virginia's implementation of a fee for water sample analysis performed by the Division of Consolidated Laboratory Services. This change resulted in many operators not collecting samples because they were not experienced with doing so or were not experienced with handling invoices and paying for services.

Figure 7: Monitoring Violations Issued to Small Systems Vary By Year



¹ Through August 1, 2006.

Source: JLARC staff analysis of VDH data.

VDH Oversight of Small Water Systems Could Be Improved

In Summary

The Virginia Department of Health's (VDH) performance in implementing and overseeing federal and State drinking water standards is mixed with regard to systems serving 3,300 or fewer people. VDH's efforts at assisting systems have been good, and EPA has lauded the extent to which federal drinking water funds within VDH's control have been provided to small water community and disadvantaged water systems. The majority of small water systems have a record of good compliance with waterworks standards, but there are some systems with a pattern of multiple violations of standards or of ignoring required improvements. Efforts by VDH and the Office of the Attorney General to return these systems to compliance have been affected by the impact such action may have on the systems' users. System compliance might be improved if the State is willing to offer incentives to encourage successful systems to acquire underperforming waterworks.

As Virginia's primary agency for protecting public drinking water, VDH is charged with implementing the multi-barrier approach envisioned by the Safe Drinking Water Act (SDWA). JLARC staff found the performance of the VDH Office of Drinking Water (ODW) to be generally good at providing technical assistance, funding, and training opportunities. However, compliance with standards by some systems has been difficult to obtain through enforcement mechanisms due to factors such as the financial ability of the system to pay a fine and the inability to close a system without impacting the customers. Developing an incentive program to encourage successful systems to take over nonviable waterworks may result in greater compliance.

ODW'S TECHNICAL ASSISTANCE IS GENERALLY GOOD, AND LOAN FUNDS ARE DIRECTED TO SMALL SYSTEMS

SDWA program elements are designed to protect drinking water from contamination. How well ODW implements these elements, therefore, provides a useful measure of whether the needs of Virginia's citizens are being met regarding access to safe and clean drinking water. JLARC staff assessed ODW's performance in the areas of technical assistance and training, oversight of system performance, and funding.

Limited Owner Survey Data on Technical Assistance and Training Suggests Good Performance by ODW

To assess ODW's performance regarding the provision and quality of technical assistance and training, JLARC staff surveyed 599 system owners and operators. JLARC staff prepared two surveys, a one-page mail survey and a more detailed on-line survey. Almost one-third of the 599 owners and operators responded to the one-page survey. However, only 43 owners and operators completed the on-line survey, which included in depth questions about technical assistance and training. In addition, those respondents did not address all questions on the survey.

Based on those responses, ODW appears to be doing a good job of providing technical assistance and training to owners and operators. Technical assistance is important because it educates the system operator about State and federal drinking water requirements, increases compliance, and reduces the need for potential enforcement action later. Such assistance may include identifying sampling locations, discussing upcoming regulatory changes, and assisting owners with obtaining funding. ODW field offices projected spending about 20 percent of their staff time providing technical assistance during 2006 and 2007.

According to small water system owners who responded to the mail survey, obtaining technical assistance is easy. Eighty-six percent of the 189 respondents reported that obtaining technical assistance from ODW or other sources is either no challenge or only a minor challenge. Although the number of on-line survey responses was limited, of the 20 owners and operators who rated the quality of VDH's assistance, all 20 respondents indicated that VDH was always receptive to their requests for technical assistance and that the assistance was mostly or very effective.

In addition to surveying owners, JLARC staff accompanied ODW field staff on five inspections and observed staff providing operators guidance on treatment techniques, describing regulatory changes, and providing other information to help operators improve their system and knowledge of the State's drinking water program. The assistance they provided appeared to be effective.

ODW's training efforts also appear effective. SDWA requires each state to adopt minimum standards for the waterworks operator licensure programs to ensure water systems have properly trained and certified operators. The 1997 National Research Council (NRC) report commented that "good operator training is as essential to improving small water systems as improved technologies, organizational fixes, or regulatory oversight." ODW, with the as-

sistance of other partners, has developed several training efforts aimed at operators (Table 13).

Limited results from the on-line survey of owners indicate that training is effective at preparing individuals to operate a small waterworks. For example, 15 of 22 respondents reported that training sessions are effective at providing useful information and technical guidance. Furthermore, 19 of 28 respondents to the on-line survey reported that ODW training efforts provide effective training on treatment technologies.

Inspections Are Conducted Within EPA's Established Time Frame but Should Be Conducted With Less Notice

Since 2001, ODW has conducted more than 4,400 inspections of small community water systems, or about 770 annually. On-site inspections are important because they provide ODW staff an opportunity to visually assess the conditions of the water system and, in some cases, talk with operators about their challenges or needs. Inspection frequencies are determined by the water source. EPA currently requires that systems using surface water be inspected at least once every 36 months. However, the agency has no similar requirement for groundwater systems, which comprise the largest number of community water systems in Virginia. In the absence of EPA requirements, ODW has established its own inspection frequencies.

Analysis of VDH data identifying the last three inspection dates for each small water system reveals that ODW inspections of groundwater and purchased surface water systems are conducted more frequently than EPA's minimum requirements but are not conducted as regularly as ODW's objectives for surface water systems (Table 14). Specifically, surface water facilities are inspected

Table 13: ODW Staff and Other Groups Provide Training to Waterworks Operators

Type	Description
Formal Training Focusing on Operator Licensure	Focuses on technical topics on the certification exam such as equipment operation and maintenance, drinking water chemistry and microbiology, water treatment technologies, and operator math
Informal Training to Address Operator Needs	Performed during inspections, telephone calls, and emails. May be given to address water quality sampling needs, or to follow up on corrective measures described in an inspection report
On-site Seminars or Workshops	Presentation of a seminar or workshop at a waterworks on topics such as new rule implementation
Training Provided by Other Organizations	Partners with outside organizations such as Virginia Tech, Virginia Rural Water Association, and the Virginia section of the American Waterworks Association to sponsor training

Source: JLARC analysis of ODW training program materials and interviews with ODW staff.

Table 14: Inspection Frequencies Are Within Established Time Frames

Drinking Water Source	EPA Inspection Frequency Standard	ODW Inspection Frequency Standard	Average ODW Inspection Frequency	Number of Systems by Water Source
Groundwater	None ¹	24 Months	20 Months	842
Surface Water ²	36 Months	6 Months	8 Months	81
Consecutive ³	None	36 Months	22 Months	155

¹ EPA's proposed groundwater rule would require states to conduct sanitary surveys for all community groundwater systems at least once every three years.

² Includes groundwater under the direct influence of surface waters with filtration.

³ Consecutive systems are defined as any waterworks with no production or source facility of its own and which obtains all of its water from another permitted waterworks, including water purchased from surface or groundwater facilities.

Source: JLARC staff analysis of information provided by VDH identifying the last three inspection dates for 1,078 waterworks.

every eight months, on average, instead of ODW's objective of every six months; however, this is well within EPA's requirement of an inspection every 36 months. JLARC staff found that inspections of groundwater systems, which make up 69 percent of the State's community systems, are being conducted approximately every 20 months, on average.

Inspections are generally scheduled in advance between ODW field office staff and the water system's owner or operator. Of the 43 respondents to the on-line survey, 16 (37 percent) indicated that VDH normally provides them with four to seven days' notice.

VDH staff indicate that they do not generally conduct unannounced inspections due to concerns that no one will be available to open the facility although some unannounced inspections of surface-water systems have been conducted. Giving owners and operators up to a week to correct potential deficiencies prior to an inspection may not provide ODW with an accurate picture of how some systems operate. Unannounced inspections, or inspections provided with 24 hours notice, may result in systems maintaining compliance when they otherwise might not. Moreover, file reviews identified several sanitary surveys that had been conducted without the owner or operator on site. ODW may want to consider developing a policy whereby it conducts a certain percentage of its sanitary surveys with only one day's advance notice. This would give the operator time to open the waterworks if he or she is not going to be present during the inspection.

In addition to not conducting unannounced inspections, ODW does not have a policy specifying the amount of time by which deficiencies or violations identified during an inspection must be corrected. (Missed sampling events are required to be rectified by a set time, and residents must be notified when samples are not taken for certain contaminants.) In some cases, ODW field staff may not de-

termine whether a correction was made until the next inspection is conducted.

Recommendation (1). The Office of Drinking Water (ODW) should develop and implement a plan to conduct a portion of its inspections on an unannounced basis. In addition, the ODW should specify time frames for the correction of deficiencies and more consistently conduct follow-up inspections to determine if time frames are met.

Review of Water Quality Analyses Appears Timely

Based on discussions with VDH staff and file reviews, it appears that ODW field staff review water quality monitoring results as soon as the results are available. In addition to their own review, procedures are in place to alert ODW staff to issues of potential contamination. As discussed in Chapter 1, small water systems must collect and submit water samples to a certified lab for analysis. Generally, the lab will notify the water system in advance of when the sample needs to be taken as well as the contaminants that will be tested for. The lab provides the results to ODW field staff. When water systems use the State's Division of Consolidated Laboratory Services (DCLS), then DCLS will electronically forward the findings to ODW. Field staff receive electronic notification to their personal computers each morning if monitoring results were received overnight. Other certified labs mail or fax their analyses to ODW. ODW staff can review the paper copy immediately, but the information also has to be manually entered into ODW's database.

Lab results that identify exceedances of MCLs are brought to the attention of ODW field staff in two ways. First, DCLS and other certified labs are required to notify ODW within 24 hours of finding an exceedance of an allowable standard. Second, the electronic data tracking systems used by ODW assist field staff in identifying issues with contaminant levels. When results are within acceptable levels, the electronic system produces a form letter addressed to the system owner that indicates to staff whether a sample resulted in an exceedance. Field staff will notify the owner or operator and provide a more detailed description of what the results mean and what the owner needs to do to correct the problem.

Information From Operators Suggests That Most Customer Complaints Are Not Forwarded to ODW

Collectively, ODW field offices annually received slightly more than 200 complaints, on average, between 2001 and 2005 (Table 15). Complaints against small water systems are largely based on

Table 15: ODW Typically Receives About 200 Complaints Annually

ODW Field Office	Average Number of Complaints Received, 2001-2005	Estimated Total Staff Hours Resolving Complaints
Abingdon	15	75
Lexington (Valley)	36 ¹	56
Norfolk (Tidewater)	40	119
Richmond	15	92
Danville	60 ²	300
Culpeper	52	98
Total	218	740

¹ The Lexington field office average is based on the number of complaints received from April 2004 through March 2006.

² The Danville field office chose to estimate that the number of complaints would equal ten percent of the region's waterworks.

Source: JLARC staff analysis of information in ODW field office's fiscal year 2007 workplans for complaints received during 2001 through 2005.

aesthetic issues, such as taste, color, and clarity problems that are considered secondary issues, according to ODW staff.

Typically, field office staff who receive a complaint immediately contact the owner or operator of the system. ODW staff will follow up with the owner to determine if the complaint was valid and how it was resolved, and then contact the complainant to discuss the resolution. In some cases, ODW field office staff will conduct an on-site investigation at the system or the complainant's residence to take samples or observe the situation. Complaint investigations comprise a small percentage of a field office's annual workload. Only 21 of the 339 customer respondents indicated that they contacted VDH concerning the quality of their water.

Complaints the office does receive are promptly reviewed, based on JLARC staff's review of water system files. Evaluation of the amount of time it takes ODW staff to respond to complaints reveals that follow-up occurs within the same day the complaint is received. Of the 57 water systems for which JLARC staff reviewed files, a total of 46 complaints were found. Of those, three complaint forms had no VDH follow-up date. For the 43 complaints forms that had follow-up dates, on average, VDH responded the same day the complaint was received. The longest time between complaint receipt and ODW follow-up was five days.

Although ODW staff are not receiving many complaints, that does not necessarily mean that consumers are not complaining about their systems. ODW does not require system owners or operators to forward complaints to the office. Also, customers may not know to contact ODW staff regarding a complaint; it is more likely that

they would contact the system owner. When asked on the on-line survey whether their system had received a complaint in 2005, 22 of 28 owners reported that they had received at least 237 complaints that year, mostly related to low water pressure and aesthetic issues. Using the median and average values from these respondents, and assuming other systems had similar levels of complaints, the number of complaints across all systems could range from 599 to 5,070. Both of these figures are well above the average 211 annual complaints VDH reported receiving between 2001 and 2005.

The mandate for this review indicates that some customers of small water systems are frustrated by the lack of oversight these systems receive. Complaints against water systems can serve as an indicator of system responsiveness to customer's needs. Systems that receive a high number of customer complaints, especially repeat complaints, may require closer ODW scrutiny to ensure they are providing safe drinking water.

Recommendation (2). The Office of Drinking Water (ODW) should require system owners to report customer complaints to the appropriate ODW field office no later than the end of the quarter after the complaint is received. In addition, ODW should develop Memoranda of Understanding with local health departments, the Department of Environmental Quality, and local governments to ensure that all water system complaints are reported to the appropriate field offices.

VDH Provides High Proportion of Federal Funding to Small, Disadvantaged Water Systems

Since 1997, VDH has received almost \$181 million for drinking water assistance from federal, State, and other sources. More than 90 percent of the funding comes from the federal Drinking Water State Revolving Fund (DWSRF). While the department has used this funding for planning and construction projects throughout the Commonwealth, more than three-quarters of the funding has been committed to projects in Southwest Virginia. Despite the amount of funding provided, needs still exist and waterworks owners indicate that obtaining financial assistance is a challenge.

Small and Disadvantaged Water Systems Receive Most Federal Drinking Water State Revolving Fund Monies. Congress created the DWSRF as part of the 1996 amendments to SDWA as a way to provide states with funding that could be used as loans and grants for waterworks improvements or maintenance. States can also use a portion of the funds for other needs, such as supporting their drinking water programs.

ODW has focused its use of loan and grants funds on small and disadvantaged water systems. Under DWSRF, small systems are defined as those serving 10,000 or fewer people. Despite this expanded pool of waterworks (72 systems in Virginia are identified as serving between 3,301 and 10,000 people), review of ODW's funding efforts reveals that 94 percent of Virginia's DWSRF funds have been allocated to waterworks serving 3,300 or fewer people.

ODW has allocated more than \$165 million in DWSRF construction funds to 167 construction projects since 1997. Additionally, ODW has used another \$2.5 million to assist 114 water systems with planning grants. Planning grants can be used to complete environmental reviews, develop engineering plans and specifications, and other planning activities. DWSRF loans and grants have been used to upgrade water lines and drill new wells, among other activities, as described by the following examples:

- In 2004, \$598,428 in funding was provided to the Russell County Board of Supervisors for the purpose of installing new water lines, a new water storage tank, and other equipment to improve the quality and quantity of ground water being supplied to approximately 330 customers.
- In 2004, the Town of Onancock received a \$2.4 million loan to install a new water line, drill two new wells, upgrade two old wells, and build a new storage tank to provide more reliable service and better water pressure to approximately 1,500 people.
- In 2005, \$795,000 in funding was provided to the Tazewell County Public Service Authority (PSA) to install 18,000 linear feet of water line to get approximately 140 people off of contaminated wells and springs and onto the PSA's water system.

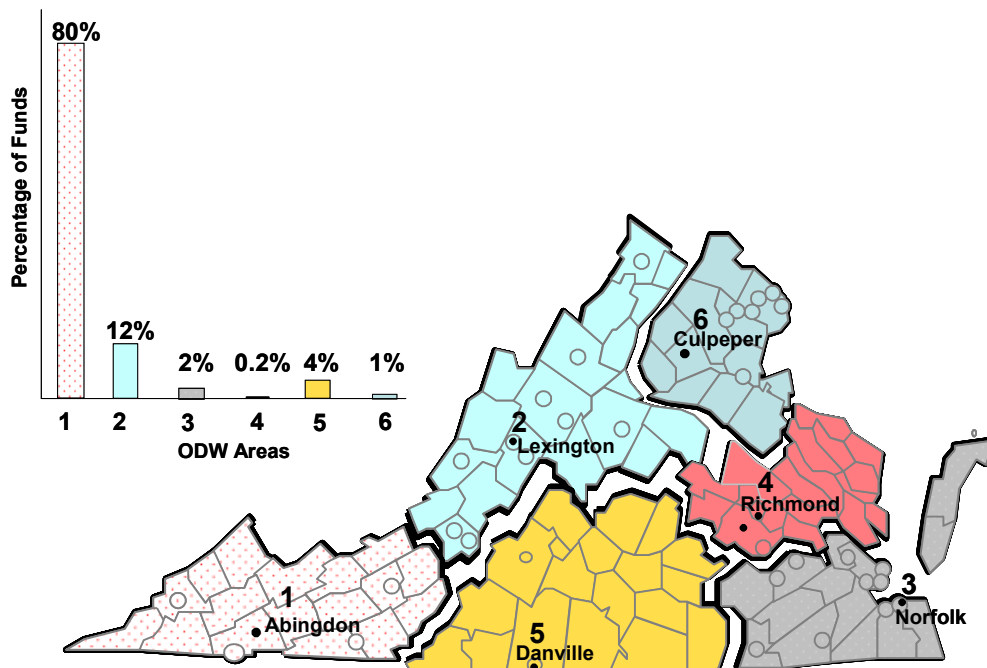
In 2006, EPA lauded the department's efforts at providing substantial portions of its DWSRF funding to small and disadvantaged systems. According to EPA, "Virginia had the highest percentage (95%) of (DWSRF) loan funds provided to small communities and highest percentage (88%) of loans to disadvantaged systems in the country." From 2003 through 2005, the percentage of available DWSRF money loaned by ODW has been more than the national average. Since 1998, ODW has disbursed about \$16 million annually in federal and State dollars for State Loan Fund Construction projects. However, the Commonwealth's share of federal DWSRF funding has been steadily decreasing from a high of \$13.9 million in 1998 to less than \$9 million in 2006.

VDH has established a funding formula, based on federal guidelines, prioritizing systems facing the most serious (1) human

health risks and (2) affordability problems. The formula ensures that systems with “eligible acute, chronic health/SDWA compliance or public health projects are funded before any other eligible project.” It also ensures that the majority of funding will go to small and disadvantaged systems because these systems are most likely to have severe drinking water problems.

Eighty percent of the State's DWSRF funding has gone to water systems located in Southwest Virginia (Figure 8). Systems in that part of the State meet the health concerns and low income standards that EPA seeks to address through its funding formula. Moreover, the planning district commissions (PDCs) in that region have been effective at helping public systems obtain funding. Each January, ODW staff send a letter to all waterworks owners announcing the amount of federal and State funding that will be available that year for loans and grants. System owners are encouraged to apply. According to VDH staff, the most interest comes from systems in the Southwest. The Southwest PDCs attend all DWSRF meetings and training programs held in their region, which is not the case in other parts of the State. PDC staff in the region will also help systems prepare grant applications and even provide starter money for acquiring engineering plans or conducting environmental reviews that get projects in a “ready to proceed” position preferred by funding entities.

Figure 8: Since 1997, 80 Percent of \$167.5 Million in DWSRF Funds Has Been Allocated to Small Systems in Southwest Virginia



Source: JLARC staff analysis of 1997 through 2006 DWSRF funding data provided by VDH.

DWSRF funding is also used to support other activities. For example, \$18 million has been used to administer the drinking water program and fund statewide initiatives since 1997. Some other uses of DWSRF include contracting with the Southeast Rural Community Assistance Project to assist systems in developing comprehensive business plans. The State has also used DWSRF funding to support the Coalfield Water Development Fund (CWDF) as a federal pilot demonstration project in Southwest Virginia. Four fund sources totaling \$10 million have been made available to the CWDF from Virginia's DWSRF to set up a regional endowment that supports a non-profit charitable organization providing assistance for waterworks planning and construction in PDC districts one and two (which are in ODW's Abingdon region.)

Water Supply Assistance Grant Provides State Grant Funds to Small Waterworks. ODW also funds some projects from the State-funded Water Supply Assistance Grant (WSAG). Eighty-one WSAG grants totaling more than \$8 million have been provided to water systems around the State. These grants are used for construction and planning purposes, as well as for identifying source water needs. Approximately 81 percent of the WSAG funds have been allocated to waterworks in Southwest Virginia.

System Owners Want More Financial Assistance. JLARC staff surveyed system owners and operators and found that 53 percent of 179 respondents think that obtaining financial assistance to help with planning or upgrades is a moderate or major challenge. Nonetheless, using the limited respondent data from the on-line owner survey, only five of 15 respondents indicated that they had ever applied for funding from the DWSRF and only one of 15 respondents reported applying for WSAG funding. When asked why they would not apply for this funding, several owners indicated that funding requirements are too burdensome and that they do not know what the money can be used for.

ENFORCEMENT IS LIMITED BY SYSTEM CHALLENGES

VDH's use of enforcement as a tool by which to obtain system compliance has improved in recent years but still faces challenges. The use of civil fines or criminal penalties to achieve compliance can be problematic depending on a particular water system's circumstances. However, contaminated drinking water can lead to a variety of immediate and long-term public health problems. ODW's capacity to ensure public health could be improved by consolidating chronically non-compliant waterworks with more successful systems.

Circumstances Surrounding Small Systems May Limit Enforcement Efforts

The challenges faced by small water systems present problems for ODW in taking strong enforcement action. The extent to which systems face financial challenges, for example, impacts ODW's ability to use financial penalties. Likewise, it can be difficult for ODW to require a water system to cease operations for repeatedly failing to meet water quality standards if closing the system will deprive the consumers of water.

As many studies of small water systems have shown, some systems face substantial challenges when it comes to meeting federal and state standards. Financially struggling systems are unlikely to be able to pay a fine, and the money would likely be better spent on system improvements.

Case Study

In the 1980s, noncompliance by a system owner in the Culpeper region resulted in the court turning over the system to the homeowners association. According to the field office director, the system still has major issues and has received several monitoring and reporting violations, but the homeowners association does not have the financial resources to make upgrades. The homeowners do not want to abandon the system, and ODW has worked with the association and county to find funding sources, but no funds have been obtained. The field office director said that the system is a good candidate for having someone else take it over and operate it, but funding would be needed to improve its infrastructure before that could happen.

Likewise, closing systems due to compliance issues deprives the customers of access to water. Unlike being able to avoid a restaurant cited for health-code violations, drinking water consumers are connected to only one water supply.

Where systems face these challenges, ODW's continued use of compliance assistance may be appropriate. For example, one of ODW's short-term goals for DWSRF funding is to promote consolidation of water supplies and waterworks. However, for truly recalcitrant systems, formal enforcement is the only option.

Enforcement Processes Could Be Improved

For the most part, small water systems are complying with federal and State water quality requirements. However, when the circumstances require enforcement in order to obtain compliance, ODW's effort could be improved in several areas. For example, the author-

ity to determine under what circumstances violations are issued and which cases are referred for enforcement resides with the field offices; however, enforcement action may be more consistent if centralized guidance was available. ODW's efforts to ensure that small systems use licensed operators could be improved if the office was proactive in verifying operator certification information. ODW compliance staff work with field staff and EPA to identify compliance issues. However, ODW's efforts to enforce State and federal standards against a small number of unwilling systems have been unsuccessful. Additional enforcement options and resources (financial and legal) to apply in these situations appear necessary.

Field Office Staff Decide When to Issue Violations and Refer Cases for Enforcement. During this review, JLARC staff found that more guidance about the circumstances under which field staff issue violations and refer water systems for enforcement may lead to greater consistency among the regions. Currently, it appears that consistency is addressed informally based on the knowledge and experience of the field staff and the water system's history. One field office director stated that staff address consistency issues as part of their day-to-day operations and during staff meetings.

ODW recognizes the importance of consistency in the enforcement manual it has issued. The manual states, "For the enforcement program to maintain credibility with the regulated community, ODW must take consistent and fair enforcement actions." Nonetheless, the ODW director told JLARC staff that inconsistent enforcement of the regulations across the regions was an issue. JLARC staff were also told by a system that operates waterworks in more than one region that what inspectors consider violations is sometimes inconsistent. In addition, EPA staff indicated that the districts may focus too much on assisting non-compliant systems and should instead consider enforcement more often as a compliance tool.

While ODW's central office has tried to address consistency issues in its enforcement manual, which clearly identifies the available enforcement options and procedures, it does not provide guidance on criteria that should result in violations or referrals. A guidance document with examples of what system deficiencies warrant action might encourage that approach.

ODW Should Ensure the Use of Licensed Operators. As part of the 1996 SDWA amendments, EPA began requiring all water systems to have certified operators. According to EPA, "Ensuring the knowledge and skills of public water system operators is widely considered one of the most important, cost-effective means to strengthening drinking water safety." If states do not implement

these guidelines, EPA has the authority to withhold 20 percent of their DWSRF allocation.

Virginia's Waterworks Regulations require system operators to be licensed. However, of 1,102 small water systems identified by ODW, JLARC staff found 40 systems that have no identified operator, another 50 systems identify an operator whose license has expired, and another 14 list someone as the operator who is not certified. Of those non-compliant systems, 82 did not receive a violation. One system has been issued four notices of violation (NOV) for failing to provide a licensed operator without ODW taking enforcement action, and another three NOVs for other types of violations. In total, ODW has issued 143 violations for operating a waterworks without a certified operator since 2003, 99 percent of which were issued to small systems. Eleven systems received multiple violations.

Problems exist with how ODW verifies whether a system has a certified operator. ODW relies on the on-site inspection process to verify if each system has a certified operator, instead of requiring system owners to report the information on an established schedule. That means whether a system has a licensed operator is checked only every six to 36 months depending on the water source used. As previously discussed, groundwater systems (which constitute the majority of community water systems in Virginia) are inspected by ODW field staff only once every 20 months, on average. Furthermore, ODW does not attempt to verify operators' certification with the Department of Professional and Occupational Regulation despite the availability of an on-line database that could be used to conduct the verification.

Several factors impact a water system's ability to hire and keep a licensed operator. For example, smaller systems often cannot afford to compensate licensed operators sufficiently. Thirty-one percent of private systems indicated on the JLARC staff survey that they found recruiting new staff to be at least a moderate challenge and 22 percent of private system respondents indicated that retaining staff is an issue.

Regardless, ensuring the knowledge and skills of public water system operators is widely considered by EPA and NRC to be one of the most important, cost-effective means to strengthening drinking water safety, as evidenced by SDWA's financial commitment to improve operator certification and NRC's findings. ODW should seek to more actively verify that each small system in Virginia has in place an operator with the proper certification level to run the system for which they are responsible.

Recommendation (3). The Office of Drinking Water (ODW) should determine which systems lack a licensed operator by checking its list of operators against the list of certified operators maintained by the Department of Professional and Occupational Regulation. To help ensure that its listing of operators is up to date, ODW should require that each water system provide the name and contact information of their system operator annually, or sooner if turnover occurs. The office should update their database with this information.

Enforcement Is Weakened By Difficulty In Tracking Owners. Having accurate contact information for system owners is critical to a successful enforcement effort. However, ODW staff have found this to be a problem. As the following case study illustrates, ODW's efforts to warn an owner about an underperforming system and to even take enforcement action are impacted because the office did not have up-to-date contact information:

Case Study

On March 30, 2006, ODW sent a small system owner a draft consent order requesting revisions by April 17; no revisions were received. ODW followed up by sending a "last chance" letter on April 25 and requesting a response by May 17; no response was received and ODW indicated it would take criminal action. Finally, on June 1, ODW enforcement staff contacted the owner and found out that ODW had had the wrong address for at least two years.

Furthermore, the problem can be exacerbated by the fact that there is no requirement for owners to update changes in contact information, and ODW may only interact with the system at the inspection, which may be as long as 20 months for a groundwater system. In addition, contacting out-of-state owners has been reported by ODW staff as an area of concern.

Recommendation (4). The Office of Drinking Water (ODW) should contact system owners annually in order to verify contact information. Contact information should include, but not be limited to, owner name, system name, home and business phone numbers, and mailing address. ODW should maintain this information in an electronic database.

Extent of Enforcement Must Sometimes Be Balanced Against Potential Effect on Residents. A majority of small water systems have a record of good compliance with waterworks standards. For example, JLARC staff's review of ODW violation data found that more than 35 percent of waterworks received no violations between 2001 and September 2006, and another 18 percent received only one violation during that time. However, there are some small systems

with a pattern of multiple violations of standards or failure to implement required improvements.

Case Studies

Since 2001, a waterworks in the Culpeper region has been issued 131 violations for failing to monitor, four for exceeding maximum contaminant levels, three for not sending out the Consumer Confidence Report, and two for failing to notify the public of exceeding combined radium limits. ODW issued a special order against the waterworks and forwarded the matter to the Office of the Attorney General (OAG) for civil action in 2003. However, both OAG and ODW staff have said that the waterworks owner has threatened to abandon the system if enforcement action is taken. As a result, no enforcement action has been taken to return the system to compliance as of October 2006.

* * *

Between 2001 and August 2006, a water system in the Danville region was issued 45 NOVs, including 26 for failing to monitor for total coliform, an indicator of disease-causing microorganisms, and two for exceeding maximum contaminant levels for total coliform. During that time, the field staff had great difficulty contacting the owner, including at least two meetings at which the owner failed to appear. In April 2005, electricity to the system was shut off because of nonpayment, requiring residents to boil their water. A sanitary survey conducted that month found "several serious public health concerns that require immediate response," including leaks in the well house and possibly the distribution system. On July 7, 2006, the ODW central office indicated that it was going to give the owner one more chance to meet with field staff before issuing a criminal complaint. In September, the field office gave central office notice to pursue criminal enforcement action. However, while the field office considered whether to refer the case for enforcement, the number of customers served by the system fell below 25, and ODW no longer had regulatory authority over it.

In some cases where ODW has turned to the OAG for enforcement of monetary fines against poor performing or recalcitrant systems, the OAG has been reluctant to pursue such penalties. Since 2000, VDH has referred eight small system cases to the OAG for civil action, but civil penalties were pursued in just two of them. In one of the two cases in which action was taken, the OAG declined to collect a settlement that it had helped negotiate. The other case involves pursuit of a financial penalty against a water system that failed to comply with a 1992 criminal plea agreement to upgrade

the filtration system. In this case, the OAG chose to let EPA pursue criminal action against the owner to conclusion and is currently negotiating with the owner to resolve the issues.

Case Study

A water system in the Danville region has been under a court order since 1992 to install iron and manganese removal systems. However, the owner took no action between then and August 2002 when the Board of Health issued a special order requiring largely the same improvements. The owner has used the administrative process in both cases to delay enforcement, and appealed the 1992 court order to the Virginia Supreme Court. ODW referred the matter to the OAG in May 2003. In 2004, EPA, through the U.S. Department of Justice, initiated a criminal proceeding against the owner for violating sewage discharge rules under the Clean Water Act and subsequently obtained a criminal conviction. Once the Justice Department began its process, the OAG declined to pursue the State case or penalty until the Department of Justice concluded their case against the operator. After the criminal case concluded and at the urging of EPA, the OAG entered negotiations with the owner to close the discharge lagoon and to install the required iron and manganese treatment technologies. The lagoon has since been closed and the OAG has entered negotiations with the waterworks to install the treatment. While the office is working with the waterworks to ensure the installment of the treatment technology, the OAG intends to also seek a civil penalty equal to the cost of installing and operating the treatment system since 1998. However, no deadline has been established indicating when the treatment technology must be installed, and the time frame for levying a civil penalty is unclear.

ODW staff indicate that enforcement action can be limited in its effectiveness and in some cases harm the progress that has been made. Similarly, OAG staff indicated that the likelihood of success and impact on the consumer are factors that help determine when civil cases are filed. Staff at both agencies expressed concern that legal action in situations as those described might cause abandonment of the system, leaving no operator.

In order for ODW to maintain a credible drinking water program while not harming system users, additional enforcement options appear to be needed to ensure that appropriate and timely action is taken against non-compliant waterworks. While compliance assistance can produce effective results under certain conditions, ODW and the OAG should continue to take strong formal enforcement action against systems demonstrating a history of unrespon-

siveness to the agencies' efforts. Not taking action against the most egregious violators sends the message that noncompliance is acceptable. Moreover, contaminated water, as each of the water systems in the case studies had or may have had, may expose customers of these noncompliant systems to serious health risks. Nonetheless, current enforcement options limit ODW's efforts. As discussed in the next section, enhancing the enforcement options available to ODW in responding to noncompliant systems may lead to greater compliance.

Encouraging Water Systems Consolidation May Improve Compliance

Some small water systems in Virginia cannot meet drinking water standards, and opportunities to improve conditions are limited. There may be as many as 104 systems operating without a licensed operator and 70 systems that have been cited three or more times for the same monitoring or MCL violations since 2001, with at least one of those violations occurring between August 1, 2005, and August 30, 2006. Although ODW and SCC have the authority to request chronically noncompliant systems be put in receivership, few systems have been identified as willing to become receivers. Underperforming systems typically require substantial financial resources to improve them, resources that the owners do not have or are not willing to commit. Drinking water quality, and public health, could be improved if incentives were offered to successful public and private water systems for administering the State's failing systems. Maryland and North Carolina have implemented such initiatives.

Problems faced by water systems in Virginia are a reflection of ongoing national issues. In 1995, EPA reported that many small water systems require major upgrades to their treatment and distribution systems due to major deficiencies in drinking water treatment (NRC, *Safe Water from Every Tap*, 1997). The report stated:

Some surface water facilities treat, but do not filter their water....Maintenance of water treatment and distribution systems in small communities is often poor....Many small systems lack the resources to initiate, let alone carry out, the steps necessary to upgrade their water service....In sum, improving water supply service is a complex task that many small communities are unable to handle on their own.

EPA's 2003 *Drinking Water Infrastructure Needs Survey and Assessment* identified the total national need for drinking water system investment at \$276.8 billion over the next 20 years. Small system need was calculated at \$34.2 billion across more than 43,000 systems. If the average cost of improvement is applied to Virginia's

1,090 active small water systems, the cost to improve these systems is around \$617 million.

VDH and SCC Receivership Options for Taking Over Underperforming Systems Are Limited. The *Code of Virginia* includes a receivership provision that allows the Health Commissioner to petition the circuit court in the jurisdiction in which the waterworks is located for the appointment of a receiver. The commissioner must find that the system is no longer able or willing to provide clean and reliable drinking water to its customers. Findings of inadequacy include an owner failing to comply with an order issued by the commissioner or that the waterworks has been abandoned by the owner, among other reasons. An ODW effort to identify potential systems for receivership found only six systems, none of which was turned over to receivers.

VDH staff report that it is difficult to convince an entity to take over a system in need of serious capital improvements with a very limited customer base. Moreover, receivership is intended to bridge the gap to viability, but even if that is achieved, these systems can still remain unattractive to local governments or private companies based on the limited number of connections or lack of proximity to existing water lines. Moreover, the State has had difficulty identifying potential receivers. For example, ODW staff said that one case fell through because the identified receiver felt overwhelmed by the review provided by the SCC.

The SCC also has statutory authority to appoint a receiver to operate a small water utility which is unable or unwilling to provide adequate service to its customers. A hearing for the appointment of a receiver may be requested by two-thirds of affected customers, or at the request of either SCC or VDH staff. In determining if a receiver should be appointed for an existing utility, the utility must be deemed unable or unwilling to comply with an order of the SCC to provide adequate service, or VDH must certify that the utility has not met State standards regarding the provision of an adequate quality and quantity of public drinking water and is unwilling to meet these standards, among other factors.

Upon appointment, the receiver assumes possession of the assets and responsibility for the utility until it can be returned to the original owners, transferred to new owners, or liquidated, whichever is determined to be in the public interest. If the SCC determines that actions causing the utility to be placed under the control of the receiver are due to intentional misappropriation of assets or other willful misconduct of the utility, restitution may be required.

SCC's receivership statute has been used only once, and its application for taking over underperforming waterworks is limited. Identification of a willing receiver is challenging because the receiving entity is responsible for achieving compliance with existing orders on the waterworks. While the receiver can request rate increases for achieving compliance, additional capital investment may be required to meet established compliance time frames. As a result of these challenges when this statute is applied, in one case SCC was unable to identify a willing receiver. Moreover, this statute applies only to utilities regulated by the SCC, and many of the chronically noncompliant systems (such as manufactured housing parks) are exempt from this regulation.

Consolidation of Water Systems May Improve Provision of Drinking Water. While most systems appear to provide safe and clean drinking water, the State is still faced with a number of chronically underperforming systems. According to VDH staff, once systems reach this point, little can be done to rectify their deficiencies, short of massive infusions of capital. In these cases, the State has often taken the approach that, from a public health perspective, enforcement would make the situation worse, and therefore has permitted these systems to continue operating.

Encouraging successful water systems to consolidate nonviable waterworks into their operations presents an opportunity to improve overall system compliance. For example, the resulting economies of scale from consolidation may yield financial resources that can be used to improve a system's condition that were not previously available. Such consolidation, or having "one community water system being absorbed into, combined with, or served by other utilities to gain the resources they lack otherwise," has been used to describe many approaches to combining systems, such as physically connecting two or more waterworks or the acquisition of one system by another. Water utilities can also achieve economies of scale and scope through the consolidation of operational and administrative functions by operating multiple systems within close proximity and saving labor costs by using a single operator.

The authority to take such action already appears to exist, and there appears to be interest in consolidation among some system owners and operators. First, section 15.2-1906 of the *Code of Virginia* provides local governments with the authority to acquire any water system through the condemnation process. Furthermore, Virginia courts have held that the localities have unconditional powers in this area. Second, the health commissioner could use the criteria established under the receivership statute to identify systems that are incapable of or unwilling to achieve compliance. And finally, most private system owners responding to the JLARC staff

mail survey reported a desire to no longer operate their system, and a large private system with experience in consolidating underperforming systems with its own has stated that it is interested if the State will provide incentives.

NRC's report *Safe Water from Every Tap* (1997) offers a series of recommendations focusing on eliminating underperforming systems through consolidation. Specifically, the report suggests that where performance appraisals find sustainability problems and improvements are not possible under current circumstances, waterworks' responsibilities should be delegated to another entity, such as a regional water authority, local government, or investor-owned utility. The report makes several recommendations designed to create incentives to encourage other entities to take responsibility for nonviable systems, including

- making Drinking Water State Revolving Funds available to public and investor owned systems to assist in restructuring small systems;
- providing tax incentives to entities that assume responsibility for failing systems;
- allowing adjustments to the rate base of larger utilities that assume responsibility for failing systems so that costs of acquiring the system can be reflected in the rate base and depreciation costs; and
- providing temporary waivers to utilities for liabilities associated with Safe Drinking Water Act violations in cases where the utility has acquired a failing water company. These waivers should be tied to reasonable compliance schedules.

Potential funding sources already exist. For example, DWSRF set-aside funds can be used for consolidating systems with better performing systems. Local systems in southwest Virginia have used these set-aside funds to extend water mains to nonviable systems and consolidate those customers into their own system. Technical fees charged to water systems present another potential source. Currently, the use of these fees is restricted to funding technical assistance activities. However, changes to the *Code of Virginia* could permit these fees or a portion of the fees to be used for other purposes. The current fee of \$1.85 per service connection has not been raised in a decade. VDH has considered raising the amount to \$2.05 per connection to address staffing concerns. Nonetheless, any additional proceeds stemming from an increase could be dedicated for such purposes.

The General Assembly may also wish to create a funding source or other financial incentives that ODW could use to encourage such

takeovers. Funding or financial assistance could be used to make infrastructure improvements to nonviable waterworks in order to raise their performance to an acceptable level for acquisition by another system. Such incentives could also be directly provided to another system with the intent that they would make the infrastructure improvements and take responsibility for the system. Funding could also be established as a revolving fund and provided through grants or low-interest loans. A revolving fund would permit ODW to recover the cost of the grants and loans in order to use that money again.

Consolidation does have disadvantages and cannot correct problematic water systems in every case. Some states have had little success with their consolidation efforts, according to the EPA Office of Inspector General. In cases where customers have been paying less than the actual cost of operating the system, consolidating small systems to create a large one may increase customer's water rates. Communities may also be wary of ceding control of their water supply to another entity with which they have no relationship. Practicality is another issue. In some cases, extending a water main to a subdivision with only 25 to 50 houses may be prohibitively costly to a locality or private system. A system may also be in such disrepair that no other system is willing to make capital improvements to it. Consolidation can also produce job losses by eliminating duplication.

While most systems operate with relatively few problems, there are some small systems in Virginia that currently have troubled operations. The State expends much effort in regulating these systems. Encouraging consolidation through State-offered incentives may help ODW in its efforts to resolve those problematic waterworks. In addition, consolidation may allow ODW to reallocate resources to the systems serving the most people. It may also lead to some improvements in the consistency of water delivery and the affordability of rates and reduce the frequency of violations and non-compliance.

Recommendation (5). The Office of Drinking Water (ODW) should implement a program to identify chronically non-compliant water systems using the criteria established under the receivership statute in the *Code of Virginia*. The Virginia Department of Health should consider requesting that the General Assembly create mechanisms or additional enforcement options for eliminating underperforming systems, such as establishing (1) a waterworks abandonment statute to force owners of underperforming systems out of business and then require the locality in which the waterworks is located to operate the system, or (2) a financial incentive in the *Code of Virginia* to encourage successful water systems to purchase and improve nonviable systems.

Mechanisms for Eliminating Underperforming Systems Exist in Maryland and North Carolina. In Maryland, the Secretary of Environment has used the State's waterworks abandonment provision to force owners of underperforming systems out of business and then required the locality in which the waterworks is located to operate the system. The secretary has to find that systems are a public health risk as a result of a history of noncompliance with monitoring requirements or health-based violations. The abandonment provision also affords the State the right to stabilize underperforming systems. In these cases, a State-approved operator will manage the system until the owner demonstrates an ability to operate the system. Under the abandonment provision, grant funding is provided for localities taking over an underperforming system; however, the locality covers the majority of the costs involved. Maryland has used this provision several times.

The North Carolina Utilities Commission negotiated an agreement with a private waterworks company establishing a financial incentive to the company for purchasing and improving nonviable systems. The company, which was purchasing another public utility, and the commission agreed to permit the company to add one dollar to its rate base for every dollar spent purchasing water systems identified by the State as nonviable and an additional dollar for every dollar spent improving those systems. To date, the company has purchased approximately ten systems.

Although the federal government and VDH have focused attention on addressing technical, financial, and managerial (TFM) capabilities in general and on small systems in particular, challenges still exist. Addressing these challenges is difficult because of the nature of public utilities and the condition of some systems. However, combining systems to create greater economies of scale may provide an opportunity to improve system compliance, increase drinking water quality, and free some statewide resources to give more attention to those systems serving the majority of Virginians.

Oversight of Small System Rates Could Be Improved

In Summary

While the Virginia Department of Health (VDH) has responsibility for overseeing water quality provided by small water systems, the State Corporation Commission (SCC) is responsible for regulating the rates charged by some small systems. The SCC has statutory responsibility for regulating rates charged by less than a quarter of small public water systems (rates charged by systems owned by local governments and those serving fewer than 50 customers are exempt). For regulated systems, SCC regulatory requirements are rigorous, although not always enforced. Formal reviews of rate increases proposed by small systems are infrequent, and the criteria reviewed can vary. The SCC has used its rate-setting powers to adjust the rates that are charged and, in some cases, to require compliance with water quality standards. The rate-setting process can challenge the financial capabilities of some small system owners, and limited technical assistance is available. Improvements to the process could be achieved through increased coordination between VDH and SCC. Moreover, efforts to consolidate small systems could be enhanced through increased use of rate structures that allow water utilities to spread costs across multiple systems.

While the Department of Health (VDH) has regulatory responsibility for individual public water systems, the State Corporation Commission (SCC) regulates public utilities, which may own more than one water system. SCC is responsible for reviewing public utility budgets and proposed rate increases. Annual financial reporting requirements for public utilities are rigorous; however, enforcement of these regulations on small water systems is limited. While proposed rate increases for the majority of small systems are not subject to formal SCC review, this process can be challenging and technical support is not readily available. Charging rates appropriate to recover the full cost of systems operation is important to maintaining system quality. However, given the potential challenges of the rate-setting process, some small investor-owned systems are wary of raising rates. Improvements in the regulatory oversight of small water system rates could be achieved through the creation of a formal agreement between the two regulatory agencies, and the increased use of single-tariff pricing structures could encourage the consolidation of small water systems.

REGULATORY REPORTING REQUIREMENTS ARE THOROUGH, BUT ENFORCEMENT IS LIMITED

All companies, individuals, or associations engaged in the production, transmission, or delivery of water to the public are regulated under the *Code of Virginia* as a public utility. Financial record-keeping and rates charged by public utilities, unless otherwise exempted, are regulated by the SCC. Currently, water utilities owned by local governments and those serving fewer than 50 customers are not regulated. Further exempt from SCC regulation are water systems operated by manufactured housing parks and systems that do not charge for the provision of water. Nonetheless, for those water utilities that are regulated, annual financial reporting requirements are rigorous and ensuring compliance with these requirements is challenging.

Rates Charged by Fewer Than One-Quarter of Small Water Systems Are Regulated by SCC

Water rates charged to the majority of Virginians are not subject to State oversight.

Under the Small Water or Sewer Public Utilities Act (Small Water Act), the level of State oversight of public water utilities is based largely on the utility's annual revenue. Utilities that serve 50 or more customers and have less than \$1 million in annual revenue are regulated as small utilities, while utilities with more than \$1 million in annual revenue are more rigorously regulated. SCC regulates rates charged by 69 public utilities which operate 254 public water systems. The majority of regulated utilities are small utilities operating water systems serving 200 or fewer customers, while four large utilities operate systems serving up to 135,000 individuals. One large utility currently owns 120 of the small water systems whose rates are regulated by SCC.

Under the *Code of Virginia*, the SCC is not responsible for approving rates for small public water systems operated by local governments and public services authorities, as well as systems serving fewer than 50 customers. While rates charged by these systems are exempt from SCC regulations, they are not exempt from VDH water quality regulations.

Rates Charged by Local Government Owned Utilities Are Not Regulated. Virginia's political subdivisions are allowed, but not required, by the *Code of Virginia* to establish public water supplies and maintain public water systems. Localities are also authorized to require property owners to connect to these supplies. Local governments that elect to provide public water services are required to charge fees that are fair and reasonable, but these charges are exempt from SCC oversight. Furthermore, SCC is prohibited from approving new private utilities in a locality served by a public water authority without local government approval, and does not

have jurisdiction to adjudicate conflicts between publicly and privately operated water utilities.

As such, publicly owned water system rates are self regulated, with accountability being provided by local government boards and citizens. In Virginia, there are 402 locally owned small water systems that provide water to almost 306,000 individuals (75 percent of all small system customers). Moreover, the rates charged by 130 large locally owned systems serving almost 5.4 million Virginians are not regulated by SCC.

Other Utilities Are Also Unregulated. Under the *Code of Virginia*, utilities serving fewer than 50 customers or incorporated prior to 1970 are not subject to SCC regulation. Because many utilities operate multiple water systems, utilities are regulated based on their annual revenues and total number of customers served by all systems owned by the utility. Application of this regulation has resulted in SCC regulating rates charged by individual systems serving fewer than 50 customers if they are owned by the same utility.

Systems that do not charge customers for water service are not subject to regulation. These water utilities are largely comprised of residential treatment facilities such as private hospitals and assisted living facilities, as well as some small subdivisions. Moreover, rates charged by 126 public water systems owned by manufactured housing parks are exempt from regulation under the Virginia Manufactured Home Lot Rental Act.

Financial Accounting Requirements Are Rigorous, but Enforcement Is Limited

For regulated utilities, SCC has jurisdiction over the adequacy of the utility's financial recordkeeping and rates charged, as well as the quality of services provided. Utilities are regulated differently by SCC based on the company's annual revenue. Water utilities with gross annual operating revenues of less than \$1 million, or those owned by property owners' associations, are directly regulated under the Small Water Act and corresponding administrative rules.

Public Utility Financial Requirements Are Rigorous. As regulated utilities, waterworks are required to obtain a certificate of public convenience and necessity before providing service. In issuing a certificate, the SCC establishes the value and projected annual revenue of the utility in order to determine which regulatory requirements apply. Further, the SCC considers whether the waterworks has obtained all necessary construction and operating permits from VDH and defers to VDH regulatory records on questions of service quality. Under this regulatory approach, the SCC auto-

matically reviews the financial models and proposed rates of new water utilities serving more than 50 customers as well as systems that have transferred ownership.

All regulated public utilities are required to submit annual financial and operating reports to the SCC detailing annual revenues, net operating costs, depreciation and amortization, capital stock, earnings and debt, taxes, and other contributions from ratepayers (such as those in aid of construction). This annual report must conform to the 1996 National Association of Regulatory Utility Commissioners' *Uniform System of Accounts for Water and/or Sewer Companies*. The main difference in filing requirements for small and large utilities is that small companies file only financial year-end data while large companies are also required to file a report consisting of earnings data adjusted to a ratemaking basis. This report consists of a limited portion of the data that would be filed in a formal rate case before the SCC.

As part of the annual financial and operating reports, regulated utilities are also required to provide information on the number of water customers (including additions and disconnects) served by the utility. Additionally, utilities are required to include information on water withdrawal, water purchased for resale, and water sold to customers.

Limited Enforcement of Annual Reporting Requirements. While SCC annual financial reporting requirements are comprehensive, enforcement of these requirements for small systems is weak. SCC has the authority to issue penalties of up to \$10,000 for those systems that fail to file however, only limited attention is paid to obtaining reports from small utilities that do not file. Reminder letters are sent to encourage compliance; otherwise, no enforcement action is taken.

In some cases, the SCC, through its approval of the certificate of public convenience and necessity, has required compliance with this requirement. Nonetheless, compliance is not ensured. SCC staff report that for calendar year 2005, 19 public utilities did not file required annual financial reports, two of which are under direct order of the SCC to comply. The central challenge to ensuring compliance with this requirement, similar to issues in ensuring compliance with water quality regulations, is the potential negative impact that financial penalties would have on system operations.

SCC further requires that utility owners maintain a copy of annual financial information in the utility's records. However, this documentation is not required to be submitted to VDH. Providing a copy of the annual financial report to the appropriate VDH re-

gional staff, and notifying VDH regional staff of those systems that fail to comply could improve compliance with this requirement. In addition, VDH review of this information would improve the overall quality of the regulatory oversight provided to small investor owned systems.

Requirements of the Small Water and Sewer Utility Act

Small water utilities are required to furnish reasonably adequate services and facilities at reasonable and just charges that are the lowest as shall produce sufficient revenues to pay all lawful and necessary expenses.

RATE JUSTIFICATION PROCESS CAN BE CHALLENGING

The Small Water Act provides small utilities regulatory relief from the rate-setting process, and the majority of proposed rate increases are not formally reviewed by SCC. Nevertheless, when a rate request is formally presented to an SCC hearing examiner, most commonly triggered by customer complaints, this rigorous process can be challenging to system owners.

Most Small System Rate Increases Are Approved

One of the purposes of the Small Water Act is to make it easy for small water utilities to determine rates and propose rate increases. Under these regulations, when a small water utility requests a rate increase, SCC staff review submitted documentation to determine if proper public notification was provided and approve the request if the percentage of the increase is less than 50 percent of the current revenue and complaints from impacted customers are limited. Because the SCC receives relatively few complaints, the majority of proposed small system rate increases have been approved (Table 16).

Formal Justification Process Is Thorough

Regulated utilities cannot make changes to rates unless customers are notified in writing at least 45 days in advance of any change.

Table 16: SCC Water Rate Actions Since 2001

Year	Rates Approved	Formal Rate Cases	Other Actions
2001	6	1	3
2002	9	1	6
2003	4	1	2
2004	4	0	5
2005	15	0	5
2006 ¹	9	2	3
Total	47	5	24

¹ Data through August 2006.

Note: Formal reviews are usually required as a result of customer complaints. Other rate actions include approval of new companies or the transfer of ownership of an existing company. These cases may also include approval of rates.

Source: JLARC analysis of SCC case data.

This notification, usually provided through monthly billing, is required to identify the reason and date of changes and identify the new rates, fees, and charges. A copy of the notification is required to be forwarded to the SCC at the same time. Customer comments in excess of 25 percent (or by 250 customers) of all customers affected trigger a formal review. Only five rate increases proposed by small systems have been formally reviewed by the SCC since 2001.

Customer Complaints Are Primary Reason for Formal Review. Customers of small investor-owned water systems can file comments regarding a proposed rate increase with SCC; however, less than a quarter of proposed rate changes receive comments. In most cases, there is insufficient customer concern to result in a formal review. In some cases, community groups have notified members of an affected neighborhood in order to meet the filing threshold. When a formal review is required (a process known as docketing), SCC hearing examiners provide a thorough review of the proposal in a process similar to that of a circuit court. Through this review, SCC may order improvements or changes in service, regulations, practices and rates as are just and reasonable, and can order the company to refund, with interest, the portion of any charges levied on an interim basis which were not justified.

Based on a review of SCC cases since 2001, the majority of recorded customer comments were for two cases in Fluvanna and Culpeper counties and deal primarily with issues of water quality and owner compensation. The most common categories of complaints identified through the JLARC staff review were

- difficulty in affording proposed rates on a fixed income,
- too high a percentage increase,
- concerns over the quality of service,
- secondary contaminant issues (water color and other aesthetics),
- questions of operator compensation, and
- parity with rates charged by neighboring utilities.

Customer complaints tended to vary by region, with customer complaints focused on specific systems that had primary or secondary contaminants identified by VDH.

The SCC does not directly notify public utility customers of their opportunity to comment on proposed rate changes. However, water systems must include in their public notification information on how to contact the SCC. Citizens have the opportunity to file comments electronically, by phone, or in writing. As the customer notification cites "Submit comments in writing," most SCC complaints

are paper based. SCC staff have reported an increase in email complaints, and have developed an automated system for tracking these complaints. SCC does not currently have a formal policy regarding the submission of email complaints but allows for public filing via its website. SCC's current policies for customer notification should be amended to include electronic filing of customer comments, and the public should be made aware of this option.

Recommendation (6). The State Corporation Commission should require public utilities to provide information to customers on the electronic filing of comments as part of their public notification of rate changes.

Formal Review Process Is Adversarial. Under the standards established within the *Code of Virginia*, a formal review of proposed rate increases is an adversarial process with burden of proof and evidentiary requirements similar to those of a circuit court. System owners are required to submit adequate justification to substantiate their claim; SCC staff submit testimony and analysis as to the necessity and fairness of the proposed increase; and public testimony is required to be pre-filed. While the Small Water Act allows small system owners to represent themselves, given the adversarial nature of this process, appropriate legal representation is most often necessary.

Four SCC hearing examiners hear all utility rate cases, and no specific hearing examiner handles water utility rate requests. This approach allows the hearing examiners to draw on knowledge of precedent in other utility cases (such as electric, gas, or telephone). In preparing their final report, the hearing examiner reviews the utility's initial proposal and documents prepared by the SCC's public utility accounting staff, and public testimony can be presented. In some cases, SCC provides regional forums for public testimony regarding water rate cases, in addition to hearings held in Richmond. Regional public hearings for local testimony are at the discretion of the hearing examiner.

The commissioners conduct a *de novo* review of the record compiled and the report prepared by the hearing examiner. The hearing examiner's report includes findings of fact and recommendations to the commission, serving as the basis upon which the commissioners issue a final order. The commissioners' final order may adopt or reject all or any part of the findings and recommendations contained in the hearing examiner's report. Final orders of the SCC may be appealed to the Supreme Court of Virginia. In water rate cases, the commissioners' final orders have largely adopted the findings and recommendations of the hearing examiners over the past six years.

Formal Review of Proposed Rates Is Thorough. When a formal review of a proposed rate increase is triggered, SCC public utility accounting staff review the proposed rates to ensure rates are the lowest possible to provide for the following:

- operation of the system, including maintenance costs, operating charges, and interest charges on bonds or other obligations;
- liquidation of bonds or other evidence of indebtedness and the attraction of capital;
- payment of taxes that may be assessed against the small water utility or its property;
- adequate funds to be used as working capital as well as reasonable reserves and funds for making replacements, which may be escrowed and used only as working capital if directed by the SCC; and
- compensation of owners for their capital or property invested in the system and for their time expended in the operation of the system.

Developers often do not keep adequate records for operating public utilities created with subdivisions, and might sell a system to an operator without providing the new owner with the necessary documentation.

Given these criteria, SCC staff primarily ensure that proposed increases assign operational cost adjustments to specific system improvements. SCC staff review the soundness of the utility's financial model and proposed rate and can dispute any concern, such as adequacy of the rate base, the public need for improvement, or the estimated cost of the improvement. SCC staff indicated their primary concern in reviewing proposed rates is verifying the utility's annual operational expenditures because small companies often do not retain adequate records and co-mingle their personal funds and company funds. Moreover, SCC staff indicated that developers often do not keep adequate records for operating public utilities created with subdivisions, and might sell a system to an operator without providing the new owner with the necessary documentation. Rates are rejected that do not have the records to substantiate a rate increase.

Rate-Setting Process Can Be Challenging, and Support Is Limited

Each docketed rate case is heard before a SCC hearing examiner, and the process for establishing and adjusting rates can challenge the financial capabilities of some small investor-owned systems regulated by SCC. The criteria reviewed in a rate case can vary, and there are specific criteria that SCC does not review when approving utility rate increases. The formal involvement of VDH and other outside parties is limited. Financial capacity requirements established by SCC are more complex than business planning re-

quirements established by VDH, and technical assistance is not readily available. Many system owners are reportedly wary of proposing rate increases given the potentially complex and time consuming rate-setting process.

Criteria Reviewed and Presented Vary. SCC has jurisdiction over the adequacy of rates charged and the quality of services provided by regulated utilities. Case law illustrates that this authority was provided to protect public health by requiring the SCC to determine whether systems have the capacity of meeting the "reasonable domestic needs of the persons served." JLARC staff review of SCC cases indicates a wide range of factors have been considered by SCC hearing examiners when executing this responsibility.

The way in which relevant criteria are reviewed and presented by SCC hearing examiners varies with each case. Through determination of what constitutes meeting reasonable domestic needs in small water utility rate approvals, the SCC has

- considered the estimated impact of proposed rates on system customers based on consumption;
- enforced VDH technical requirements, including cross-connection and operator certification;
- required compliance with VDH consent orders; and
- established that compliance with Secondary Maximum Contaminant Levels, not enforced by VDH, is critical to meeting the domestic needs of customers.

SCC Does Not Review Several Factors When Approving Utility Rate Increases. Because each requested rate increase is reviewed on its own merit, formal rate reviews are based on the financial requirements established in the *Code of Virginia*. As such there are several areas that SCC does not review, including historical increases by the utility, affordability of the proposed increase for customers, and a comparison of rates to neighboring utilities.

Without a review of the utility's historical rate increases, it is possible that customers of some regulated systems may see rate increases as disproportionate to previous increases. Historical information on rates that have been approved without formal review is not maintained in a searchable database, and determination of a rate history for a specific system would be difficult. In formally reviewed rate requests, the hearing examiners review final orders of the SCC for a previous rate increase, if any exist.

Another criterion that the SCC does not consider when approving rate increases is the affordability of the proposed rate for the customer. Affordability criteria, established by EPA, assess customer

rate affordability as approximately 2.5 percent of median household income. Affordability criteria exist only as guidelines and are not enforceable by any State agency.

Similarly, SCC does not maintain any indices of rates charged by water systems within a geographic area or by size of customer base. It is important to note that the review of SCC files indicated cases of specific customer requests to compare proposed rates to rates of surrounding localities.

Formal Involvement of Outside Parties Is Limited. One challenge of the adversarial rate-making process is that the burden for proving the need of a rate increase is on the system owner. When assessing the necessity of a rate increase, SCC staff are largely responsible for reviewing and presenting all applicable public records and presenting this information to the hearing examiner. Through this approach, SCC staff are given wide discretion in establishing the public record, and staff from other regulatory entities and local governments rarely enter testimony to the record.

When reviewing the necessity of a proposed rate increase, SCC staff review regulatory documents and relevant public comments to evaluate the quality of service provided by the utility. Documentation provided by the system owner about the quality of service and the condition of infrastructure is also included in this review. However, evaluation by SCC staff consists largely of reviewing regulatory records maintained by VDH. SCC has the discretion to seek VDH's comments; however, there are no formal requirements or guidelines for VDH's input on a proposed rate increase.

Under this approach, regulatory enforcement documents (such as VDH consent orders) serve as the primary basis for establishing the utility's level of service and asset condition. Review of informal enforcement documents, such as notices of violation, are at the discretion of SCC staff. Several cases reviewed illustrated an apparent benefit to the system owner for creating a public document of record, and thereby demonstrating need, through non-compliance with VDH orders.

While VDH staff should not testify on behalf of a utility, VDH staff should testify to a utility's quality of service and condition. This testimony would allow regulatory staff to speak to the system's performance record even if violations are not elevated to consent orders as well as other operational deficiencies. Respondents to the JLARC survey of small system operators indicated that increased VDH participation would benefit the rate-making process.

Additionally, local governments are not directly notified in cases in which a proposed public water utility rate increase is formally re-

viewed. Local government decisions can impact the size and necessity of proposed rate increases. Benefits from local government notification earlier in the process would be twofold. First, it would inform local governments of rates that are being charged to customers of investor-owned water systems operating in that locality and of any concerns with proposed rate increases. Second, local governments could testify to their intentions regarding the potential for consolidating the operation of the water system as well as the proximity to municipally operated public water systems.

Limited Technical Assistance Is Available to System Owners. Regulated public utilities are provided minimal guidance and support in the rate-making process under the current regulatory framework. The SCC has authority to reject a utility's annual financial filing or rate request, but neither SCC nor VDH provide formal assistance to utilities. Moreover, for those cases formally reviewed, obtaining appropriate legal representation can be expensive and may be difficult for some systems.

SCC annual financial reporting requirements are critical for reviewing the operating income, expenses, and maintenance reserves of public utilities. Assistance provided to system owners for preparation of these documents is limited. A copy of the *Uniform System of Accounts* is provided to all companies to use as guidance, when requested, and public utility accounting staff provide limited "off-the-record" technical assistance in development of the report. This assistance is typically informal and by telephone. Several respondents to the on-line JLARC staff survey of water system owners indicated that specific guidelines for what will be reviewed by SCC would benefit both small system financial recordkeeping and the overall ratemaking process.

VDH has the ability to require business and financial planning documents for all new systems as well as those systems receiving Revolving Fund allocations. The financial requirements of these plans are not as stringent as SCC requirements. SCC staff does not assist VDH in developing small water system business planning requirements, and financial capacity components of these plans are not based on SCC regulatory criteria. Moreover, federal guidance on rate-making provided by EPA is voluntary and largely focuses on documenting and recovering the actual costs of water delivery through appropriate rate structures.

A business plan required by VDH is not based upon strict accounting standards; however, it is a step towards improving the financial capability of small system owners. While the two documents are independent of one another, there is an opportunity for increasing the financial capacity of small systems owners by increasing the coordination of the financial requirements of these two

documents. Through increased coordination of business and financial reports, SCC and VDH could improve small systems' financial capacity, increase compliance with SCC financial reporting requirements, and improve technical support that is available to system owners.

Given the legal bearing and complexity of SCC's formal review process, such reviews often require legal representation. While this report does not recommend providing direct financial assistance to system owners, increasing the technical assistance provided by VDH should increase the ability of small systems to successfully negotiate this complex process. The SCC should work with ODW to develop financial planning and reporting guidelines that will allow ODW to provide technical support to small systems in meeting regulatory requirements.

Many Small Waterworks Owners Are Wary of Proposing Rate Increases. Given the complexities of the rate making process for small investor-owned utilities, it appears that many utilities are reluctant to raise rates. Charging customers rates that adequately recover the full cost of providing water service is important to maintaining the quality of the water provided. However, half of the respondents to the JLARC staff mail survey of small system operators indicated that increasing rates was a moderate or major challenge, and they were hesitant to propose rate increases under the current regulatory framework. This has the potential to exacerbate concerns with obtaining capital required to adequately maintain water system operations.

OPPORTUNITIES EXIST FOR IMPROVEMENTS TO THE RATE-SETTING PROCESS

Given the challenges of the current regulatory framework for rate setting by small investor-owned water systems, the regulatory efforts in this area could be improved. A formal memorandum of understanding outlining the roles and responsibilities of VDH and SCC could improve agency and owner understanding of the current regulatory environment as well as increase compliance with SCC and VDH regulations. Additionally, a formal policy encouraging implementation of single-tariff pricing has the potential to increase the affordability of rates charged by some systems as well as increase the State's ability to encourage consolidation of some systems.

Coordination With VDH Should Be Formalized Through Memoranda of Understanding

While the SCC and VDH play complementary roles in ensuring that regulated public water systems maintain safe and reliable water supplies, there is no formal agreement between the agencies identifying common goals and objectives. Other states have developed an approach to this coordination that could serve as a model for implementation in Virginia. Similarly, the SCC and the Department of Environmental Quality currently have a memorandum of agreement for the coordination of environmental impact reviews for electric transmission lines that could serve as a model for implementation.

One possible model for the development of this agreement is the 1996 Memorandum of Understanding between the California Department of Health Services and Public Utilities Commission that sets forth common goals, objectives, policies, and procedures for regulating the safety, reliability, and affordability of public water systems. Through this agreement, responsibilities of each agency are identified, with the health agency assuming primary responsibility for enforcement of water quality and permitting requirements, and the utilities agency responsible for approving rate changes.

One critical component of this agreement is the enumeration of areas of coordination, specifically those relating to health agency participation in rate-setting hearings and the evaluation of cost-effective solutions to maintaining compliance with water quality regulations. Through this agreement, the utilities agency is required to notify the health agency of all requests for rate increases, as well as provide health agency staff with hearing schedules. Health agency staff are required through the agreement to provide technical input into proposed rate requests. Additionally, this agreement specifically requires the utilities to provide analyses of the financial impacts of system improvement projects on both water companies and customers.

Development of a formal agreement between these agencies would benefit both small system owners and regulatory agencies by clearly defining regulatory roles and responsibilities. More importantly, such an agreement would identify specific areas for coordination between VDH and SCC, such as providing testimony in formally reviewed rate cases. Such an agreement could take advantage of VDH's ability to provide technical assistance to small systems in meeting SCC regulatory requirements. Moreover, such an agreement could improve the rate-setting process by improving the identification of system deficiencies and adequacy of financial resources to maintain compliance with water quality regulations.

Recommendation (7). The Virginia Department of Health (VDH) and the State Corporation Commission (SCC) should develop a formal Memorandum of Understanding on maintaining safe and reliable water supplies for regulated water companies. This agreement should include, but not be limited to identification of common goals, enumeration of agency responsibilities, and agreements for implementing enforcement actions. This agreement should include a process for developing financial planning and reporting guidelines that will allow VDH to provide technical support to small systems in meeting SCC regulatory requirements, and a process for encouraging and coordinating the direct testimony of VDH staff in rate cases when requested by the waterworks applicant.

Single-Tariff Pricing Across Multiple Systems May Increase Rate Affordability

Single-Tariff Pricing

A common example of this pricing structure is the single rate used for first-class postage. The standardization of rates facilitated the extension of postal service to rural areas by providing equity and accessibility. Examples can also be found in current utility sectors including electrical, telephone, and cable television rates.

A consolidated water rate, or single-tariff pricing, is the use of a unified rate structure for multiple water systems that are owned and operated by a single regulated utility, but that may not be contiguous or physically connected. Under single-tariff pricing, all customers of the utility pay the same rate for the same service even though the individual systems providing the service may vary in terms of the operating characteristics and stand-alone costs. Single-tariff pricing is widely used by publicly owned water systems. While Virginia does not have a specific policy encouraging the development of single-tariff pricing among utilities that operate multiple systems, SCC has approved its use by six investor-owned water utilities operating 74 water systems.

Single-tariff pricing structures are designed to spread costs over a greater service population so that service to high-cost areas, such as those with a very small customer base, is more affordable. However, single-tariff pricing can also have the opposite and unexpected effect when there is a large variation in the income levels of the populations served across systems (Table 17). For example, service areas with greater populations and higher concentrations of low-income residents could subsidize charges to customers of smaller systems that may consist of higher concentrations of high-income population.

Virginia has historically handled rate applications on a case-by-case basis. This is due in part to the nature of the commission's decision-making process in which hearing examiners must rule on the record of evidence put before them in each proceeding and each utility must make its own case for implementation.

States such as Connecticut, Pennsylvania, and Texas have recognized single-tariff pricing as a policy tool. Decisions of public util-

Table 17: Issues in Single-Tariff Pricing

Arguments in Favor of Single-Tariff Pricing	Arguments Against Single-Tariff Pricing
• Mitigates rate shock to customers • Lowers administrative costs to utilities • Provides incentives for utility regionalization and consolidation • Physical interconnection is not required • Addresses small system viability issues • Improves affordability for customers • Ratemaking similar to electric utilities • Facilitates compliance with drinking water standards • Promotes universal service for utility customers • Promotes ratepayer equity on a regional basis • Encourages increased investment in water supply infrastructure • Encourages further private involvement in the water sector	• Conflicts with cost-of-service principles • May provide subsidies to high-cost customers • Not acceptable to all affected customers • Considered inappropriate without physical interconnection • May distort price signals to customers • Fails to account for variations in customer incomes • Inadequate case-specific justification • Discourages efficient use of water • Encourages growth in high-cost areas • Undermines economic efficiency at the system level • Provides unnecessary incentives to utilities • Insufficient regulatory precedent

Source: EPA, *Consolidated Water Rates: Issues and Practices in Single-Tariff Pricing*, September 1999.

ity commissions in these states have found that single-tariff pricing is in the public interest and comports with prevailing standards concerning just, reasonable, and nondiscriminatory rates. Some commissions have explicitly encouraged the movement toward single-tariff pricing, and a few have incorporated this approach into policies for the acquisition of smaller systems.

Single-tariff pricing has the potential to encourage consolidation and regionalization of water utilities. It can be an incentive for larger water utilities to acquire small water systems that lack financial capacity because costs can be spread over larger service populations and rate affordability can be maintained for customers of some smaller and more expensive systems.

Single-tariff pricing can be used by publicly owned or nonprofit water utilities that operate satellite systems. As such, a policy should be developed that encourages comparable prices for comparable services produced from comparable facilities. It is critical that this policy adequately ensure that the integrity of recordkeeping and financial bookkeeping be maintained.

Recommendation (8). The State Corporation Commission, in consultation with the Virginia Department of Health, should develop policies and guidelines for increasing the use of single-tariff pricing to en-

courage the consolidation of small water systems. These guidelines should include, but not be limited to, demonstration of need for rate structure, impact of proposed rate structure for improving compliance with water quality regulations, and the potential impact of the rate structure on the rate payers.

Water Supply Protection and Planning Are Limited

In Summary

Responsibility for statewide water supply protection and planning is shared between the Departments of Health (VDH) and Environmental Quality (DEQ). While most small water system sources are identified as highly susceptible to contamination, protection efforts based on these classifications are voluntary. Similarly, small water system security initiatives are voluntary, and many small water systems lack adequate emergency response capabilities. Of particular concern are small systems that lack adequate capacity to provide water during power disruptions because the restoration of power to small systems is not likely to receive the same priority as larger systems. Additionally, State and local water supply planning activities are in their infancy, with a statewide plan not expected before 2011. Statewide water supply planning and protection activities could be improved through a formal agreement between VDH and DEQ outlining areas of coordination for groundwater withdrawal and water system permitting as well as the planned response for identified instances of contamination.

Man-made and natural disasters—such as the terrorist attacks of 2001, drought conditions in 2002-2003, and hurricanes in 2003-2005—highlight the need to address security concerns. Security is an issue for small water systems and sources. There is also a need to plan for the long-term viability of public water supplies. Protection of water sources and the infrastructure that supports water production, treatment, and distribution is critical to the long-term sustainability of public water systems. Improvements to water system protection and water supply planning activities could be improved through the creation of formal agreements between the Departments of Health (VDH) and Environmental Quality (DEQ).

CURRENT SOURCE WATER PROTECTION AND SYSTEM SECURITY EFFORTS HAVE MINIMAL IMPACT

VDH began conducting source water assessments for all regulated water systems in 1999. These assessments identify areas of potential risk to regulated water systems and classify those systems based on their susceptibility to possible contamination. Most water sources for Virginia's small water systems are identified as being highly susceptible to contamination. However, EPA staff have raised a concern that Virginia took too narrow an approach to implementation of this program, and small system owners have largely mixed reactions to the benefits of this effort.

Additionally, efforts at protecting the security of small water system infrastructure are limited. Security guidelines developed by EPA are voluntary and, as a result, many small systems may lack adequate emergency response capabilities. Of particular concern is the ability of small water systems to operate in emergency situations when primary electrical power is not available.

Efforts to Protect Source Waters Are Limited

Virginia was required by the 1996 amendments to the Safe Drinking Water Act (SDWA) to implement a source water assessment program that determines the susceptibility of public water sources to regulated contaminants. Implementation of this program largely focused on the identification and mapping of public water sources (such as individual wellheads) and potential sources of contamination. The majority of small water system sources are identified as highly susceptible to contamination; however, source water protection efforts taken as a result of this classification are voluntary and small system owners report mixed benefits of the assessments.

Most Water Sources Are Highly Susceptible to Contamination. As part of each source water assessment, VDH is required to delineate the boundaries of public water system supplies and identify regulated contaminants with the potential to threaten those supplies. Between May 2001 and June 2006, VDH staff completed assessments for 1,860 small community (and 2,117 non-community) water sources. Because this analysis is conducted on public water sources—such as an individual wellhead—there may be multiple assessments for an individual water system.

In implementing source water assessment programs, each state was given discretion to increase the size of the water system boundaries and to include additional contaminants. Virginia opted to develop specific assessments for groundwater systems based on a 1,000-foot radius around the wellhead, and general assessments based on a one-mile radius, for only the federally regulated contaminants. Land use activities were identified and VDH field staff used professional judgment in assigning susceptibility criteria to each source ranging from “very low” to “very high.”

Nearly three-quarters (73 percent) of small community water sources are identified as being highly susceptible to contamination (Table 18). These systems are in proximity to land use areas of concern (such as manufacturing or agricultural production) or had known contamination in the five years prior to the assessment. These systems are located in all areas of the State and have the potential for acute microbiological or chemical contamination.

Table 18: Nearly 75 Percent of Small Systems Identified as Highly Susceptible to Contamination

Susceptibility Classification	ODW Region						Total
	1	2	3	4	5	6	
Very Low	0%	0%	2%	<1%	0%	0%	<1%
Low	1	0	24	47	0	4	12
Moderate	3	4	0	2	1	<1	2
High	92	83	63	44	78	81	73
Undetermined ¹	3	13	12	7	20	14	13

¹ Undetermined includes small community water sources where assessments have not been completed.

Source: JLARC staff analysis of VDH source water protection information.

Virginia's source water assessment efforts emphasize the electronic mapping of wellhead locations and potential contaminants. In conducting the assessments, maps of the water systems are prepared in the central office. Regional staff use these maps to identify potential threats. The map and field assessments are returned to the central office, and a final map and source water assessment is prepared for the water system. The central office staff position responsible for developing assessment maps and coordinating the statewide program, however, has been vacant since February 2006. As a result, source water assessment program activities have largely been on hold, and VDH has been accumulating field assessments until the position gets filled. Review of VDH source water protection data identified 233 (13 percent) small water systems for which susceptibility determinations have not been made or were still incomplete.

According to regional EPA staff, Virginia's approach could have been improved. While Virginia does not appear in direct violation of federal requirements, EPA staff raised concerns that Virginia did not take a comprehensive approach to assessing the condition of water sources, but instead drew a circle around each well and looked for problems within that circle. To address these concerns, regional EPA staff have encouraged VDH and DEQ to develop an approach to source water protection that increases local involvement and identifies other conditions (such as geologic impacts) that might influence the water.

Water Systems Report Not Using Source Water Protection Information. VDH source water assessments were to be provided to all system owners and included in the system records maintained in each field office. While most system owners responding to the JLARC staff on-line survey reported that they had been provided copies of the assessments, respondents indicated mixed satisfaction with the utility of the assessments provided by VDH. Slightly more

than half found these documents to be useful in identifying potential contaminants. However, the assessment provides system owners limited ability to address those threats. While many small system owners may not be using the assessment in the day-to-day operation of their water system, this information is a valuable tool for increasing owners' awareness of the potential threats to their system.

Small Water System Security Guidelines Are Voluntary, and Emergency Response Capacity Is Limited

Part of providing safe drinking water is protecting the system from threats and preparing for emergencies. Many natural and man-made threats may put water system customers at risk. Natural disasters, such as hurricanes, floods, forest fires, or ice storms have the potential to damage water treatment facilities, resulting in drinking water shortages or outbreaks of waterborne disease. Similarly, man-made threats such as accidents, release of hazardous materials, vandalism, or terrorism could also result in an interruption of service, public panic, or waterborne illnesses in addition to the costs of repairing, rebuilding, and decontaminating the water supply.

Despite these concerns, current EPA security guidelines are not enforceable for small systems, and many small systems may not be adequately prepared to respond to an emergency. Two of the most critical needs identified for small systems are mutual aid agreements and emergency power supply.

Water System Security Plans are Flexible

In 2005, the National Drinking Water Advisory Council recommended that EPA promulgate guidelines for establishing a water security program that would allow for flexibility based on water system size and local circumstances.

EPA Security Guidelines Are Voluntary for Small Systems. In response to the 2001 terrorist attacks, Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act (P.L. 107-188). The act requires systems providing water to more than 3,300 customers to develop vulnerability assessments and emergency response plans. Vulnerability assessments evaluate system risks and weaknesses, critical customer needs, and potential points of failure. As part of the assessment, operators also identify existing threat detection and deterrence capabilities in order to better identify needs. The regulations required water system owners to develop these plans without VDH assistance and submit this information directly to EPA.

Emergency response plans are developed to identify the steps required to respond to the threats identified in the vulnerability assessment. Emergency response plans are also helpful in identifying the organizations that will be required to respond to emergencies and address customer needs, such as local police, fire, and hazardous materials units; public health officials; nearby water utilities; and the news media.

While not required, EPA does encourage small systems to develop both a vulnerability assessment and emergency response plan. In response to requests from the National Drinking Water Advisory Council, EPA recently published voluntary guidance for smaller systems in identifying basic security precautions in *Drinking Water Security for Small Systems Serving 3,300 or Fewer Persons*.

Small Systems May Lack Adequate Emergency Response Capabilities. Given the voluntary nature of security guidelines for smaller systems, as well as the lack of State involvement in the development of plans for larger systems, most small systems have not developed vulnerability assessments or emergency response plans. An evaluation of existing security measures for protecting water treatment facilities is an important component of the long-term viability of small water systems. However, responses to the on-line JLARC staff survey of small water system owners illustrated that some small systems may be underprepared for responding to natural or man-made disasters. While most systems reported having plans in place for contacting local emergency response agencies and notifying customers, the majority of survey respondents indicated that they had not performed a vulnerability assessment of their system.

One critical component of an emergency response plan is the development of mutual aid agreements, or service agreements between public water systems. Mutual aid agreements can exist between publicly or privately owned water systems or as a contract with a private water provider, and can be used to facilitate the exchange of people or parts in addition to emergency water supplies. The majority of respondents to the on-line survey indicated that they do not have mutual aid agreements in place with neighboring utilities, private distributors, or local governments. Florida and Texas have agreements in place that serve primarily as a contact list for systems of similar size in relative proximity. Development of these plans should be encouraged by ODW.

Recommendation (9). The Office of Drinking Water should provide assistance to small water systems in developing emergency response plans and mutual aid agreements. Mutual aid agreements should provide for, but not be limited to, the provision of staff, equipment, and potable water in case of a disaster.

Auxiliary Power Identified as a Critical Need. Auxiliary electrical power is an important component of a secure and reliable water supply system. If a water supply system depends on wells and hydro-pneumatic pressure tanks for both supply and storage, an interruption or power outage can create immediate and severe water shortages. The need for small systems to have emergency power

Impact of Power Outages

Tropical Storm Ernesto, in August 2006, left 13 systems serving more than 854,000 people in Tidewater and central Virginia without power to their pumping and distribution systems. VDH staff reported most of these systems had fewer than 100 customers.

capabilities is recognized by the State Drinking Water Advisory Board.

Auxiliary power is not difficult to provide for most small systems, but can be expensive. Gasoline-powered generators are reliable and systems can be installed that start automatically when power is lost, but these systems can be costly. The Drinking Water State Revolving Fund and EPA safety and security grant programs do not provide additional funding for the specific purpose of increasing the electrical capacity of small systems. A State program to require all systems to acquire emergency generators was proposed but not acted upon in 2004.

There are challenges to maintaining an uninterrupted power supply to some small water systems. Many of these systems are located in small communities and, in many cases, may be some distance from electrical distribution lines. Additionally, some systems may not currently be designed to accept emergency power from an external generator.

Several approaches could improve small system emergency preparedness, including identifying small public water systems as critical facilities for statewide emergency response planning, working with Virginia's electric utilities to identify and prioritize restoration of power to small water systems following outages, and ensuring systems have the capability of accepting emergency power.

Identification of small water systems as critical facilities for statewide emergency response planning has the potential to improve emergency response. Identifying these systems as critical to public health and safety would ensure that emergency response planning provided by the Virginia Department of Emergency Management would include small systems, as well as potentially allowing funding to be allocated for water system security programs. ODW currently has staff that support State efforts during emergency response events.

ODW staff could further assist Virginia's electric utilities in identifying small water systems as critical facilities. Following Hurricane Isabel, in 2003 Virginia's largest electric utility began working with water authorities and municipalities to identify water pumping and treatment facilities for expedited restoration; however, no specific efforts have been directed at small systems. ODW could provide information on the location and populations served by these small systems and encourage prioritization when restoring power following outages. Similarly, ODW should work with Virginia's electric utilities to make guidance available to system operators on how to identify the location of a problem (identifying

the pole number or meter number) to help get repair crews there faster.

Even if small systems are designated as critical facilities, those located near the end of a circuit still have the potential to face lengthy outages. Therefore, the ability for a system to accept alternate power feeds is critical. As such, all newly permitted systems should be designed with a manual transfer switch that would allow the well-pump to receive emergency power. There is, however, no source of public funding to retroactively install such switches on systems currently in operation.

Recommendation (10). The Office of Drinking Water (ODW) and the Department of Emergency Management should include small water systems as critical facilities in statewide emergency response planning. In addition, ODW should continue to coordinate efforts with Virginia's electric utilities for identifying the location of small systems and facilitating the restoration of power. ODW and the Department of Emergency Management should collaborate to establish priorities for the systematic restoration of power to critical facilities. These approaches should include, but not be limited to, the development of a program for training small water system owners on all aspects of emergency management planning, including recovering from power losses.

STATEWIDE WATER SUPPLY PLANNING IS EVOLVING

Virginia is rich in water resources; however, the impacts of drought conditions in 2002 have increased awareness of statewide water supply issues. An increased focus on the long-term viability of statewide water supplies resulted in 2003 legislation requiring DEQ to develop a statewide water supply plan. Water supply planning in Virginia is still in its infancy, with local and regional plans under development until 2011. Improved coordination of water resources management activities at the local, regional, and State levels is essential to guaranteeing water supplies meet both the current and future needs of Virginia's citizens in an environmentally sound manner.

Statewide Data on Groundwater Availability Is Limited

Locating adequate groundwater sources has not historically been a problem for small systems. DEQ has currently permitted groundwater withdrawals of more than 27 billion gallons annually from supplies in Tidewater and the Eastern Shore. However, there is relatively limited groundwater mapping and modeling available for the rest of the State.

Groundwater Management Is Occurring in the Tidewater Region.

Under the Groundwater Management Act of 1992, DEQ regulates groundwater withdrawals in designated groundwater management areas. There are currently two of these areas in the State. The Eastern Virginia groundwater management area comprises 13 counties and 11 cities in the Tidewater region east of Interstate 95 and south of the Mattaponi and York rivers. The Eastern Shore groundwater management area includes Accomack and Northampton counties.

Any person or entity wishing to withdraw 300,000 gallons per month or more in a declared management area must obtain a permit from DEQ. In order to obtain a withdrawal permit, hydrologic information on properties of the aquifer (the water-bearing rocks) is required, and DEQ evaluates this information to determine if the requested amount of withdrawal can be obtained without causing adverse impacts to groundwater resources or existing users.

Through this program, DEQ has issued groundwater withdrawal permits to 109 public water systems. Currently, permitted annual groundwater withdrawals in Virginia total more than 27.5 billion gallons (Table 19).

Groundwater Data for the Rest of the State Is Under Development.

For localities that are not located in a groundwater management area, limited information is available. Current statewide groundwater maps only identify Virginia's geologic regions and pollution potential attributable to each geologic type. DEQ is working with the United States Geological Survey, Virginia's research universities, and several professional associations to increase the amount of this data available for aquifers outside of the Tidewater region. Because of the limits of available data, and the time required to collect and model groundwater data, withdrawal permitting does not occur outside of designated groundwater management areas. According to DEQ, it took more than 20 years to establish defensible withdrawal amounts in the Tidewater region, and it is conceivable that it could take as long or longer to develop these criteria for the rest of the State.

2003 Water Supply Planning Act Requires Long-Term Local Water Supply Plans

DEQ began looking at ways to improve water supply planning due to the drought period between 1999 and 2002. This effort resulted in legislation requiring DEQ to work with VDH, local governments, public service authorities, and other interested parties to

Table 19: Groundwater Withdrawal Permits in Virginia

Locality	Total Permits	Yearly Permitted Withdrawal (in Thousands of Gallons)
Accomack	8	196,653
Charles City	2	21,369
Chesapeake	3	4,295,000
Franklin	1	1,051,200
Hanover	17	662,305
Henrico	1	28,366
Isle of Wight	13	2,622,800
James City	11	3,587,849
King William	5	275,414
New Kent	6	1,522,634
Newport News	1	2,555,000
Northampton	8	401,295
Prince George	9	135,799
Smithfield	1	10,000
Southampton	11	491,750
Suffolk	4	8,884,570
Surry	2	21,300
Sussex	2	238,573
Virginia Beach	1	16,100
York	3	487,400
Total	109	27,505,377

Note: Gallons rounded to nearest thousands.

Source: JLARC staff analysis of DEQ groundwater withdrawal permit data through Sept. 2006.

establish a comprehensive process for the development of local, regional and State water supply plans. Local water supply plans are currently under development, and many of these plans are not due until 2011. Because these plans are requirements on local governments and not specific water systems, it is critical that all system owners participate in their development.

Local Water Supply Plans Not Required Until 2008. State regulations require local and regional water supply plans that address a locality's existing water sources, water uses, and resource information. Water supply plans must also address local water conservation efforts and drought response. In the event that existing sources are determined to be inadequate to meet demand, water supply plans are required to identify alternative ways of meeting the shortfall in water supply. All local and regional water supply plans must include a statement of need based on the adequacy of existing water sources to meet current and projected water demand.

The program is envisioned as a State and local partnership with the localities having the primary responsibility for identifying their future demands and the State providing technical support

and oversight. Full implementation of this program will result in a statewide understanding of local water needs and potential alternatives for at least 30 years into the future. It will also allow for improved preparation for future drought, earlier identification of potential resource and inter-jurisdictional conflicts, increased opportunities for public input, and the potential to reduce conflicts in future permit processes.

All cities, counties, and towns in Virginia must develop local or regional water supply plans. A timeline for their phased completion was established by DEQ based on population, with water supply plans for the largest localities due in November 2008 (Table 20). Localities electing to participate in a regional water supply plan have an additional three years to submit the plan. Based on the current local activities related to the development of the required water supply plans, it appears that a large majority of Virginia's local governments will be pursuing a regional approach to their planning efforts. DEQ staff are working with numerous localities on the development of these plans.

State Water Supply Plan Not Required Until 2011. Efforts are also underway to develop a State water supply plan by 2011. DEQ's approach for this plan is to combine local and regional water supply plans with relevant State water resource information. The State plan should provide a qualitative and quantitative description of water resources in Virginia and a statewide snapshot of water supply needs, where needs are met, and an estimate of the ability to meet additional needs.

The State plan will be used as a tool to manage water resources to ensure their continued availability, while also maximizing environmental and economic benefits. An important result of this planning is that DEQ will be able to identify areas where multiple users want to use the same source for their water needs and areas where water availability may be insufficient now or in the future.

Table 20: Schedule for Completion of Local Water Supply Plans

Population	Number of Localities	Completion Date
More than 35,000	45	November 2008
Between 15,000 and 35,000	49	November 2009
Less than 15,000	40	November 2010
Regional	Undetermined	November 2011

Note: DEQ staff estimate that the majority of local governments will participate in regional plans.

Source: DEQ, *Annual Status of Virginia's Water Resources Report*, October 2006.

Almost \$800,000 in Water Supply Planning Grants Have Been Awarded. To assist with the cost of implementing these regulations, DEQ has established a competitive grant process for proposals from local governments for development of their local or regional plans. These grant funds were supplemented by local funds to address the regulation requirements. Since FY 2006, almost \$800,000 in water supply planning grant funds have been awarded to 23 local government entities to develop local and regional water supply plans (Table 21).

Projecting Future Water Demand Is Difficult. While local efforts at implementing statewide water supply planning requirements are underway, implementation of the local water supply planning regulation has proven difficult. As illustrated in the *2005 Virginia Water and Wastewater Rate Report* (prepared by Draper-Aden and Associates), the majority of responding localities indicated that they did not currently have a plan in place that would meet the requirements of the regulation. Of more concern, the report found that more than one-third of the respondents indicated that there was a need for additional water source capacity in the near future,

Table 21: Water Supply Planning Grant Total Almost \$800,000

Recipient	FY 2006 Planning Awards	FY 2007 Planning Awards
City of Bristol	\$10,000	
Central Shenandoah Planning District Commission	9,000	\$50,000
Charlotte County	50,000	
Hampton Roads Planning District Commission	25,000	
New River Valley Planning District Commission	50,000	
Northern Shenandoah Planning District Commission	9,000	
Orange County	50,000	
Region 2000 Local Government Council	42,500	
Southside Planning District Commission	37,918	
Stafford County	15,000	
Accomack-Northampton Planning District Commission		30,000
Appomattox River Water Authority		30,000
Cumberland Plateau Planning District		40,000
Greensville County Water and Sewer Authority		35,000
LENOWISCO Planning District Commission		40,000
Mount Rogers Planning District Commission		40,000
New River Valley Planning District Commission		40,000
Northern Neck Planning District Commission		40,000
Nottoway County		25,000
Rivanna Water and Sewer Authority		20,000
Roanoke Valley-Alleghany Regional Commission		30,000
Southside Planning District Commission		40,000
West Piedmont Planning District Commission		40,000
Total	\$298,418	\$500,000

Source: DEQ, *Annual Status of Virginia's Water Resources Report*, October 2006.

but more than half of the respondents noted difficulty in projecting the extent of actual local water demand.

Planning Activities Should Involve Both Public and Private Water System Owners. Statewide water supply planning requirements are requirements of local governments and not specific water systems. Therefore, localities are responsible for ensuring that all systems participate in determining long-term supply and need regardless of ownership. Several small water system owners expressed concern with their limited involvement in the development of local water management plans. However, development of these plans by the smallest localities—which have higher concentrations of small systems—may not yet have been initiated. Through its development of the State water supply plan, DEQ is responsible for ensuring that local plans adequately account for all public water system despite ownership.

Coordination of Protection and Planning Efforts Between VDH and DEQ Should Be Improved

VDH and DEQ have complementary missions in ensuring the safety and availability of public water supplies. Coordination of small water system protection and statewide water planning between these agencies, however, is largely done on a case-by-case basis. DEQ staff report that every year there are numerous incidents of contamination, such as leaking petroleum storage tanks or chemical spills. However, none of these instances has been linked to widespread aquifer contamination. When DEQ responds to these events, it is at the agency's discretion to notify VDH and, in turn, notify water system owners of potential threats to groundwater supplies. Similarly, VDH staff reported that they contact DEQ when potential sources of contamination are identified during the sanitary survey process. The reporting of this information, however, is at the discretion of each agency staff, and neither agency is able to provide additional information on the frequency of these contacts.

Coordination between VDH and DEQ could also be improved in the waterworks permitting process administered by VDH, and the groundwater withdrawal permitting process administered by DEQ. While DEQ issues groundwater withdrawal permits based on the amount of water that can be withdrawn without causing adverse impacts to groundwater resources, VDH approves withdrawal amounts (through the issuance of operation permits) that are based on the production capacity required to meet the capacity demands of the water systems. Therefore, in some instances the VDH design amount may exceed the DEQ safe yield amount.

Similarly, VDH staff do not verify data on groundwater withdrawal amounts that is collected through sanitary surveys with permitted capacities from DEQ. While not required by VDH regulations at this time, coordination of these oversight responsibilities could improve statewide efforts at water supply planning.

An agreement between DEQ and VDH identifying the common goals and specific objectives of each agency would help system owners understand the complex regulatory environment and could improve the overall coordination of State regulatory activities. This agreement should include a formal process for communicating potential threats to public water supplies and for identifying and verifying water yields approved by VDH and DEQ. DEQ and SCC currently have a similar agreement in place regarding the coordination of environmental impact reviews for the placement of electric transmission lines.

Recommendation (11). The Departments of Health and Environmental Quality should develop a formal Memorandum of Understanding outlining the goals and objectives of each agency regarding the protection of public health and long-term water supply planning. This agreement should include, but not be limited to, policies for coordination of groundwater withdrawal and water system permitting as well as coordination of response for identified instances of contamination.

Study Mandate

SENATE JOINT RESOLUTION NO. 82

Directing the Joint Legislative Audit and Review Commission to study very small and small community water systems in Virginia. Report.

WHEREAS, the availability of safe drinking water is essential to the health of the citizens of Virginia; and

WHEREAS, any system that provides water via pipes or other constructed channels to at least 15 service connections or serves at least 25 people per day for 60 days of the year is considered a public water system; and

WHEREAS, public water systems are classified by the number of people they serve; and

WHEREAS, many homeowners in the Commonwealth are required to purchase their water from public water systems that are classified as very small or small; and

WHEREAS, the Virginia Water Resources Research Center reported that, in 2000, approximately 70 percent of the very small and small public water systems are investor-owned; and

WHEREAS, these systems lack the economies of scale of larger systems; and

WHEREAS, some customers of very small and small public water systems are frustrated by the perceived lack of regulatory authority over these systems; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Joint Legislative Audit and Review Commission be directed to study very small and small community water systems in Virginia. In conducting its study, the Joint Legislative Audit and Review Commission shall determine whether the needs of Virginia's citizens are being met through the existing regulatory scheme with regard to both water quality and rates charged and shall make recommendations on any needed improvements.

Technical assistance shall be provided to the Joint Legislative Audit and Review Commission by the State Corporation Commission and the Department of Health. All agencies of the Commonwealth shall provide assistance to the Joint Legislative Audit and Review Commission for this study, upon request.

The Joint Legislative Audit and Review Commission shall complete its meetings by November 30, 2006, and the Chairman shall submit to the Division of Legislative Automated Systems an executive summary of its findings and recommendations no later than the first day of the 2007 Regular Session of the General Assembly. The executive summary shall state whether the Joint Legislative Audit and Review Commission intends to submit to the General Assembly and the Governor a report of its findings and recommendations for publication as a House or Senate document. The executive summary and report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

Research Activities and Methods

Research activities undertaken as part of this review included

- surveys of small water systems customers, and waterworks owners and operators;
- collection and analysis of water system rate and violation data;
- site visits to four Department of Health (VDH) field offices and attendance at five on-site inspections;
- reviews of VDH and State Corporation Commission (SCC) files;
- structured interviews;
- document reviews; and
- attendance at meetings.

SURVEYS OF SMALL WATER SYSTEM CUSTOMERS AND WATERWORKS OWNERS AND OPERATORS

The study mandate directs JLARC staff to "determine whether the needs of Virginia's citizens are being met through the existing regulatory scheme." Therefore, one of the primary research activities of this review was conducting surveys of both small water system customers and owners.

Surveys of Small Water System Customers

Senate Joint Resolution 82 notes that "some customers of very small and small public water systems are frustrated by the perceived lack of regulatory authority over these systems." To obtain input from the customers served by small water systems, a 20-question, single-page, direct-mail survey was developed for a sample of small water systems in selected localities. A one-page, postage-paid, survey instrument was used to encourage responses. The survey required information concerning

- customer experience and overall satisfaction with water quality and the reliability of service,

- perceptions about the rates that are charged and customer ability to pay,
- perceptions of the regulatory framework and the extent to which customers have confidence in their water system, and
- the adequacy of the information received from the system owner and State agencies regarding water quality and rate adjustments.

The study team did not find evidence that previous surveys of customers have been conducted. Moreover, none of the State regulatory agencies maintains customer address information. As such, owners of selected systems were requested to provide customer address information to JLARC staff, and these addresses were destroyed following completion of the survey.

Customers in each of the six VDH regions were included in the survey population (Table 1). In five of the regions, the team selected the locality closest to the regional median number of customers per small water system. In the sixth region, the team selected Culpeper County because incidents in that county helped to trigger the study mandate. In each locality, up to ten systems were selected, and the owners of these systems were contacted in order to obtain customer addresses.

Based on the number of small water system customer connections in the localities selected, an initial goal was set of obtaining 80 or more survey responses in the counties of Nelson and Southampton

Table 1: Customer Survey Selection and Response Rates

County	VDH Region	Number of Systems Selected ¹	Number of Discrete Addresses	Number of Surveys Sent ²	Number of Responses Received	Response Rate ³
Bedford	Danville	9	1,887	325	77	24%
Culpeper	Culpeper	9	1,448	303 ⁴	85	28
Southampton	Southeast	6	2,501	200	49	25
Nelson	Lexington	5	811	200	53	27
Richmond	East Central	5	701	325	50	15
Russell	Abingdon	5	1,927	325	39	12
Totals		39	9,275	1,678	353	22%

¹ Excludes customers of State and federally owned systems.

² Includes 75 pre-test surveys sent in Bedford, Richmond, and Russell counties (25 each).

³ Total response rate excludes 40 surveys returned undeliverable.

⁴ JLARC staff sent 303 surveys to residents in Culpeper County as the total number of addresses received from owners closely matched the target number of surveys.

Source: JLARC staff survey of small water system customers, summer and fall 2006.

Systems Refused to Participate

In Dinwiddie County, the Town of McKenney would not respond to repeated requests for customer address information. The owner of two small private systems did not respond to repeated requests. A review of recent VDH actions indicated that this owner's systems have received several violations related to naturally occurring radium that was appearing in some customers' water.

The Dinwiddie County Service Authority (a large local system providing water to the majority of Dinwiddie County residents) was able to provide staff with customer addresses for one small system it operates. However, these addresses had to be excluded from the survey population given the lack of response from the other small systems in the county.

and 120 or more surveys in the counties of Russell, Richmond, Bedford, and Culpeper. With a target response rate of 40 percent, 1,603 surveys were sent with the objective of obtaining 640 or more responses (Table 1). Including 75 customers selected for inclusion in a pretest of the survey, in the selected localities, 943 customers (56 percent of the total) of locally owned systems received surveys, and 735 customers (44 percent) of privately owned systems received surveys.

The actual response rate for the survey was less than the original goal. A pretest was sent to 75 customers in three localities, and the response rate was 20 percent. For the entire survey effort, the response rate was 22 percent. Survey responses from each locality were generally close to the overall response rate, with the highest percentage of respondents (28 percent) coming from the customers of private systems in Culpeper County and the fewest (12 percent) from the customers of municipal systems in Russell County. Response rates to individual questions are included in Appendix C.

JLARC staff faced several challenges in collecting customer address information from both locally and privately owned systems. Following the selection of localities, JLARC staff contacted system owners to request customer address information. Challenges collecting customer address information from some privately owned systems in Culpeper County resulted in staff having to select additional systems for inclusion in the sample. Similar challenges occurred when trying to collect addresses from small systems in VDH's Danville region. Initially, Dinwiddie County was selected as it was closest to the median number of customers served by small systems; however, one municipal and two private systems refused to provide address information, resulting in the need to select another locality from within the region. Using the methodology employed for the initial selection, Southampton County was selected, as the number of customers in the county was the next closest to the median.

Survey of Small Water Systems Owners and Operators

To gain their perspective of the regulatory framework, JLARC staff surveyed 599 owners and operators of small systems. According to VDH-provided information, these 599 systems administrators serve all small systems in Virginia. (JLARC staff use the term "administrator" here because public systems do not have individual owners, and operators may administer both publicly and privately owned systems.) JLARC staff prepared two surveys, a one-page mail survey and a more detailed on-line survey. Responses to the one-page survey were received from 188 administrators (31 percent). Forty-nine responses were received from operators of public systems, 131 responses from owners of private systems, and

eight responses from administrators of public and private systems. The primary purpose of the survey was to obtain information from owners regarding the extent to which they are challenged in meeting various technical, financial, and managerial issues. Response rates to the individual questions are included in Appendix D.

An on-line survey with more detailed questions on the effectiveness of certification and training requirements for operators, the level of technical assistance provided by the State, adequacy of the rate-setting process, and best practices that are used to improve water quality and costs was made available to all 599 administrators. This survey was available on-line from early September to mid-October 2006. JLARC staff received 43 responses to this survey for an overall response rate of seven percent.

DATA COLLECTION AND ANALYSIS

JLARC staff collected and analyzed data on rates charged and violations incurred by Virginia's small water systems. This data was collected from a number of sources maintained by the VDH, the SCC, and a private engineering firm.

Statewide Water Rate Analysis

In determining statewide water rates, JLARC staff obtained water rate information from a number of sources. For publicly owned system rates, JLARC staff used the *2005 Water and Wastewater Rate Report* published under contract for VDH by Draper-Aden Associates. This report contained base rate and estimated annual billing information for 142 local government entities (cities, counties, towns, and public service authorities) that operate 294 water systems. For private water system rates, JLARC staff used data provided by the SCC Division of Public Utility Accounting for 69 regulated utilities. This dataset contained rate information for 254 water systems.

In an effort to make analysis of available rate data more robust, JLARC staff attempted to collect rate information through its survey of small system owners and operators. This approach was, however, limited by the number of overall responses to the survey, and to questions on rate data in particular. As a result of this research, JLARC staff obtained usable responses from 88 water systems (80 of which were locally owned). Of these, 40 were for systems for which previous information was not otherwise available and 18 confirmed rate information that was already reported. For the 30 systems for which reported rate information conflicted with previously available data, the system operator was contacted to determine the appropriate rate to report.

As such, the analysis of statewide median water rate information in Chapter 2 is based on rates for 63 percent (335) of locally owned and 39 percent (260) of privately owned systems. These 595 systems represent approximately 50 percent of the 1,201 locally or privately owned community water systems (excluding 38 state and federally owned systems).

Analysis of Small Water Systems Violation Data

To determine the breakdown of violations issued to small and large water systems, JLARC staff requested and received data from VDH of all violations issued between January 1, 2001, and September 1, 2006. In addition to the violation date, VDH also provided the water system identification number, name, ownership type, population served, type of violation, a description of the violation, and other information. There were 6,688 violations issued during that time frame to 799 individual water systems.

JLARC staff analyzed the violation data several ways. First, the overall number of violations was categorized by system size using a population size of 3,300 or fewer. Second, JLARC staff controlled for the number of water systems by dividing the number of violations issued to small and large systems by the number of systems in each category. Finally, JLARC staff analyzed the number of violations issued based on whether the system type was identified by VDH as public (local or county government, or public service authority), private, State, or federal.

The number of systems operating each year fluctuated as some systems were deactivated and new ones began operations. VDH's Office of Drinking Water (ODW) does not maintain data on which systems operated in a given year, but it does track when the system was activated or inactivated. For the most part, there were no substantial changes in the number of systems from one year to the next.

SITE VISITS

JLARC staff visited four of the six VDH field offices, including Culpeper, Danville, East Central, and Southeast. At each field office, JLARC staff met the key personnel responsible for the oversight of drinking water in the region. These individuals included the field director, deputy director, and environmental inspectors. During the site visits, JLARC also reviewed files of a selected number of small community water systems in the region. The site visits were conducted in July and August, and each site visit was completed in one to two days. Additionally, JLARC staff accompanied VDH staff on five inspections of small water systems during the course of the

study. The inspections that JLARC observed were in Henrico, Isle of Wight, and Suffolk counties.

REVIEW OF DEPARTMENT OF HEALTH AND STATE CORPORATION COMMISSION FILES

JLARC staff reviewed the official documents of record for more than 110 small water systems maintained by VDH and SCC. Review of these documents was conducted across VDH field offices as well as from the SCC central office and on-line case management system. Staff analysis of these documents was used in assessing the adequacy of these State regulatory agencies.

Review of Small Water Systems Records

JLARC staff reviewed files for 58 permitted waterworks in four of VDH's six regions. The water systems were randomly selected from a total of 1,081 waterworks. JLARC staff eliminated military and NASA installations from the file review because the systems serve a different population than the one referenced in the mandate. However, State facilities such as correctional institutions were included to determine if such facilities performed differently than non-State systems. After backing out the military and NASA systems, the four regions account for 64 percent of the waterworks in the State. The 58 waterworks included 18 public facilities and 40 private facilities.

Review of SCC Files

In assessing actions of the SCC, JLARC staff reviewed opinions in five rate cases docketed since 2000. In reviewing recently docketed cases, JLARC staff were able to review all documents filed on the SCC automated docketing system in addition to the final report of the hearing examiner, including initial filings by system owners, progress reports, and testimony received through public hearings. Additionally, using LEXIS, staff reviewed final SCC opinions for an additional seven cases since 1980. In reviewing historical case information, JLARC staff were only able to review the final opinion of the SCC. In addition to reviewing formally docketed cases, JLARC staff reviewed undocketed files and customer complaints for 47 cases since 2000.

STRUCTURED INTERVIEWS

Numerous structured interviews were conducted during the course of this review. JLARC staff interviewed staff at VDH, SCC, the Department of Environmental Quality (DEQ), the Department of Professional and Occupational Regulation (DPOR), the U.S. Envi-

ronmental Protection Agency (EPA), water system owners and operators, and other states' drinking water programs.

JLARC staff interviewed ODW central office and field office staff charged with overseeing and enforcing the Safe Drinking Water Act and State waterworks regulations. ODW central office staff interviewed include the director, the director of regulatory compliance, the director of construction assistance, planning and policy, and the small water systems coordinator.

Interviews were also held with the SCC, including the assistant directors of the divisions of Energy Regulation and Public Utility Accounting, associate general counsel, and a utilities analyst.

In addition, JLARC staff spoke with EPA staff, staff of the Auditor of Public Accounts, representatives of a wide range of locally and privately owned systems, representatives of the Virginia Water Well Association, and drinking water staff in Maryland and North Carolina.

REVIEW OF PROFESSIONAL LITERATURE

JLARC staff reviewed the following documents that focus on small systems as well as the Safe Drinking Water Act including

- *Code of Virginia*, including the Public Water Supplies Act;
- VDH's Waterworks Regulations;
- National Research Council of the National Academy of Sciences' *Clean Water from Every Tap* (1997) report;
- Annual workplans prepared by the ODW field offices and central office;
- ODW Enforcement Manual, pending and accomplished regulatory enforcement synopses; and
- Annual Public Water Systems Compliance Reports for 2001 through 2005.

In addition to technical documents published by EPA and VDH, staff reviewed recent publications of the United States Government Accountability Office (GAO) dealing with national water infrastructure, water regulations, and rates. Publications were also reviewed of the following professional organizations:

- Virginia Water Resources Research Center,
- National Drinking Water Advisory Council, and
- Brookings Institution - American Enterprise Institute.

JLARC staff further reviewed professional instruction and field training literature, in particular, *Small Water System Operation and Maintenance*, prepared by California State University, for developing an understanding of the water collection and distribution processes as well as treatment techniques used by small waterworks. Additionally, JLARC staff used the "Sanitary Sam" program developed for the EPA by the University of Montana for training sanitary inspection staff of state drinking water offices.

ATTENDANCE AT MEETINGS

JLARC staff attended the July and September 2006 meetings of the Waterworks Advisory Committee (WAC), an advisory panel established within the Virginia Waterworks regulations to allow for input in the development of statewide policies.

Customer Survey Response Summary

Water Quality and System Performance

	Never	1-2	3-4	5 - 10	11 or More
<i>In the past 18 months...</i>					
How many days have you experienced an interruption in water service?	57%	29%	5%	5%	4%
Public (n=153)	70	24	3	3	<1
Private (n=194)	47	32	7	7	7
How many days have you experienced water quality concerns (discoloration or odor)?	61	11	5	7	17
Public (n=149)	61	14	8	7	10
Private (n=196)	60	8	3	7	21
How many days have you experienced water taste concerns (metallic or soapy taste)?	73	7	5	3	12
Public (n=147)	78	5	6	3	8
Private (n=191)	69	8	4	4	16
How many times have you been notified of water quality issues (for example, a boil water order)?	81	14	2	1	2
Public (n=147)	83	11	3	0	3
Private (n=192)	80	16	2	1	2
How many times have you contacted your system operator regarding water quality concerns?	75	13	6	3	2
Public (n=149)	88	7	3	1	0
Private (n=193)	65	18	9	5	3
	Very Good	Good	Fair	Poor	Very Poor
How would you rate the performance of your system operator in...					
Providing quality drinking water?	44%	30%	11%	6%	9%
Public (n=152)	51	28	12	4	5
Private (n=195)	38	31	10	8	12
Running a safe and dependable water system?	47	30	11	4	8
Public (n=151)	54	30	12	2	3
Private (n=194)	42	30	10	6	12
Responding to customer concerns?	40	32	12	9	7
Public (n=134)	49	36	8	5	2
Private (n=182)	34	29	15	11	11
Notifying customers of potential water quality issues in a timely manner?	40	32	10	8	10
Public (n=137)	46	37	7	5	5
Private (n=181)	35	29	13	9	13
Meeting your overall drinking water expectations?	41	33	9	7	10
Public (n=143)	48	37	6	5	4
Private (n=184)	35	30	13	8	15

Continued...

State Oversight

	Yes	No	Does Not Apply
Have you contacted the Virginia Department of Health concerning the quality of your tap water?	6%	93%	1%
Public (n=151)	1	98	1
Private (n=193)	10	89	1
Did the Health Department investigate your concerns?	2	14	84
Public (n=115)	0	17	83
Private (n=160)	4	13	84
Were your concerns addressed to your satisfaction?	4	12	84
Public (n=110)	6	6	87
Private (n=159)	2	16	82
Were your concerns addressed in a timely manner?	6	10	84
Public (n=110)	6	5	88
Private (n=159)	5	14	81
Do you receive annual information about the performance of your water system?	78	14	8
Public (n=141)	82	7	11
Private (n=197)	76	18	6
Do you find this information helpful?	66	16	17
Public (n=139)	71	16	14
Private (n=186)	63	17	20

Water Rates

	Yes	No	Does Not Apply
Are the water rates that you are currently charged affordable?	69%	25%	7%
Public (n=149)	72	27	1
Private (n=192)	66	23	11
Have the reasons for proposed rate increases been explained to you?	32	41	27
Public (n=148)	41	44	15
Private (n=191)	25	39	36
Do you receive adequate and timely notification of proposed rate increases?	37	31	32
Public (n=147)	51	29	20
Private (n=191)	27	33	40
Do you have adequate opportunity to comment on proposed rate changes?	32	31	37
Public (n=144)	43	30	27
Private (n=191)	24	32	44

Source: JLARC staff survey of small water system customers, September 2006.

Appendix D

Owner and Operator Survey Response Summary

SYSTEM OWNERSHIP		
	Yes	No
If you had the opportunity, would you choose NOT to own/or operate your water system?		
All	44 %	56 %
Public (n=38)	18	82
Private (n=99)	56	44
Mixed ¹ (n=7)	14	86

FINANCIAL ISSUES	Not a Challenge or Problem	Minor Challenge or Problem	Moderate Challenge or Problem	Major Challenge or Problem
Paying for capital improvements	17 %	20 %	30 %	33 %
Public (n=49)	8	25	23	45
Private (n=126)	21	18	33	28
Mixed (n=8)	0	25	25	50
Obtaining financial assistance to help with planning or upgrades	22	25	28	25
Public (n=49)	10	33	37	20
Private (n=122)	29	22	25	25
Mixed (n=8)	0	25	25	50
Maintaining adequate reserve funds for emergency repairs	26	23	29	22
Public (n=49)	18	31	31	20
Private (n=130)	29	21	28	22
Mixed (n=8)	13	13	50	25
Increasing rates	27	24	28	22
Public (n=49)	18	22	39	21
Private (n=122)	32	24	21	24
Mixed (n=8)	0	25	75	0
Covering operating costs under current rate structure	31	29	24	17
Public (n=49)	16	47	16	20
Private (n=130)	37	23	25	15
Mixed (n=8)	13	13	63	13

Continued...

TECHNICAL ISSUES	Not a Challenge or Problem	Minor Challenge or Problem	Moderate Challenge or Problem	Major Challenge or Problem
Condition of distribution system	25%	28 %	32 %	16 %
Public (n= 49)	12	31	35	23
Private (n=129)	30	26	33	12
Mixed (n=8)	25	50	0	25
Age and condition of the tanks and equipment	27	29	33	11
Public (n=49)	12	37	45	6
Private (n=131)	34	24	29	13
Mixed (n=8)	13	50	25	13
Age and condition of the building or water storage shed	30	36	23	11
Public (n=49)	23	39	29	10
Private (n=131)	31	35	21	12
Mixed (n=8)	38	38	25	0
Losing water through leaks or breaks in the system	32	36	24	9
Public (n=49)	16	33	31	20
Private (n=130)	37	38	22	4
Mixed (n=8)	50	25	13	13
Finding the time myself or finding a qualified person to operate the system	37	34	18	12
Public (n=49)	43	29	16	12
Private (n=131)	37	33	18	12
Mixed (n=8)	13	75	13	0
Fixing or repairing problems that arise in operating system(s)	29	43	20	8
Public (n=49)	14	61	23	2
Private (n=131)	34	37	19	10
Mixed (n=8)	25	38	25	13
Meeting all applicable drinking water quality standards	52	26	12	10
Public (n=49)	53	29	12	6
Private (n=131)	52	24	12	12
Mixed (n=8)	38	38	25	0
Maintaining an uninterrupted water supply to the customers	49	33	15	3
Public (n=49)	45	39	16	0
Private (n=129)	51	30	16	4
Mixed (n=8)	38	63	0	0

Continued...

TECHNICAL ISSUES	Not a Challenge or Problem	Minor Challenge or Problem	Moderate Challenge or Problem	Major Challenge or Problem
Obtaining technical assistance	49 %	37 %	10 %	4 %
Public (n=49)	45	49	6	0
Private (n=132)	52	30	12	6
Mixed (n=8)	13	88	0	0
Maintaining required records	61	26	9	4
Public (n=49)	71	20	4	4
Private (n=131)	59	28	9	5
Mixed (n=8)	38	38	25	0
Taking required water quality samples	64	21	12	4
Public (n=49)	69	18	10	2
Private (n=132)	64	20	12	5
Mixed (n=8)	38	50	13	0
Responding to customer complaints and concerns on a timely basis	65	23	11	1
Public (n=49)	57	35	6	2
Private (n=131)	69	18	12	1
Mixed (n=8)	63	25	13	0
Maintaining appropriate disinfectant levels	61	28	9	2
Public (n=49)	63	27	10	0
Private (n=124)	61	27	9	3
Mixed (n=8)	38	63	0	0
Keeping the system(s) locked and secured	69	25	5	2
Public (n=49)	51	35	8	6
Private (n=131)	77	19	3	1
Mixed (n=8)	38	50	13	0

Continued...

MANAGERIAL ISSUES	Not a Challenge or Problem	Minor Challenge or Problem	Moderate Challenge or Problem	Major Challenge or Problem
Recruiting new staff	47 %	20 %	16 %	17 %
Public (n=49)	33	29	18	20
Private (n=124)	52	17	15	15
Mixed (n=8)	50	25	13	13
Population growth and new system construction	47	25	21	8
Public (n=49)	29	31	37	4
Private (n=127)	57	21	14	9
Mixed (n=8)	13	50	25	13
Projecting future water demand	41	34	15	10
Public (n=49)	18	41	29	12
Private (n=129)	50	31	11	8
Mixed (n=8)	25	50	0	25
Retention of staff	53	25	13	9
Public (n=49)	41	35	8	16
Private (n=124)	57	21	15	7
Mixed (n=8)	50	38	13	0
Developing a business plan	46	32	13	9
Public (n=49)	31	43	18	8
Private (n=123)	54	27	11	9
Mixed (n=8)	25	38	25	13
Water system security and vulnerability assessment	45	37	16	3
Public (n=48)	25	50	19	6
Private (n=127)	54	32	13	2
Mixed (n=8)	13	38	50	0

Note: Some percentages sum to more than 100 due to rounding.

¹ "Mixed" indicates owners of both public and private systems.

Source: JLARC staff survey of system owners and operators, summer 2006.

Review of VDH Performance Measures

The Virginia Department of Health (VDH) has developed two performance measures related to the State's drinking water program for *Virginia Performs*, the internet-based performance site maintained by the Council on Virginia's Future. Performance measures reflect agency or program inputs, outputs, or outcomes. To assess the effectiveness of its drinking water oversight efforts, VDH measures the following two outputs:

- number of citizens provided an adequate quality and quantity of drinking water as a result of loans and/or grants from the Drinking Water State Revolving Fund (DWSRF) and Water Supply Assistance Grant programs; and
- number of routine waterworks inspections conducted in accordance with VDH's Office of Drinking Water (ODW) schedule.

JLARC staff reviewed the two performance measures and found the measures do not fully reflect the agency's performance in meeting its stated mission of providing affordable and safe drinking water to Virginia's residents. For example, using the potential number of customers served by a system receiving improvement funding does not measure what role ODW had in improving water quality and affordability. Likewise, tracking the number of routine sanitary surveys over time is helpful, but given the importance ODW places on providing technical and compliance assistance to small waterworks, it is also important to address outcomes from the inspections.

A better reflection of ODW performance could be gained by developing measures for the following activities:

- complaint response time and resolution,
- number of operators who completed ODW training and passed the licensure exam,
- percentage of small system operators who are certified,
- number of funding applications received and funding requests filled classified by ODW region,
- percentage of identified deficiencies and violations corrected within a time frame specified by ODW, and

- systems returned to compliance as a result of compliance assistance and/or enforcement actions.

These and other measures would provide a more accurate depiction of ODW's effectiveness in carrying out its responsibility to ensure that all water systems meet federal and State drinking water standards.

Agency Responses

As part of the extensive validation process, State agencies and other entities involved in a JLARC assessment effort are given the opportunity to comment on an exposure draft of the report. Appropriate technical corrections resulting from comments provided by these entities have been made in this version of the report. This appendix contains the written responses from the Virginia Department of Health, State Corporation Commission, and the Office of the Attorney General. The Department of Environmental Quality was also given a copy of an exposure draft and made technical comments; however, the agency chose not to submit a formal response.



COMMONWEALTH of VIRGINIA

ROBERT B. STROUBE, M.D., M.P.H.
STATE HEALTH COMMISSIONER

Department of Health
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RICHMOND, VA 23218

TTY 7-1-1 OR
1-800-828-1120

November 8, 2006

NOV 08 2006

Mr. Philip A. Leone, Director
Joint Legislative Audit and Review Commission
Suite 1100, General Assembly Building
Capitol Square
Richmond, Virginia 23219

Dear Mr. Leone:

Thank you for submitting to the Virginia Department of Health (VDH) an Exposure Draft of your report entitled, *Performance and Oversight of Virginia's Small Community Drinking Water Systems* dated November 1, 2006. In addition, I would like to commend your staff for their thorough and detailed analysis of the current drinking water regulatory program.

The VDH staff reviewed the document in detail and we appreciate the opportunity to provide clarification regarding some of the data and technical interpretations. During our meeting on November 7, 2006, we provided you and your staff with various comments and recommendations for your consideration (attached). VDH agrees that there is a need for a more comprehensive enforcement process to address the recalcitrant and non-compliant waterworks.

To that end, the Office of Drinking Water has taken initial steps to work more closely with the State Corporation Commission, the Office of the Attorney General, and the Department of Environmental Quality to better serve the citizens of the Commonwealth.

If we can assist you in any way, please feel free to contact Dr. Wesley Kleene, Director, Office of Drinking Water at (804) 864-7522.

Sincerely,

Robert B. Stroub, M.D., M.P.H.
State Health Commissioner



MARK C. CHRISTIE
CHAIRMAN
THEODORE V. MORRISON, JR.
COMMISSIONER
JUDITH WILLIAMS JAGDMANN
COMMISSIONER

COMMONWEALTH OF VIRGINIA



NOV 07 2006

JOEL H. PECK
CLERK OF THE COMMISSION
P. O. BOX 1197
RICHMOND, VIRGINIA 23218-1197

STATE CORPORATION COMMISSION

November 6, 2006

Philip A. Leone, Director
Joint Legislative Audit and Review Commission
Suite 1100, General Assembly Building
Capitol Square
Richmond, Virginia 23219

Dear Dr. Leone:

Thank you for submitting to the State Corporation Commission an Exposure Draft of your report entitled, *Performance and Oversight of Virginia's Small Community Drinking Water Systems* dated November 1, 2006.

The Commission Staff has suggested a number of recommended technical changes to this draft, and these are included with this letter as Attachment 1. Please do not hesitate to contact me should there be any questions regarding these changes, or if you should require further documentation or clarification.

In addition to the technical changes recommended in Attachment 1, we have several concerns with the substantive recommendations in the Exposure Draft. In the interest of responding to the JLARC Exposure Draft by the deadline given, we enclose our Staff's memorandum detailing its concerns, and we endorse the concerns expressed therein. We would certainly be happy to discuss these issues in more detail in the future with the General Assembly.

The Commission and its Staff remain ready to assist you however we may in fulfilling the directive upon JLARC by the General Assembly in Senate Joint Resolution 82 to assess the regulatory framework of small community drinking water systems with regard to water quality and rates charged.

Sincerely,

A handwritten signature in cursive script, reading "Mark C. Christie".

Mark C. Christie, Chairman
State Corporation Commission

Attachments

TYLER BUILDING, 1300 EAST MAIN STREET, RICHMOND, VA 23219-3530 PHONE (804) 371-9638 • <http://www.scc.virginia.gov> • TDD PHONE (804) 371-9206

MEMORANDUM

TO: Chairman Christie, Commissioner Morrison and Commissioner Jagdmann

FROM: Marc Tufaro, Susan Larsen and Raymond Doggett

DATE: November 6, 2006

RE: Joint Legislative Audit and Review Commission's Report on the Performance and Oversight of Virginia's Small Community Drinking Water Systems

The JLARC report contains three recommendations impacting the operations of this Commission. Furthermore, there are 14 technical or editorial changes Staff recommends that the Commission consider asking JLARC to make to improve the Exposure Draft. We have attached a draft letter and three pages of the recommended technical or editorial changes in summary form to the JLARC report for your review as well.

The recommendations are found in Chapter 4 of the study. The three recommendations are as follows:

1. The State Corporation Commission should require public utilities to provide information to customers on the electronic filing of comments as part of their public notification of rate changes.
2. The Virginia Department of Health (VDH) and the State Corporation Commission (SCC) should develop a formal memorandum of agreement on maintaining safe and reliable water supplies for regulated water companies. This agreement should include, but not be limited to identification of common goals, enumeration of agency responsibilities, and agreements for implementing enforcement actions. This agreement should include a process for developing financial planning and reporting guidelines that will allow VDH to provide technical support to small systems in meeting SCC regulatory requirements, and a process for encouraging and coordinating the direct testimony of VDH staff in rate cases when requested by the waterworks applicant.
3. The State Corporation Commission, in consultation with the Virginia Department of Health, should develop policies and guidelines for increasing the use of single-tariff pricing to encourage the consolidation of small water systems. These guidelines should include, but not be limited to: demonstration of need for rate structure, impact of proposed rate structure for improving compliance with water quality regulations, and the potential impact of the rate structure on the rate payers.

Staff agrees with JLARC that the notice currently found in the Commission's *Rules implementing the Small Water or Sewer Public Utility Act* (20 VAC 5-200-40), should be amended to clearly allow for the filing of electronic comments. The General Counsel has interpreted the word "written" in the notice prescribed in the Rules to encompass electronic comments, but Staff agrees that it would be appropriate to clearly allow for the acceptance of electronic comments.

The second recommendation relating to a formal memorandum of agreement ("MOA") with the Virginia Department of Health is also a positive recommendation, though the scope of the recommended MOA has potential issues. Staff and VDH currently enjoy a good working relationship. Agreeing to a MOA should not be difficult in the opinion of Staff. The scope of the MOA as set out by the recommendation of the report presents problems though.

Enforcement actions taken by VDH encompass significantly more issues than actions taken at the Commission. Quality of service issues encompass nearly all the types of actions taken by VDH, but Staff has not historically petitioned the Commission to take action on issues falling within the purview of VDH.

Second, the implementation of enforcement actions for VDH and the Commission makes use of different legal mechanisms and the scope of VDH's enforcement actions is broader than the Commission's. VDH's enforcement actions result in a Special Order of the Commissioner of Health, which is an administrative action. Violation of Special Order may result in the imposition of fines and penalties by a Circuit Court after VDH, through the Office of the Attorney General, petitions a Circuit Court of competent jurisdiction. EPA may also step in and take action on its own. Enforcement actions at the Commission ultimately result in a Rule to Show Cause, which is a judicial function of this Commission.

The third recommendation regarding increasing the use of single tariff pricing to encourage consolidation in theory would increase the number of adequately capitalized companies this Commission regulates. In reality with one company, Aqua America, currently controlling approximately 25% of the small water companies the Commission currently regulates there may not be that many opportunities for consolidation remaining. Single tariff pricing alone does not encourage consolidation. Consolidation occurs where there is a convergence of factors, including but not limited to, geographical location, operational efficiencies, current rate level, and the rate level the acquiring entity can charge. The Commission has not openly endorsed such an approach on a generic basis and has maintained flexibility in the past. This is a ratemaking issue that has historically fallen within the scope of the Commission's decision making authority.



COMMONWEALTH of VIRGINIA

Office of the Attorney General

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November 7, 2006

VIA FACSIMILE – (804) 371-0101

Philip A. Leone, Director
Joint Legislative Audit and Review Commission
Suite 1100, General Assembly Building, Capitol Square
Richmond, Virginia 23219

Dear Mr. Leone:

On behalf of the Attorney General, thank you for the opportunity to review the Exposure Draft of the JLARC report, *Performance and Oversight of Virginia's Small Community Drinking Water Systems*. Nelson Daniel, the Assistant Attorney General who represents the Virginia Department of Health's Office of Drinking Water (VDH/ODW), reviewed the report and provided the following suggestions for your consideration:

Comment #1: On page vi, the last sentence in the fifth paragraph (beginning with, "Furthermore, the Office of the Attorney General (OAG) ...") suggests the OAG does not pursue certain cases because of the "difficulty of prevailing in court." The difficulty the OAG anticipates is achieving a result that is ultimately beneficial to the individuals served by the waterworks. In certain cases, the OAG has decided not to initiate court action seeking injunctive relief and/or civil penalties because, using the enforcement tools that are currently available, our assessment of the likely outcome suggests the operator does not have the funds to pay a penalty or make improvements to the waterworks, litigation will likely lead to abandonment, and litigation increases the risk to the population served by the waterworks.

Suggestion: Delete "that it should" in the first sentence and "prevailing in court" in the second sentence. Revise the second sentence to say, "According to VDH staff, when the department has referred cases to the OAG to pursue civil penalties, the OAG has declined to initiate litigation because of limited resources and the difficulty of achieving a result that provides benefits to the population served by the waterworks."

Comment #2: On page 46, the paragraph before the case study says “the OAG had to be directed by the federal Justice Department to pursue a financial penalty against a water system that failed to comply with a 1992 criminal plea agreement to upgrade the filtration system.” This statement is not correct. The OAG declined to initiate enforcement action during the proceedings initiated by the Department of Justice (DOJ) for violations of the Clean Water Act. Following the conclusion of the DOJ case, the OAG resumed activities to have the operator comply with Orders issued by both the Departments of Environmental Quality and Health. The DOJ never directed the OAG to pursue a financial penalty.

Suggestion: Replace the last sentence with, “In the other case, the OAG declined to pursue a financial penalty against a water system operator until the federal Justice Department concluded its case against the operator for violations of the Clean Water Act. The OAG has resumed activities to bring the waterworks into compliance with the drinking water standards and is seeking an appropriate civil penalty.”

The case study that immediately follows the paragraph discussed above should be revised accordingly, replacing the last three sentences with comparable statements.

Comment #3: On pages i, v, vi, 31, 41-2 and 44-6, the report refers to “enforcement efforts,” suggesting they could be more aggressive and/or improved. Like Comment #1, the problem is not a lack of effort by VDH/ODW and the OAG; instead it is the difficulty in achieving a result that is ultimately beneficial to the individuals served by the waterworks. The OAG would like to have additional enforcement tools available to bring systems without the Technical, Financial, and Managerial (TFM) capabilities into compliance. For example, in Maryland, the Secretary of Environment has used the State’s waterworks abandonment provision to force owners of underperforming systems out of business and then required the locality in which the waterworks is located to operate the system. Additionally, North Carolina has used financial incentives to encourage successful systems to purchase and improve unviable systems. (page 51, JLARC Draft Report)

Suggestion: Page i: Replace the last two sentences in the third bulleted comment with, “Efforts by VDH and the Office of the Attorney General to return these systems to compliance could be aided by creating more effective mechanisms and enforcement tools for eliminating underperforming systems. The State may improve compliance by offering financial incentives to encourage consolidation of these waterworks and other problematic waterworks with successful systems. (Chapter 3)”

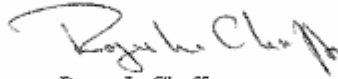
Comparable language can be incorporated in the discussion and headings on pages v, vi, 31, 41-2 and 44-6.

Philip A. Leone
November 7, 2006
Page 3 of 3

I concur with Nelson's comments and hope they can be incorporated in future revisions of the draft. I understand that Nelson and Eric Messick have discussed the issues addressed by Comments #1 and #2 and that Eric may have already incorporated some or all of these suggestions into the report.

Because Nelson is out-of-town I am forwarding the foregoing in order to meet your deadline. Thank you for your assistance and attention with this matter. Please contact me at (804) 786-3880 or Nelson at (804) 786-0098 if we may be of further assistance.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Roger L. Chaffe".

Roger L. Chaffe
Senior Assistant Attorney General

cc: D. Nelson Daniel, Assistant Attorney General

573L433



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